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Université de Lorraine

THÈSE

en vue d'obtenir le grade de Docteur en « Sciences Économiques »

présentée par : Morten LUCHTMANN

The Creation of Rational Addiction as a Descriptive Concept and a Political Fiction

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Thèse soutenue publiquement le 05 décembre 2025 devant le jury composé de :

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Résumé

Cette thèse de doctorat examine l'histoire récente de la microéconomie, en prenant comme étude de cas le modèle de dépendance rationnelle de Gary Becker et Kevin Murphy (1988). Notre objectif principal est de décrire en quoi ce modèle était novateur à deux égards. Premièrement, nous soutenons que le modèle a fourni une description économique de la dépendance ; deuxièmement, en tant que « fiction politique », le modèle a fourni une vision néolibérale de la dépendance compatible avec les principes économiques libéraux du gouvernement, tels que la souveraineté du consommateur. D'un point de vue historiographique, nous considérons le modèle de dépendance rationnelle comme un « ensemble de pratiques ». Nous décrivons les pratiques contenues dans le modèle et comparons la manière dont elles ont été perçues dans différentes communautés de recherche. Bien que les travaux de Becker sur la dépendance constituent la menace centrale de cette thèse, nous utilisons différentes méthodes pour contextualiser ses contributions et celles de ses coauteurs sur la dépendance.

La thèse est structurée en trois parties. Dans la première partie, nous présentons une préhistoire socio-institutionnelle du modèle de dépendance rationnelle en nous concentrant sur le cadre de production des ménages, un cadre théorique dans lequel le modèle de dépendance rationnelle a été formulé pour la première fois. Nous documentons la manière dont le cadre de production des ménages a été développé au sein d'une communauté intellectuelle au NBER dans les années 1960 et 1970. À l'aide de concepts historiographiques tels que les collectifs de pensée et les styles de pensée, nous mettons l'accent sur les relations socio-institutionnelles dans lesquelles Becker est devenu le leader intellectuel qu'il était lorsqu'il s'est lancé dans la modélisation de la dépendance.

Dans la deuxième partie, nous nous concentrons en profondeur sur les pratiques contenues dans le modèle d'addiction rationnelle et nous comparons la manière dont elles s'inscrivent dans la littérature existante sur la formation des habitudes dans les modèles de demande formels. Tout d'abord, nous retraçons la manière dont les habitudes ont été intégrées dans les modèles de demande formels au cours des décennies qui ont suivi la Seconde Guerre mondiale afin de rendre les estimations statiques plus dynamiques. Alors que les habitudes étaient initialement modélisées comme un mécanisme limitant les choix présents par la dépendance au cheminement de la consommation passée, elles sont devenues un mécanisme plus complexe dans les modèles d'utilité intertemporelle, car on supposait également que les agents tenaient compte des effets futurs de leur consommation présente guidée par leurs habitudes. Nous décrivons comment le modèle de dépendance rationnelle s'inscrivait dans cette littérature et en quoi il constituait un cas d'innovation pratique.

Dans la troisième partie, nous nous concentrons sur la réception du modèle de dépendance rationnelle. Nous comparons la manière dont le modèle a été discuté et adopté par trois communautés intellectuelles différentes : les psychologues comportementaux, les économistes de la santé appliquée et les économistes comportementaux. En montrant

comment le modèle a été perçu différemment dans chacune de ces trois communautés, nous documentons les associations qui ont été attribuées au modèle de dépendance rationnelle au-delà de l'aspect purement descriptif. Nous soutenons que notre présentation de la création et de la diffusion du modèle illustre bien comment les concepts microéconomiques ont souvent une signification et une importance qui vont au-delà du simple aspect descriptif.

Summary

This PhD thesis investigates the history of recent microeconomics, taking the rational addiction model of Gary Becker and Kevin Murphy (1988) as a case study. Our main objective is to describe how the model provided was innovative in two ways. First, we argue, the model provided an economic description of addiction; second, as a "political fiction," the model provided a neoliberal view of addiction that was compatible with economically-liberal government principles, such as consumer sovereignty. Historiographically, we look at the rational addiction model as a "host of practices." We describe the practices that are contained in the model and we compare how they were perceived in different research communities. Although Becker's work on addiction provides the central threat of this thesis, we use different methods to contextualize his and his co-authors contributions on addiction.

The thesis is structured into three Parts. In Part 1 we provide a social-institutional prehistory of the rational addiction model by focusing on the household production framework, a theoretic framework in which the rational addiction model was first formulated. We document how the household production framework has been developed within an intellectual community at the NBER in the 1960s and 1970s. Using historiographical concepts like thought collectives and thought styles, we stress the social-institutional relations in which Becker became the intellectual leader that he was when he became involved in modeling addiction.

In Part 2 we focus in depth on the practices that were contained in the rational addiction model and we compare how they fitted in the existing literature on habit formation in formal demand models. First, we trace how habits entered into formal demand models in the post-WWII decades as a means to make static estimations more dynamic. While habits were at first modeled as a mechanism that limited present choices through the path dependency of past consumption, they became a more complex mechanism in intertemporal utility models as agents were also assumed to take in account the future effects of their habit-guided present consumption. We describe how the rational addiction model fitted in this literature and in which ways it was as a case of practice innovation.

In Part 3 we focus on the reception of the rational addiction model. We compare how the model was discussed and taken up among three different intellectual communities: among behavioral psychologists, among applied health economists, and among behavioral economists. By showing how in each of the three communities the model was perceived differently, we document associations that have been ascribed to the rational addiction model going beyond the purely descriptive aspect. We argue that our presentation of the creation and dissemination of the model illustrates well how microeconomic concepts often have meaning and significance going beyond the purely descriptive.

Zusammenfassung

Diese Doktorarbeit untersucht die Geschichte der jüngeren Mikroökonomie am Beispiel des Modells der rationalen Sucht von Gary Becker und Kevin Murphy (1988). Unser Hauptziel ist es, zu beschreiben, inwiefern das vorgestellte Modell in zweierlei Hinsicht innovativ war. Erstens, so argumentieren wir, lieferte das Modell eine ökonomische Beschreibung der Sucht; zweitens lieferte das Modell als „politische Fiktion" eine neoliberale Sichtweise der Sucht, die mit wirtschaftlich-liberalen Regierungsprinzipien wie der Konsumentensouveränität vereinbar war. Historiografisch betrachten wir das rationale Suchtmodell als eine „Vielzahl von Praktiken". Wir beschreiben die in dem Modell enthaltenen Praktiken und vergleichen, wie sie in verschiedenen Forschungsgemeinschaften wahrgenommen wurden. Obwohl Beckers Arbeit über Sucht den zentralen Schwerpunkt dieser Arbeit bildet, verwenden wir verschiedene Methoden, um seine Beiträge und die seiner Co-Autoren zum Thema Sucht in einen Kontext zu setzen.

Die Arbeit ist in drei Teile gegliedert. Im ersten Teil geben wir einen sozial-institutionellen Überblick über die Vorgeschichte des Modells der rationalen Sucht, wobei wir uns auf den Rahmen der Haushaltsproduktion konzentrieren, einen theoretischen Rahmen, in dem das Modell der rationalen Sucht erstmals formuliert wurde. Wir dokumentieren, wie das Haushaltsproduktionsmodell in den 1960er und 1970er Jahren innerhalb einer intellektuellen Gemeinschaft am NBER entwickelt wurde. Unter Verwendung historiografischer Konzepte wie „Gedankengemeinschaften" und „Denkstile" betonen wir die sozial-institutionellen Beziehungen, in denen Becker zu dem intellektuellen Vorreiter wurde, der er war, als er sich mit der Modellierung von Sucht befasste.

Im zweiten Teil konzentrieren wir uns eingehend auf die Praktiken, die im rationalen Suchtmodell enthalten waren, und vergleichen, wie sie in die bestehende Literatur zur Gewohnheitsbildung in formalen Nachfragemodellen passten. Zunächst verfolgen wir, wie Gewohnheiten in den Jahrzehnten nach dem Zweiten Weltkrieg als Mittel zur Dynamisierung statischer Schätzungen in formale Nachfragemodelle Einzug hielten. Während Gewohnheiten zunächst als Mechanismus modelliert wurden, der die gegenwärtigen Entscheidungen durch die Pfadabhängigkeit des vergangenen Konsums einschränkte, wurden sie in intertemporalen Nutzenmodellen zu einem komplexeren Mechanismus, da davon ausgegangen wurde, dass die Akteure auch die zukünftigen Auswirkungen ihres gewohnheitsgeleiteten gegenwärtigen Konsums berücksichtigen. Wir beschreiben, wie das rationale Suchtmodell in diese Literatur passte und inwiefern es ein Fall von Praxisinnovation war.

In Teil 3 konzentrieren wir uns auf die Rezeption des rationalen Suchtmodells. Wir vergleichen, wie das Modell in drei verschiedenen intellektuellen Gemeinschaften diskutiert und aufgenommen wurde: unter Verhaltenspsychologen, unter angewandten Gesundheitsökonomen und unter Verhaltensökonomen. Indem wir zeigen, wie das Modell

in jeder der drei Gemeinschaften unterschiedlich wahrgenommen wurde, dokumentieren wir Assoziationen, die dem rationalen Suchtmodell zugeschrieben wurden und über den rein deskriptiven Aspekt hinausgehen. Wir argumentieren, dass unsere Darstellung der Entstehung und Verbreitung des Modells gut veranschaulicht, wie mikroökonomische Konzepte oft eine Bedeutung und Signifikanz haben, die über das rein Deskriptive hinausgeht.

Preface and Acknowledgments

> "Economics is one of the strangest items in mankind's intellectual cupboard. The styles of thought exemplified in its literature range from mathematics of a purity to which observational data are quite alien, through measurement-procedures which are culinary and gastronomic in their fascination, to the treatment of the subject as a branch of philosophy and, finally, to its use as the material of literary art. All these styles are expressions of humanity's untrammeled imagination and creative urge. Each in its own way is a form of art, and in each we may truly discover beauty."
>
> G.L.S. Shackle (1983: p. v)

> "The frames used in science are consequential, for the production of scientific knowledge is a social privilege inextricably bound to questions of social justice."
>
> Nancy Campbell (2007: p. 1)

Since embarking on my journey to study economics in university, I have always found it to be a very complicated discipline. It's not because the math is too hard, econometric techniques are too intricate, or economic theories are too difficult to learn. What took me a long time to understand was that economics consists of a variety of different practices. At one end of the spectrum are formal methods such as mathematical models and statistical procedures. At the other end are philosophical-ideological discussions and the legitimization of politics with economic arguments. While the former seem objective, value-neutral, and impartial, the latter seem subjective, value-laden, and partial (sometimes more, sometimes less openly). While the technical end of the spectrum seems clear-cut, unified, and homogeneous, the value-laden end seems fuzzy, ambiguous, and fragmented. Most economics is actually not at the outer ends of the spectrum but somewhere in the middle, which is what makes it complicated.

This PhD thesis is for me the outcome of coming to terms with my experiences in becoming familiarized in economics, first as a Bachelor and Master student of applied economics at the University of Hamburg, Germany, and then as a master student at the University Paris I Panthéon-Sorbonne, and finally as a PhD candidate at the University of Lorraine in Nancy, France. Although subjectively, I experienced this journey always from my particular perspective, I did not do this journey alone and so I wish to express some words of gratitude and acknowledgment before starting.

First of all, I would like to thank the financial and reflective support of the Evangelisches Studienwerk Villigst during my studies in Hamburg. In particular I am very grateful for the careful and attentive counseling of Knut Berner. Without their support a student like me would only hardly have found the resources and confidence to study abroad, and even less so to do a PhD in something like the history of economics. I would also like to thank Felix Roth from the University of Hamburg who provided us Master students with plenty of occasions to study the political economy of the Eurozone ourselves. Studying public support for the Euro currency made me realize that doing a PhD is not something impossible for me. I would like to thank Annie Cot for opening my horizon to the history of economic thought and all of its epistemological questions. When learning the methods of microeconomics, macroeconomics and econometrics in Hamburg provided me with a solid base in economics, the more reflective history and epistemology perspective made me realize the full value of the practices I had learnt before. I would also like to thank Jérôme Gautié for guiding my research interest towards applied economics and for supervising my Master's thesis.

Most of all, I want to thank Samuel Ferey for having accepted to supervise and support my PhD project during the last five and a half years. Thanks to the intellectual freedom he provided, and thanks to his tirelessness in facing my tendency to branch off into various directions, and to gather vast amounts of material, I was able to become a better writer and organizer of my ideas by having to integrate quite different chapters into one PhD thesis. I would especially like to thank Jean-Sébastien Lenfant and Pedro Teixeira

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I would like to express my gratitude to all members of the BETA in Nancy and Strasbourg that filled my doctoral experience with life and human interaction. Coming to Nancy in the middle of the first two COVID-19 lockdowns was special, but thanks to the social life the BETA laboratory became quickly a place I keep in warm memory. In particular, I would like to thank my doctoral fellows from the "bureau de productivité" and from the "café de commerce," and from Agro Paris Tech Abdelkarim Azami Idrissi, Félix Bastit, Jaele Bechis, Augustin Doto, Daniel Elanga, Oliver Frings, Julie Galet, Remi Girard, Mehdi Guelmamem, Seynabou Gueye, Toho Hien, Nicola Jovanovic, Anaïs Kanellos, Noame Khaldi, Julian Layrat, Dylan Martin-Lapoirie, Valentin Matthieu, Arthur Mely, Léa Munich, Jeanne Poulain, Ala'a Shqairat, Tatiana Stoica, Vincent Teixeira, Julien Thavard, Marion Tosolini, Sarah van Driessche, and Daniel Zarama. Thanks to them I was not alone in a new city and thanks to them it was always a pleasure for me to come to work, to eat together in the university restaurant, to chat about research, or to come together after work doors had closed. A special thanks goes to Daniel Elanga and Daniel Zarama for having our weekly writing club where I advanced my writing and enormously. I would also like to thank Judith Audureau, Antoine Ebeling, Eva Jacob, Vincent Zanello, and the other doctoral students from the Strasbourg part of BETA for the conversations we had.

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0. General Introduction

> "Children carry along into adulthood the baggage of experiences they had only a limited role in shaping. [...] We all are to some extent prisoners of experiences we wish we never had."
>
> Gary S. Becker (1991: p. 16f.)

> "We seldom have the power to choose these aspects of our social identity, which shape our socially constructed understandings of the world. In neoclassical parlance, we did not choose our own tastes and preferences, and that is exactly why we need to question them."
>
> Nancy Folbre (1993: p. 180)

0.1 Learning from rational addiction about post-WW2 microeconomics

This PhD thesis investigates the history of recent microeconomics, taking the rational addiction model of Gary Becker and Kevin Murphy (1988) as a case study. Our main objective is to describe how the model provided was innovative in two ways. First, we argue, the model provided an economic description of addiction; second, as a "political fiction," the model provided a neoliberal view of addiction that was compatible with economically-liberal government principles, such as consumer sovereignty. From a historiographical perspective, we view the rational addiction model as a "host of practices." We describe the practices that are contained in the model and we compare how they were perceived in different research communities. Although Becker's work on addiction provides the central threat of this thesis, we use different methods to contextualize his and his co-authors contributions on addiction.

The thesis is structured into three Parts. Figure 1 provides a graphic representation of the structure of our thesis. Figure 1 shows which years are covered in which chapter and how the different chapters are related to each other. In Part 1 we provide a social-institutional history of the rational addiction model by focusing on the household production framework, a theoretic framework in which the rational addiction model was first formulated. We document how the household production framework has been developed within an intellectual community at the NBER in the 1960s and 1970s. Using historiographical concepts like thought collectives and thought styles, we stress the social-institutional relations in which Becker became the intellectual leader that he was when he became involved in modeling addiction.

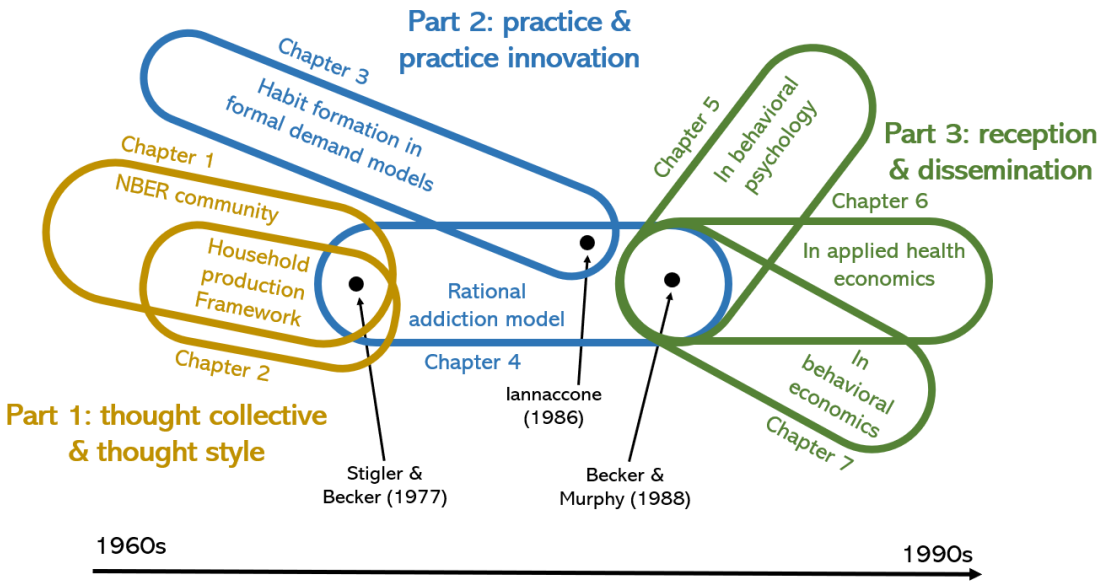

Figure 1 Graphical representation of the structure of this PhD thesis. The black arrow in the lower part of the figure indicates the time that is captured in each chapter.

In Part 2 we focus in depth on the practices that were contained in the rational addiction model and we compare how they fitted in the existing literature on habit formation in formal demand models. First, we trace how habits entered into formal demand models in the post-WWII decades as a means to make static estimations more dynamic. While habits were at first modeled as a mechanism that limited present choices

through the path dependency of past consumption, they became a more complex mechanism in intertemporal utility models as agents were also assumed to take in account the future effects of their habit-guided present consumption. We describe how the rational addiction model fitted in this literature and in which ways it was as a case of practice innovation.

In Part 3 we focus on the reception of the rational addiction model. We compare how the model was discussed and taken up among three different intellectual communities: among behavioral psychologists, among applied health economists, and among behavioral economists. By showing how in each of the three communities the model was perceived differently, we document associations that have been ascribed to the rational addiction model going beyond the purely descriptive aspect. We argue that our presentation of the creation and dissemination of the model illustrates well how microeconomic concepts often have meaning and significance going beyond the purely descriptive.

In 1988 the economists Gary Becker and Kevin Murphy published an academic article called "A Theory of Rational Addiction" (Becker and Murphy 1988). In that article Becker and Murphy suggest an economic definition for "addiction" (a term, then, mostly associated with the medical realm).[1] They describe addiction as a consumptive condition that is "chosen" by the agents in their model. Given that addicted and non-addicted agents are assumed to maximize their utility through forward-looking consumption choices, Becker and Murphy describe the behavior of addicts as rational, as the result of a rational choice process. Their view of addiction was by far not a common view among scientific expert communities working on addiction. Their labeling of addiction as the result of a rational choice went against common knowledge of addiction in medical circles (but also in common parlance of lay people), who understood addiction rather as a disease, a medical condition, something "irrational." Thus, Becker and Murphy introduced a new, different

[1] On the etymology and history of the word addiction, see Rosenthal and Faris (2019). For changes in the definition of addiction in medical diagnostic manuals, see Hofmeyr (2015: chapter 1).

perspective on the social problem of addiction, which had gained increasing public attention during the 20th century.

The Becker-Murphy model was also innovative from the perspective of microeconomics. Their model has pushed economic analysis towards theoretic territory that was usually belabored by other scientific disciplines. By addressing the issue of addiction upfront, their model has contributed to legitimize addiction as an appropriate research topic for economists. The Becker-Murphy model inspired later contributions estimating demand for cigarettes, alcohol, and other drugs. Survey articles and handbook chapters argued that the model has stabilized economic reasoning on addictive consumption activities (see for example Grossman et al. 1998, Chaloupka and Warner 2000, or Hofmeyr 2015). Usually, the Becker-Murphy addiction model is presented as diverging from a more myopic or naïve modeling approach to addiction. This framing of addiction as rational has been controversial. Yet, even the most critical commentators (like the philosopher Jon Elster) recognized Becker and his co-authors' contribution to the economics about the proper modeling of addiction and of related issues, like self-control (Hofmeyr 2015: p. 50).[2]

The rational addiction model was also innovative for addiction research beyond economics. With economic analyses like Becker and Murphy's, another expert community came to the spot to proclaim authority in speaking about addiction. Building on methods from the historical sociology of scientific knowledge, the historian Nancy Campbell has documented how different scientific research communities have approached addiction over the course of the 20th century (Campbell 2007, Campbell 2020). Campbell describes the history of recent addiction research as "[a] shifting succession of diverse disciplines […], each competing to define addiction on their terms." She traces how over the 20th century addiction has become a topic of interest for researchers from "sociology, social psychology, experimental and clinical psychology, psychopathology, neurophysiology, behavioral

[2] The Norwegian philosopher of the social sciences Jon Elster has worked over his career extensively on questions of rational choice, often by engaging multiple disciplinary approaches. For a concise critique of the rational addiction model, see Elster (1997).

pharmacology, epidemiology, ethnography, and, ultimately, economics and neuroscience" (Campbell 2020: p. 292). As new entrants came to the social sciences of addiction, she observes that "addiction became a different kind of social problem." In this way she tells the history of addiction research as "historically and culturally specific moments of 'becoming'[,]" as moments in time in which the scientific conception of addiction became somewhat different (see Campbell 2020: p. 291f.). For Campbell Becker and Murphy's rational addiction model embodies the shift towards an *economic* analysis of addiction. Moreover, she argues, the rational addiction model illustrates disciplinary practices from economics that came to shape addiction research. In short, the Becker-Murphy model reflects how, in the late 20th century, addiction became an "economic" phenomenon.

Campbell (2020) investigates the rational addiction model as one among many disciplinary approaches contributing to the research on addiction. In this PhD thesis, we go in the opposite direction: We focus on the rational addiction model as a case study of practice innovation and we use the model as a prism to provide a history of recent microeconomics. In other words, we are primarily interested in the economics discipline, not in addiction research. Our purpose is to document the microeconomic tools used by economists to grapple the problem of addiction, and thus to describe the kind of microeconomic analysis embedded with the rational addiction model. Thus, we focus on the scientific practices surrounding the model, and on economists (and psychologists) who promoted, disseminated, or criticized these practices. The resulting history of microeconomics that we offer is necessarily a partial history (as it is centered on one particular case study), yet it is a novel contribution to the broader history of microeconomics.

In the following paragraphs, we will briefly present our contribution to the history of microeconomics. First, our investigation of the Becker-Murphy model provides an opportunity to study the emergence of addiction as an *economic* concept. We argue that rational addiction was both innovative (as a descriptive concept), but also policy-relevant (as a "political fiction"). Second, the creation of the rational addiction model allows us to

observe one transition into behavioral economics: in the 1980s and 1990s addiction has been explained as well by established microeconomists like Becker and Murphy, but also by an ascending group of behavioral economists. Therefore, addiction becomes an epistemologically interesting research object that helps to understand the ascendency of behavioral economics.

0.1.1 Practice innovation in the economics academe: Descriptive and political

In this PhD thesis we characterize how the rational addiction was innovative as a descriptive concept and, at the same time, as a political fiction. We see the creation of rational addiction as a conceptual, theoretical innovation. Becker and Murphy present their model primarily as an innovation in descriptive theory - a description of addiction in the economic terms of demand theory. In a nutshell, the model framed addiction as a choice outcome, that is, as the result of an intertemporal consumption process involving consideration of pleasure in the present and in the future. The model describes addiction as the result of habit formation. It sees habits as mechanisms internal to decisionmakers that help them to coordinate consumption activities stretching out over the past, present, and future. Habits are described as physiological-psychological mechanisms helping individuals to find an optimal consumption level in the present when consumption patterns are dynamically changing over time.

While "habit formation" had a well-established position within pre-WWII institutional economics (see Rutherford 2000) and within post-WW2 microeconomics of consumption (see Duesenberry, 1949), addiction was not covered by any formal model. Becker and his coauthors expanded the scope of microeconomic analysis of consumption to a new, socially pressing type of behavior, making it descriptively accessible with the usual means of price theory. They extended the reach of economic reasoning to specific consumption patterns, and they proposed a way to make sense of them. Once the rational addiction model has been created and published, it provided others with descriptive means to interpret data on the consumption of addictive goods like cigarettes (see Chaloupka and

Warner 2000).[3] At the same time, the model provided a role for time preference and legitimized individual time discount rates as a meaningful characteristic for comparing individuals. As a consequence, the model has been widely applied by empirical economists estimating demand for dependence-creating consumption items throughout the 1990s and 2000s (see for example Chaloupka, Warner 2000 or Hofmeyr 2015).

Our perspective interprets the rational addiction model as a "host of practices."[4] Some of these practices are widely-used in economics, whilst others are more distinctive of smaller communities of economists. Given that the conception of habits within the model has also created some debate and controversy among economists, we might do good to understand what the model proposed in the first place. The basic idea of the model is that people become more skilled in consuming goods and activities that they have experienced more often. By contrast, people lose the skills and knowledge of goods and activities that they have already acquired, when they do not continue to experience them.[5]

In formal terms, the model describes human beings as a collection of psychological stocks of consumption capital that are accumulated over time by past experience. Consumers may consume goods that are either habit-forming or normal goods. Consuming habit-forming goods creates stocks of consumption capital within the consumer that endure over time. Depending on how consumers adjust their ongoing consumption of habit-forming goods they may end up in consumption situations that are overall unbeneficial or harmful to them because they consume excessive amounts of habit-forming

[3] The process of practice adaptation is strongly embedded in social relations among researchers. For example, Frank Chaloupka wrote his PhD thesis on the economic analysis of smoking. He was a PhD student of Becker's former student Michael Grossman. In his PhD thesis published in 1988 Chaloupka cites the unpublished theoretic work of Becker and Murphy to which he had access (Chaloupka 1988).

[4] In an interview with Catherine Herfeld, Becker defines models similarly, as sets of collective assumptions: "The way I restated Milton Friedman's view in my own thinking is that one cannot evaluate a set of assumptions individually. You have to evaluate the whole set of assumptions collectively, because that is what a model is: a collective set of assumptions about behavior that is predicting behavior" (Becker in Herfeld 2012: p. 82).

[5] Some readers may recognize this as resembling the logic of operant conditioning in behavioral psychology, where behavioral responses are reinforced through repetition and extinguished without it. This is no coincidence. Although Becker did not want to be associated with behaviorists like B.F. Skinner during his lifetime, we argue that the Becker-Murphy model of addiction is similar to behavioral psychology models of addiction in some aspects (see Chapter 5).

goods, although consuming these goods lower their overall utility. By defining addiction theoretically, the rational addiction model brings economics practices in relation with the real-world phenomenon of addiction. In Chapter 3, we describe in detail how habits have been modeled in formal demand models in the post-WWII decades. In Chapter 4 we describe how the rational addiction model fitted in these practices.

The rational addiction model goes beyond a purely descriptive concept, a descriptive theory, or "positive" economics. The philosophers Charles Djordjevic and Catherine Herfeld have described rational addiction as a "thick concept" that contains not only descriptive, but also evaluative components (Djordjevic, Herfeld 2021). They have argued that the model is value-laden in the sense that researchers using the model make a number of value judgements that are embedded in the model. Djordjevic and Herfeld do not argue against value judgments in science in general; but they argue that the value judgments embedded in the Becker-Murphy model are inconsistent with the positive economic stance with which the authors promote their model. Such inconsistency risks to mislead other users of the model to be more judgmental than they think they are (see Djordjevic, Herfeld 2021: p. 394).

Following Djordjevic and Herfeld, this PhD thesis investigates the rational addiction model not only as a descriptive concept, but also as a "political fiction". By this term, we mean a carefully constructed object that can be seen as the value-laden counterpart of the descriptive concept. We use the term political fiction to capture the value judgments that practitioners implicitly risk to accept when using the model. As a political fiction, the rational addiction model renders addiction compatible with a neoliberal vision of individual consumption and personal responsibility.

To grasp the relevance of these political aspects, it helps to see the model in the context of US domestic policies on drug regulation in the 1970s and 1980s. During this period, US federal administrations were tasked with waging the so-called "War on

Drugs".[6] The term was coined by US President Richard Nixon, who declared drugs as the public problem number one and who enacted rigid criminal punishment for the selling, possession, and consumption of drugs. The Nixon administration notably established the Drug Enforcement Agency (DEA) as a new federal agency, while passing new laws (like, for example, categorizing marijuana among those illegal substances that lead to the highest criminal punishments). Subsequent Presidents and their federal administrations pursued this punitive approach on drugs.

Ronald Reagan, US President from 1981 to 1989, strengthened the punitive approach towards drug use. The Reagan administration enacted regulations that sentenced citizens to prison even for nonviolent crimes related to drug use. They also discriminated criminal punishment by type of drug consumption, leading to disproportionate rates of incarceration among people of color.[7] While harsh mandatory minimal sentences were established for modes of consumption more prevalent among African Americans (like crack cocaine), much milder punishment was applied for modes of consumption more prevalent among White people, like the consumption of powder cocaine.[8] The First Lady, Nancy Reagan, became popular during the 1980s for her public engagement in the *Just Say No* campaign against recreational drug use, in which she appealed to the strength of self-determination to stay abstinent from drugs. Again, many of these policies were continued by the subsequent administrations.

Becker and Murphy took up the rational addiction model during Reagan's presidency. Becker diverged from Reagan's politics with regards to the question of drug

[6] For historic accounts of the US policies related to the "War on Drugs," see Farber (2022) and Foster (2023). For a historic study of the development of the US criminal and incarceration system tracing the development from the Great Society programs to the "War on Drugs", see Hinton (2016).

[7] The historian Michelle Alexander has described the racial injustice of US drug prohibition policies in the late post-Nixon era in her book *The New Jim Crow* (Alexander 2010).

[8] A very concise overview of some of the racist effects of the War on Drugs is presented by the writer and journalist Clint Smith in an episode of the YouTube series *Crash Course Black American History* in which he also refers to further readings (see https://www.youtube.com/watch?v=shGpC_WVDQk, last accessed 29.06.2025 at 16h57).

regulation.[9] He did so as a public intellectual and as an applied economist. As a public commentator, Becker opposed the punitive approach applied by the federal government in a series of columns he wrote for the magazine *Business Week* in the late 1980s.[10] Comparing the prohibition of drugs to the prohibition of alcohol in the US in the early 20th century, Becker argued for legalizing drugs plus taxing their consumption. We will take a closer look on these columns in Chapter 6 of this thesis.

As an applied economist, Becker pushed forward the rational addiction model roughly at the same time. The model makes addiction accessible with the tools of price theory. Becker and Murphy (1988) define economically that addictive goods are different from normal goods due to the dependence created in those who consume them. But, in principle, demand for addictive goods can be described like demand for any other usual goods with the tools of price theory. This means that the effects of potential policies can be simulated by the usual description of incentives working on the opportunity set of consumers via the income and substitution effects of demand theory. This means also that even addicts react to economic incentives, in the form of changes in prices, by adapting their consumption behavior – even if they need more time than non-addicts to adapt and change their consumption. Therefore, the rational addiction model provides a justification for the view that addicts actually do respond to incentives. By rendering addiction

[9] Milton Friedman also argued similarly for the legalization of drugs. For an overview of Friedman's public-intellectual engagement for drug legalization see Thornton (2016).

[10] In 1986 Becker started to write columns for the magazine *Business Week* on policy related aspects. He continued to write them until 2004. In the late 1980s and early 1990s Becker wrote four columns closely linked to the topic of addiction, two columns on the legalization of drugs in 1987 and in 1988, one column on the regressive character on taxes on cigarettes in 1989, and one column on gambling in 1993. In his very last column for *Business Week* magazine in 2004, Becker looks back on 19 years of writing columns. He describes his political positions in that column as follows "Along with many others of my generation, I was a socialist when I started my university studies. But my first few economics courses taught me the power of competition, markets, and incentives, and I quickly became a classical liberal. That means someone who believes in the power of individual responsibility, a market economy, and a crucial but limited role of government. I have not hesitated to express these beliefs in evaluating policies of both Democratic and Republican Administrations. I understand that politics often trumps economics, but it is a mistake to excuse misguided policies because one generally sympathizes with a particular party or person" (Becker 2004).

accessible to the usual tools of price theory, the rational addiction model fits in a wider narrative to normalize drugs as legitimate consumption activities.

The descriptive implications of the rational addiction model are quite coherent with the economically liberal governance principle of consumer sovereignty. Making addictive goods legal, does not mean that Becker endorses harmfully addictive goods. Addictions are often expensive over time in terms of foregone spending bound up by the dependence drugs have created. But as for other classic consumption goods as well, assuming consumer sovereignty means that consumers themselves know best with which products and activities they best satisfy their needs and wants. Hence, consumers should be seen as sovereign in their consumption decisions and they should in principle not be hold back to buy whatever they would like to buy, as long as their consumption behavior does not impose any harm on other people. Therefore, individual drug addiction is seen as a private consumption problem and not as a public health problem. From this perspective, being simply addicted to a good is in itself no reason for government intervention.

For consumers can be sovereign and individually responsible they need to be conceived as sufficiently rational. In the 1980s behavioral economists have begun to propose formal models assuming conflict and ambiguity by using multiple selves (see Chapter 6). When consumers have multiple selves, they have multiple, potentially conflicted preferences, which makes the interpretation of consumption data in terms of choice outcomes more complicated. The rational addiction model should be seen as an alternative to the propositions of behavioral economists precisely because of its coherence with economically-liberal arguments of regulation. As a political fiction the model has been created as a formal means of expression that helps to render past-dependent choices compatible with the economically-liberal principle of individual responsibility and the libertarian governance principle of consumer sovereignty. This means that as for any other classic consumption item as well, consumers themselves know best with which products and activities they best satisfy their needs and wants.

The research funding that Becker and Murphy acknowledge in their 1988 article fits with the resulting narrative about consumer sovereignty. The first footnote of the article acknowledges financial support from the Lynde and Harry Bradley Foundation via the Center for the Study of the Economy and the State at the University of Chicago.[11] Since its establishment in 1942, the Lynde and Harry Bradley Foundation has become a major conservative think tank financing a host of different scholarly work. The Bradley Foundation lists among its founding principles the creation and maintenance of a society embedded in free markets and self-governing individuals. It is considered one of many influential conservative-to-far-right philanthropic organizations that swamped social sciences with funding from the 1970s onwards (see for example Backhouse 2005: p. 380). In 2008, Becker was again publicly endorsed by the Bradley Foundation, as he was one of four recipients of the annually-awarded Bradley prize in that year.

Besides policy or political motivation, the rational addiction model fits with a broader research agenda within microeconomics. As illustrated notably by Stigler and Becker (1977), addiction was just one of several phenomena useful to demonstrate the power of economic analysis without changes in taste. They used microeconomic theory to access addiction and to provide an economic vision of it. In this PhD thesis we go the opposite direction. We start from the economic vision of addiction provided by the rational addiction model and project it back on microeconomics more generally. By taking the rational addiction model as a descriptive concept and as a "political fiction" and by extrapolating its descriptive and political vision back onto microeconomics, we provide an innovative characterization of the microeconomics of intertemporal consumption in the late 20th century.

[11] In 1986 an early version of Becker and Murphy's rational addiction model marks number 41 in the working paper series of the Center for the Study of the Economy and the State of the Graduate School of Business of the University of Chicago. Historian of economics Edward Nik-Khah has described in detail how Stigler created and managed the center while accessing to enormous amounts of funding (Nik-Khah 2011).

0.1.2 Transitioning to behavioral economics

The early 1990s are an interesting moment in the history of microeconomics. Becker gained the Nobel Prize in 1992, as he was on the peak of his academic career. However, over the 1990s, behavioral economists became an up-and-coming community of applied economists that challenged preexisting assumptions in microeconomics (see Sent 2004, Heukelom 2015, Cot, Ferey 2016). In recent years, historians and philosophers of economics have produced a substantial literature about the rise of behavioral economics, documenting how behavioral economists contributed to integrate elements of cognitive psychology into economics. Often it has been suggested that with the formalization of post-WWII microeconomics, economists have retreated from psychology in an aim to get rid of the historical baggage that their methods share with psychology (see for example Lewin 1996, Bruni and Sugden 2007, Hands 2009). The rational addiction model provides an example of some of the established practices in microeconomics that were criticized by behavioral economists. We describe how these practices were actually not void of psychology, but resembled rather behavioral forms of psychology.

We consider the rational addiction model as point of intellectual encounter between neoclassical microeconomics and behavioral economics, one that represent the tension and the transition between the two approaches. Today we associate behavioral economics with an economic approach inspired by cognitive psychology that was promoted by economists like Richard Thaler and psychologists like Daniel Kahneman and Amos Tversky in the 1980s and 1990s. Over the years, behavioral economics gained popularity among economists and several research directions were taken by different sub-communities of behavioral economists.[12] But during the second half of the 20th century, the label "behavioral economics" was for a long time a loose description that was used by different psychologists or economists to describe their own research.[13] Among others

[12] For a very useful overview of the most canonical behavioral economics literature, see the bibliometric work of Alexandre Truc (2022a,b).

[13] Floris Heukelom (2014) has described that the term behavioral economics was initially popularized by George Katona at the Institute for Social Research at the University of Michigan in the 1940s. Different

behavioral psychologists used the label in the early 1980s to promote versions of behavioral psychology inspired by microeconomics (see Chapter 5). The rational addiction model became a common reference not only among behavioral psychologists, but also among behavioral economists interested in intertemporal decisionmaking. Among them were behavioral psychologists like Howard Rachlin and Richard Herrnstein, economists like Richard Loewenstein, but also philosophers like Jon Elster and psychiatrists like George Ainslie. While the methodologic import of cognitive psychology into behavioral economics has been discussed a lot in the secondary literature, the import of behavioral psychology into behavioral economics has with some exceptions rather been neglected.[14]

We argue that the study of addiction by economists is a very interesting case study in this respect. Addiction was explained not only by microeconomists like Becker (see Becker, Murphy 1988), but also by behavioral psychologists like Herrnstein (see Herrnstein, Prelec 1992), and by behavioral economists like Laibson (see Laibson 2004). By focusing on the use and reception of the rational addiction model, we describe one transition from the microeconomics establishment in the late 20th century to the behavioral economics of the early 21th century.[15] Seeing the model as a collection of practices, we can describe how behavioral economists broke with some, but not with all practices implicit in the model. Following the historian Rüdiger Graf (2024), we describe this transition overall rather in terms of continuity, while acknowledging some important changes,

economists have used the term over the 20th century to describe their own approach. The label behavioral economics became much more visible when economists like Thaler and psychologists like Kahneman and Tversky used funding from the Russell Sage Foundation to institutionalize behavioral economics as a subdisciplinary field within economics (see Heukelom 2014: p. 4). Heukelom has argued that the financial funding as such was not enormous, but enabled the researchers to create lasting structures to organize themselves as a community (Heukelom 2012). For a brief description of the different streams of "behavioral economics," see Sent's account of behavioral economics in the 1980s (Sent 2004: p. 744-747).

[14] Exceptions are the work on the quantitative studies by behavioral psychologists like Richard Herrnstein by Nicolas Vallois (2012), the work on interdisciplinary cooperation in the development of intertemporal discounting models by Till Grüne-Yanoff (2015), and the work on the rise of the behavior paradigm in the 20th century in economics and other social sciences by Rüdiger Graf (2024).

[15] In a bibliometric analysis of the behavioral economics literature Alexandre Truc has identified multiple communities of behavioral economists. Using topic modelling Truc has identified the most distinctive words for each community. "Addiction" is among the 20 most distinctive words in the "intertemporal decision" community that he has identified (Truc 2022b: p. 224).

especially with regards to the prescriptive aspects of making economic behavioral knowledge accessible to policy makers.

We argue that the reception of the rational addiction model constitutes a useful element for the history of behavioral welfare economics. Behavioral economists criticized the model as only a partial view of addiction neglecting important aspects as self-control and internal personal conflict. From the 2000s, behavioral economists began to venture increasingly into more normative questions of public policy. In the early 2000s, they began to develop behavioral economic analyses of the law (see for example Jolls, Sunstein, Thaler 1998, or Sunstein 2000). In the late 2000s, they also set out to develop approaches to welfare economics informed by behavioral economics (see for example Bernheim and Rangel 2007, Bernheim 2009).[16]

Although behavioral economists provided another type of behavioral knowledge about economic agents, they accepted the aspiration of neoclassical microeconomics to provide universal principles of behavior. It even provides their own expertise foundation. While behavioral economists claimed to correct the inaccuracy of neoclassical predictions, they have carved out their own area of expertise by describing systematic deviations from these universal principles. One could say behavioral economists have popularized islands of systematic deviations in an ocean of otherwise rational behavior.[17] Behavioral economists

[16] Nicolas Brisset and Dorian Jullien (2020) provide an interesting discussion of how dual models informed the behavioral welfare economics of the 2000s. Building on linguistic theory, they interpret models as speech acts.

[17] When behavioral economics pushed into the field of law and economics, the critical legal scholar Mark Kelman criticized in 1998 that behavioral economists expose the same type of scientific hubris as the neoclassical microeconomics that they criticized. Behavioral economics was not replacing neoclassical economics, Kelman argued. He rather saw neoclassical microeconomists and behavioral economists involved in a rhetorical duet with each other. By obeying to the promise of providing a universal theory of behavior rather than an interpretative trope, Kelman argued that behavioral economists would risk to make the same mistakes that they have criticized in neoclassical economics (see Kelman 1998). Kelman's critique was a comment on an influential law and economics paper written by Christine Jolls, Cass Sunstein, and Richard Thaler titled *A Behavioral Approach to Law and Economics* (1998a). The paper was commented also by Richard Posner who criticized the paper in a different way. Posner argued that although behavioral economists make several useful empirical criticisms of rational choice models, behavioral economics does not provide a unifying theoretic framework and is hence unable to replace rational choice theory in the economic analysis of law (Posner 1998). In their rejoinder Jolls, Sunstein

implicitly accepted the possibility of the rational addiction model to provide value-neutral descriptions of behavior, but they argued that the model was unfit with regards to the case of addiction where intrapersonal conflict and self-control issues pervade.

0.2 Observing practice innovation: Historiographic strategies and challenges

In this section, we present briefly the historiographic approach that we follow in this PhD thesis. In a first step, we present the choices in terms of research strategies and we explain how and why these choices have been made, and how they limit our results. In a second step, we provide a quick outlook on the different chapters that follow this introductory chapter.

0.2.1 Goals, research strategies, and limits

We begin by presenting the goals that have motivated our historiographical approach. To accomplish our goals, we made several strategic choices about how and why we tell the story of the rational addiction model in the way we do. At the same time, our historiographical choices limit the results we have gathered by the way we have gathered them.

Economics as practices

Quite generally, we see economics in terms of practices. When looking at economics, we are interested in what economists do, in which forms of action and chains of actions they engage, how these practices evolve, and in the different ways through which these practices are put into action. Thus, we conceive practices very broadly, but we are mostly interested in social practices, those practices that are shared by others. Different historians of economics have called for giving practices a central place in historiography. In 2011, Harro

and Thaler positioned themselves closer to Posner and the rational choice way of doing law and economics, than to Kelman's critique of scientific hubris (see Jolls et al. 1998b).

Maas, Tiago Mata, and John Davis have edited a special issue of the *European Journal of the History of Economic Thought* dedicated to the history of economics as a history of practice (see Maas et al. 2011). They describe practices as generally referring "to procedures, customs and habits, and so to the social context framing human action." Adopting a view of science in terms of practice means, according to Maas, Mata, and Davis that "products of science are cultural artifacts that inhabit spatial and material sites, embedded in human and social settings, crafted by individuals who seldom work in isolation, and that intervene upon material and social cultures" (Maas et al. 2011: p. 635). In a similar vein, Thomas Stapleford has described the historiography in terms of practices as historical epistemology (Stapleford 2017). He defines practices as "collections of behavior that are teleological, subject to normative evaluation by broader groups, and exhibit regularities across people in a constrained portion of time and space." Stapleford describes practices as teleologically oriented in the sense of being goal-oriented processes that may consist of several elements or actions. He describes practices as subject to normative evaluations in the sense that groups or individuals who are trained or knowledgeable with a practice can evaluate whether a practice has been applied or performed correctly or not. Further he argues that "the norms of a practice are socially determined and subject to negotiation" (Stapleford 2017).

We acknowledge the view that very basically, economic reasoning is a learned practice. It consists of formal techniques, tacit assumptions, epistemological choices, (conscious or unconscious) ethical considerations, and familiarization with wider canons of literature pertaining to an area of research. Philosophers like Gregory Keller define such practices as epistemic practices, as "ways that communities of knowers propose, justify, evaluate, and legitimize knowledge products such as claims, designs, or solutions" (Kelly 2024: p. 136). To be considered an economist, one needs first be educated in different practices that make up a training as an economist. Some practices are very readily detectable in publications of economists, other practices might be more tacit and are passed orally, or even just by doing, observing and imitation. Some learned practices are directly related to research, others are more important to the organization of work, applying for funding, or

accessing institutional resources. The different practices that make up the discipline of economics change with the time and their meaning is historically given. The practices that make up economics may be changed, extended or innovated in the academic arena of economics, or they may be changed when being applied in non-academic fields.

Although the practices embodied in the rational addiction model are very tightly connected to Gary Becker, we hope to show that Becker is just one practitioner taking a central place in a construction process that involved many practitioners directly, and even more indirectly. He might be the person most centrally associated with these practices, but in fact many of these practices emerged as the result of a collective effort. Thus, we believe that historians of economics should describe the evolution of scientific knowledge not as something resulting only from individual action. Rather, we contend that as historians of economics we should observe change in economics as resulting in part from the efforts of economists and in part from other changes that happen in the environment in which economists exercise their practices.

One inspiration for the historiographic approach of this PhD thesis has been the work of the sociologist of sciences Elizabeth Popp Berman (2012, 2022; see also Hirschman and Berman 2014). Berman argues that changing practices in the social sciences can be only partially explained as the result of intellectual and institutional entrepreneurs that try to innovate practice in their respective social fields. Although it is necessary to have actors in the field who propose to change or maintain practice as it is done in a field, Berman argues that this is basically happening all the time. At any time, observers of economics may find some economists who propose to change economic models in this or that way. Thus, Berman argues, change is also partially driven and selected by forces that act upon the field in which intellectual and institutional entrepreneurs try to innovate or maintain the practices that are already in action (Berman 2012). It is not only the economist who comes up with a new model, usually there are other demand factors in the environment of economists that push certain models, but not others. Thus, change in

practice should be explained as resulting from changes in the specific situations in which these changes happen.

In this PhD thesis we describe the creation of rational addiction as a case of practice innovation. We describe how a handful of economists described addiction in economic terms and set the label rational addiction into the world. But we focus only on academic practices, so to speak, we do not consider how the concept of rational addiction has travelled into non-academic fields by application.[18] We consider mainly how academic economists have proposed an innovative concept and we describe the change in practices like the tacit assumptions and formal techniques that were involved in that innovation. We look at models as hosts of practices as reflecting the "laboratory logics" or "patterns of believe that shape practical reasoning" (Campbell 2007: p.3).[19]. The technical practices that are involved in the rational addiction model are most detailed in Chapter 4 of this thesis. In that chapter, we describe the change in tacit assumptions involved in the model and we describe how the model was couched in the practices that existed already in the existing literature on habits in consumption theory.[20]

But the view of economics of practices comes to bear also in the other chapters of this thesis. In Chapter 2, we describe the general view of behavior in terms of household

[18] An interesting venture for future research could be to access in how far the concept of rational addiction has practically played a role in the many legal disputes involving large tobacco companies and US consumers that were taking place in the 1990s and early 2000s. As cigarette consumption has been one of the main areas of empirical application of the model, the tobacco litigations provide in principle extremely close real-world occasions for the concept. It would be interesting to see whether and how the concept of rational addiction actually had any relevancy in these litigations, and how the economic jargon of rational addiction has been absorbed or not in the legal domain.

[19] In her book *Discovering Addiction* Campbell uses the sciences and technology studies concept of laboratory logics. By laboratory logics she means "the pattern of beliefs that shape practical reasoning in science. Practitioners within epistemic communities trade in relatively narrow and coherent structures of belief that enable and constrain the lexicons, techniques, technologies, and practices that are considered legitimate ways to speak authoritatively about drugs in a given domain. Laboratory logics connect cultural beliefs and prior commitments to the actual practices enacted in the lab" (Campbell 2007: p. 3).

[20] A wider focus on the innovation that is not pursued in this PhD thesis could compare the practices of the rational addiction model to economics practices from earlier decades or other geographical areas. As many institutionalists and home economists were considering habits and past-dependence in their economic analyses such a comparison should be a worthy route for further research. To some extent, Geoffrey Hodgson has been comparing the Becker-Murphy view of habits to the view of habits of institutionalist economists (see Hodgson 2004).

production technology that was cultivated within the intellectual community at the NBER. We describe this cultivation in terms of research practices and argue that it is helpful to understand this general view of behavior to better understand the later creation of the rational addiction model. The reception of the rational addiction model (covered in chapters 5, 6 and 7) is better understood when considering the model as a collection of practices. We show how the different communities of scholars focused on different practices in their discussion of the rational addiction model.

Intellectual production as a collective process

A second commitment that we put forward in our historiographic approach is to view science as collective process of knowledge production. Inspired by studies from the field of sciences and technology studies, we adhere to the conviction that science should not be represented solely as the outcome of the efforts of some big-name individuals. Instead we go with the view of scientific production that has been proposed by the Polish medical scholar and epistemologist Ludwik Fleck (Fleck et al. 1979 [1935]). In his main work published originally in German in 1935, Fleck has provided an intellectual genealogy of the illness syphilis, in which he has traced how syphilis became conceived as a scientific fact. When it was first published in 1935, Fleck's work has not attained a lot of attention for the epistemological contributions it contained.[21] But it became very popular in the late 20th century, especially in sciences and technology studies.

Fleck went against a purely positivist view of scientific facts as the outcome of individual effort resulting from a straight-forward application of logic and method. Instead he argued that it is necessary to conceive scientific facts as the outcome of historical processes embedded in social and institutional situations. The philosopher Wojciech Sady

[21] It is often argued that Thomas Kuhn contributed a lot to the retrospective discovery of Fleck's work in the second half of the 20th century. Kuhn cited Fleck's work in the preface of his major book The Structure of Scientific Revolutions arguing that many of his ideas were already present in the works of Fleck. Fleck's book has first been translated into English in 1979. For an overview of Fleck's intellectual contributions see the entry in the Stanford Encyclopedia of Philosophy by Wojciech Sady (2023) or the summary essay by Lothar Schaefer (1993).

has argued that "Fleck claimed that cognition is a collective activity, since it is only possible on the basis of a certain body of knowledge acquired from other people." Two key concepts in the epistemological framework of Fleck are thought collectives and thought styles. Thought collectives are intellectual (or other) communities within which individual persons are organized. Sady has written that "When people begin to exchange ideas, a thought collective arises, bonded by a specific mood, and as a result of a series of understandings and misunderstandings a peculiar thought style is developed." A thought style is the result of repeated interaction in thought communities that have stabilized over time. "A thought style consists of the active elements, which shape ways in which members of the collective see and think about the world, and of the passive elements, the sum of which is perceived as an 'objective reality'" according to the Fleck expert Sady. Thus, "[w]hat we call 'facts', are social constructs: only what is true to culture is true to nature" (Sady 2023). In other words, scientific facts are accepted and seen as such as the result of a particular view that has been shaped by the familiarization with a particular way of thinking that has been learned while being part of a thought collective.[22]

Fleck provided very inspiring ideas not only for the organization of particular thought communities, but also regarding the connection, overlapping, interaction, and communication between different thought communities. Fleck saw people being part of different thought communities, some of which were more salient and important than others. Resuming Fleck's contributions, Sady argued that "[w]hen a thought style becomes sufficiently sophisticated, the collective divides itself into an esoteric circle (professionals) and an exoteric circle (laymen)" (Sady 2023). As a consequence, there are communication activities between the esoteric and exoteric circle the thought collective that gave rise to that thought style, but also between people who look at the world with different thought styles.

[22] Or otherwise, we might accept some facts as "scientifically" or "economically" correct not by having been familiarized with it ourselves, but by trusting others who are (or pretend to be) "scientific" or "economic" experts themselves.

Fleck thought that scientific disciplines like economics might best be understood as agglomerations of smaller thought communities that are held together by organizational links and by an evolving literature that documents changes in the knowledge. In general, there are efforts to align the common knowledge making up the discipline between the different thought communities. But as scientific disciplines like economics are made up of different researchers who have been familiarized with the practices of economics in different thought communities there is always potential for conflict, misunderstanding, but also innovation.

The historiographic approach of this PhD thesis is inspired by the work of Fleck and of other scholars from the science and technology studies who use similar views of scientific production of knowledge.[23] Philip Mirowski and Dieter Plehwe have looked at the Mont Pelerin Society as a thought collective to describe their political-ideological projects (Mirowski and Plehwe 2015).[24] Harro Maas, Tiago Mata, and John Davis mention Fleck's work as an early exponent of a view of science in terms of practices and have been arguing for integrating a view similar to that of Fleck into studies on the history of economics practices (Maas et al. 2011: p. 635). In 2011 Evelyn Forget and Craufurd Goodwin have argued that historians of economic thought should pay more attention to intellectual communities and collective production processes so as not to reduce economic contributions to the efforts of individual researchers alone (Forget & Goodwin, 2011).[25] Daniel Hirschman and Elizabeth Popp Berman have built their analysis of the political effects of economic policies on epistemic communities, but refer to them also as thought collectives (Hirschman and Berman 2014: p. 783). Although they are not explicitly citing

[23] The contributions of several scholars from the science and technology studies make references to Fleck's work and can be seen as applying a similar view on science as socially, institutionally and historically embedded. See for example the works of Elizabeth Popp Berman (2012, 2023), of Daniel Hirschman and Berman (2014), or the works of Nancy Campbell (2007, 2022).

[24] In the introductory chapter Plehwe is presenting the Mont Pelerin Society as one big thought collective and is explicitly referring to the historiographic framework proposed by Fleck (Plehwe 2015).

[25] Forget and Goodwin's article was the introduction to a Special Issue of the *Journal of the History of Political Economy* on the role of intellectual or creative communities in the history of economic thought. Studies of that Special Issue were for example Annie Cot looking at the Pareto Circle at Harvard University in the 1930s (Cot 2011) or Craufurd Goodwin looked at the Bloomsbury group as a creative community (2011).

Fleck, these propositions are very close to the perception of Fleck that we put into action in this PhD thesis. There are many more studies of historians of economics that argue in a similar vein, but who do not explicitly cite Fleck as an inspiration.[26]

In our historiographic approach, we have looked at the scientific creation of rational addiction in a similar manner. We believe that Fleck's vision of the collective organization of science with its central concepts of thought collectives and thought style can be a helpful guide for the history of economics. We see the analytical visions, theoretic conventions, epistemological norms and values as a set of practices that are strongly shaped by the engaging in a collective knowledge production process in which thought collectives play an important role in the transmission of knowledge. Applying Fleck's epistemological framework to the creation of the rational addiction model has pushed us to make some critical choices.

There was the choice of whether we try to identify a thought collective and when and where. We decided to use the NBER as the site of knowledge creation in which we can identify an intellectual community as a thought collective relevant for the creation of rational addiction (Chapter 1). In Chapter 2, we describe a thought style as the view of non-market behavior in terms of household production that was common in a community at the NBER that we call the CEAHBSI community. The acronym CEAHBSI refers to the Center of Economic Analysis of Human Behavior and Human Institutions that existed formally within the NBER for some years in the 1970s. Scholars of the CEAHBSI community had a common conceptual framework and vocabulary, based on some theoretic concepts like human capital and household production functions. Using that thought style they ventured into different applied fields of economics. In Chapter 4, we show how the rational addiction model has been constructed with that thought style. When we look at

[26] For example, in their book on general equilibrium theory, Till Düppe and Roy Weintraub use one chapter to describe the intellectual communities that were involved putting up general equilibrium theory in the mid-20th century (Düppe and Weintraub 2014: chapter 5). See also Malcolm Rutherford who has investigated early-20th century US institutionalism as a creative community, "as a movement held together by some fairly general methodological, theoretical, and ideological commitments" (Rutherford 2011: p. 22)

the use and reception of addiction the household production thought style contributes significantly to the positive reception of the model in the field of applied health economics. As we show in Chapter 6, eminent health economists such as Michael Grossman or Victor Fuchs were very familiar with this thought style because they were central members of the CEAHBSI community in the 1960s and 1970s.[27]

A further historiographic difficulty in our history of rational addiction concerned the centrality of Gary Becker as a scholarly figure. Becker has been publishing extensively on addiction from the mid-1970s to the mid-1990s, more than any other scholars involved with the CEAHBSI community. Thus, focusing on Becker and his work makes sense, in order to grasp the concept of rational addiction. Yet, focusing only on Becker, his individual world-view, and his individual efforts to formulate the rational addiction model would go against our historiographic commitments to see scientific production as embedded in social and institutional relations. We thus chose to give Becker a central place, but to pay attention to the social and institutional environment surrounding his intellectual personae. Becker's intellectual personae also provides a narrative thread to different chapters: in Chapter 1, we describe his role as an intellectual leader in the CEAHBSI community;[28] in Chapter 4, we describe how his role as intellectual leader played out when

[27] When the rational addiction model was created, Becker had already moved back to Chicago. At first, he remained part of the CEAHBSI while being placed in the Chicago-hub of the CEAHBSI. But the CEAHBSI disintegrated in the end of the 1970s and from 1980 onwards, Becker, Robert Michael and others left the NBER behind and became associated with the National Opinion Research Center (NORC) at Chicago. Although it would make sense to re-trace the social environment of Becker and his fellow thought-mates at the University of Chicago, we did not engage ourselves in historiographic efforts similar to those to trace the CEAHBSI community in Chapter 1. Instead we only describe the Chicago context based on secondary literature and focus in the suite more on the practice innovation compared to the wider economics literature on habit formation models (see chapter 3). This historiographic choice makes our description of the Chicago environment less nuanced. At the same time, it enables us to make our description of the economics practices involved in the rational addiction model more nuanced.

[28] The thought collective of the CEAHBSI community in the 1960s and 1970s can be seen as a rather narrow thought collective that existed formally and geographically over a couple of years. Other narrow thought collectives in which Becker was engaged could be found in the workshops at the University of Chicago in which he engaged, in particular the Applications workshop and the rational choice workshop. See Beller et al. (2024) for additional information on the applications workshop. See Rosen (1998) for a short description of the rational choice workshop that Becker initiated together with the sociologist James Coleman at the University of Chicago. One can also imagine a much larger, more shallow thought collective that Becker helped to cultivate with his teachings of price theory at the University of Chicago.

he and his co-authors approached addiction.[29] In Chapter 5 we describe how behavioral psychologists perceive him as a leading figure in microeconomics.

Using good labels

Becker and the thought collective surrounding the work on addiction have been labelled in different ways by the literature: neoclassical or mainstream economics, post-WWII economics, microeconomics, neoliberal thinkers and neoliberalism, "the" Chicago School of economics, new household economics. All these different labels come with different connotations and that have been described and refined by historians of economics. This subsection briefly describes how our own research engages with these labels.

Becker's models are often called neoclassical models by fellow economists.[30] Uses of this label have been diverse and somehow contradictory, spanning from describing Alfred Marshall's approach, to Paul Samuelson "neoclassical synthesis", to a use as a synonymous to "mainstream" economics Consequently, some historians, like David Colander, have recommended to abandon the label, as it is too vague, too broad, and therefore not really descriptive in a historiographical sense (see Colander 2000). Other historians of economics have used the term neoclassical economics or postwar neoclassicism to refer to the kind of economics that has developed in the US after the second world war (WWII). Mary Morgan and Malcolm Rutherford have described this period as a transition from interwar pluralism to post-WW2 neoclassicism (Morgan, Rutherford 1998). Philip Mirowski and Wade Hands have described postwar economics as the rise of a new "hybrid orthodoxy", consisting of different orthodox approaches centering around common fundamental conceptions in demand theory (Mirowski, Hands 1998).[31]

[29] Becker has been described as someone who worked consistently throughout his career on a key set of problems, driven by his individual stamina and endurance (see for example Heckman 2014). Our view, by contrast, stresses the role of different thought collectives in supporting Becker's endeavour.
[30] See for example Folbre (1996) or Pollak (2003).
[31] Mirowski and Hands identify three places in which economists developed three distinctive approaches to p demand theory: Chicago, MIT, and the Cowles Commission. At the University of Chicago,

In this thesis, we rather use the term post-WWII economics, to designate the orthodoxy of formal economics that has become dominant in the US in the immediate post-WWII decades. Although the Becker-Murphy addiction model (1988) has been published rather towards the end of the 20th century, it makes sense to see the authority of the model rooted in the post-WWII economics.

As Becker has been at the University of Chicago for the largest part of his career, Becker is usually strongly associated with how economics has been practiced there. In the last decades, research on economics at Chicago has often focused on a so-called Chicago School of Economics. But considering Chicago as a "school of thought" is not the only perspective possible.[32] Recently, the historian of economics Steven Medema has investigated the origins of the label "Chicago School" (Medema 2024).[33] He observes that, since the beginning, the label served different personal and collective research agendas. Often the label has been used by those adherents of the Chicago School in a self-promoting way highlighting its distinctiveness.[34] Although Becker was employed as professor by the economics department of the University of Chicago when he published his models of addiction (Stigler, Becker 1977 and Becker, Murphy 1988), we argue that the rational addiction model should not be considered as an output of the Chicago School. This thesis documents that most of the constituting practices of the model can be better characterized without framing everything in an overarching Chicago School narrative.

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economists like Friedman or Stigler used demand theory for analyses in terms of price theory. At the Cowles Commission, economists like Marschak or Koopmans used demand theory to push forward structural, econometrical models. Finally, at MIT, economists like Samuelson used demand theory to push forward revealed preference theory.

32 The focus on a "school of thought" is apparent in the titles of edited volumes focusing on economics at Chicago. Ross Emmett's volume (2010) is titled *The Elgar Companion to the Chicago School of Economics*. The volume edited by Robert von Horn, Philip Mirowski, and Thomas Stapleford (2011) is titled *Building Chicago Economics: New Perspectives on the History of America's Most Powerful Economics Program*. More recently the focus on the school of thought has disappeared in the title of edited volumes focusing on Chicago as a place, see the volume *The Palgrave Companion to Chicago Economics* edited by Robert Cord (2022).

[33] Medema has also contributed chapters to the past edited volumes on the Chicago School of economics.

[34] See for example Melvin Reder (1982), see also the very recent textbook by Sonia Jaffe, Robert Minton, Casey Mulligan, and Kevin Murphy (2019) titled *Chicago Price Theory*.

The history of economics at Chicago is interwoven with the history of modern neoliberalism, as documented by historical studies about the Mont Pellerin Society, a global ideological thought collective in the second half of the 20th century (see for example the edited volume of Plehwe and Mirowski 2009). A considerable number of Chicago-based economists were part of the Mont Pelerin Society, most prominently Friedman and Stigler.[35] Becker also served as president for the Mont Pelerin Society in 1990. In the chapters focusing on the reception of the rational addiction model, we are thus investigating this connection between the theoretical and the political dimension of Becker's work, questioning whether the model reflects neoliberal thinking.

Recently, historians of economics have stressed Becker's earlier career involvement with new household economics. New household economics has been developed by Becker and his colleagues when he was still working at the NBER and teaching at Columbia University in the 1960s. Although Becker moved back to Chicago, he remained integrated in a community of researchers at the NBER during the 1970s (see Chapter 1). Contributions in the secondary literature have already shown how the social and institutional background at the NBER shaped the research of Becker and those around him. In her monography *A History of Feminist and Gender Economics* Giandomenica Becchio has described the new household economics that emerged around the Columbia Labor Workshop and the NBER the 1960s and 1970s (Becchio 2019, p. 101). In her PhD thesis, Agnès Le Tollec has described the NBER in the 1970s as a place where a group of young researchers around Becker and Mincer dragged many old ideas from pre-WW2 old household economics into the conceptual framework of neoclassical economics (Le Tollec 2022). Miriam Bankovsky has described how new household economics constituted the core theoretical underpinning of Becker's later work on the economics of family relations (Bankovsky 2025, chapter 5).

[35] Friedman has been president of the Mont Pelerin Society from 1970 to 1972, Stigler from 1976 to 1978, Becker from 1990 to 1992. Other notable scholars who have been employed by the University of Chicago and who have been part of the Mont Pelerin Society are Allen Wallis, Kevin Murphy, Ray Ball, Ronald Coase, Richard Epstein, Sam Peltzman.

Several studies have explicitly focused on the social relations in which new household economics came to be. Shoshana Grossbard, a former PhD student of Becker at Chicago, has been the first to highlight the importance of the workshops that were run by Becker and Mincer. Since 2001 Grossbard has described the Columbia Labor Workshop and the Applications work at the University of Chicago in several articles and book chapters (Grossbard Shechtman 2001, 2006, Grossbard and Beller 2023, Beller et al. 2024).[36] Pedro Teixeira, a historian of economics who has worked extensively on the rise and dissemination of human capital, has described the early work of Becker (Teixeira 2014) and Mincer (Teixeira 2007, 2011), the importance of the Columbia Labor Workshop, and Becker and Mincer's role in it (Teixeira 2021).[37] Finally, Claudia Goldin and Lawrence Katz have described the rise of the NBER to an incubator for the human capital paradigm (Goldin, Katz 2024). Building on official NBER reports, oral interviews conducted by Goldin and Katz, and on some bibliometric statistics of human capital mentions, they stress the importance of the NBER for the dissemination of human capital theory.

Building on the work of Becchio, Le Tollec, Bankovsky, Grossbard, Teixeira, and Goldin and Katz, this PhD thesis contributes to this ongoing strand of research on new household economics. Although we use the term "household production framework" to describe the practices embedded within the rational addiction model, this label designates the same community approach of new household economics. Our focus on the rational addiction model leads thus to rather emphasize the importance of new household economics as the relevant "thought collective", instead of the Chicago School. Indeed, the initial Stigler-Becker model was formulated in the terms of new household economics;

[36] Grossbard and her co-authors have described and compared both workshops, they have highlighted their role for the creation of new applied fields in economics, and they have created statistics highlighting the participation of women in these workshops (Beller et al. 2024). Grossbard and Andrea Beller have pointed as well to the pivotal role of the NBER for creating community and the creation of the CEAHBSI (Grossbard and and Beller 2022).

[37] As Grossbard and her coauthors, Teixeira has argued that the NBER provided an important additional training ground for the participants of the workshop enabling experience in research projects (Teixeira 2021: p. 672ff.).

moreover, early adopters of the model, like Michael Grossman, were trained in new household economics. Finally, the label new household economics questions the evolution of the approach to the subject matter, namely contrasting "old" household economics (before the post-WWII) and "new" household economics. For many questions, in particular for the role of habits in household relations, this comparative perspective would prove highly valuable: For example, habits played an important role in the conception of households as consumption units of Hazel Kyrk, Margaret Reid, or Elizabth Hoyt.[38]

Using different sources

Our perspective about models as practices, and about publications as artifacts, requires to use and interpret different types of sources. All sources used in this thesis are textual publications, often containing data tables, graphic figures, and bibliographic lists. Most sources from the primary literature that we use are academic articles (published in peer-reviewed economics journals edited and reviewed by other researchers). Some sources are books, or book chapters, published by academic publishers. These publications are generally written for a specialized audience, although books can sometime address a broader audience, going beyond academic economists. Usually, such publications have been edited and proof-read before publication. In order to go beyond these polished outcomes, we also use oral histories, namely publicly accessible interviews that have been published in textual or audiovisual form. Compared to the reviewed publications, the tone and content in interviews is often much less rendered in shape.[39] Occasionally, we also resort to publications of economists that are addressed to a more general audience, like posts of Becker's weblog that he maintained together with Richard Posner. In Chapter 1, we use a lot official, semi-public reports of the NBER like the NBER Annual Reports. These sources need to be interpreted in the institutional context of the NBER that

[38] For introductive summaries of the "old" household economics or home economics, see Becchio (2019: chapter 2), Le Tollec (2022), or Philippy et al. (2024).
[39] About the use of oral history for history of economics, see Dorian Jullien (2019).

included the obligation for researchers to report on their research progress. All NBER documents that we use were made accessible to the public via the NBER website.

Limits

Next to the challenges linked to our historiographic goals, we quickly want to describe some of the historiographic limits of this PhD thesis. We have set out to use the rational addiction model as a prism to look on post-WW2 microeconomics more generally. In other words, we use the creation and reception of the rational addiction model as a case study of post-WW2 microeconomics. One great difficulty with this aim is to define the general validity of our case study. In other words, it is difficult to define in how far the results for the rational addiction model generalize for microeconomics more generally. To the extent that Becker and other members of the CEAHBSI have contributed to construct and to inhabit many applied fields of economics in the 1970s, they had a considerable impact on microeconomics, disseminating their thought style to new applied fields.[40] Researchers from the CEAHBSI community also actively taught and mentored an substantial cohort of younger economists; as a result, their thought style was the entry point to the discipline for several generations of economists.[41] And yet, even if their thought style has been disseminated widely, this has not always been met with sympathy. Researchers from the CEAHBSI community, and particularly Becker, have often been criticized for their economic approach to human behavior, both by researchers from other disciplines and by other economists.[42] We hope to provide enough arguments in this PhD

[40] Arguably, there are some fields like family economics in which the thought style of household production technology took a very central place, and other fields like the economic analysis of law or health economics, in which the thought style was used as well, but was less central.

[41] Becker has been a very popular teacher of price theory at the University of Chicago who lectured a great number of students over time. Becker, but also Grossman have been very active supervisors of PhD theses. For example, Grossman supervised the dissertation of Frank Chaloupka, a health economist who has been taken up the rational addiction model empirically. In the 1990s and 2000s Chaloupka and Grossman contributed a lot to the empirical study of the demand for cigarettes, alcohol, and some illicit drugs.

[42] For example, the view of non-market behavior in terms of utility production technology has been pushed very far on the applied field of family economics. But the applied field of family economics has also been one of the academic subfields on which behavior in terms of utility production theory has been the most strongly criticized, in particular by feminist economics. But also, in the applied fields of health

thesis to convey the point that to some extent the thought style of the CEAHBSI community has been disseminated further into the wider economics discipline. But ultimately, we cannot fully answer to what degree their thought style is representative for the wider economics discipline. and that we give back as a thinking invitation to the readers of this PhD thesis.

Another limit is that this PhD thesis is a history of economics "from far", not "from close". Our account of the creation of rational addiction is from a rather distant point of view, one of a historian posing as a distant observer. This means that, except from the analysis of the official NBER documents, we have not engaged in the research and interpretation of any archival material. This is a clear limitation of the results presented here, because some archival material could considerably strengthen our arguments.[43] Second, we our perspective on the developments in the academic economics discipline in the US is shaped by our upbringing in a European cultural context. The economics discipline has become a lot more globally connected over the 20th century (see for example Fourcade 2006). For the second half of the 20th century, the US economics discipline has been in many ways a global fixpoint from which many technical and methodological innovations have been disseminated to other parts of the world, including Europe. English has become the first academic language for economists worldwide. With these qualifications in mind, we see ourselves rather as a distant observer, since we have never practiced in or otherwise experienced US academic culture. Third, we see ourselves as a rather distant observer in the sense that we do not see ourselves as part of the CEAHBSI thought collective or of any other thought collective described in the PhD thesis. Nonetheless, we do see ourselves as part of the larger disciplinary thought collective of

economics or law and economics there have been critics of the utility production technology approach and its implications for economic analysis.

[43] For example, it would be very interesting to search in the personal correspondence of Gary Becker in the special collection at the University of Chicago for traces of Becker's exchange with other scholars. The finding aid that has been published online indicates that there has been some exchange between Elster and Becker and also between Howard Rachlin and Becker. Both Rachlin and Elster play important roles in the reception of the rational addiction model in behavioral economics and in behavioral psychology.

microeconomists, since we have been familiarized with microeconomics in our own university education.[44]

0.3 Outline

The chapters of this PhD thesis are divided into three parts. Part I contains two chapters and provides a social-institutional prehistory of the rational addiction model, embedding Becker and others in an intellectual community at the NBER in the 1970s. Part III looks at the rational addiction model of Becker and Murphy as a common reference point and compares how the model has been received in three different communities of researchers: among behavioral psychologists, among applied health economists, and among behavioral economists.

In Chapter I we identify and describe a thought collective within the research program of the NBER in the late 1960s and 1970s. We call this thought collective the CEAHBSI community, named after the Center for Economic Analyses of Human Behavior and Social Institutions that has been formally established at the NBER in the early 1970s. We document Becker's social-intellectual role in this thought collective and we explain why that thought collective has emerged at that moment at the NBER.

In Chapter 2, we describe the view of non-market behavior in terms of utility production technology that we see as the common thought style of the thought collective identified by Chapter 1. We investigate how different theoretical concepts (like human capital, time as a production input, and household production functions) have been combined to provide a general framework for analyzing non-market behavior. We also provide some brief examples about different uses, by the researchers of the community, of

[44] I have been trained in microeconomics at public universities in Germany and France in the 2010s. I have an economics degree on the Bachelor level and Master level from the University of Hamburg. I also have a degree from the University of Paris I from a one-year research master in epistemology, history and methodology of economics. This PhD thesis is the result of five years of research done at the University of Lorraine in Nancy.

the thought style to frame their questions related to risky or unhealthy forms of consumption behaviors that stretch out over time.

Part II recounts the creation of the rational addiction model, from a perspective of the history of practices. First, we present some of the modeling practices that were already existing in the post-WWII decade. Chapter 3 documents how habits have been conceptualized and how endogenous preferences have been introduced in formal demand models in the post-WWII decades. Chapter 4 investigates how the rational addiction model was built on these existing practices, how it innovated the economic vision on habits and addiction, and how it fitted into the existing habit formation literature.

Chapter 3 engages with a small economic literature on formal demand models with habit formation, running from the 1950s to the 1980s. This chapter describes how habits have been conceptualized by economists in demand models. In the 1950s habits were used in empirical demand estimations to make an otherwise static demand estimation more dynamic. Over time, habits were modeled as accumulations of psychological stocks and they became a mean for more theoretically-oriented economists to model endogenous preference changes that are dependent on past consumption. We account for the evolution of two different kind of habit formation models, models of naïve (or myopic) habit formation and models of rational habit formation.

Chapter 4 addresses the different stages of creation of the rational addiction model. In the first stage, addiction was modeled by Stigler and Becker model in terms of household production theory. In a second stage, addiction was embedded and harmonized with the habit formation literature. Finally, in a third stage, the initial model was adjusted according to the synthesis and became a full-fledged dynamic model. By comparing how the rational addiction model fitted into the literature on habit formation, we describe the practice innovation contained in the model and the change in tacit assumptions that it entailed.

Part III consists of three related chapters, each offering a case study of the reception of the rational addiction model. Each chapter provides a case of reception in a different research community. This builds up to a comparative study of the reception of the rational

addiction model. Thus, the aim of Part III is not primarily to check whether the different research communities have received the model positively or negatively. Instead, our comparative study of the reception helps us also to describe additional characteristics and aspects that researchers from the different communities have associated with the rational addiction model. In the three research communities that we compare, the rational addiction model is perceived differently and stands for different things. We use these attributions from the different research communities to describe the rational addiction model as a different kind of benchmark in each community.[45]

Chapter 5 describes the reception of the rational addiction model by a community of behavioral psychologists that includes researchers like Howard Rachlin or Richard Herrnstein. As the authors of the rational addiction model, behavioral psychologists became interested in the explanation of addiction in behavioral terms. Although these psychologists have a different general theory of intertemporal behavior, the descriptive addiction that they provide of addiction as a behavioral phenomenon is surprisingly similar to the one of the rational addiction model. The reception of the model has been shaped by interdisciplinary research that has been initiated by a couple of researchers in the 1970s and 1980s, and we use this chapter to describe the subtle ways in which the disciplines of behavioral psychology and microeconomics are similar, and in which ways disciplinary differences exist and obstruct close cooperation. As some psychologists have wondered to what degree they could import tools from microeconomics to behavioral psychology, and as others have criticized the methodological limitations of the rational addiction model, we describe the rational addiction model in the perception of behavioral psychologists as a methodological benchmark.

[45] To be precise, we do not use the term benchmark in the sense of a point of comparison that represents the state-of-the-art model or a dominant model in the sense that it is the best performing model. Rather we use the term benchmark as a general point of comparison, like a common reference that has meaning for those who talk about it. To the extent that the model is associated with different aspects and problems in the three communities that we look at, we describe how the model is a different kind of benchmark in each community.

In Chapter 6, we document the reception of the rational addiction model by applied health economics, mostly in studies of cigarette demand. While Chapter 3 considered the Becker-Murphy model as an end point in the theoretical creation, Chapter 5 shows that the theoretical model has been taken up by applied health theorists. Among those who played an important role in the dissemination of the model was Michael Grossman, a former student of Becker, who was centrally involved in the health economics research project of the CEAHBSI. We describe how the model was seen by applied health economists as a theoretic benchmark, a public reference that provided orientation for the economic analysis of harmful health habits that were sometimes also called unhealthy lifestyles.

Chapter 7, address the reception of the rational addiction model by behavioral economists. Behavioural economics became a well-organized intellectual community from the 1980s to the 1990s. The development process of the rational addiction model (from 1975 to 1988) overlaps largely with this period. Behavioral economists like Richard Thaler engaged increasingly in establishing an alternative new form of applied economics that would represent the decisions of real-world economic deciders more properly than many models of neoclassical microeconomics. While the rational addiction model has been criticized by behavioral economists already in the early 1980s, it is in the early 1990s that behavioral economists look at the model explicitly as a positive description of addiction with wrong normative implications. The reception of the model among behavioral economists reflects how the rational addiction model was strongly associated with a libertarian approach to human welfare and public policies. That is why we describe the rational addiction model in the behavioral economics community as a prescriptive benchmark.

Finally, Chapter 8 draws the main conclusions of our historical account and summarizing the results of the different chapters.

Part I:
Thought collectives & thought styles

Introduction

As historians of economics, we tend to reduce scientific work often to the contribution of individual scientists, while ignoring the many relations that individual researchers have with their social and institutional environment. Be it that publications like scientific articles or books are usually signed only by one or several authors, or be it that the cultural glasses of perception through which we look at scientific production in economics biases us in direction of an individualistic view of society, or be it simply that it is easier to trace historic activities of an individual than the intertwined activities of smaller or larger social groups or organizations. But as historians we should be prepared to deal with these obstacles to the narration of past scientific activities.

In this PhD thesis we narrate the story of a scientific explanation of addiction that explains addiction explicitly in economic terms. This economic explanation of addiction has been proposed in the form of a scientific article (Becker and Murphy 1988) that presents a model of addiction. Our aim in telling this story is twofold. First, we aim to make the economic and non-economic aspects of the model accessible to interested readers. Second, we aim to describe the political and economic implications resulting from the model's particular explanation of addiction. Together, these two aims should make the model accessible to economists and non-economists alike, and facilitate constructive criticism. To achieve these goals, we must begin the narrative much earlier than 1988.

Before delving into the details of the rational addiction model, in this Part I we provide a social-institutional prehistory of the way of economic thinking that shaped the creation of the model. Our primary focus is on an earlier period: the 1960s and 1970s. These decades have been described as a major turning point for economics and the broader U.S. policymaking environment by sociologist of science Elizabeth Popp Berman (2022). During this time, Becker and others developed many of the fundamental theoretical concepts that would later be used to formulate the rational addiction model. In these years

Becker also became an intellectual leader, socially embedded within a tightly stitched network of like-minded economists. Becker is the central figure of our story, as we see him as the central researcher behind the theory of rational addiction. But to avoid individual reductionism, we must extend our narration from the published article to the social and institutional situations through which the article came into existence.

To extent our narration we chose to structure our thinking loosely with historiographic concepts that were originally promoted by Ludwik Fleck. Fleck saw scientific production in terms of practices that were organized socially in different thought collectives and that gave rise at times to certain thought styles, socially formed ways of thinking. Thought collectives and thought styles are useful historiographic concepts as they help us understand meaning as it is historically constituted. We use these two concepts to describe how the economic style that informed the rational addiction model became commonplace originally in New York, within a community of like-minded scholars at the National Bureau of Economic Research (NBER).

Thought collectives are the social constellations in which individual researchers participate and which shape their intellectual production. As Fleck assumed that research is better explained as a collective activity that is done together in exchange with others, individual researchers should be seen as socially embedded in different thought collectives. Identifying relevant thought collectives, their members, and their research provides historical observers with additional material that is useful for telling the story of the scientific contributions made within those collectives. This approach also contextualizes the contributions within social and institutional relations that may be important for understanding them.

Thought styles are particular collective ways of thinking, of asking interesting research questions, of using theoretic assumptions and concepts, of selecting and manipulating data in the right way, of defining and ignoring what is irrelevant and what deserves more attention and resources to be investigated. According to Fleck thought styles are the result of collective thinking that happened in thought collectives that have

sufficiently stabilized over time. Stabilized thought collectives produce particular ways of thinking that are (more or less) different from how researchers in other thought collectives think and see the world. Although thought styles are even more difficult to identify than thought collectives, they are useful for understanding the meaning of past documents and publications. They can help us better understand the scientific arguments and exchanges happening within a specific thought collective, as well as within the broader discipline of economics, which can be viewed as an even larger thought collective. In Part 1, we focus solely on the specific thought style that emerged at the NBER. In Part 2, we describe how this thought style related to other modeling approaches. In Part 2 we also discuss how the original NBER style evolved when economists from the University of Chicago proposed new versions of addiction models.

As a thought style, the household production framework familiarized economists with a view of human behavior in terms of productivity. Using the household production framework, economists like Becker proposed to rationalize subjective variables such as taste as the result of optimization within production constrains, and not as unpredictably changing variables in itself. The household production framework was carried by a promise to structure the informal household sector, in analogy to an industrial sector in which each household is described as a micro-factory. Dragging subjective, intangible variables like taste into the realm of productivity, Becker and other promoters of the household production framework unleashed the promise of impartial, scientific judgment on issues that were formerly considered full of partial value judgements. As industrial activities could in principle be viewed as being primarily motivated by profit maximization, households could in principle be described as trying to maximize utility from non-market production activities.

While thinking in thought collectives and thought styles helped us to structure each chapter of this thesis, the chapters in this part come the closest in identifying actual thought

collectives or thought styles.[46] Chapter 1 identifies a thought collective, an intellectual community that has been raised and cultivated by some economists in the late 1960s and 1970s at the NBER. We call that thought collective the CEAHBSI community, in reference to the NBER-internal organizational structure that has been a main result of the temporary institutionalization of the thought collective over the 1970s. Chapter 2 identifies the household production framework as a conceptual framework that was commonly used within the thought collective identified in chapter 1. While the household production framework may arguably be only part of the thought style shared in that community, we argue that it can be interpreted similarly as a thought style. It defined largely the way how researchers in the community conceived non-market behavior in economic terms.

The thought style identified in Chapter 2 is relevant not only to the rational addiction model. It provides the theoretical tools that allowed Becker and his colleagues to push economic analysis to non-market behavior, opening the door to new applied fields of economic analysis. Many of the young researchers involved in the CEAHBSI community became centrally involved in the new applied fields that they began to explore in the 1960s and 1970s, like Michael Grossman in the field of health economics. When Becker and his coauthors provided models of addiction they used the framework that had been promoted in the CEAHBSI community. When Becker and Murphy provided a full-blown dynamic theory of addiction in 1988, there were researchers like Grossman out on applied fields like health economics receiving the model warmly as it was very close to their own way of doing economics.

Part 1 of this thesis can be viewed as the prehistory of the rational addiction model. It focuses on the social and institutional origins of the thought style later used to describe addiction in economic terms. By describing the practices that comprise this thought style,

[46] Parts Two and Three of this thesis also assume that scientific production is socially structured and organized by thought collectives and thought styles. However, the chapters in these parts are not designed to identify additional thought collectives or thought styles.

we establish the theoretical foundation necessary to understand the rational addiction model in Part 2.

I. The CEAHBSI at the NBER: The Coming of Age of an Intellectual Community

I.1 Introduction

In 1976 the economist Gary Becker published one of his most emblematic books, *The Economic Approach to Human Behavior*. The chapters of the book are published articles from Becker's early career that deal with different non-market phenomena like discrimination, fertility, crime or marriage. What is common between each chapter is Becker's objective to master various phenomena with the tools of price theory. The book attracted a lot of scholarly attention from economics and from beyond. Some admired his work, like the circle of students that followed him in reviving several applied fields. Others criticized Becker for pushing economic reasoning too far, for making too much room for self-interest and individualism, and for disrupting the social division of labor among the disciplines. Becker has also become one of the economists the most associated with *economics imperialism*, the attempt to unify scientific explanations by subjugating various forms of reasoning in the social sciences to the logic and tools of economics.[47]

Whether we admire the elegance of Becker's models or whether we condemn the values put forward by it, we might do well to detach our understanding of his scholarly contributions a bit from the agency of Becker as an individual persona. Although Becker is the main protagonist of his academic career, it would be a misrepresentation to attribute the success of *The Economic Approach to Human Behavior* solely to the brilliance and endurance of one individual researcher. Economics in the 20th century is produced collectively. Sociologists of sciences have stressed the importance to look at economists not only with regards to their scholarly contributions, but also with regards to their social

[47] In 1992 the committee of the Sveriges Rikesbank attributed him the Nobel Prize in economics "for having extended the domain of microeconomic analysis to a wide range of human behaviour and interaction, including nonmarket behaviour" (Nobel Prize 1992).

and institutional embedding in society (Fourcade 2009, Berman 2022; see also Forget, Goodwin 2011).

In this chapter we characterize Becker as an intellectual leader by describing him at the same time as a reflection of his research environment. Looking at Becker's early years as an economist at the NBER from 1957 to 1980, we trace how Becker became the economist that was later associated with economics imperialism. We argue that it would not have been possible for Becker to write the *Economic Approach to Human Behavior* without the support of his institutional development and without the community that he created around him. This is not meant trivially. The history of the community that Becker built with Jacob Mincer and Victor Fuchs at the NBER mirrors his early career as an applied economist. While many know Becker as the elegant model-builder and Nobel winning economist, the reduction of his success to his persona leaves us with a biased history of the collective intellectual production of the period. Becker was undoubtedly a skillful frontier entrepreneur at the edges of utility theory. But he was able to put his ideas into practice due to continued support from the NBER, from funding organizations and from his position in a well-connected community. That is the main argument of this chapter.

Many authors have contributed already a huge amount of knowledge on the work of Gary Becker and his disciples. Pedro Teixeira has written two portraits of Becker that provide an overview of Becker's different contributions (Teixeira 2010, 2023). Both published in collections of essays on the *Chicago School of Economics*. Teixeira has also focused on Becker's early work on human capital theory (Teixeira 2014, Teixeira 2010) and its application to higher education (Teixeira 2005). Jonny Bunning has described Becker's very early years before and while obtaining his PhD thesis from the University of Chicago in 1955 (Bunning 2025). Cléo Chassonnery-Zaïgouche and Jean-Baptiste Fleury have described Becker's formalization of discrimination as an economic problem (Chassonnery-Zaïgouche 2013, 2017; Fleury 2012). Giandominica Becchio, Agnès Le Tollec and Miriam Bankovsky have described how Becker and others have reformulated

economic questions of household and home economics that have a long tradition among US home economists (Becchio 2019, Le Tollec 2020, Bankovsky 2025). Shoshana Grossbard focused on Becker's marriage models at Chicago (Grossbard 2010). James Heckman has provided an overview of Becker's model of time allocation and how it has been applied by some of his students and others (Heckman 2015). On the same topic, Nancy Folbre presents a more critical evaluation of the theory of time allocation by Becker and his followers (Folbre 2004). Regarding legal studies, Steven Medema has described Becker's role in the transition of law and economics at the University of Chicago (Medema 2007, 2011). Fleury has summarized Becker's interactions with the economic analysis of law (Fleury 2015). All these studies highlight ways in which Becker and some of his followers have contributed to the creation or recreation of applied fields of economics. Not only Becker's contributions, but also those of his intellectual fellow-travelers have been put in historical perspective.[48] As the studies on Becker the studies on Becker's allies focus on their efforts and on the conditions under which they pushed their research agenda.

Given its popularity also beyond economics, Becker's methodological innovations, his economic approach and his boundary crossing have been given special consideration as well. Roger Backhouse and Medema have used the case of Becker to illustrate how economists in the 20th century adopted a definition of economics as a method similar to that of Lionel Robbins (Backhouse, Medema 2009a, 2009b, 2009c). The methodological approach of Becker has also been discussed with regards to economics imperialism. He has been described as an economics imperialist by Ben Fine and Dimitris Milonakis (Fine 2000, Fine, Milonakis 2009). Jimena Hurtado has compared Becker's methodologic approach and his imperialistic posture to the writings of Jeremy Bentham (Hurtado 2008). Medema has illustrated imperialistic values in law and economics after Becker (Medema

[48] Teixeira has worked extensively on Jacob Mincer's contributions to modern labor economics (Teixeira 2007, 2011). Others have traced the work of disciples of Becker in the field of law and economics. Samuel Ferey (2008) and Fleury and Alain Marciano (2023) have described Posner's contributions to law and economics. Sophie Harnay and Marciano have distinguished Posner's economic analysis of law from a more traditional law and economics approach (Harnay and Marciano 2009). Bruno Deffains and Ferey illustrate how Posner's economic analysis matched the demands of legal science at the time (Deffains and Ferey 2012).

2015). And Chassonnery-Zaïgouche has discussed Becker's theory of discrimination with regards to economics imperialism (2013, 2017).

In most of these studies the attention is rather focused on Becker and his theoretic framework. Concepts from his framework like human capital or household production functions served Becker and his followers to extend their tools to the different applied fields. Thus, Becker often took a role as forerunner that marked the run with his name. But given the fact that Becker operated from within a community of followers, often there is no special attention to the social organization of research activity within their intellectual community.

Another set of studies has focused more on the institutional environments in which Becker and his fellow-travellers developed their theories. These studies are the most related to this chapter. Ross Emmett has described how the workshop system has been implemented and how it has innovated research activities at the economics department of the University of Chicago (Emmett 2011). Before any historians of economics have jumped on the track, Shoshana Grossbard, a former PhD student of Becker, has argued to look at Becker and Mincer's workshop at Columbia University and Becker's workshop at the Chicago University as sites of knowledge creation (Grossbard 2001, 2006). Together with Andrea Beller, Ana Fava, and Marouane Idmansour, Grossbard has extended this research regarding the participation of women in theses workshops (Beller et al. 2024). Teixeira (2021) has also described how Becker and Mincer created a community around the Columbia labor workshop that served as a place for research initiation. Teixeira argues that the NBER was another important environment that provided research experience for Becker and Mincer's doctoral students, helping participants of the workshop find their way into economics. Le Tollec has described the NBER also as a place in which a group of like-minded scholars around Becker subjugated many ideas of the older home economics to the framework of new home economics (Le Tollec 2020). In this chapter we provide further knowledge by looking how Becker and others developed an intellectual community within the institutional structures of the NBER.

We build on the studies that described the workshops at Columbia and Chicago as important places of community formation. But instead of looking at the workshops, we focus on the NBER as a geographical place and institutional structure to observe the intellectual community around Becker. Claudia Goldin and Lawrence Katz have described how the NBER has been an important place for the dissemination of human capital theory (Goldin and Katz 2025). The chapter of Goldin and Katz is similar to this chapter in its focus on the CEAHBSI community at the NBER. In this sense their paper is strongly overlapping with this chapter. But this chapter is different from their paper by the historiographic approach ad by the depth with which we try to capture the social environment at the NBER.[49]

To capture the research activities at the NBER we adopt a sociological approach inspired by an analysis of the practice change proposed by Elizabeth Popp Berman (2012). In her analysis Berman is interested in the spread of market logic in research practices in US academics after the second world war. She argues that these changes in research practices were not due to an orchestrated entrepreneurial effort among the universities. Rather she argues that the systematic increase of practices rooted in market logic has been made possible by a regulatory change. Different practices following market logics have existed for a long time, but only when the rules implied by the wider environment changed could these practice gain track in the field (see Berman 2012: p. 290).

Berman's framework is interesting because it explains practice change as the result of two forces that work together in shaping the resulting practices in the field (Berman 2012). On the one side, the framework attributes agency to the institutional entrepreneurs who continuously propose new practices or who reinforce those practices already in place. But on the other side, the framework also attributes agency to social selection processes or institutional processes that are beyond the reach of the entrepreneurial agents in the field. These environmental developments are for Berman necessary to explain change, because

[49] While Goldin and Katz focus on the human capital framework (or human capital paradigm as they call it) we focus more specifically on Becker's role in the community, the early history of that community, and the historiographic consequences we might draw from that.

they interfere with the behavior of the institutional entrepreneurs. Dependent on the general stability or instability of the situation in the field, these environmental developments might start dynamic processes that will lead to bigger changes than they would be possible only by the effort of the institutional entrepreneurs (see Berman 2012).

To analyze what is happening at the NBER in the 1970s we will use Berman'sconcepts of social fields, practices, institutional entrepreneurs and environmental selection. In our case we see the creation of the CEAHBSI in 1972 and its existence until 1978 as a manifestation that reflects the research activities of the intellectual community. For us the CEAHBSI reflects a change of practice within the NBER. We see the CEAHBSI pushed into existence by developments in the wider policy-research field, and by developments in the narrower institutional field that consists of the organizational structure of the NBER. At the same time, we view Becker and his allies, such as Mincer and Fuchs, as institutional entrepreneurs. They have used their experience and skill to create a research community and coordinate their different research programs. As we will explain, these individual efforts would have been less effective without the environmental selection forces.

To trace the community activities at the NBER we make great use of the NBER Annual Reports that are accessible on the website of the NBER.[50] These Annual Reports were published and distributed by the NBER since its foundation in 1920 until 1977. They were edited by the Directors of Research at the NBER. They contain a section with staff reports by all researchers working in research projects financed via the NBER. In these staff reports the researchers reported on the progress in their research activities. We use these reports to track the research activity at the NBER over time.

The chapter is structured as follows. In section two we describe two main environmental developments that act similar to demand forces for the economic approach

[50] The NBER Annual Reports are available under the following permalink. See https://www.nber.org/about-nber/history/historical-archives/annual-reports-director-research, last accessed 22.09.2025.

to human behavior. First, we describe how the Great Society programs of the 1960s and early 1970s have provided financial resources and demand for policy-related research. Second, we describe how the change of leadership within the NBER from Arthur Burns to John Meyer introduced important changes in the institutional structure of the NBER. In section three we describe the efforts of Becker and his allies to build a community by providing and organizing research experiences, and to innovate economic research at the NBER. In section four we describe how the creation of the CEAHBSI emerged from the environmental developments in the field and from the efforts of the institutional entrepreneurs. We describe the activities happening at the CEAHBSI and its disintegration in the late 1970s. In section five we resume and draw brief conclusions.

1.2 Environmental selection of practice: The War Against Poverty and John R. Meyer as President of the NBER

This section focuses on important developments in the broader and more specific research environments at the NBER. These developments brought about significant structural changes that affected the research conducted at the NBER. First, we will describe some of the developments at the intersection of economics and policymaking in the U.S. during the 1960s and early 1970s. Second, we examine the situation at the NBER, a private, nonprofit research organization that is part of the broader policymaking environment. These developments have contributed significantly to the success of the intellectual community at the NBER.

1.2.1 The Great Society Programs: A positive demand shock for policy-related research

The late 1960s and early 1970s have been attractive years for private research organizations interested in policy-related research. US Social policy has been profoundly reformed during the 1960s. After decades of racial segregation and continued poverty for parts of the US society the administration of president Lyndon B. Johnson (1963 – 1969)

promoted a *War on Poverty* and a host of other social policies oriented towards changing the socio-economic situation in the United States. Johnson created the Office of Economic Opportunity (OEO) as new federal agency to coordinate these policies (see Fleury 2010, Berman 2022). The War on Poverty efforts resulted in new federal programs that were quickly increasing in costs. At the same time, Johnson implemented budgeting and planning units in most federal agencies. These budgeting units were employing many economists and were outsourcing part of their research to private research organizations, among others to the NBER, as has been illustrated meticulously by sociologist of sciences Elizabeth Popp Berman (2022).

Desegregation, education or public health were among the big topics that dominated the policy discourse of politicians and administrators in the 1960s.[51] The practical implementation of the Great Society programs crucially changed US federal policies for decades. Sociologists of sciences Elizabeth Popp Berman has illustrated in great detail how these programs affected the research-policy nexus. She has argued that while these programs aimed to achieve greater equality within the US society, they helped to root what she calls "the economic way of thinking" in US federal government agencies (see Berman 2022).

[51] In 1964 the Civil Rights Act was passed to outlaw discrimination based on individual characteristics such as skin color. After centuries of deprivation of rights of Black people, the US society was marked by great discrepancies in living conditions between Whites and Blacks. This situation continued to shape legislation also after the political parties in the White House changed. In 1972 the Republican president Richard Nixon (1969 – 1974) amended the *Civil Rights Act* with the *Equal Employment Act*. One of the hopes of the day were to achieve a change in the US society by focusing on education. Already under president John F. Kennedy (1961 - 1963) education and its role in promoting welfare has been placed centrally on the agenda of the Democrats (see Holden, Biddle 2017). Under president Johnson many pathbreaking legislations have been put into action by the US federal government. In April 1965 the *Elementary and Secondary Education Act* was passed. The act aimed for equal access to education and provided federal funds to reduce gaps in the educational achievements of US Americans. In November of the same year the Johnson administration passed the *Higher Education Act*. This act provided federal funds for the higher education system in order tried to make higher education more accessible to those who might otherwise not have the means to pursue extended education. Public health was another concern for public policy under President Johnson. In 1965 the he enacted *Social Security Amendments* that lead to the Medicare and Medicaid programs. These two programs introduced major changes in the US health care system by providing federal health insurance for elderly citizens and for citizens with very low income. Matthew Panhans has described how public health insurance has been discussed by economists and policy makers during the 20th century (Panhans 2018).

After economists from the RAND corporation implemented a planning and budgeting system in the Department of Defense, president Johnson prescribed the creation of such budgeting units in all major federal agencies (see Berman 2022). The system initially used in the *Department of Defense* was called *Planning-Programming-Budgeting-System* (PPBS). In a nutshell, PPBS and its follow-up programs tried to translate government activity in objectives, urged to quantify current progress on these objectives by estimating costs and benefits of current activities, and aimed to compare different activities by their cost-benefit rates. The engineers and economists at RAND had designed PPBS initially as a decision aid to optimize military expenses. Under Johnson it has been introduced also in agencies like the *Department for Health, Education, and Welfare* (DHEW). Presented as neutral budgeting tools, the programs were criticized by many as politics through the back door, concealing actual decision-making processes and shifting power to the new budgeters (Berman 2022).

Although many of these new budgeting units were effectively not very successful, Berman (2022) has argues that the practices implemented by these units were outlasting and outgrowing the initial budgeting offices. The implementation of PPBS-like budgeting techniques brought implied subtle changes for formulating policies. For policies could be broken down into objectives and cost-benefit ratios, the budgeting units needed quantifications of the costs these policies and, what was often harder to express, quantifications of their benefits. To do so the initial budgeting units employed economists, many from the RAND corporation. Not all their activities could be done in-house. Often, they outsourced research to private research institutions, to an extent that new sites for sponsored research. In 1966, researchers at the University of Wisconsin created the *Institute for Research on Poverty* with funding from the *Office of Economic Opportunity*. In 1966 Gerald Somers, economist of the University of Wisconsin, published the first issue of the *Journal of Human Resources* (JHR). In the preface he thanks the *Ford Foundation* and the OEO for financial support that made the new journal possible.[52]

[52] At the same time Somers defined the objective of the journal and resumed current policy-developments:

Another research institution that was brought into life in these days was the *Urban Institute*, a think tank created in 1968 in Washington. Its first director was William Gorham an economist from the RAND corporation.[53] Based in Washington the Urban Institute was intended to serve as an outpost to produce much of the evaluative research that was demanded by the increasing government-internal budgeting units. The NBER became also one of these research organization that obtained funding from federal government in the early 1970s. Especially the NBER projects related to human resources, education and health issue included, and urban economics attracted considerable federal funding in the late 1960s and early 1970s.

Overall, the 1960s and 1970s have been important decades of change for the research environment in the US, particularly for those areas of research amenable to contribute to policy planning, budgeting or evaluation. Berman has argued that the total outflow of resources from the different federal agencies created an enormous impetus of change for the broader policy-research environment (Berman 2022). She has illustrated how the broader policy-making environment was changed permanently by several

"When, at the beginning of the decade, the U. S. Department of Labor heralded 'The Manpower Revolution of the 1960's,' they referred to projected changes in the nation's labor force. As significant as these changes have been, however, the real manpower revolution of the past few years can be found in two other areas: the unprecedented growth of federal involvement in the fields of education, training, and welfare; and the sharp expansion of research under the general rubric of investment in human resources. The Manpower Development and Training Act, the Vocational Education Act, and the Economic Opportunity Act are only a few of the recent legislative measures in these areas. These acts all accord a central role to education and training. They constitute novel American ventures in social experimentation. And, like all fruitful experiments, they call for a careful evaluation of research. The rapid expansion of research in these same fields is partly a built-in requirement. Many of the legislative measures have provided for substantial research funds, to be allocated for study and assessment of the problems associated with operating policies. Private foundations and research organizations have also extended their activities in these areas, and university research investigators have inevitably found that their interests coincided with the pressing problems of the day and with the availability of research funds." (Somers 1966: p. 3).

[53] Gorham has been head of one of the budgeting units in Johnson's *Department of Health, Economics, and Welfare* (DHEW). Gorham started to work for the *Department of Defense* in 1962 under president Kennedy. With Johnson's War on Poverty, Gorham moved to become *Assistant Secretary for Program Coordination* at the *Department for Health, Education, and Welfare* from 1965 to 1968. Berman describes how Gorham set up a team of economists and carved out means to finance evaluating the different policies of the DHEW (see Berman 2022). In 1968 Gorham was selected to lead the newly created Urban Institute.

institutional changes that can be traced back to the 1960s and 1970s. First, she argued that the initial demand in expertise by the budgeting units was translated into a more permanent demand to think in terms of a certain vocabulary, concepts, norms, and other predispositions that make up what she calls the economic way of thinking. She argued persuasively how this new style of thinking needed to be learnt and how the academic field of public policy offered possibilities to reclaim the space that formerly has been filled by the academic discipline of public administration studies. She has shown how higher education institutions like universities or the RAND Corporation seized the moment to offer new programs in public policy schools and formations for administrative personnel. Second, Berman argued that this style was further reinforced by the creation of institutions such as the *Congressional Budgeting Office* that made similar expertise more generally available among politicians the US congress.[54] That is why she argued the economic style of reasoning ultimately endured the changes of political parties in government by having become institutionalized.

For policy-oriented economists the late 1960s and 1970s were rather generous years. Economists were generally in high demand in policy planning and evaluation units of federal agencies. And those working for institutions like the RAND corporation, the Urban Institute, but also the NBER had the opportunity to apply for plenty of research funds coming from federal agencies.

1.2.2 New leadership and new possibilities at the NBER: John R. Meyer becomes president of the NBER in 1968

Since its founding, the NBER has firmly positioned itself between academic economics and the practical business of government. Since its inception, the NBER has been a

[54] One of the economists that worked for Gorham was Alice Rivlin. Having obtained a PhD in economics from Harvard in 1958, Rivlin has been an affiliated researcher of the Brookings Institution, a Washington-based thinktank of the center left. From 1966 to 1969 Rivlin worked for Gorham in the DHEW, from 1968 to 1969 she was Assistant Secretary for Planning and Evaluation. She worked mainly on questions related to education. In 1975 she became the first director of the Congressional Budgeting Office.

research organization funded primarily by grants from foundations and other private donors for general research or specific projects, as well as by subscription fees for disseminating its publications and reports. The NBER began as a small research unit in 1920, with Wesley Clair Mitchell as its first director of research. The NBER became known for its studies on business cycles and national income accounting. Over the years, the NBER has extended its research to other topics and expanded its personnel and fundraising. Historian of economics Malcolm Rutherford has argued that this long-term expansion was possible because the NBER developed and maintained good relationships with its funders. Continuous funding from the Rockefeller Foundation, in particular, has been key to putting the NBER's research on a firmer financial footing.

The NBER is composed of many people engaged in a division of labor. The various organizational positions within the NBER have different roles, obligations, and capacities to change or reinforce research practices. NBER publications generally contain an organizational roster listing the individuals holding current NBER positions.[55] The NBER's leading executive positions are the president, directors of research, executive director, and treasurer. Those in these roles are heavily involved in organizing and managing the conditions under which research at the NBER takes place, as well as developing the organization's general direction.

Up until the late 1970s, the NBER employed a host of research staff in addition to the officers. Some had full-time positions, while others worked part-time and also served as university professors. According to former staff, the pay was modest rather than competitive (see Goldin and Katz 2002: p. 10). The research staff was further hierarchized into different positions. Senior research staff were listed in the organizational roster. They often worked in teams with junior personnel, such as research associates and assistants. However, information on junior-level research staff is sparse in official reports. For many years, the NBER offered fellowship programs that enabled young postdoctoral students

[55] For examples of the NBER organizational roster in 1957 and in 1977, see Figure 15 and 16 in the Annex.

or assistant professors to spend a year at the NBER. In addition to researchers, NBER personnel included administrative staff, computational personnel dedicated to supporting the researchers' computational needs, and staff responsible for organizing the publication process and assisting authors. This division of labor, coupled with financing research projects over planning horizons longer than one year, enabled the NBER to undertake larger collective research efforts or those with longer planning horizons. This also facilitated the organization and funding of research projects with researchers from different universities.

Many decision-making processes within the NBER were divided among many people. NBER organizational rosters from that time also included members of the Board of Directors. The Board of Directors generally met twice per year to discuss and decide on ongoing issues. The people filling these positions were not on the NBER payroll. Directors were generally appointed for a couple of years, with one serving as Chairman of the Board. Some directors represented universities that cooperated with the NBER; others were appointed by business or labor organizations; and others were appointed by professional or academic associations. This made the Board of Directors a deliberative committee balanced by different societal interest groups' viewpoints. In addition to the Board of Directors, an Executive Committee met several times per year to decide on pressing issues as defined by the Board of Directors. Other committees existed for specific activities and were staffed with internal or external NBER personnel. The NBER also organized several conference series that usually resulted in publications. Examples include the Research in Income and Wealth conference and the National Bureau-Universities program conferences. These conferences were organized by organizational committees.

One of the NBER's founding principles was its commitment to impartial and objective expertise. The NBER's founders envisioned it as an intersection between academia and the government. They considered contributing to policy discussions and providing solid empirical statistics to be one of the main objectives of collectively achieved research at the NBER. From the beginning, a challenge has been to ensure the degree of

impartiality necessary for such a delicate role amid competing social interests. One way the NBER addressed this issue was by establishing a rigorous internal review process for publications. Each official NBER publication must pass a reading committee consisting of three NBER directors. During the lengthy review process, other directors could place a veto if they were not satisfied with a publication's quality or level of objectivity. One veto was enough to prevent publication.[56] In addition to this formal quality control mechanism, researchers were expected to present their work at internal seminars and circulate their manuscripts to receive feedback from their peers. Usually, advanced manuscripts first passed a staff reading committee before going to the Board of Directors reading committee (see Goldin's interview with former staff member Robert Lipsey, 2001, p. 7; see also Lipsey's description of the publication control procedure, 1991, p. 610).

At the start of World War II, the NBER and the Brookings Institution were among the leading private research organizations in the U.S. After Mitchell stepped down as Director of Research in 1945, Arthur F. Burns, a former research assistant and protégé of Mitchell, became the new director. Although the NBER secured financial support until the 1950s, Rutherford describes how it became increasingly difficult for the NBER to raise enough funds after World War II (Rutherford, 2006). Rutherford described how the NBER aligned with the scientific expectations of its financial patrons in the decades before World War II. However, as scientific techniques and theoretical norms evolved, financial patrons increasingly doubted that the NBER matched their expectations. Before World War II, the Rockefeller Foundation was the most important sponsor of the NBER and of the social sciences in the US. After World War II, the Ford Foundation became the single most important funding source. Initially, Rutherford has argued, the NBER secured funding from the Ford Foundation. However, during the 1950s and 1960s, the NBER fell out of favor with most foundations. Consequently, it became difficult for the

[56] In her biography of Milton Friedman, Jennifer Burns describes how Friedman's early work on competition in the medical sector was significantly delayed before it was published by the NBER because single members of the Board of Directors were not accepting it (Burns 2023: p. 87-92, p. 126-128).

NBER's directors to secure enough funding to cover the increased research expenses (Rutherford 2006).[57]

The NBER's financial patrons were willing to provide funds, but only for research that met their expectations. However, Arthur Burns still represented the NBER's traditional image. As Rutherford (2006) argued, he ran the NBER in the same spirit. While Burns was temporarily away from the NBER to serve on the Council of Economic Advisors, NBER officers close to Burns, such as Solomon Fabricant and Geoffrey Moore, managed its affairs until his return. After a period of severe financial insecurity about the NBER's future, a change in leadership improved the outlook, as Burns eventually announced his resignation as president of the NBER. Since no internal candidate seemed to meet expectations, a search committee of senior NBER directors was set up to find a promising external candidate. The search committee proposed John R. Meyer, a Harvard economist who worked at the intersection of transportation economics and industrial organization. He was known as one of the authors of the widely recognized book *The Economics of Competition in the Transportation Industries*, which was published in 1959 with Merton Peck, John Stenason, and Charles Zwick.[58] Meyer agreed to become president on the condition that he would have reasonable freedom to introduce changes to the NBER's organization and research program (see Rutherford 2006).

Meyer was elected president, and within his first year, he amended the NBER's bylaws. These bylaws describe the different positions within the NBER's organizational structure and define the obligations of these positions, as well as the rules that guide research and publication at the NBER. These changes included shifting some rights from the Board of Directors to the president, such as accepting new research projects and selecting the reading committee for publications on the *Board of Directors*. Importantly,

[57] Rutherford argues that also Tjalling Koopmans's attack on the business cycle research of Mitchell and Burns in the late 1940s should be understood in this context, as the NBER and the Cowles Commission were competing for funding. While the NBER stuck to their research tradition, mainstream economics moved more toward Keynesianism and formal mathematical and econometric models (Rutherford 2005).
[58] During the 1960s, Peck, Zwick, and Meyer were involved in the federal government in different advisory positions concerning transportation (see Berman 2022).

Meyer also relaxed the reading committee's quality control process for some publications like working papers.

Meyer also envisioned changing the content of NBER research. In the 1969 Annual Report, Meyer described his vision for the NBER in more detail. He named four particular areas of research in which he announced plans to expand research activity: Studies of poverty, racism, and urban change and decay; studies of growth processes; and studies of the implications of technological change; and studies of the implications of environmental change (NBER 1969: p. 3). Additionally, he planned to make greater use of computers and econometric models. Regarding the NBER research staff, Meyer planned to hire more young economists. By hiring postdoctoral researchers or assistant professors for periods of up to three years, he hoped to ensure that the NBER would stay up to date in terms of skills, techniques, and topics.

For researchers with the right areas of interest and skills, Meyer's arrival as the new NBER president could create rather favorable conditions. Over the years, the Staff Report sections in the Annual Reports have reflected some of these changes. The names of the different subsections of the staff reports remained relatively stable from 1958 to 1968. Figure 2.1 shows how the pages of the staff reports are distributed among the different subsections. The proportional number of pages of each subsection is represented among the total number of pages of the staff report for each year. Thus, each colored area represents a subsection's relative space among other staff reports in the Annual Report over time. Reading the figure from left to right shows whether a subsection is taking more or less space compared to the others.

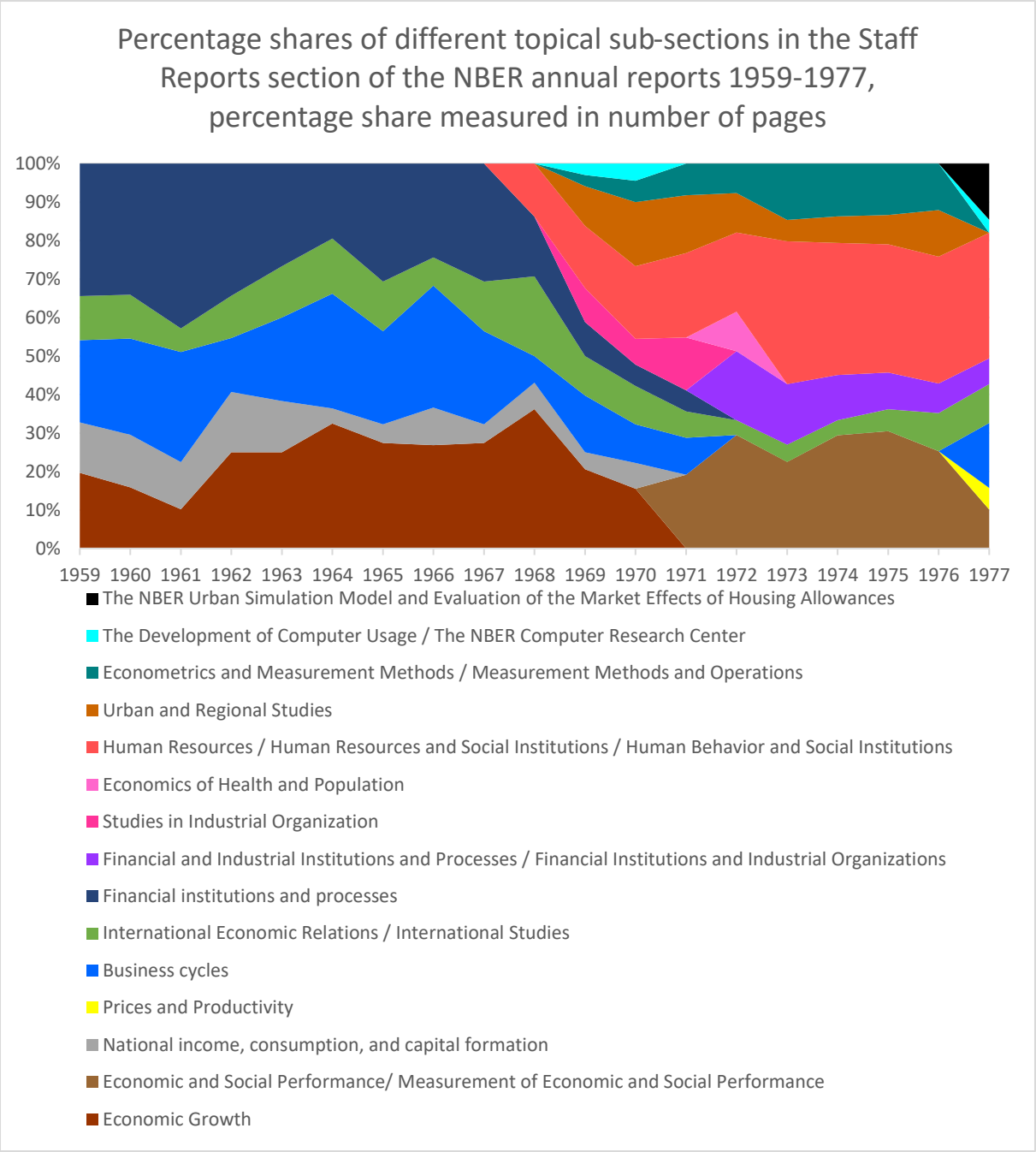

Figure 2 Subsection of the staff report section from the NBER Annual Reports from 1958 to 1977, source: own representation

In fact, Meyer's arrival as president marks a turning point for many subsections. From 1958 to 1968, the names of the subsections did not change much, and their relative

shares remained similar.[59] However, beginning in 1969, four new subsections were created. These new subsections include Urban and Regional Studies, Econometrics and Measurement Methods, Economic and Social Performance, and Human Resources and Social Institutions. Within the yearly staff reports, the subsection linked to human resources and social institutions makes up a considerable portion, roughly 30 percent, from 1973 to 1977. Similarly, the Economic and Social Performance subsection occupied many pages in the staff report section. The NBER stopped publishing the annual reports after 1977, but one can still see that several subsection titles were changed again in 1977 when Martin Feldstein became the new NBER president.

The position of President wasn't the only one that changed in the 1960s; the position of Director of Research changed as well. Solomon Fabricant, a close ally of Burns, had been the NBER's Director of Research since 1954. He served in this position during the 1950s and 1960s. Fabricant was heavily involved in studies on productivity and growth. After Fabricant wanted more time for his own research, Geoffrey H. Moore, another ally of Burns, became Director of Research for two years. In 1967, Victor Fuchs, a former research staff member working on the service sector, shared the position of Director of Research. Fuchs remained Director of Research and Vice President until 1977. For most of those years, Fuchs shared the position with two or three other officers. Fuchs would become heavily involved in raising and maintaining the NBER program of health economics in the following years.

Not only have there been major general changes in the US policy making institutions in the late 1960s, there have also been important changes within the organizational structures of the NBER. In the following section, we will describe how some institutional entrepreneurs benefited from these changes.

[59] A change in subsection names does not mean that entire teams of researchers were abruptly replaced with new teams working on different subjects. Rather, the name changes reflect a restructuring and reprioritization that made funding accessible to those willing to respond to new demands.

1.3 Institutional Entrepreneurs: Gary Becker in a Community of Like-Minded Fellows at the NBER

The economic approach to human behavior was partly successful due to environmental changes within the U.S. government and organizational changes at the NBER. However, the economic approach took its particular form due to the collective efforts of certain institutional entrepreneurs at the NBER. In this section, we will focus on Gary Becker, who was one of the driving forces behind establishing the CEAHBSI intellectual community at the NBER. However, we must also mention some of his allies, such as Jacob Mincer and Victor Fuchs. They worked alongside Becker and were important leaders in the community they developed together. Since creation and nurturing were collective efforts, focusing only on Becker would be misleading.

In a first step we look at the 1960s and early 1970s and we summarize our observations in two periods: First, from 1957 to 1967; second, from 1968 to 1972. In Part Four we are going to resume the activity from 1972 to 1980.

1.3.1 1957 – 1967: Getting a grip at the NBER

When Becker arrived at the National Bureau in 1957, it was still more of a local New York City organization than a national institution.[60] All of its physical facilities were in New York, as were most of its researchers.

From his first year, Becker was responsible for a project on the economic returns of education. In 1957, Solomon Fabricant, the Director of Research, raised $37,500 from the Carnegie Corporation for Becker and a research assistant. In an interview Becker remembered that, in the beginning his work on human capital "started out entirely as an empirical study." While others, such as Theodore Schultz at the University of Chicago, were working on human capital, Becker believed that the empirical work had not been

[60] Becker said that after finishing his Ph.D. at the University of Chicago, he wanted to become more independent of his professors. After receiving an offer from Columbia University, Becker was introduced to the NBER through his former professor, Milton Friedman (Goldin and Katz, 2003, pp. 3, 12).

conducted carefully enough to accurately estimate returns (Goldin & Katz, 2003, p. 3). Becker's project was part of the subsection on national income, consumption, and capital formation (NBER 1958: 23–24).[61]

During his early years at the NBER, Becker maintained close contact with his former professor, Ted Schultz, at the University of Chicago. Becker remembers, "I was in constant communication with Ted when I was working on human capital. We interacted frequently, and I learned a lot from Ted." In 1961, Schultz organized the *Exploratory Conference on Capital Investment in Human Beings*, which was hosted at the *Carnegie Endowment International Center* in New York City. The conference was partly financed by the *Universities-National Bureau Committee* of the NBER. It was also supported by the *Carnegie Corporation*. The papers presented at the conference were published a year later in a special issue of the *Journal of Political Economy* (JPE, 1962), which became a well-known reference in the literature. Schultz was chairman of the conference's program committee, and Becker was his secretary.

Over the years, Becker's project flourished. As a result, he was able to publish much of his work in the book *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education* (1964). The book was an official NBER publication and part of the General Studies series. This meant that his manuscript had to pass the Board of Directors' internal quality control process in the form of a reading committee.[62] Throughout the 1960s, Becker expanded the project and received two follow-up grants from the *Carnegie Corporation*. He also included other researchers in the project. In 1963, he announced that Albert Fishlow would examine historical trends in education in the US (NBER 1963: p. 56). In 1966, he announced that Barry Chiswick and Linda Kee would join the project as research assistants. The following year, Becker's research assistant, Dave

[61] At the time, NBER research was classified into six subsections in the annual report. 1. National Income, Consumption, and Capital Formation; 2. Business Cycles; 3. Economic Growth;4. Banking and Finance; 5. Government Activity and Finance; and 6. International Economic Relations.

[62] According to the preface of his book the reading committee consisted of George J. Stigler, Richard Easterlin, Albert Fishlow, Milton Friedman and Zvi Griliches (Becker 1964: p. xvi).

O'Neill, authored his own staff report.[63] Over the following years, Becker continued to involve many of his and Mincer's Ph.D. candidates from Columbia in NBER research projects (see Teixeira, 2021, and Beller et al. 2024, for lists of Becker's and Mincer's Ph.D. candidates).

It is interesting to compare Becker's arrival at the NBER with that of his future colleague, Jacob Mincer. When Becker arrived at the NBER at age 27, he was immediately put in charge of his own research project in an area that interested him greatly. Things ran differently for Mincer. Eight years older than Becker, Mincer had a different personal upbringing. Born in Poland, he studied engineering for a year in Czechoslovakia before the Nazis took power. After surviving the German occupation, the 26-year-old Mincer immigrated to the United States in 1948. He began working on his Ph.D. at Columbia University in 1950.[64] Like Becker, Mincer was attracted to the NBER by the opportunity to conduct empirical research. In 1952, he became a research assistant to Ruth Mack, who was on the NBER's full-time research staff. He finished his thesis, A Study of Personal Income Distribution, in 1957. At the invitation of Theodore Schultz, he went to the University of Chicago on a postdoctoral fellowship the following year. After returning to New York, the NBER hired Mincer as a research staff member in 1960. He replaced a statistician, so his initial task was to assist with statistical procedures although his PhD thesis was about personal income distribution and human capital (Goldin 2002: 2, 5–6, 11; see also Chiswick 2007). Mincer's first staff report on a project more directly linked to his doctoral thesis appeared in the Annual Report in 1966. While Becker arrived as a praised student and immediately became a staff researcher with his own project, Mincer took the more common path of advancing from research assistant to staff researcher over eight years.

[63] Both Barry Chiswick and Dave O'Neill have been PhD students at Columbia University that participated in Becker and Mincer's Labor Workshop (see Beller et al. 2024).
[64] Mincer started his PhD at the University of Chicago, but moved to Columbia University not long after (see Chiswick 2007).

Mincer met Becker after returning from his postdoctoral year in Chicago. At the time, the young Becker already had an impressive reputation. In an interview Mincer said, "I heard all kinds of stories about Gary, about his approach to demographic economics, something completely new to me, and the fact that he had already written two published articles while an undergrad […]" (Goldin 2002: p. 8).[65] Mincer said that in the following, he and Becker made it "a custom to meet for lunch once a week, each week." Over the years, they became close partners in establishing the Labor Workshop at Columbia University, where Mincer became an associate professor in 1959. For more on the Columbia Labor Workshop, see Teixeira (2021) and Grossbard (2006).

Becker and Mincer had a lot in common as applied price theorists. They both admired the NBER as a place where sound empirical research was conducted in the early 1960s. However, they both thought that the NBER's research often lacked engagement with theory. As a research assistant at the NBER, Mincer experienced the debate between Koopmans and Burns. According to Goldin (2002: p. 5), Mincer perceived that at the NBER there "was no confrontation of theory with empirical measurement," and that "theory wasn't being mobilized to attack the data". For Becker, Burns and Mitchell were "basically antitheoretical." By the time Becker arrived, he argued that the NBER had "developed a strong tradition [...] of very empirical, very careful work, which was not the standard of the profession at that time, which was largely non-empirical" (Goldin and Katz 2003: p. 1). When he arrived "pretty much all the Bureau was in business cycle staff." He viewed NBER research staff from that time, such as Ruth Mack and Thor Hultgren, as "very empirical" and lacking a solid understanding of economics. According to Becker, the Bureau did not perform enough analysis (Goldin and Katz 2003: p. 7f.).

In their own way, both Becker and Mincer introduced the missing theory. In the following decades, Mincer focused on human capital, income distribution, and the labor market. He is often remembered for his empirical application of the human capital earnings

[65] For example, Mincer remembered hearing that when Becker applied to the University of Chicago for graduate work, Jacob Viner wrote a letter saying, "Gary is the best student I ever had" (Goldin 2002: p. 8).

function (see Teixeira 2007 and Chiswick, 2007). Becker applied the general human capital framework to various other problems. Becker recounted his first seminar at the NBER: "I made it very, very empirical and I thought it was a poor seminar because [...] I felt I wasn't doing my comparative advantage [...]." He remembered being asked about the broader issues he was addressing. Those were actually the issues that interested Becker the most. After that, he said that he had learned his lesson and started to speak more directly about what he wanted. As he gained influence, he began pushing for more formal analysis in his work at the NBER. He said, "in my own work I began to report on some more theoretical aspects, and I found that these people were interested in that even though they were highly empirical, so the Bureau maintained its empirical bent while I was at New York but gradually also began to allow some more theory" (Goldin & Katz, 2003, p. 10). This shift is reflected in the articles of Becker and Mincer presented at Schultz's exploratory conference on investments in human beings in 1961. While Mincer presented a paper called *On-the-Job Training: Costs, Returns, and Some Implications*, Becker's paper was titled *Investment in Human Capital: A Theoretical Analysis* (Becker, 1962).

Becker and Mincer had different personalities and played different roles within the intellectual community. Becker was very outgoing. He reminisced about his early years at the Bureau:"anybody you could mention that was at the Bureau I knew them, because I'd go in a lot. I'd go to all the seminars. Sure I knew them all, and I was on good terms with all of them" (Goldin and Katz 2003: p. 10). When Mincer arrived at the NBER in the 1950s, however, he described himself as shy (Goldin 2002: p. 5). Regarding their shared workshop, Teixeira has argued that Becker and Mincer "were both regarded as excellent teachers, though with very different styles." He described Becker as "admired as being a brilliant professor, but also very intimidating." And he described Mincer as "praised for his clear, articulated, methodical teaching" with which he "taught the students basic elements about statistics and especially its usefulness for economic analysis" (Teixeira 2021: p. 670). Teixeira described Mincer as taking a more empirically oriented approach and showing his students how human capital research could be applied to explain various aspects of the labor market. Teixeira argued that Becker "Becker explored those matters

more on a theoretical basis" (Teixeira 2021: p. 671). Victor Fuchs, the NBER's vice president in the 1970s, praised Becker as "a major intellectual leader at the Bureau" despite his young age. Later in 1994 Fuchs praised Becker arguing that "many would say that he [Becker] was the most significant intellectual force as the Bureau shifted from an emphasis on business cycles and national income to a wider set of economic and social issues. Either directly or indirectly Becker played a large role in the creation of many new Bureau programs, including those in law and economics, education, health, the family, income distribution, and labor economics" (Fuchs 1994: p. 186).

Former Becker student Shoshana Grossbard describes Becker as a charismatic scholar who became increasingly political in his academic work over the years. She wrote, "While both Mincer and Becker tried to minimize the role played by political and ideological considerations, they differed in their adherence to strategies aimed at separating politics from academic pursuits." Grossbard argued that Mincer remained "very adamant about avoiding political discussions during professional interactions," and that "this policy, which Mincer continued to enforce until his retirement, facilitated fruitful cooperation among people – men and women – with diverse political opinions and personal lifestyles" (2006: p. 40). After moving to Chicago in 1970, Becker did not shy away from politically controversial issues in his work, such as the role and societal place of women. Together with Andrea Beller, Ana Fava, and Marouane Idmansour, Grossbard argued that Becker's writings and teachings on the economics of the family in the 1970s included justifications for a gendered division of labor based on biological arguments, such as genetic fitness. For example, they claim that Becker attributed women's comparative advantage in household production and men's comparative advantage in market work to "selection over time of traits having greater genetic fitness and survival value" (Becker, 1976). They also argue that such biological determinism entered Becker's teaching on family economics in the 1970s at the University of Chicago. According to the authors,

"earlier publications […] by Becker or Mincer did not express implicit or explicit support for gender differentiation to the same extent" (Beller et al. 2024, p. 30).[66]

Victor Fuchs also played a major role in organizing research programs at the NBER. Along with Mincer, Fuchs was one of Becker's key allies at the NBER. He began his Ph.D. at Columbia University in 1950 and finished in 1955. After holding teaching positions at Columbia and New York University, he worked as a program officer at the Ford Foundation from 1959 to 1961. He became a research staff member at the NBER in 1962. After becoming associate director of research in 1966, he became vice president of research, the same year Meyer became president of the NBER in 1968. In the 1970s, Fuchs became president of the CEAHBSI. The history of Fuchs's early years at the NBER provides a good example for the importance of tacit knowledge embedded in the social environment.

Fuchs was familiar with the NBER from a brief visit in 1958. At the time, he was teaching at Columbia without a clear research focus. His PhD supervisor, George Stigler, asked him to write a chapter for a book financed by the *Social Science Research Council*. The book, which was part of a series of census monographs, was about the location of industries. Stigler was on the organizing committee of that series. Fuchs recalled, "I liked working with numbers, and this obviously afforded an opportunity to dig into a large dataset" (Goldin 2002a: 4). For a semester, Fuchs took leave from his teaching position at Columbia and regularly visited the NBER. Under Stigler's and the Social Science Research Council's guidance, Fuchs remembered to have learned how to access restricted data at the Census Bureau in Maryland and how to use it (Goldin 2002a: p. 6f.).

In 1959, Fuchs left his position as an assistant professor at New York University to become a program officer at the Ford Foundation. What appeared to be a move away from academia actually drew Fuchs deeper into academia over time. He recounted that he found his teaching position unattractive: "I didn't find the students at all challenging or

[66] For a complementary assessment of Becker's embedding of questions of gender in his family economics, see also Becchio (2024, especially chapter 5) and Bankovsky (2025, especially chapter 5).

interesting, and I didn't find the intellectual environment contributing to my development and intellectual growth." He considered going to the Ford Foundation thanks to friends from Columbia who had connections there. They encouraged him, saying, "You know, this is an opportunity to learn and do things." For Fuchs, this turned out to be the case: "I learned a great deal there. Most of the top economists in the country came through the office one way or another [...]" (Goldin, 2002a, p. 9).

While at the *Ford Foundation*, Fuchs learned how to align his research questions with the interests of potential financial sponsors. He worked in a program called *Economic Development and Administration*. According to Fuchs, each program officer was "free to develop his own ideas," and he became interested in problems related to human resources. It was then that Fuchs first became interested in the health field and initiated a project on health, education, and welfare (Goldin 2002a: p. 8). The president of the *Ford Foundation*, Henry Heald, then asked Fuchs to report on whether the foundation should get involved in health. Fuchs concluded that "the Foundation should stay out of the field of financing biomedical research, and medical schools and the like [...], but that it should provide support for work in health economics, and health-care administration [...]" (Goldin 2002a: p. 9).

For his project on health, economics, and welfare, Fuchs commissioned renowned scholars to write books and essays on these topics. Three books and a notable article resulted from this endeavor. These books included Theodore Schultz's *The Economic Value of Education* (1963), Herbert Klarman's *The Economics of Health* (1965), and Margaret Gordon's *The Economics of Welfare Policies* (1963). Additionally, Kenneth Arrow's article *Uncertainty and the Welfare Economics of Medical Care* (Arrow, 1978) was initially commissioned by Fuchs. The article is sometimes heralded as the beginning of modern health economics.

The *Ford Foundation* was also interested in these fields. In the foreword to Schultz's book, Henry H. Villard, the Director of Ford's Program in *Economic Development and Administration*, wrote, "this monograph is one of a series of three

dealing with the economics of health, education and welfare. In commissioning these volumes, the Ford Foundation was influenced by the fact that expenditures in these three fields are in excess of $100 billion annually, that they are among the most important and sensitive areas of the entire economy, and that communication between economists and those making policy and operating decisions in these areas has been infrequent and irregular" (Villard cited in Schultz 1963: p. v). Although Johnson's Great Society programs were still to come, by 1963, foundations were already keeping an eye on federal agency spending, such as that of the *Department of Health, Education, and Welfare*.

In 1962, Fuchs left his position at the Ford Foundation to head a research project at the NBER. The NBER's Director of Research, Solomon Fabricant, had contacted him about heading a new research project on the service industries. Interested in the role of services in US society, Fuchs became a full-time NBER staff researcher, going in practically every day" (Goldin 2002a: 11–12).[67] Fuchs's first staff report, published in 1963, was titled Exploratory Study of Productivity and Growth (NBER 1963: p. 50). The title changed slightly in his second year to Productivity in the Service Industries, by which time the NBER had obtained three years of funding for the project from the Ford Foundation (NBER 1964: p. 61). In that staff report, Fuchs planned industry studies on "the problem of productivity and related changes in particular service industries" as well as broader studies related to questions such as "the quality of labor" that cut across industry lines (NBER 1964: 61–62).

Fuchs found a nurturing environment at the NBER, and the NBER found a nurturing research entrepreneur in him. He argued that the 1960s at the Bureau were "a very, very fruitful time." He considered it a "long and late post-doctoral experience" in which he learned to be a good researcher. The Bureau could nurture Fuchs "because there were very good people around, [...] particularly, Gary Becker," as Fuchs remembered (see

[67] Fuchs believed "the whole American economy was being transformed, from an industrial to a post-industrial society, and it was being led by the shifted employment, just as the Industrial Revolution had been led by shifting employment from agriculture to industry" (Goldin 2002a: p. 11).

Goldin, 2002a, p. 12).[68] In return, Fuchs brought his skills, ideas, and effort to the NBER. Becker had a positive memory of Fuchs's return to the NBER: "when I first met Victor Fuchs, he was teaching at [the] General Studies [program of New York University]. [...] He was a Columbia PhD., one of these big nice guys, who I never took very seriously, to tell the truth. I liked him. I mean, he was a nice person and then he went to the Ford Foundation for two years, and usually you get ruined by going to a foundation, but he came back much better than ever." Becker recalled that Fuchs "had a lot of ideas, brilliant 12ideas. So he and I began to interact a great deal" (Goldin and Katz 2003: p. 5).[1]

While still working on the project about service industries, Fuchs eventually turned his attention to the health and health services industry. In 1965, he reports, among other things, having started "a study of productivity in health" with "principal attention given to the problem of measuring the output of the health industry." Although output has traditionally been measured by the number of physician visits and hospital patient days, Fuchs supposed "that output should be reflected in the health of the population." He argued that "one important, readily available, and objective measure of health is the death rate." In his staff report, he proposed investigating "the relations over time and among states and countries between death rates and inputs of health resources, income, industrialization, and other economic and social variables." Although he acknowledged the complexities and problems of using the death rate as a measure, he anticipated "useful insights into the economic aspects of health" (NBER 1965: p. 48).

Judged by the staff reports from this early period (1957 – 1967), Fuchs seemed even more active than Becker in delegating tasks to research assistants. In his 1964 staff report he mentioned the participation of Harry Gilman, Ernest Kurnow, David Schwartzman, and Jean Wilburn in his project. Gilman, Schwartzman and Kurnow wrote staff reports in the same year, Wilburn a year later. In his staff report in 1966 he named Harriet S. Rubin, Deborah W. Sarachek, Irving Leveson, Richard Auster, and Reuben

[68] Next to his PhD supervisor Stigler, Fuchs identified Becker in an interview with Claudia Goldin as one of two primary influences on his intellectual development, theory, and economics (Goldin 2002a: p. 12).

Gronau. In 1967 he mentioned also Henrietta Lichtenbaum, Kay Wilson, Lorraine Wolch as assistants, and Lorraine Lusardi as secretary.

In 1967, Fuchs began reporting on a second research project titled "Economics of Health." In this project, he planned to conduct five types of studies: "Descriptive Industry Studies," "Studies of Output and Productivity," "Studies on Decision Making and the Allocation of Resources at Three Levels," "Studies of Alternative Institutional Arrangements for Producing and Financing Health Services," and "Studies of Innovation and Diffusion." The three levels of resource allocation are: 1) "resources for health versus other social goals," 2) "resources for health services versus other factors affecting health," and 3) "the allocation of resources among different types of health services" (NBER 1967: p. 59). Fuchs' project on health economics marked the beginning of a significant and ongoing program of applied research within the NBER that continues until the present day.

To guide the implementation of the health economics research project, Fuchs created an advisory committee consisting mostly of people from outside the NBER. The committee consisted of an interdisciplinary group of individuals. George James, the dean of the *Mount Sinai Medical School* in New York, where Fuchs held a part-time teaching position in the 1960s, headed the committee. Initially, the committee consisted of twelve people from business, research, medical, and governmental institutions. Among them were two economics professors: Becker and Melvin Reder from Stanford University.[69] William Gorham, the *Assistant Secretary for Program Coordination* in President Johnson's *Department of Health, Education, and Welfare*, was also a member (see section 2). In

[69] The other initial committee members were James Brindle, president of the *Health Insurance Plan of Greater New York*, Norton Brown, chairman of the *New York Academy of Medicine*, Eveline Burns, professor at the *Columbia School of Social Work*, Marion B. Folsom, director of the *Eastman Kodak Company* who had been *U.S. Secretary of Health, Welfare, and Administration* from 1955 to 1958, Eli Ginzberg, director of the *Conservation of Human Resources* at *Columbia University*, William Gorham from the *Department of Health, Education and Welfare*, David Lyall, a practicing surgeon, Peter Rogartz, executive director of the *Long Island Jewish Hospital*, James Strickler, assistant to the president of the *Cornell-New York Medical Center*, and Gus Tyler, assistant president of the *International Ladies' Garment Workers' Union*.

1968, Fuchs announced that he had obtained funding from one of the *Department of Health, Education, and Welfare*'s budgeting and evaluation units. This funding was renewed over the years and continued until at least 1977. Thus, in the late 1960s, Fuchs and his allies at the NBER directly profited from the broader changes in federal funding for policy research.

1.3.2 1968 – 1972: Becoming a hotspot for human resource research

By the end of the 1960s, activities in human resource studies at the NBER had intensified. By 1968, Becker, Fuchs, and Mincer were engaged in leading research projects and continued to integrate young scholars, often from the Columbia Labor Workshop, into their studies. As Teixeira (2021) has argued, the NBER, as a learning environment, complemented the purely academic *Labor Workshop* at Columbia. While the workshop shaped their economic intellectual framework, the NBER offered research assistant positions where they could apply their skills to real datasets and learn from senior staff. 1968 was also an important year for the NBER because George Meyer became its new president. As explained in Section 2.2, Meyer was an outside candidate who planned to implement changes at the NBER. At the same time, Fuchs became Vice President of Research alongside Geoffrey Moore, who had experience in the position.

Many young scholars became involved in Becker's, Mincer's, and Fuchs's research projects. With more researchers involved their projects expanded in scope. Starting from 1969 the staff report section *Human resources* changed its name into *Human Resources and Social Institutions*. Each section also came with an introductory staff report, written by those researchers who coordinated the different research projects by different people in each subsection. In 1969 the introductory report to the *Human Resources and Social Institutions* section was written by Becker and Thomas Juster.[70] Staff reports within that

[70] Juster is listed as staff member of the NBER since the 1959 report. In his research projects he assessed differences between consumer's intentions to purchase and their actual purchases, see for example NBER Annual (NBER 1959: p. 35-38). In part he worked in a project on consumer finances lead by Robert Shay.

section were henceforth further regrouped into topical areas. For example, in 1969 the topical subsections were *Human Capital and the Personal Distribution of Income* with reports by Mincer and Barry Chiswick, *Human Capital and Consumption* with reports by Gilbert R. Ghez, Becker, Robert T. Michael, Paul Taubman, Terence Wales and Sherwin Rosen, and *Law and Economics* with reports of William M. Landes and Isaac Ehrlich. The general introduction to the sub-section in is written by Juster and Becker. In 1971 a subsection of *Population Studies* appeared as a new applied area in the section *Human Resources and Social Institutions*.

From 1968 to 1972, over twenty young researchers became authors of staff reports in the *Human Resources and Social Institutions* section or the *Industrial Organization* sub-section, which contained Fuchs's project, *Economics of Health*. At least ten of these researchers were students of Becker and Mincer at *Columbia University*.[71] Teixeira described the relationship between the *Columbia Labor Workshop* and the NBER as a mutually beneficial situation for the participating researchers and the host institution. The researchers benefited from intellectual exchange, research opportunities, and networking possibilities, while the NBER profited from scholarly activity and the establishment of new sites of knowledge creation, such as health economics and the economics of education (Teixeira 2021: p. 673).

The human resources department also attracted many NBER visiting scholars. In the 1960s, selected research fellows came from different U.S. universities and received scholarships financed by NBER sponsors. They could spend one year at the New York facilities to intensify their research in one of the NBER's program areas. From 1967 to 1971, many of the incoming NBER research fellows were engaged in the human resources research area. These fellows included Sherwin Rosen (1967), William Landes (1968), V. K. Chetty, Lewis Solmon, and Finis Welch (1969), and John C. Hause and Robert Willis

[71] Pedro Teixeira lists nine as participants of the Columbia Labor Workshop lead by Becker and Mincer in the late 1960s and early 1970s (see Teixeira 2021: p. 687-688). Beller et al. 2024 also list Sue Goetz Ross as a doctoral student of Becker and Mincer (Beller et al. 2024)

(1970).[72] As more people became involved in human resource projects, the NBER became a hub for young, like-minded scholars working on various applied questions. In the 1970 Annual Report, Welch wrote a survey essay titled *The NBER Approach to Human Resource Problems* (NBER 1971: p. 9).

By 1972, Becker had left education and the labor market behind in order to address new problems. He had also moved geographically from New York to Chicago. Now, he and William Landes wrote the introduction to the subsection *Law and Economics*. The other topical subdivisions that year were introduced by Juster (*Education and Other Studies on Human Capital*), Finis Welch (*Labor Market Studies*), and Fuchs (*Economics of Health and Population*).[73] More senior researchers like Becker, Mincer, and Fuchs profited from these developments, as their research themes expanded and their work became central to providing guiding principles for applying theory or ideas in different research areas.

Increased network activity and an extension of a common research program are reflected in staff reports. Since the general form of the reports has not changed over the years, we can use them to capture research activities at the NBER. By counting basic information, such as the number of project reports per author each year, we can approximate each author's level and duration of activity. Table 3 in the annex section 10.4 lists authors active in the human resources area at the NBER from 1958 to 1977. These tables show how many staff reports each author wrote per year. We can track whether staff reports mention other researchers. This occurs when an author mentions the work of another researcher (NBER intern or extern) in a staff report, or when introductory staff reports list the people engaged in a project. Collecting this information for all authors in the human resources research area for each year and accumulating it over time allows us to represent the research community as a network graph. In such a network, nodes represent

[72] In the later period, James Heckman (in 1972) and in Mark Pauly (in 1974) were Research Fellows at the NBER as well.

[73] On paper, the part of the staff reports introduced by Fuchs contributes an own sub-section next to the sub-section *Human Resources and Social Institutions*.

researchers or cited researchers, and they are linked to other researchers either because they mention them, they are mentioned by others, or they have written a staff report together.

Figures 3, 4, and 5 show network representations derived from the staff reports for the periods 1958–1962, 1963–1967, and 1968–1972. These time frames were chosen pragmatically to align with the broader structure of this chapter. We do not intend to perform any kind of sophisticated network analysis here. The main purpose of these figures is to provide an illustration of the network and the researchers active within it. In each figure, we included only researchers related to research activities in the human resources area. Green nodes represent researchers who were authors of staff reports during that period and were thus responsible for a research project in at least one year within that period. Each red node represents a researcher cited by one of those staff reports. Red nodes represent other researchers, assistants, secretaries, and other NBER internal personnel, as well as external personnel, including deceased individuals such as Alfred Marshall.

If an author of a staff report mentions another person in the report, we connect the two nodes with a directed edge, or arrow, pointing towards the person mentioned. If two authors write a staff report together, we count it as if they cited each other. We aggregate our results over five-year periods and weigh the edges (links) between two nodes based on how many times an author has been connected to another person during that period. Thus, the thicker the edge, the more often an author cited a person during that period. We count a maximum of one mention per staff report; we do not count how often a person is named in an author's staff report. Finally, we use a ForceAtlas2 algorithm to simulate a gravity model and place the network in space.[74] The size of each node is defined by the total number of staff reports written during the respective period. The larger the node, the more staff reports that person has written.

Our approach to creating these network representations involved several choices that determine what we see represented. First, we identified the authors who we consider

[74] ForceAtlas2 allocates a connected graph in space by holding together nodes that are strongly connected and pushing weakly or unconnected links farther apart.

to be part of the human resources area through a qualitative reading of the staff reports. Next, we defined how to link different nodes. Finally, we defined the observation periods over which we would aggregate network activities. Figure 3 shows that from 1958 to 1962, only three researchers were responsible for projects that would later be related to human resources at the NBER: Gary Becker, Thomas Juster, and George Stigler. Stigler is connected to many people because he reported on a committee on prices in which many others were engaged. Juster and Becker are only weakly linked to each other via Milton Friedman, who was an NBER staff member since the 1940s.[75] Mincer is cited by Becker, but he is not yet responsible for independent research projects reported in the staff reports section.

[75] In 1958 Friedman published the NBER monography *A Theory of the Consumption Function* in which he presented the idea of a permanent income hypothesis that he had developed together with his wife Rose Friedman, Dorothy Brady, and Margaret Reid (see Burns 2022).

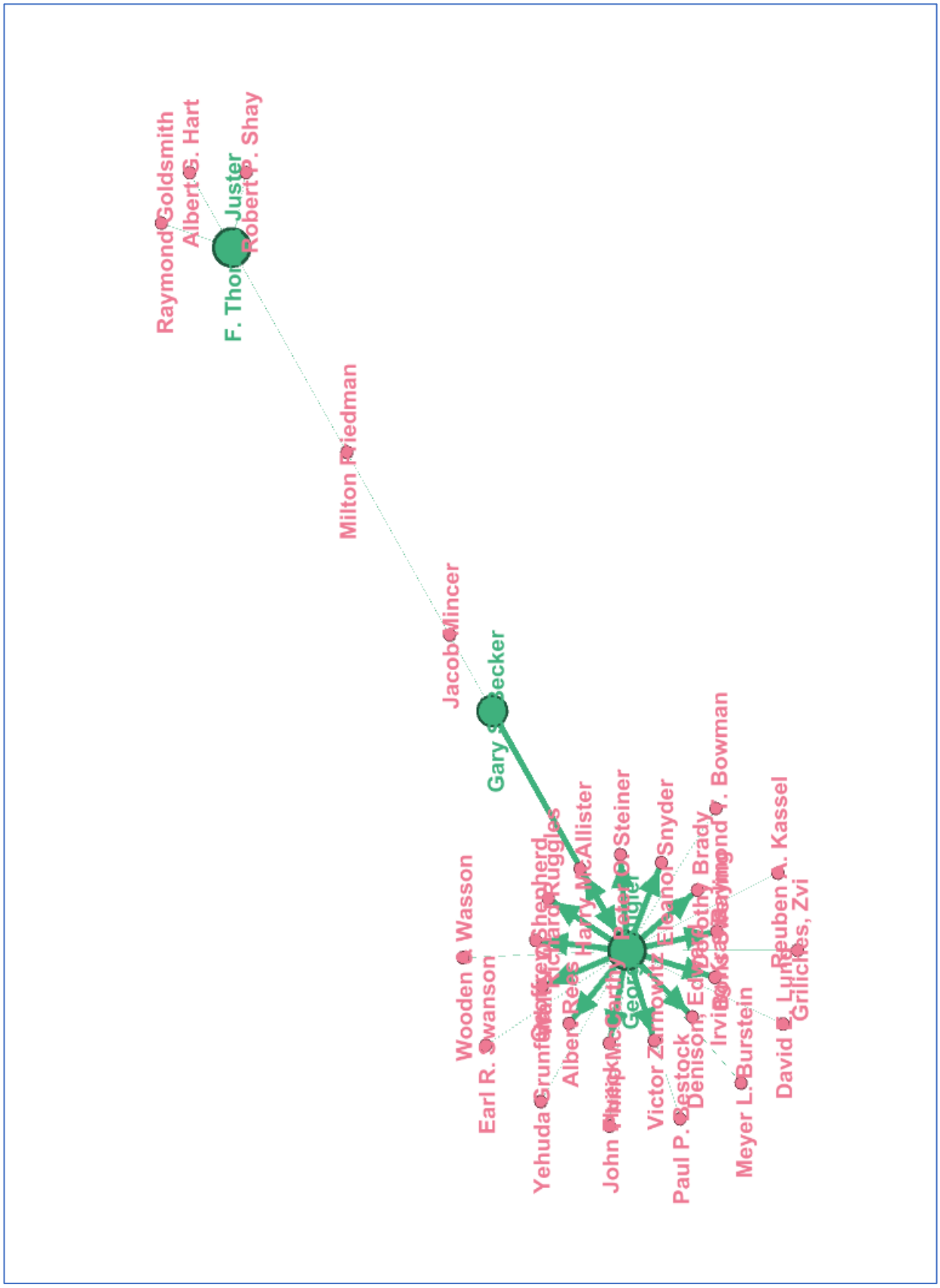

Figure 3: Citation network for authors from the later human resources section from the staff report section of the NBER Annual Reports 1958-1962

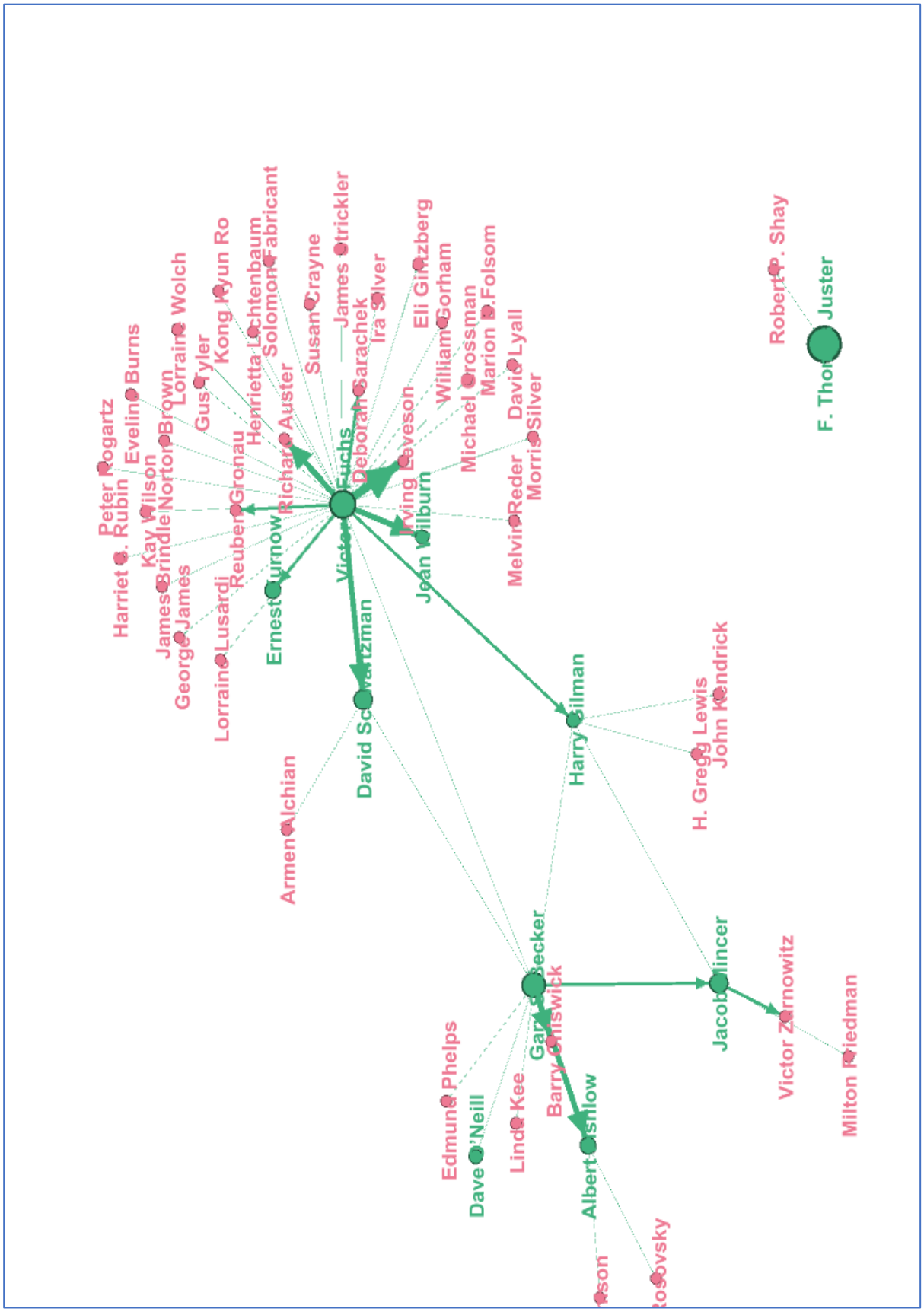

Figure 4: Citation network for authors from the later human resources section from the staff report section of the NBER Annual Reports 1963-1967

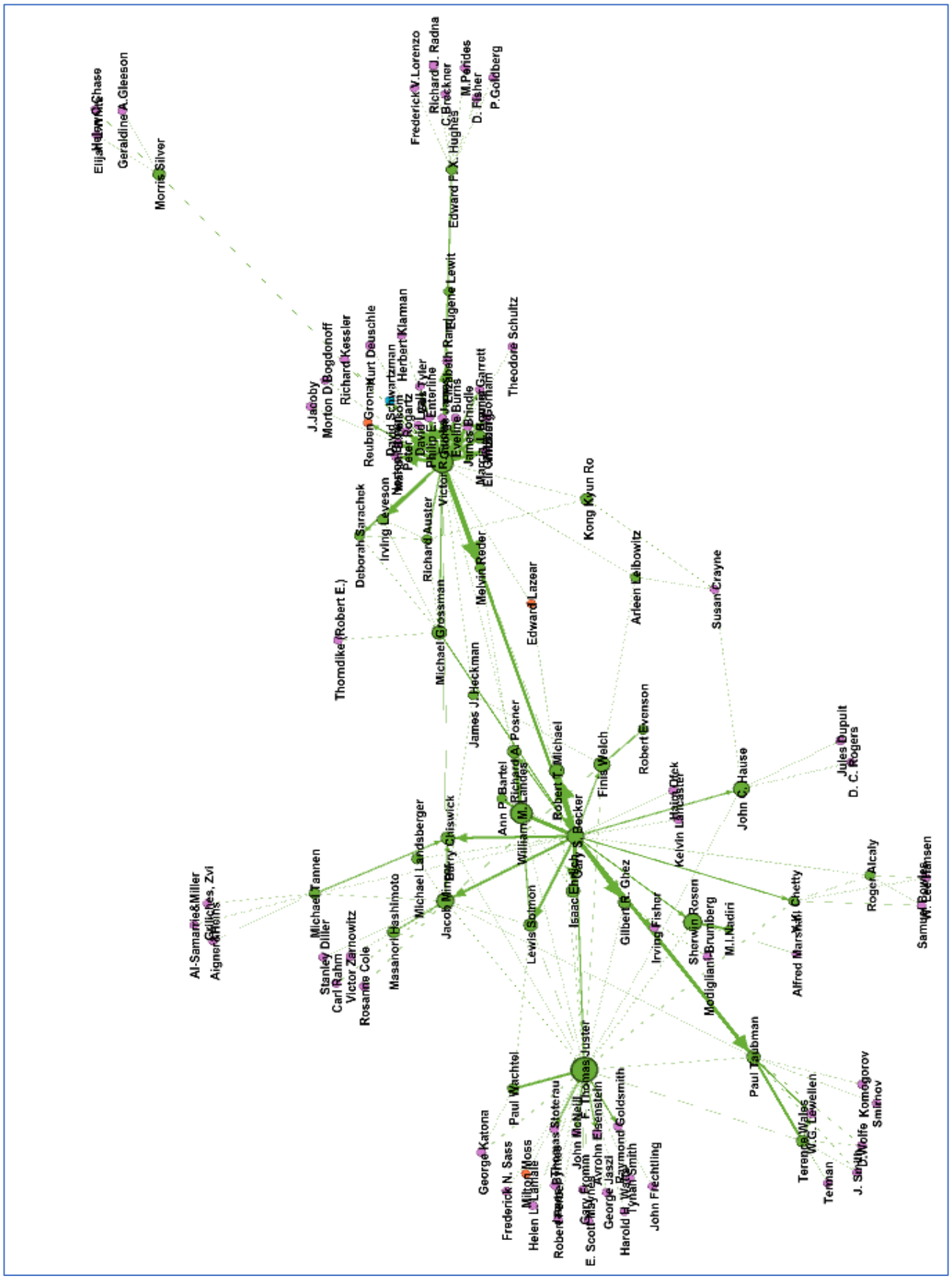

Figure 5: Citation network for authors from the later human resources section from the staff report section of the NBER Annual Reports 1968-1972

Figure 4 shows that the number of authors active in the field of human resources rose to nine between 1963 and 1967. Fuchs and Becker are two central nodes that link to other staff report authors. This reflects the increased involvement of research assistants in Becker's and Fuchs's projects. Fuchs is also linked to many external individuals (red nodes) because, in 1967, he reported on his project, "Economics of Health," for which he established a program committee with many external individuals. Becker and Fuchs are only weakly linked directly. But they are indirectly linked via David Schwartzman, Harry Gilman, and Jacob Mincer, all of whom report on ongoing projects. Thomas Juster is not yet connected to the rest of the graph, even this would change later on.

Figure 5 shows that the network has grown even larger. From 1968 to 1972, nearly 40 authors were part of the NBER research group working on human resource issues. Fuchs and Becker remain central nodes, with Fuchs connected to more outside individuals as he mentioned the program committee for the economics of health project. By now, Becker is linked to many more researchers who are authors of staff reports themselves. Compared to the period from 1963 to 1967, Becker appears much more central than Fuchs. Together with Melvin Reder, Grossman is a linking node between the local network hubs around Becker and Fuchs. Juster has also become engaged in organizing research in the human resources area. He is also linked to many of these authors because he is responsible for a book project that includes their work. However, his links are rather weak in our representation. Juster is also linked to a variety of people not involved in the human resources research project but active in other NBER projects, such as the Economic and Social Measurement project. During this period, a small component appears on the lower right that is not linked to the main component of the network. This component contains researchers from the Population Studies subsection. It would become connected to the rest of the network after 1972.

Figures 3, 4, and 5 illustrate the growth and increasingly interconnected nature of the research community. Becker and Fuchs's centrality is partly explained by their frequent authorship of introductory staff reports on sub-sections such as *Economics of Health* or

Law and Economics. These reports usually summarize the research conducted in the area and mention the researchers involved. This is why they have greater centrality in the network representation. However, their centrality may also be justified by their administrative role in sponsored research projects, which required them to oversee the work of others.

Following Meyer's arrival in 1968, many titles of entire subsections in the NBER staff reports changed in the years that followed. This change in wording reflects not only new research priorities, but it reflects also changes in funding. Not only were the subsections newly ordered, but the titles of research areas within the subsections also changed. Within the *Human Resources and Social Institutions* subsection, the exact titles of the research areas change slightly from year to year. Table 1 in the annex provides an overview of the changes that occurred in different years. These changes reflect the different funds that researchers in the subsection could access for their research over the years. Becker reported that, under Burns's presidency, he did not receive sufficient support to conduct a law and economics project. Becker remembered, "he [Burns] was a very smart man, and he was sympathetic to my work, but he didn't want [all of it at] the Bureau. He had the old conception of the Bureau: Stay within the confines. [...] So while he was quite receptive to the human capital work, [...] but the law and economics stuff he turned down" (Goldin and Katz 2003: p. 6). Staff reports on projects analyzing law and economics first appeared in the 1969 Annual Report shortly after Meyer arrived (NBER 1969: p. 74).

Over the following years, researchers such as Becker, Fuchs, and Juster had access to new sources of funding for their research projects at the NBER. Figure 6 shows the major sources of funding raised for human resource studies at the NBER over time. Each funding source is represented by a horizontal bar on a timeline. Each bar's position and length represent when the funding was made available and how long it continued. The researchers responsible for the different research projects connected to each source are also noted. The color of each bar indicates the broader research area within human resource

studies to which the funding was intended. Funding from federal agencies is marked with a small red arrow. All information was retrieved from NBER annual reports from 1958 to 1977.

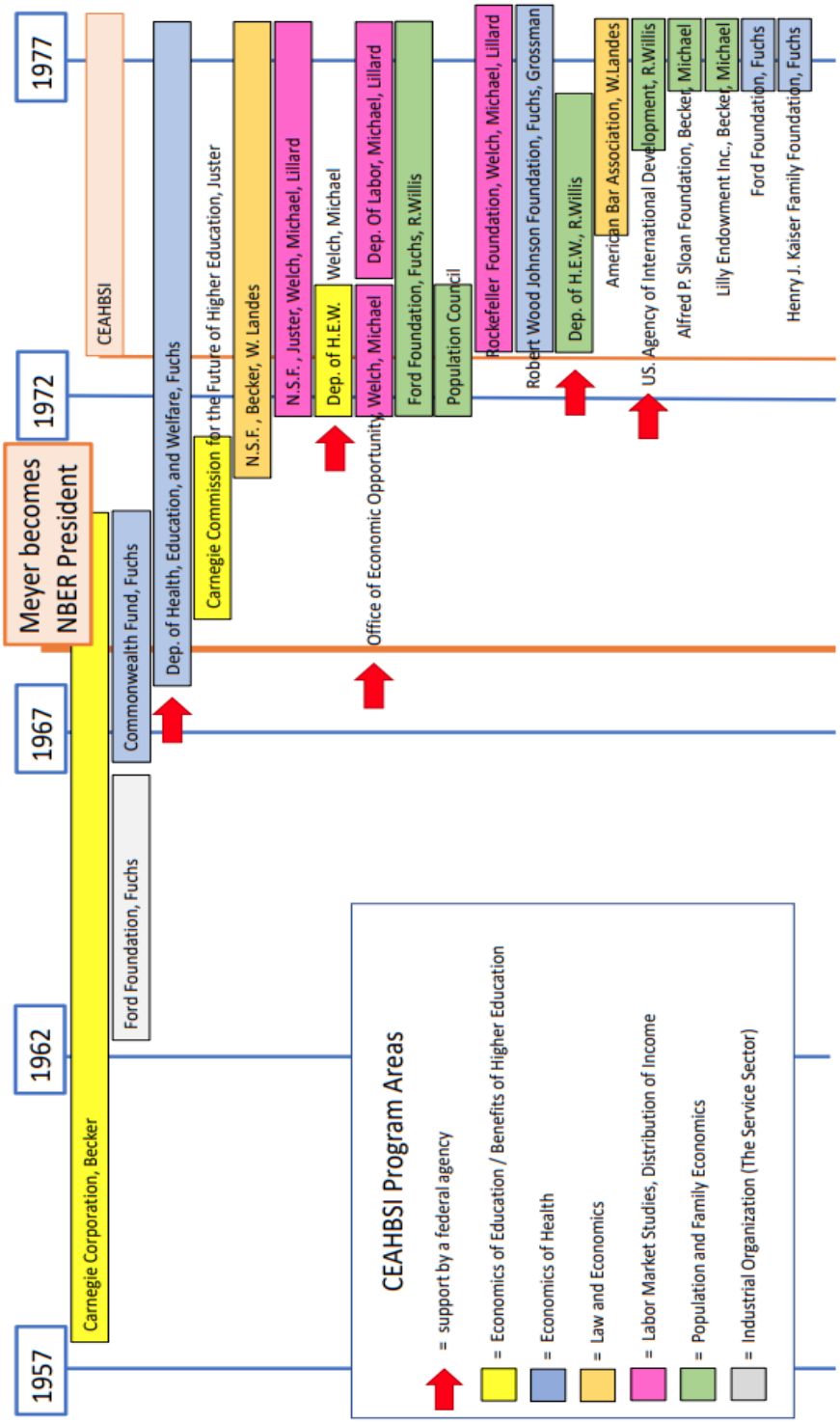

Figure 6: Different sources of funding for different research programs of the CEAHBSI community.

Fuchs was a leading force in these fundraising efforts. He recalled how proposals for new research projects were handled under Burns. According to Fuchs, Burns was mostly interested in business cycles and the development of the American economy. Fuchs said, "If there were free funds available within the bureau, those areas got priority." However, Fuchs also recalled that "if people were successful in raising funds on their own, there was no one standing in their way and saying, 'you can't work on this, you have to work on that" (Goldin 2002a: p. 16).

Fuchs learned about the possibilities created by successful fundraising firsthand. He recalled the period around 1965. Burns was still president, and Fuchs was working on a project about service industries. However, he also "wanted to pursue certain questions having to do with health economics." He recalled, "I came to Arthur [Burns] and told him about my plans, and he tried to discourage me. He tries to persuade me to think about certain subjects like business cycles or economic growth. [...] He didn't see a great deal of future for me growing as an economist, to spend a lot of time on something like health economics [...]". Fuchs further recalled, "I respected his opinion, but I must have been somewhat tough-minded myself because I persisted in that for a while, and by chance I met a man named Quigg Newton, who was president of the *Commonwealth Fund* in New York. I told him some of my ideas and he said, 'Why don't you write me a letter?' I sat down and wrote him about a five-page letter, telling him some of my ideas about health economics as a field, and asking for some money. [...] one day I walked into my office, and it didn't seem very long afterward, and there was a check on my desk made out to Victor Fuchs for a very substantial amount of money. [...] When I showed Arthur the check, he withdrew all his objections to my going to work in Health Economics. He [was] a realist, and if someone is willing to fund it, and the person wanted to do it, do it" (Goldin 2002a: p. 15).

During Meyer's presidency of the NBER (1968–1977), the proportion of funding from federal agencies increased considerably. Fuchs recalled that Meyer "was particularly good [...] at getting money from the government. When he started to raise money, that's

where he mostly went." Fuchs himself preferred private foundations because he knew them well from personal experience. He said in an interview that "I personally always found private foundations the easiest place to work with to get money – the least demanding in terms of what you have to submit and so forth, but that may be partly because I've spent a couple of years at the *Ford Foundation*, so I know how foundations work" (Goldin 2002a: 21).

New funding meant new research possibilities for young researchers like Becker and Mincer's students from the *Columbia Labor Workshop*. With more projects overlooked by Becker, Fuchs, and others, the community was able to grow and become a more attractive place for others to advance their careers as economists. Those who followed the leaders also benefited as they entered a growing community. By formulating their analyses in terms compatible with the broader human capital framework, they helped establish new applied fields. Michael Grossman's early career trajectory is a fitting example. Grossman was a Ph.D. student of Becker and Mincer at Columbia University. While pursuing his Ph.D., he worked part-time at the NBER and developed a model of health demand that became widely popular in health economics (Grossman, 1972). In retrospective interviews and publications, Grossman is very generous in attributing part of his success to his early mentors, especially to Becker and Fuchs. While Becker helped him choose a topic for his dissertation, Fuchs offered him an office at the NBER if he continued working on the economics of health.

Grossman's 1972 model effectively illustrates the type of practice change that occured at the NBER. In his model of health demand, Grossman offered a new perspective on individual health levels, the demand for medical services, and risky, health-related intertemporal consumption. Essentially, Grossman argued that consumers do not demand medical services per se. Rather, they desire to be healthy or to be in a healthy physical state. Rather than passively consuming, Grossman argued that households actively produce health by combining health services purchased in the market with other resources, such as time and human capital (Grossman 1972). The early career of Grossman illustrates in

which ways he benefitted from the research environment at the NBER in advancing his formalization. As we show in Chapter 2, Grossman used a terminology that was fully compatible with Becker's theoretical framework. Grossman complemented the existing literature on health services studies by describing and explaining health levels with the help of the broader human capital framework (see Klarman 1965 for an overview of existing studies). At the same time Grossman added nuances to the theory of human capital by arguing that health capital is a form of human capital that works slightly different than just augmenting individual productivity and income.[76]

Nowadays it is often Grossman who is remembered for pushing the view of health as a result of investment thinking. But Grossman was not the only economist who advanced ideas like that. Already in 1962, Selma Mushkin presented a paper called *Health as Investment* at the famous NBER conference on human capital organized by Theodore Schultz. In her paper she described good health as analogue to other forms of human capital (Mushkin 1962).[77] Similar approaches to value health have been developed as well by Dorothy P. Rice, a health statistician within the *Social Security Administration* who later became director of the *National Center for Health Statistics* (see Rice, Cooper 1967).[78] Nonetheless, it is Grossman's model which would become the main reference in the field of health economics.

[76] According to Grossman health capital increases the amount of future time from which individuals might derive utility. As such health capital enlarges the overall consumption horizon that individuals take in account when considering intertemporal consumption decisions that involve effects in the near or far future. So according to Grossman, beneficial health-related consumption activities can be seen as investments in health (see Grossman 1972a,b).

[77] Mushkin obtained a Ph.D. from the *New School for Social Research* in 1956 and has worked in federal government offices. On that same conference Burton A. Weisbrod argued that improvements in health such as an extended life expectancy make investments in education more likely (Weisbrod 1962). He did his Ph.D. thesis at *Northwestern University* in 1958 on the economic impact of diseases (published in revised form as Weisbrod 1961). Weisbrod later went to the *University of Wisconsin* where Robert Lampman and others had mounted the *Institute for Research on Poverty*.

[78] For economic conceptions of human capital before the post-WWII decades, see Teixeira (2020). According to Teixeira several researchers were using at different times similar concepts, but human capital research really became to flourish in its neoclassical conception put forward by researchers like Schultz, Mincer, and Becker.

While important changes happened in the broader and narrower institutional and organizational framework, Becker, Mincer, and Fuchs can be seen as institutional entrepreneurs within the NBER. In a strategically favorable moment they proposed new research practices themselves. But next to that they also created a social research environment putting their ideas in a common framework that provided plenty of space for others to use the wider framework in their own applied studies.

1.4 Practice Innovation: The Economic Approach to Human Behavior and the CEAHBSI (1972-1978)

The efforts of Becker, Fuchs, and others as institutional entrepreneurs and the demand for research by federal agencies and the presidency of John Meyer made the flourishing of the human resource community and the popularization of the economic approach to human behavior, often associated with Becker (1976), possible. These forces led to the brief existence of the Center for Economic Analysis of Human Behavior and Social Institutions (CEAHBSI), an organizational manifestation of the intellectual community at the NBER. While this is in part due to selection occurring largely through the patrons of research at the NBER, it reflects at the same time the blossoming of the intellectual community cultivated at the NBER in the 1960s and 1970s.

1.4.1 1972: The foundation of a new Center within the NBER

The CEAHBSI was established in the summer of 1972. Its creation was an attempt to coordinate and guide the activities of NBER researchers associated with the theoretical framework cultivated thus far. In a sense, the establishment of the CEAHBSI formally solidified the programmatic associations that had existed informally within the NBER beforehand. In conjunction with the staff reports, the former sub-section, *Human Resources and Social Institutions*, obtained the new name, *Human Behavior and Social Institutions* (see Table 1 in the Annex).

The CEAHBSI existed until at least 1978 and was an unusual institution within the NBER. According to Fuchs and Michael, its staff members were geographically dispersed on several local hubs , yet united by their shared research interests and long-term research program (NBER 1973: p. 62). Some researchers like Mincer or Grossman were still in NEw York, others like Becker, Stigler, or William Landes were in Chicago, and some like Fuchs or Michael were based for much of the existence of the CEAHBSI in Palo Alto. Fuchs became the Director of the CEAHBSI, Michael became Assistant Director, and Becker became the center's Research Policy Advisor.[79] In its first year, Michael served as Acting Director while Fuchs was on leave at Stanford, participating in a fellowship at the Center for Advanced Studies in the Behavioral Sciences. In 1974, the NBER-West office in Palo Alto became the center's main location.

Several donations facilitated the physical creation of the CEAHBSI. In 1974, the NBER opened its first West Coast office near Stanford University. This office was established with an anonymous donation of $250,000. Around the same time, the CEAHBSI received two substantial research grants. The Robert Wood Johnson Foundation granted $210,000 for "research, training, and publication in the Center's health economics program area." The Rockefeller Foundation granted $250,000 for "research in the economics of education and the distribution of income" (NBER 1973: p. 138). Both grants were spread out over a couple of years.

In the 1973 annual report, Fuchs and Michael presented the CEAHBSI as a manifestation of their community's collective efforts at the NBER over the previous decade. They acknowledged Becker and Mincer for developing a shared methodological framework. They showcased the results of this framework by listing recent publications and presenting program directors for the developed subdomains. In 1973, the program directors were Finis Welch and Michael for education and income distribution, William

[79] Retrospectively, the CEAHBSI was rather of short duration and today it is not talked about a lot. The fact that Becker carried officially the title of *Research Policy Advisor* of the CEAHBSI is maybe just a detail. But we think that it is a very telling detail with regards to the social-intellectual role that Becker embraced in the 1960s and 1970s in the CEAHBSI community, but also with regards to the rest of his career. It reflects well the intersection of academic research, policy, and expertise.

Landes for law and economics, Grossman for health economics, and Robert Willis for population and family economics. That same year, Grossman, Landes, and Michael are listed as members of the senior research staff in the NBER staff roster. Willis became a senior research staff member in 1974.[80]

In their presentation of the CEAHBSI in the Annual Report of 1973, Fuchs and Michael explained the role they attributed to this common methodological framework in organizing research activities. First, they described the community's shared research interests. For them their main interest was mostly characterized by two "important extensions in the scope and focus of economic research[:]" intangible wealth and non-market behavior. With regards to "the intangible wealth of society," they argued that it is embodied "in human beings – in their health, their skills and knowledge, their ability and motivation" and in "public and private social institutions such as the legal system, the political system, churches, hospitals, schools, business firms, and private families[.]" With regards to non-market behavior they explained that it "occurs outside formal markets, yet involves situations in which choices must be made and scarce resources allocated." Second, Fuchs and Michael explained how the group uses "the familiar tools of economic analysis of production and distribution theory to aspects of human behavior for which no formal markets exist." They postulated that economic analysis contributes to understanding this behavior, that "the whole range of human action, from birth to death, is amenable to this analysis[,]" and that "valuable behavioral insights" can be provided with it (NBER 1973: pp. 62–63).

If the economic approach to human behavior associated with Becker is placed on a much broader social footing, we may interpret some of Becker's texts also as advocacy papers for the community framework. Remarkably, some of Becker's most emblematic texts in terms of methodological principles fall within the CEAHBSI period. These include

[80] In 1976, Richard Posner, a lawyer from the CEAHBSI Law and Economics Program, became a member of the Senior Research Staff for a short period before the positions were eliminated altogether during the NBER's organizational restructuring under Martin Feldstein's directorship. Posner has been one of the shining figure heads of the law and economics movement in the 1970s.

the 1973 article *On the New Theory of the Consumer*, co-authored with Michael; the 1976 book *The Economic Approach to Human Behavior*; and the 1977 article *De Gustibus Non Est Disputandum*, co-authored with Stigler. As Le Tollec has remarked, methodological principles such as the assumption of stable tastes make sense not only with Becker, but also with the CEAHBSI community more generally (see Le Tollec 2021: p. 152). Although Becker was central to upholding these principles, they would not have meant much if they would not have been respected and put to work by those around him. Although this may have been somewhat altruistic, as Becker described not purely self-interested behavior, it benefited Becker's reputation by strengthening the framework built around his contributions.

The ambition to establish a new approach to economic research within the NBER was evident in the CEAHBSI's research dissemination activities. Fuchs's 1972 book, *Essays in the Economics of Health and Medical Care*, was the first of six books published by the NBER in the name of the CEAHBSI. This branding of research results is also reflected in the NBER Working Paper series. The series, which is still in existence as of 2025, began in June 1973 with a paper by Finis Welch titled *Education, Information, and Efficiency*. Like more than 100 other papers published over the following six years, it was published with the CEAHBSI prominently printed in the document's front matter.

Figure 7 shows the total number of papers in the NBER Working Paper Series, as well as the number of papers associated with the CEAHBSI. Other papers were published either by the NBER Computer Research Center or without a particular label. In the first year, CEAHBSI papers made up nearly two-thirds of all papers. Over the next few years, this relative CEAHBSI share decreased but remained above one-third of all working papers. To our understanding this might reflect in part the vitality of the research community, but also the ambition of the CEAHBSI members to advertise and communicate the CEAHBSI approach. In 1978, papers from the Working Paper Series stopped carrying the CEAHBSI branding altogether. For a summary of the most frequent authors among the CEAHBSI-branded working papers, see Table 2 in the Annex.

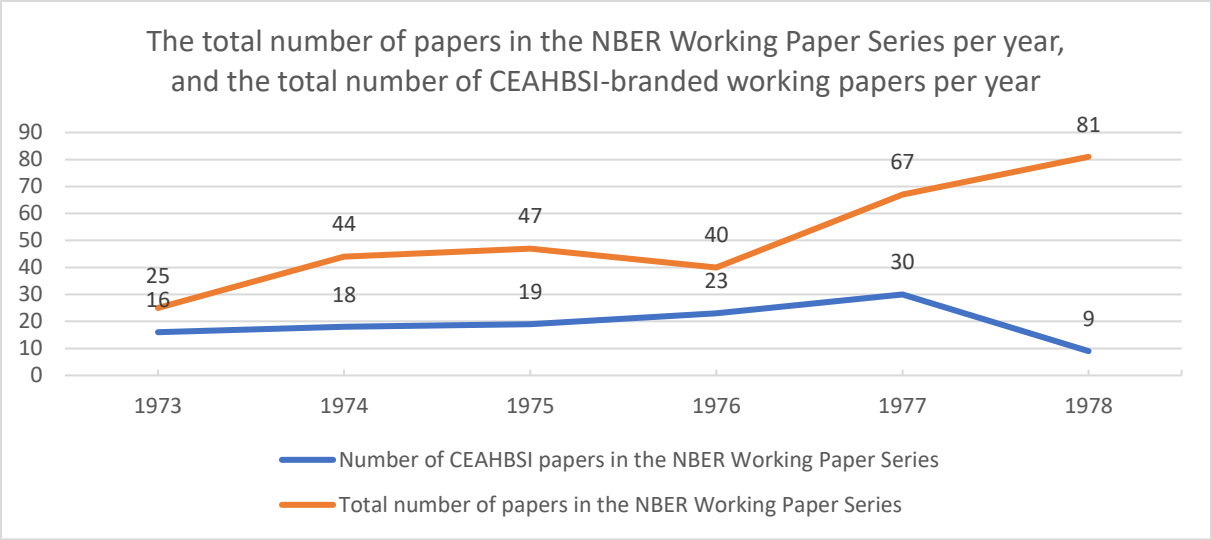

Figure 7: Absolute number of papers and absolute number of CEAHBSI-branded papers in the first six years of existence of the NBER Working Paper series

The expansion of the CEAHBSI community also created new roles for the second generation. For example, Robert Michael became increasingly involved in directing and organizing research activities. In 1975, when new funding for family research was granted to the CEAHBSI, he and Becker led the project. Grossman, who was tenured at the City University of New York, included new, young researchers, such as Linda Edwards and Ann Colle, in his projects. He also co-authored NBER staff reports and working papers with them. By using the community framework, the CEAHBSI researchers were able to apply economic principles to health or fertility behavior, enriching the different subfields of applied economics that were becoming established roughly at the same time.

During the years of the CEAHBSI's existence, research activity within the community increased once again. By then, members of the community were working in different geographical locations. Despite being dispersed and employed in different academic settings, they used the CEAHBSI to coordinate their research activities remotely. Funding provided the means to meet during the summer or for other occasions to collaborate on shared research projects. Being part of the community also offered practical benefits, such as obtaining access to data already accumulated by other CEAHBSI members and accessing the computational resources of the NBER.

Although the CEAHBSI community became more geographically dispersed during the mid-1970s, it was still growing. Figure 5 shows the network representation of the community from 1973 to 1977, during which time the CEAHBSI existed. Compared to the preceding period, the network contains many more researchers. While Becker remains highly connected, other researchers are much more active in writing staff reports. This is evident in the size of the nodes representing the researchers, especially those with administrative responsibilities for research programs within the CEAHBSI, such as Grossman (health economics), Landes (law and economics), Willis (population and family economics), and Lillard and Michael (economics of education and income distribution).

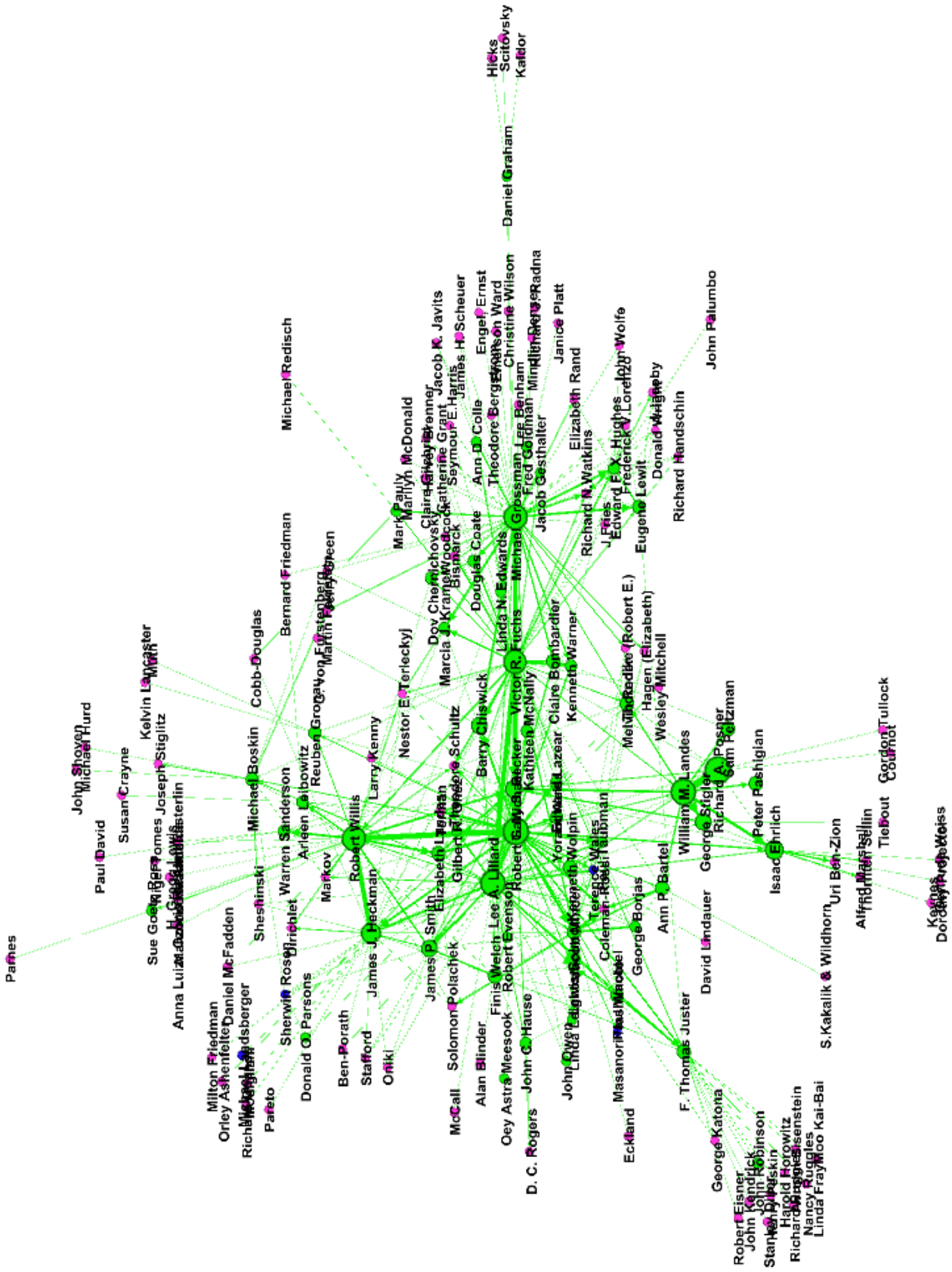

Figure 8: Citation network for authors from the later human resources section from the staff report section of the NBER Annual Reports 1973-1977

1.4.2 1978: The disintegration of the CEAHBSI

In 1967, the researchers who established the human resources community greatly benefited from the changes brought about by a new NBER president. Ten years later, however, some of the same researchers seemed to crumble under the changes brought by another new president. John Meyer resigned in 1977, and Martin Feldstein was elected President of the NBER. Feldstein reorganized the NBER's operations and moved its headquarters from New York to Cambridge in 1978. The labels of the subsections in the 1977 staff reports changed once more before the NBER stopped publishing annual reports. Research activities were then reported four times per year in the NBER Reporter.

Shortly after, the CEAHBSI disintegrated. It is last mentioned in a short biographical text about Fuchs's research career in the March 1978 *NBER Reporter* (1978a: p. 4). In December of that same year, the *NBER Reporter* announced that Fuchs had resigned as vice president and director of the Palo Alto office (NBER Reporter 1978b: p. 18). The CEAHBSI is not mentioned at all. The last paper in the working paper series with its branding on the cover page is dated June 1978. Although there is no formal statement about the dissolution of the CEAHBSI, these pieces of evidence make it highly likely that the CEAHBSI ceased to exist in 1978. Michael, who was first announced as Fuchs's successor, left the NBER in July 1980 to establish an economics research section at the *National Opinion Research Center* (NORC) in Chicago. NORC was created in 1941 as a social research organization and sought ways to strengthen its research capacities (NORC 1981–1982: p. 19).

In 1980, NORC established the *Economics Research Center* (ERC), appointing Michael as its director. In the center's inaugural progress report, Michael announced it as an enterprise "bringing economists into the interdisciplinary social science community of NORC." He states the center's three objectives as follows: 1) "to conduct research on issues of long-run relevance to the economy and to social and private behavior[,]" 2) "to promote basic research through the provision of training in research procedures and through a research environment and staff committed to basic research in economic

science[,]" and 3) "to improve the tools of empirical research through efforts to provide better survey data and better statistical techniques of analysis" (NORC 1981-82: p. 36). The ERC's agenda, as outlined in its first report, was structured into three major topics: the economics of the family, labor markets and earnings, and behavior over the lifecycle. The ERC's research staff consisted partly of former CEAHBSI members, such as Becker, Gronau, Heckman, Lazear, Michael, Willis, and Rosen. Other research staff members were economists from Chicago, including some of Becker's Ph.D. students, such as Thomas MaCurdy and Nigel Tomes.

Not all former CEAHBSI researchers migrated together with Becker and Michael to the NORC. Some researchers remained in New York. Grossman, Mincer, Edwards, Bartel, and others continued in their university positions. The City University of New York, in particular, offered many university positions, as it had in the early 1970s.[81] Others, like Mincer, remained at *Columbia University*. Other researchers, such as Lillard, Welch, and Smith, went on to work at other major research organizations, such as the *RAND Corporation*. Arleen Leibowitz also ended up at RAND, but not immediately after her time at the NBER.

1.5 Conclusion

The economic approach to human behavior is often associated with Gary Becker because he was one of its most prominent proponents. He proposed the term, wrote a book with it as the title, and he received the Nobel Prize for it. In this chapter, however, we attempt to reduce the reductionist association of the economic approach to human behavior with the individual researcher, Gary Becker. While the economic approach is strongly associated with Becker, it cannot be explained by one person alone. Instead, we have examined Becker and his social environment during his time at the NBER, stressing his role as an intellectual

[81] The employment possibilities offered by the *City University of New York* (CUNY), especially by their graduate school, can be seen as another source of practice selection that reinforced the creation of the CEAHBSI community in the early 1970s. Chiswick, Landes, Grossman, Welch, Willis and others were all at some stages of their early careers employed by the CUNY.

leader and one of the most central figures in the community in which the economic approach emerged.

The overall approach would be less effective without the community. For instance, Becker would have had fewer opportunities to interact with and receive feedback from individuals such as Grossman, who investigated related research questions in different applied fields. Thus, it would have been impossible for Becker to venture into different applied fields in such a short period of time. We have therefore emphasized the important supporting function that the network provided. PhD students like Grossman benefited from placing their research within an innovative framework and interacting with like-minded researchers who expressed their research questions using similar language. At the same time, they consolidated the common theoretical language developed by Becker and Mincer.

More generally, it is useful to contextualize the research community represented by the CEAHBSI within the broader policy landscape of the early 1970s. The funding history of those involved in the CEAHBSI shows that their programs benefited greatly from the increased demand by federal agencies. They also benefitted to a large extent from private funding money of foundations. However, the economic approach was presented as a key distinctive characteristic of research conducted at the CEAHBSI. As such, the economic approach fitted well into the research trends of the time. Although the era of Johnson's Great Society had ended, an economic mindset had taken root in various policy domains, including federal agencies, the Congressional Budget Office, and new public policy programs, as Berman (2022) has demonstrated. The economic approach to human behavior nourished at the CEAHBSI was quite compatible with this broader economic way of thinking.

We attempted to explain how Becker became the researcher he was by establishing a community of like-minded scholars around him. This chapter will serve as the foundation for the subsequent chapters of this thesis, in which Becker, Stigler, Grossman, and Fuchs will reappear later on. While this chapter mainly tells the story of the research

activities of a group of people at the NBER, it also provides elements that might interest those more generally interested in the development of applied fields in economics in post-WWII United States, such as health economics and law and economics. The data, figures, and tables in this chapter should be useful for those interested in specific topics.

2. A common view of human behavior: Non-market behavior in terms of household production technology

2.1 Introduction

In this second chapter we briefly describe the household production framework as a widely shared conceptual framework in the CEAHBSI community. We describe the use of the main assumptions and components of the household production framework such as household production functions and human capital stocks. We interpret this framework as part of the thought style of the CEAHBSI community.[82] According to Ludwik Fleck thought styles consist of particular assumptions, concepts, and other familiarizations that prevail in stabilized thought collectives. They are shared by the members of a thought collective, and they distinguish ways of reasoning dependent on the socialization of researchers. [83] In particular, we argue that the thought style of household production helped to access non-market behavior with traditional tools of economic analysis that were initially developed to analyze market activities. We illustrate our argument by briefly describing how different members of the CEAHBSI community have studied different issues linked to unhealthy or risky lifestyles.

Fleck offered a comprehension of scientific production in terms of thought collectives and thought styles. A thought style can be seen in the way how researchers process in their research activities, in the way how they argue, or in the particular sets of assumptions that they put into action. Thought styles are the result of the fact that individual researchers come together in thought collectives, interact, and potentially

[82] We do not claim that the thought style of the CEAHBSI community is completely explained or 100 per cent overlapping with the household production framework. But we believe that the household production framework has been part of the overall thought style of the CEAHBSI community and that it, therefore, shares its main characteristics. That is why, historiographically, we treat the household production framework like a thought style.

[83] For a concise explanation of Fleck's main concepts, see Schaefer (1993) and Sady (2023).

become part of stabilized thought collectives that are marked by the particular views of the researchers who inhabit them and by the tools, assumptions, concepts, and theories that are used by them. Fleck has argued that when thought collectives have stabilized and endure over time, the way how science is discussed and done in a thought collective is sufficiently stable to be described as a thought style. Thus, in theory, the thought style of one thought collective distinguishes the reasoning within the thought collective from forms of reasoning prevalent in other thought collectives (see Sady 2023, Schaefer 1993).

Being part of a thought collective, Fleck argued, partly determines how researchers see and perceive the world around them, how they classify phenomena into categories, and how they interpret the data that they extract from the world. The concepts and assumptions that make up a thought collective have been shaped and need to be taught transmitted by experienced members of a thought collective. New members thus become socialized with particular ways to see the world according to the thought style with which they have been familiarized. In practice Fleck assumed many different types of more and less stabilized thought collectives in which people take part. As a result, Fleck saw scientific production fundamentally as a social act. Fleck argued that "[e]very cognition is a social act (…) for during every lasting exchange of thoughts there appear and grow ideas and standards which are not associated with any individual author. A communal mode of thinking develops which binds all participants, and certainly determines every act of cognition. Therefore, cognition must be considered as a function of three components: it is a relation between [1.] the individual subject, [2.] the certain object and [3.] the given community of thinking (Denkkollektiv), within which the subject acts; it works only when a certain style of thinking (Denkstil), originating in the given community is used". (Fleck 1986, as cited in Sady 2023).

In this chapter we describe the household production framework as something like a thought style that was developed and became common practice in the CEAHBSI

community in the 1970s.[84] For those researchers that were familiarized with it, the framework equipped them with a distinctive view of the world that these researchers then also put into action in their own research.

The chapter is structured as follows. In section two, we describe the basic formal means that constitute the household production framework. First, we describe how economists like Becker expanded some core principles of demand analysis to furnish a very general theory of choice. Second, we describe how the household production framework describes consumption decisions in terms of household production technology with which decision-making units are equipped. In section three of this chapter we describe how the household production framework has been used by different members of the CEAHBSI community. First, we describe how Michael Grossman has formulated a model of health capital within this framework. Second, we describe how other members of the CEAHBSI community have studied aspects of unhealthy and risky lifestyles by making use of the household production framework. We close this chapter with some brief conclusive remarks.

2.2 Explaining human behavior in terms of household production technology

> "We walk around without seeing any points, lines, angles, light or shadows, from which we would have to arrange 'what is this' by synthesis or reasoning, but we see at once a house, a memorial in a square, a detachment of soldiers, a bookshop window, a group of children, a lady with a dog, all of them ready forms. (…) We look with our own eyes, but we see with the eyes of the collective body, we see the forms whose sense

[84] Whether the household production framework was developed primarily in the lecture halls of the Columbia Labor Workshop or the offices of the NBER is not important to us. What matters is that we believe it has been widely adopted and disseminated in both places.

and range of permissible transpositions is created by the collective body."

Ludwik Fleck [1947], as cited in Wojciech Sady (2023)

In the 1960s and 1970s the economists from the CEAHBSI community applied economic analysis to various types of nonmarket behavior and helped to create or to revive applied fields of economics like health economics, law and economics, or family economics. The leaders of the *Columbia Labor Workshop* Gary Becker and Jacob Mincer have been at the forefront of this movement (see Teixeira 2021). But, as we have seen in Chapter 1, they were accompanied and followed by many others. While Mincer has provided the statistical and econometric guidance, Becker is often credited for providing elegant models in terms of price theory. Becker is also more generally associated with the framework as he wrote several key texts in which the framework is exposed.[85]

The household production framework is a set of theoretic propositions for economic analysis of household activities that has been extended to non-market behavior more generally. It has been applied to different situations by members of the CEAHBSI community in the 1960s and 1970s. In consequence the framework has been at the heart of applying microeconomics to formerly non-conventional research questions in economics, like engagement in criminal behavior, family relations, or health preservation. These efforts have been viewed as economics imperialism by many, among others by Becker himself (see Becker 1971: p. 2).

[85] The household production framework is mostly known from the article *On the new theory of the consumer* cowritten by Robert Michael and Gary Becker and published in the Swedish Journal of Economics (Michael and Becker 1973). But the framework is also exposed in Becker's economics textbook from 1971 (Becker 1971, especially Part I), in the introductory chapter of Becker's monography *The Economic Approach to Human Behavior* (Becker 1976), and in George Stigler and Becker's article *De Gustibus Non Est Disputandum* published in the American Economic Review in 1977 (Stigler and Becker 1977). Arguably, a book chapter written by Jacob Mincer (Mincer 1963) and Becker's article on the economic allocation of time (Becker 1965) contained already central components of the framework.

The view of the world contained in the household production framework was constructed by conceiving household activities in terms of behavior. As historian Rüdiger Graf has described, viewing human action in terms of behavior as something objectively observable has become frequent in the social sciences in the second half of the 20th century, especially in the United States (see Graf 2024). In the1950s economists have at first been distant with regards to the behavioral sciences movement. The household production framework illustrates how the economists from the CEAHBSI community adapted a conception of behavior for applied microeconomics. With some qualifications, the CEAHBSI view of behavior was nonetheless quite similar to general views of behavior within the behavioral science movement, even though microeconomics was rather distant from the behavioral science movement of the post-WWII decades.[86] We argue that the scientific ideals behind the household production framework and those carried forward by the behavioral sciences were not too different.

To illustrate our argument, we proceed in two steps. First, we describe quickly how the household production framework mobilized basic ideas of demand theory to provide explanations of human behavior in terms of objectively accessible variables. Economic agents were assumed to behave in market contexts and to react to external changes in prices inflicted, for example, by a change in policy. The resulting behavior was seen as a choice, whether it has been made intentionally or not; whether agents were conscious or unconscious of it. Second, we describe how the household production framework tried to circumvent the effect of tastes on economic choices. Although tastes were a conventional explaining variable in demand theory, tastes were highly subjective. In order to minimize the importance of tastes in the household production framework economic decisions were framed in terms of production technology. As a consequence, human activities were described as production processes and individual agents or household could be compared by using measures of productivity.

[86] The historians of sciences Jefferson Pooley and Mark Solovey have described how economists distanced themselves and their discipline in the 1950s and 1960s from the behavioral sciences as they saw their own theories put into question by the behavioral sciences movement (see Pooley, Solovey 2010).

2.2.1 A behavioral theory of market choices

At the heart of Becker's approach to economics is his theory of choice. Choice was for Becker an integral part of human activity. Whether alone or in groups, human beings are, according to Becker, constantly engaged in trade-offs in which they compare the benefits of realized opportunities with the foregone benefits of unrealized opportunities. In each trade-off, one opportunity is ultimately chosen. This is how Becker describes economic agents. He developed his theory of choice and other basic trademarks of his economic analysis in the early stages of his career when he was in New York at Columbia and at the NBER. In 1971, he published a microeconomics textbook called *Economic Theory*.[87] The book is based on lectures that Becker gave in the late 1960s at Columbia University. It illustrates well Becker's analysis in general and his theory of choice in particular.[88] With regards to Becker's view of the market, Becker's textbook builds strongly on some of ideas that he had already described in an article in the JPE in 1962. The following paragraphs reconstruct Becker's basic vision of economic agents, his description of markets, and his theory of choice mainly using passages from Becker's 1962 article and from his textbook.

A vision of humans as budgetary creatures

Very basically, Becker saw and described humans as budgetary beings that exist constrained by their economic possibilities. All agents were imagined as having a budget of economic means at disposition and alternative ends or objectives for what to do with these means.[89] Thus, agents are usually confronted with making ends meet in the sense that they need to

[87] In the preface of the book Becker explains his choice of the title. He writes that "[t]he perhaps presumptuous title of Economic Theory is used instead of a title like Micro Theory or Price Theory because of my belief that there is only one kind of economic theory, not separate theories for micro problems, macro problems, nonmarket decisions, and so on" (Becker 2007 [1971]: p. xviii).

[88] The book has been published with the assistance of Michael Grossman and Robert Michael, two students of Becker that grew into important roles in the CEAHBSI community (see Chapter 1). Grossman and Michael provided transcriptions of lectures of a course of price theory that Becker gave at *Columbia University* in the academic year 1968 - 1969. In 2007 Becker published a reprint of the book that contained a new introduction and new problem sets for the different chapters, but the old body of lectures.

[89] This definition of economics can be traced back to the British economist Lionel Robbins as the historians of economics Steve Medema and Roger Backhouse have argued (Backhouse and Medema 2009a, 2009b).

allocate their budget of available resources for different objectives. The resources that are under the control of people are limited, so their resources also limit what they can obtain by exchange in markets. This accounting logic is expressed in what Becker and other economists call the budget constraint (see Becker 1971: p. 16). It holds that agents cannot spend more resources than they have. In other words, the expenditures of an agent must not exceed the income of that agent.[90] In this sense, economic choices are always determined by the scarcity of resources. Making the budget constraint one of the most central tenets of his analysis, Becker has pushed this accounting logic to various real-world applications.[91]

Economists like Becker used the budget constraint to assign value to goods and services and to render spending behavior for different commodities comparable. Independent of people's actual income, economists assume that the budget constraint generally exists for all people. This means for them that when people spend their income to gain access to different goods and services, they are actually always constrained by the necessity to adapt their expenses to their available resources. Households have a limited amount of income and they allocate that income to different consumption options that are available to them. In this way expenditures on different goods become comparable by the fraction of total income that is spent on them.[92] And in this way Becker approximates the subjective valuation process happening inside individuals or households by using expenditure data as observations. Economists like Becker knew that they could not know

[90] Becker actually often assumes that expenditures of agents must equal the income of agents (see for example Becker 1971: p.11).

[91] Becker was not the originator of doing economics in terms of competing ends and constrained means. This kind of thinking came into fashion more widely in the post-WWII era. Elisabeth Popp-Berman shows how economists and engineers from the RAND Corporation have developed it for military spending and brought it into federal government agencies in the 1960s (see Berman 2022). Technically, Becker received the Sveriges Riksbank price in memory of Alfred Nobel in 1992 not for this kind of thinking as such, but for having extended this logic to a host of decision situations that were formerly unconventional in economics.

[92] Becker wrote in his 1971 textbook that "[a] more serious definition is that economics is the study of the allocation of scarce means to satisfy competing ends. [...] The ends must be competing in order that value judgments or choices of different kinds are involved. When there are no alternatives, there is no problem of choice and, therefore, no economic problem" (Becker 1971: p.1).

the exact value that a good has for an individual, because they cannot directly observe this valuation process. Instead, they estimate subjective value by interpreting the spending behavior of that individual.

A theory of market behavior: individual opportunities and behavior change

Becker uses demand theory to provide a descriptive theory of how consumers are likely to respond to various price and income changes.[93] Demand theory groups together a set of theoretical propositions that economists use to analyze the quantities of goods that are demanded in markets. Becker's demand theory starts with some basic assumptions about opportunities and builds on what he calls "the 'law' of the negatively sloped demand curve" (Becker 1971: p. 11).[94] The resulting demand theory provides him a very flexible framework to describe human action. In that framework price changes translate into changes of opportunities, and changes in opportunities are likely to result in corresponding changes in consumption behavior. By using the logic of income and substitution effects, Becker provided a very shallow, but very general theory of behavior.

Becker reinterpreted demand theory by viewing it through the prism of individual opportunities. Ultimately, individual opportunities are for him provided by the budget of resources that individuals dispose. The opportunities of agents are all those combinations of goods that are accessible to them with the resources that they have. What economists like Becker formally call the opportunity set contains all those consumption possibilities that are within their budget.[95] Very generally, "[o]pportunity sets apply [...] to all decision

[93] Becker wrote that his 1971 text book contained "primarily lectures on what is called positive economics – the actual, not the desired, behavior of markets and economies" (Becker 1971: p. 3). The list of recommended readings of the book also contained Friedman's 1953 essay on the methodology of positive economics.

[94] Becker defined the demand curve for a good by a group very generally as "the locus of points giving the amount of the good that the group would purchase per unit of time at different unit prices." He argued further that demand curves "can be defined for any group." It can be defined for " [...] the individual household, [...] all persons in a city or [...] all members of a particular income or education class" (Becker 1971: p. 11). It is up to the practicing economist to define the right level and the statistical variables that enter into the demand function.

[95] In graphical representations with two goods the opportunity set is usually given by the set of points below and directly on the budget constraint. The budget constraint is the boundary that separates

units with limited resources." (Becker 1962: p.12). Combining opportunity sets with assumed utility functions of agents, microeconomists can determine an optimal consumption combinations for agents.[96]

Changes in the prices of goods shift the accessible consumption opportunities of agents. Each good has a price and each time when the price of a good changes demand theory provides techniques to estimate the consequences of such price changes for the quantities of goods that are concerned. In the early 20th century economists have developed methods to break down the results of price changes as the result of income and substitution effects.[97] The income effect is defined as the change in demanded quantities

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accessible combinations of goods from inaccessible combinations of goods. All combinations located directly on the boundary correspond to situations in which agents use all of their resources to access a maximal amount of goods.

[96] Economists usually try to determine that point on the budget boundary that provides the largest amount of utility. Becker regards utility basically as an artificial accounting quantity that measures the satisfaction of agents. Economists like Becker assume that agents can be more or less satisfied, depending on the degree to which they realize their consumption objectives given by their preferences. Economists usually assume that agents have a set of preferences that can be approximated by utility functions and represented as indifference curves.

[97] The historians of economics Philip Mirowski and Wade Hands have argued that the development of consumer theory stabilized in the post-WW2 decades in a new orthodoxy of microeconomics consisting of different approaches all adhering to some core ideas about consumer behavior (Mirowski, Hands 1988). To Mirowski and Hands, thinking in terms of income and substitution effects was the base from which different centers of economics in the US developed these base ideas into different branches of economics that formed together a new mainstream. They describe the University of Chicago as the research center that developed the empirical, applied economics branch of the new post-WW2 orthodoxy in microeconomics.

Before going to Columbia, Becker has been learning economics from Friedman in his graduate years at Chicago. Friedman, an economic statistician turned economic teacher, learned statistics with Henry Schultz in the 1930s. Henry Schultz has been an economist who tried to develop a rigorous, scientific framework for demand studies based on mathematical and statistic concepts. In his monography The Theory and Measurement of Demand Schultz (1938) was interested in the relationship between prices, income and demanded quantities of goods. He proposed to use concepts like the price or income elasticity of demand to describe the changes of prices and income on demanded quantities of goods. Using his proposed theoretic concepts, Schultz also estimated demand curves for various consumption items. Friedman and other students of Schultz, like Allen Wallis, were proponents of a statistical approach to quantitative economics that differed in many methodological questions from experimental approaches furthered by psychologists (see Wallis, Friedman 1942, see also Lenfant 2012). Both Wallis and Friedman served together in the Statistical Research Group (SRG) Division of War Research at Columbia University during WW2 (see Boumans 2024).

Although the University of Chicago may have turned out as a major site of applied economics in the post-WW2 decades, the researchers that came to inhabit this site were linking the site as a place of knowledge creation with other sites and other researchers. Friedman, for example was a longtime staff member of the

of a good that is due to a change in price of that good.[98] The substitution effect is a change in the composition of expenditure that is due to the fact that after a price change, economic agents face different relative prices compared to the situation before the price change. The good that is affected by the price change is either cheaper or more expensive compared to the situation before, while all other prices are assumed to have stayed the same. Usually, both effects are assumed to be at play simultaneously when the price of one good changes.

The income effect and the substitution effect both change the opportunities available to agents. A pure income effect was for Becker (1971) like an increase in real income. He argued that income effects are valid, even if one "does not assume utility maximization, preferences, or any decision rule[.]" Rather the income effect "is based solely on the scarcity of opportunities and the identity between income and expenditures" (Becker 1971: p. 18). If households gain access to a higher real income, this will shift the chosen consumption combination to some point on a new, higher boundary.[99] The income effect is the result of assuming that "the total change in expenditures would be equal to the change of income" (Becker 1971: p. 16). A pure income effect leads thus to an enlargement of the opportunity set, but the exact position of the new consumption bundle on a higher budget constraint induced by a pure income effect is not known. The exact

NBER. Two of his major research contributions are NBER publications. In 1958 Friedman published an NBER monography called A Theory of the Consumption Function presenting the concept of permanent income. As historian Jennifer Burns has recently worked out, the book built heavily on the work of a group of female economists consisting of Margaret Reid, Dorothy Brady and Rose Friedman (Burns 2022). The permanent income hypothesis became strongly associated with Friedman who published the work as a solo publication. But, Burns argues, the main ideas and empirical findings can be traced back to the work of Brady, Reid and Rose Friedman. Not only is the University of Chicago as a research center connected to many other research sites and researchers. The research cite University of Chicago is also part of a larger policy making sphere. The major changes causing the flourishing of the economic style of thinking that became common parlance in politics in the late 20th century was coming from institutional changes that were introduced in the Great Society administrations in the 1960s, and that were continued and extended thereafter (Berman 2022). The University of Chicago is also an important site of creation of economic expertise in the follow-up decades in her story. But in no way is it the central place of these changes to her.

[98] For example, after the price for a good has increased economic agents have less income to spend if they want to buy the same amount of quantities of that good as before. Hence, the income effect assumes that as the price of a good increases, the demanded quantities of that good decrease.

[99] The slope of the boundary given by the relative prices that the household faces, remains the same as before.

position on the new budget frontier depends on the income elasticities of the different goods that are consumed by the household and on the fractions of total budget that the household is already spending on them. This is due to the fact that income elasticities of goods are dependent on each other, because all goods must be bought with the same level of total income (see Becker 1971: p. 17).

Likewise, a pure substitution effect or a pure change in relative prices changes the opportunities available to agents.[100] An increase of the relative price of a good is for Becker not linked to utility or preferences, but simply to the change of accessible opportunities resulting from the change in relative price. With a pure change of relative prices some of the earlier available combinations of goods have been eliminated from the new set of feasible combinations, while some other combinations that were formerly not available have been added to the new opportunity set (see Becker p.19f.). Becker argued that "[s]ince a compensated increase in the relative price of [good] X shifts opportunities away from [good] X and toward [good] Y, a consumer would be 'forced' to consume less X and more Y. The force is not rationality or preferences, but simply the changing relative mix of different opportunities" (Becker 1971: p. 21). When good X is becoming more expensive, consumers should spend less of their budget for it. Instead they should spend more of their budget for all other goods (good Y).[101]

Using demand theory as a means of expression, Becker's theory of behavior was based on how agents reacted to changes in the opportunities they were exposed to. His demand theory culminates in what he called "the 'law' of the negatively sloped demand curve," what is to him "perhaps the most fundamental finding in economics" (Becker 1971: p. 11). Becker's law of the negatively sloped demand curve means that "an increase in the relative price of any good would decrease the amount consumed of that good," given

[100] Analytically, economists speak of a pure change in relative prices when the price of a good changes and at the same time agents are compensated in income so that they can still access the same consumption combination that they chose already before the price change. A pure change in relative prices is like a rotation of the budget constraint with the old (and new) consumption combination as the center of rotation.

[101] Becker demonstrates his analysis with two goods only. He assumed that the logic inherent in his analysis easily extends to cases with more goods.

that real income is being held constant. In Becker's words, "[a] change in relative prices would shift marginal as well as average consumption opportunities toward relatively cheaper and away from more expensive commodities because a dollar now buys more of the former and less of the latter." It also meant that "rational households would have an incentive to change their consumption, along with the opportunity set, toward relatively cheaper and away from more expensive commodities" (Becker 1962: p. 4f). Thus, agents should adapt their expenditures to this new situation of relative prices and adjust the composition of consumed goods according to the opportunities of the new situation. Demand theory thus provided the theoretical basis for Becker to describe changes in the environment of economic agents very generally as price changes, and to estimate how agents are likely to respond to such changes. The negative relation between the price of a good and its demanded quantity is also captured in the statistic measure of the price elasticity of demand.[102]

The community of the market and the group-level rationality it implied

In his reinterpretation of demand theory Becker argued that much of the empirical validity of demand theory stems from changes in opportunities, and not from utility maximization. In the second chapter of his 1971 textbook Becker argued that "[i]nitially, we avoid utility functions, indifference curves, rational behavior, transitivity, and the other paraphernalia of modern demand analysis" Instead he wrote that "[w]e intend to demonstrate that the main conclusions of demand analysis stem from a much more general principle than rational behavior – the scarcity of resources that defines an economic problem […]" (Becker 1971: p. 15). He argued that the negatively-sloped demand curve has traditionally

[102] The price elasticity of demand compares two demand situations and provides a numerical value as a measure for it. The measure is defined as the ratio of proportional change in the demanded quantity of a good to the proportional change in the price of that good. It is often interpreted as the degree to which a consumer is able to substitute the consumption of a good with alternative goods. For Becker the price elasticity of demand "is an important concept primarily because it is a convenient summary of the effect of a change in price on total expenditure […]" (Becker 1971: p. 13). It is convenient for applied economists, because it measures change independent of the units in which prices and quantities are measured. Given that elasticity statistics are independent of the measured units, they can be applied to compare a broad variety of non-monetary quantities to monetary values.

"been associated with rational behavior since it was derived from, and considered the main implication of, utility and indifference curve analysis. We intend to show, however, that [...] it is basically implied by scarcity, not rationality, and holds for many other kinds of behavior as well" (Becker 1971: p19).

Utility maximization was for Becker only one among many individual decision rules that resulted in negatively sloped demand curves. Utility maximizing agents are assumed to compare the marginal utilities of different goods, the additional amounts of utility that one more unit of that good would provide. In a hedonic equilibrium such agents spend all their resources for different goods exactly in proportion to the utility that each good provides them. They balance their consumption in such a way that any gains in satisfaction from additional units of some goods would not cover up the losses created by giving up some units of other goods in exchange (see Becker 1962: p. 4).

For Becker (1962) utility maximization defined rationality on the individual level. "A utility maximizing household would necessarily have negatively inclined compensated demand curves and a consistent and transitive 'revealed' preference system" (Becker 1962: p. 7). But, Becker argued that rationality on the individual level is not necessary to obtain a negatively sloped demand curve on the market level, because irrational decision rules would lead to negatively sloped demand curve as well.

Irrational response behavior was for Becker given by all different kind ways to react to price changes that deviates from utility maximization. In the JPE article of 1962 Becker illustrated his argument by sketching out formal models of two alternative decision rules on the individual level: stickiness to behavioral responses already chosen in the past and random choice of behavioral response. Becker associated stickiness to past behavior with habitual behavior and random choice of behavior with impulsive behavior.[103] Looked at

[103] According to him these more irrational decision rules also lead to a negatively sloped demand curve on the market level. The irrational decision rules captured for him "the spirit of the strongest and most frequent criticisms of utility theory." On the one hand, he argues "households are often said to be impulsive, erratic, and subject to never-ending whim, and on the other hand, inert, habitual, and sluggish. One view alleges that momentary impulses beget a confusing array of undirected change, the other that

impulsive or inert households individually, a pure change in relative prices would not necessarily correspond to a negatively inclined demand curve. An inert household would not necessarily change its consumption compared with what the household consumed before. An impulsive household might consume less of a good after its relative price has been increased, but it could also consume more given that for Becker impulsiveness means mathematically choosing at random. What makes the difference for irrational households is when they are aggregated to groups of households.

Becker envisioned economic agents always socially embedded in markets. He looked at choices as part of socially organized action, whether choices of economic agents had been made in actual market situations, or in non-market situations. He argued that the focus on markets had been a driving force in the development of utility theory. "Although economists have typically been interested in the reactions of large markets to changes in different variables, economic theory has been developed for the individual firm and household with market responses obtained simply by blowing up, so to speak, the response of a typical unit." (Becker 1962: p. 2) He argued that a typical or "[a] 'representative' household would act rationally even when actual ones did not if 'representative' simply indicates a microscopic reproduction of market responses." (Becker 1962: p. 7). He stressed that economists "are not primarily interested in households[.]" Instead, he argued "the analysis of household demand is just an intermediate step useful in understanding the market" (Becker 1971: p. 14f).

Becker's economics contained a theory of individual behavior, but only as a means to estimate group-level behavior. On the market level, individual decision units are thought to sum up to a whole, forming a market demand curve. Becker argued that "[a] group of irrational units would [...] respond more smoothly and rationally than a single [irrational] unit would.". This meant for him that "undue concentration at the individual level can easily lead to an overestimation of the degree of irrationality at the market level" (Becker

the past permits little current change or choice. Between these two extremes lies a wide spectrum of irrational behavior, partly determined by the past and partly by current impulses." (Becker 1962: p.5).

1962: p.13). Becker's basic claim in his 1962 article (and also in his 1971 textbook) was that market rationality is consistent with irrationality on the individual level. As a consequence, economists would not need to verify whether all households actually choose rationally by maximizing utility. Instead, economists could use group level observation to infer the optimal behavior of actual households (see Becker 1962: p. 7). When grouped together, Becker argued, the resulting market demand is likely to be negatively inclined even if some of the individual households in the market respond irrationally to price changes.

Becker illustrated his argument for impulsive, randomly choosing consumers. He explained that for an impulsive individual "[b]oth expected individual and actual market demand curves are negatively inclined because of the effect of a change in prices on the distribution of opportunities" (Becker 1962: p. 6). Given that a pure change of relative prices shifts the opportunity set towards now more affordable goods and away of now more expensive goods, the aggregated market demand of a group of randomly choosing impulsive households would probably shift accordingly to the shift in opportunities. Becker argued that "[t]he market demand curve in markets with many irrational households would, however, be negatively inclined, and the market's revealed preference system could be said to be rational (consistent and transitive) in the sense that a compensated change in prices would push the market outside its initial opportunity set. Hence the market would act as if 'it' were rational not only when households were rational, but also when they were inert, impulsive, or otherwise irrational" (Becker 1962: p. 7)

Market power and the social necessity of the budget constraint

Markets were for Becker not only aggregation tools in the hands of the economist. For him markets were also part of social reality. To the extent that markets involved many economic agents, the market level could also be described as the group level. As individuals were grouped together as participating in the same market, they were considered as having something in common. As they were participating in the same exchange situation, they formed a market community. As a social reality, Becker described markets as social

constellation in which the group-level market rationality is imposed on those market participants that were individually irrational.[104]

Becker viewed the market as a powerful social force, because he saw markets and consumption behavior in markets as existing in time. Those individual households who want to participate in markets continuously over time need to obey to the budget constraint, otherwise they would not "survive" as market participants. In his JPE article from 1962 Becker explained in which way households or firms can be imagined as surviving over time, and how such surviving was related to his general theory of shifting opportunities. He explained that "firms could not continually produce, could not 'survive' outputs yielding negative profits, as eventually all the resources at their disposal would be used up." And similarly, he argued that "[f]or the same reason households could not continually consume, in this sense could not 'survive,' outside the region covered by incomes." Becker specified that "the word 'survive' simply refers to a resource constraint on behavior and does not literally distinguish 'life' from 'death,' although some households and firms may actually die from trying to 'live' beyond their means" (Becker 1962: p. 10).

Households in the modern societies may not literally die when reaching the end of their resources. But for Becker it was important that societies make the budget constraint binding for its members for markets can develop their full social force – even though the social force of markets has arguably quite different effects on different types of agents. The full social force is perceived differently by rational and by irrational households. By definition, rational households adapt to changes in opportunities as it is implied by market rationality. But irrational households are, according to Becker, forced to obey to the market rationality and need to adapt their way of responding. Becker argued that "[e]ven irrational decision units must accept reality and could not, for example, maintain a choice that was no longer within their opportunity set." Indeed, Becker wrote in 1962, "the most important substantive result of this paper is that irrational units would often be 'forced'

[104] As before irrational decision-making means here that households deviate from utility maximization in their individual decisions.

by a change in opportunities to respond rationally" (Becker 1962: p.12). Therefore, we can say that Becker described markets as social constellations that impose their economic market logic on those who participate in them.

Passing from the individual level to the market or group level comes also with political considerations.[105] Consumption choices of individuals have often been described in economics as a common, united interest that it is driven by a set of well-defined preferences. But the more individuals are grouped together, the more it becomes likely that the resulting group-level demand does reflect conflicting interests and inconsistent preferences. Thus, representation becomes an issue when passing from the level of individual households to the market or group level.

Becker embraced an economically liberal, but not a politically liberal answer to the question of group level representation. In his 1971 textbook Becker indicated that market demand does not represent individual household demand "democratically," in the sense that the market income elasticity is an equally weighted average of the household income elasticities. Rather he indicates that "there is proportional representation rather than simple democracy; higher income households have greater influence than others." (Becker 1971: p. 17).[106] In different words, after aggregation market demand represents rather the interests and consumption decisions of those households that command more resources.[107]

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[105] The social aggregation of subjective values or preferences has been one of the big technical problems in US welfare economics of the 20th century. It is documented in numerous discussions of the social welfare function. The problem of aggregation is also a central problem in the household production framework whenever preferences of different household members are aggregated into one household preference. Feminist economists have criticized repeatedly that such aggregation implies various political considerations, see for example Folbre (1986) or Becchio (2019: p. 212).

[106] We may speculate that his economically-liberal solution to the problem of group-level representation is probably carried over by Becker from traditional demand theory before it was extended to non-market situations and phenomena. When demand theory is used to estimate demanded quantities of goods that were exchanged on an actual market, it seems much less problematic that there is a proportional rather than a "democratic" representation.

[107] "In decentralized market economies like our own, families, governments, and other organizations influence what others produce. They do so not primarily through the ballot box but by the way they spend their resources in the market place. There is a kind of proportional representation in which the influence of each person is not fixed nor shared equally, but is strictly proportional to his command over

Society, markets, and the role of the applied economist

For Becker (1971) markets are the central institutions of real-world economies. He has made market behavior the center of his theory of choice. He wrote that "[p]articularly in Western countries, economists are primarily concerned with the operation of the market sector in an industrialized economy" (Becker 1971: p. 1). Economists were for him experts on markets. They provide expertise on the behavior of individuals engaging in markets and on overall market activity. And as people value goods and services through their choice behavior in the market, market outcomes more generally implied for Becker what people organized in societies value collectively. "Every society, regardless of its method of organization, must somehow determine what is produced, how it is produced, and how that product is distributed" (Becker 1971: p. 3).

Although Becker's theory of choice was rooted in demand theory and markets, Becker saw no necessity to limit his analysis to those situations in which people literally exchanged goods or services for monetary compensation. In the introduction of his textbook Becker wrote that "[a]lthough much of our discussion is also related to the market sector in industrialized economies, the principles being developed are frequently applied to other sectors and different kinds of choices" (Becker 1971: p.2). As we described above, Becker expanded market logic to the non-market sector through his theory of choice.

Becker accorded crucial importance for the coordination of markets to prices. Like other economists in the post-WW2 decades, he saw prices as coordination institutions that have been shaped by past market activity and that take binding force for present market transactions.[108] Becker wrote that "[b]ecause prices are so important, lectures on microeconomic theory can be said to be lectures on price theory," and "[o]ne of the

resources. Influence is exerted by offering to exchange these resources for the goods and services that are desired" (Becker 1971: p. 3).

[108] For a conventional economic description from the 1960s of the societal coordination role that economists accorded to prices see for example Dorfman (1964).

important goals of these lectures is to demonstrate how market prices influence […] decisions" (Becker 1971: p.3f.).

But unlike many other economists, Becker became much more famous in the second half of the 20th century for stressing the coordination role of prices also for non-market activities.[109] He argued that in the process of coordinating social activity "prices play a crucial role even in the nonmarket sector where monetary prices do not exist, for economists have ingeniously discovered 'shadow prices' that perform the same function" (Becker 1971: p.3). Shadow prices are assigned by economists in the process of constrained optimization.[110] By allocating a limited budget to different spending options according to a principle of valuation, economists can ascribe a value to each spending option that is expressed in terms of foregone utility derived by comparison to the other spending options. In his textbook Becker uses shadow prices to express opportunity costs of different goods, services, or production factors.

Over his career Becker became famous for using opportunity costs to push economic reasoning from formal markets to a host of other social situations. Becker believed that principles of analysis developed for the market sector were relevant to all problems of choice. In the introduction to his 1971 textbook he wrote that "[a]lthough much of our discussion is also related to the market sector in industrialized economies, the principles being developed are frequently applied to other sectors and different kinds of choices. It is my belief that economic analysis is essential in understanding much of the

[109] Although we should keep in mind that Becker became the most known for his economics imperialism, but he was not the only economist of his epoque bragging enthusiastically about economic imperialism. See for example Hirshleifer (1985) or Stigler (1984) for further examples.

[110] A limited budget, for example, constrains how much goods agents can buy. A utility function usually specifies how much utility the agents derive from different goods. Whether each good is traded in a market or not, by balancing expenditures for the different goods to maximize utility, the budget constraint fixes an optimal quantity to consume for each good. The amount of utility that agents would derive from an additional unit of one of the goods is called the shadow price of that good. By including goods, items, services, or whatever in a constrained maximization problem that allocates a fixed amount of budget according to some valuation principles to the different items options in question, economists can attribute shadow prices to the items in question. In the post-WW2 decades economists made increasing use of the techniques of the mathematical techniques of constrained optimization that became standard knowledge in microeconomics curricula for the following decades.

behavior traditionally studied by sociologists, anthropologists, and other social scientists. This is a true example of economic imperialism!" As long as economists can describe social problems in terms of costs and benefits, they should, according to Becker, have a say with regards to these problems. "In other words," Becker argued that "the broad definition of economics in terms of scarce means and competing ends should be taken seriously and should be a source of pride rather than embarrassment to economists since it provides insights into a wide variety of problems" (Becker 1971: p. 2). Once worldly phenomena have been quantified as costs and benefits, they can be compared to other monetary sums. And if decisions press, economists can offer their valuations as a decision aid, offering to break highly multidimensional phenomena down to one-dimensional sums of utility.

Economists have a central role as statisticians in the process of quantifying opportunity costs. How economists use statistics in this process is described in a book chapter from 1963 on the empirical consequences of opportunity costs. The chapter is not written by Becker, but by Jacob Mincer. In that chapter Mincer wrote about what he calls "a class of specification biases that affect the estimation of parameters of economic relations[.]" Specification biases are misspecifications in the data that economists use that "are the result of neglecting certain easily overlooked or misunderstood price variables" (Mincer 1963: p. 67). The role of the applied economist is to evade errors of misspecification by properly adjusting observed market data such as prices or income.

To capture the effect of opportunity costs in economic decisions, Mincer maintained that real-world observations of prices and income need to be adjusted. Often, he wrote, "market prices alone do not provide sufficient information on the theoretically relevant opportunity costs." The opportunity costs that are theoretically relevant are those that exist for the economic agents themselves. They are not objectively observable for the economist, since they exist mainly subjectively for each individual. Observed market prices on the contrary, are usually the same for each market participant. In this general sense, Mincer argued that "[p]rice variables [...] are not fixed in cross sections, and cannot be

left out of the analysis without creating misinterpretations of income effects" (Mincer 1963: p. 67).

Mincer (1963) argued that "[i]t is the opportunity cost of time which is the most likely to be overlooked in the specification of relevant prices in demand functions." He wrote that "many consumption activities involve some specific costs to consumers over and above the money price paid to the seller of the consumption goods." Such specific costs would consist of "complementary economic resources such as labor, time, and other goods." If money prices were taken at face value, Mincer argued, these costs would not be taken in account in the predictions of demand theory. It was thus the role of applied economists to adjust the observed data. "For the proper specification of a demand function, prices must somehow be imputed [...]" (see Mincer 1963: p. 67f.)

Although opportunity costs are subjective, Mincer argued that they were usually linked to key variables such as the income individuals have at disposition (Mincer 1963: p. 67). Therefore, Mincer argued that economist needed to redefine the budget constraint. He argued that "[s]ince the opportunity cost of time is linked, at the margin, to the wage rate, this price element [the opportunity cost of time] is positively related to income" (Mincer 1963: p. 67f.). Thus, the role of the applied economist is partly that of a statistician, providing the right specification to interpret market observations. "The properly defined price [P] with which the consumer is faced is not p, the market selling price, but P = p + c, where c is the opportunity cost of time. The relative size of components p and c differs by commodities and by individuals" (Mincer 1963: p. 68)

Becker's views were very similar at the time. Two years later Becker published a paper in the *Economic Journal* titled *A Theory of the Allocation of Time* (Becker 1965). In the following citation from that article Becker praised the working climate at the NBER.

> "In the last few years a group of us at Columbia University have been occupied, perhaps initially independently but then increasingly less so, with introducing the cost of time systematically into decisions about non-work activities. J. Mincer has shown with

> several empirical examples how estimates of the income elasticity of demand for different commodities are biased when the cost of time is ignored; J. Owen has analysed how the demand for leisure can be affected; E. Dean has considered the allocation of time between subsistence work and market participation in some African economies; while, as already mentioned, I have been concerned with the use of time in education, training and other kinds of human capital. Here I attempt to develop a general treatment of the allocation of time in all other non-work activities. Although under my name alone, much of any credit it merits belongs to the stimulus received from Mincer, Owen, Dean and other past and present participants in the Labor Workshop at Columbia." (Becker 1965: p. 494).

The choice theory that was developed by Becker and put forward by him and others was built by expanding the market logic of traditional demand theory to non-market situations. It assumed binding budget constraints and the possibility to describe subjective costs and benefits generally in terms of prices and incomes. Becker's choice theory implied a theory of individual behavior, but only as a means for ultimately estimating group-level or market-level behavior. The resulting view of rationality was rather socially and not individually determined.

2.2.2 Choice environments as household production technology

Demand theory provided applied theorists like Becker powerful principles to formulate a general theory of choice. But demand theory had some inconveniences when the resulting theory was applied to the unconventional questions related to non-market behavior. Traditionally, demand theory explains changes in the quantities of goods consumed as a result of changes in prices, income levels, or tastes that have changed over time. Therefore, economists must assume unchanging tastes or stable preferences when analyzing demand

in a market. Depending on the specific market situation, this assumption may be more or less convincing.[111]

In empirical demand studies taste can be represented by different socioeconomic variables or by variables informing about the specific decision-making context. Users of the household production framework acknowledged the potential effects of taste, but argued that these effects could sufficiently well be mirrored in observable variables that describe the household production technology with which economic agents consume, produce, and make their choices. As a result, behavior is explained in terms of productivity differences resulting from the production technology and not in terms of differing tastes.

Choice objectives as the ultimate source of utility

In the household production framework consumption behavior is seen as the result of production decisions being made in households. Households are decision-making units consisting of at least one person. In his 1971 textbook Becker wrote that the framework "abandons the traditional separation between production and consumption and makes households producers as well as consumers" (Becker 1971: p. 45). Traditionally, household activities were generally seen as consumption relying on many factors, on the needs and wants of household members, on sociodemographic characteristics, on social influences, and on tastes. Economists could describe some of these activities with demand theory, but only to the extent that other factors such as tastes were not intervening too much. By employing the tools and concepts of production theory Becker and others claimed that they could explain household activities more systematically by formally imagining consumption activities as production processes.

This reorientation of theory involved a fundamental redefinition of consumption behavior, utility, and preferences. Technically, this extension was made possible by establishing a theoretical structure that could bypass the impact of tastes and other non-economic factors on demanded quantities. Becker and other members of the CEAHBSI

[111] For a discussion of the role of tastes in neoclassical demand analysis, see Wallis and Friedman (1942).

community redefined the fundamental objects from which individuals derive utility. Traditionally, economists defined goods and services bought in markets as measurable items from which economic agents derive utility. Household production functions added a more fundamental layer to the analysis by considering items that are subjective, intangible and not actually transferable. In this framework, market goods only provide intermediary utility. Ultimately, utility comes from abstract choice objectives, which households try to obtain using goods bought in the market.[112] Households achieve these objectives through production processes, combining market goods and available time. Thus, choice objectives are modeled analogously to final products produced by firms using different production inputs.

Choice objectives are at the center of household production theory because economic agents derive utility from them. Mathematically, these objectives are expressed as quantities generated by household production functions. Using the methods of constrained optimization, household production theorists aim to find the optimal combination of production inputs that maximizes the quantity of the choice objective, given the constraints on the availability of production inputs. Representing choice objectives with household production functions translates them into utility theory.

Formalizing household production functions not only makes choice objectives more accessible in terms of utility quantities, it also formalizes the inputs that can be combined to achieve each objective. Production inputs include available goods purchased through market transactions, the time consumers dedicate to achieving a production goal, and the production skills consumers have developed, stocks of human capital. Each input can be expressed in terms of shadow prices, or the marginal utility that a production input

[112] Michael and Becker (1973) simply called them "commodities." We will refer to them rather as choice objectives or production objectives in this PhD thesis.

provides.[113] Each input can be characterized by its productivity, by how much it contributes to producing additional units of a choice objective.

One might ask how objective the abstract production objectives need to be. Utility is not derived directly from the goods or services in question but rather from the more fundamental production objective. Production objectives are not restricted in principle and are thus defined very broadly. They can be specific and temporary, such as the desire to eat a good meal. Alternatively, they could be very general and extend over time, such as maintaining good health. Theorists from the CEAHBSI community did not usually discuss the degree to which household production objectives must be objectively shared to be relevant (see, for example, Michael Becker, 1973; Stigler and Becker, 1977).[114]

In practice, production objectives are not explicitly reported in the data economists use. Economists often use data collected by others and assume certain production objectives.[115] Therefore, whenever they use household production functions to analyze

[113] One of the crucial innovations of household production functions is the treatment of chronological time as an objective and limited resource that constrains the production possibilities within a household to produce household goods and within the labor market to produce money income (see Heckman 2015).
[114] The definition of economics as a method has psychological implications for the imagination of the consumption process. It implies that limited resources are objectively given and measurable. However, it is unclear to what extent this also applies to the purposes for which the resources can be used. One could interpret household production objectives as basic needs, as philosopher Alexander Rosenberg has argued (Rosenberg 1985). In that case, the objectives chosen would somehow be limited, representing the attainment of universal basic needs. Whether the ends should also be viewed as limited has not been widely discussed by members of the CEAHBSI community, at least not publicly. Occasionally, Michael and Becker (1973) have made somewhat similar points. They argued that "[i]n the standard theory all consumers behave similarly in the sense that they all maximize the same thing – utility or satisfaction. It is only a further extension then to argue that they all derive that utility from the same 'basic pleasures' or preference function, and differ only in their ability to produce these 'pleasures'" (Michael, Becker 1973: p. 392). In Chapter 6, we explain how Becker revisited this issue using his extended utility framework.
[115] For a contemporary critique of economists' data usage and processing practices, see Thomas Juster's paper, "Microdata, Economic Research, and the Production of Economic Knowledge," a colleague of Becker's at the NBER (Juster, 1970). Juster argued that, rather than actively participating in the data collection process, economists often merely transform data observed by others. Thus, Juster argued that economists depend on the organizations who provide the data. While Becker worked on the estimation of human capital returns at the NBER in the early 1960s, Juster conducted data collection experiments through consumer surveys aimed at predicting consumer purchase intentions. A revised version of Juster's paper is also included in a collective volume on the advances in "behavioral economics." The volume was edited by the behavioral psychologist Leonard Green and microeconomist John Kagel (Green and Kagel, 1987) to whom we turn in Chapter 5. Other members of the CEAHBSI community, such as Robert Michael, later became strongly involved in data collection. After becoming director of the economics

data, economists implicitly ascribe choice objectives to the decision units they observe. This may be uncontroversial for basic food items, clothing, or rent. However, it may be much less clear for other consumption items. Although the actual choice objectives of consumers are not directly accessible to the observing economist, household production theorists assume that their derived results approximate consumption reality sufficiently well.

In practice, production objectives are not literally expressed or reported in the data that economists use. Economists often use data collected by others and assume certain production objectives. So, whenever economists use household production functions to analyze data, they implicitly ascribe choice objectives to the decision units they observe. This might be uncontroversial for basic food items, clothing, or rent. But it might be much less clear for other consumption items. Even if the actual choice objectives of most consumers are not directly accessible to the observing economist, household production theorists assume that their derived results approximate consumption reality sufficiently well.[116]

Redefining households as decision making environments

Production processes are assumed to occur in a household environment. This environment provides the decision-making unit with technology. This technology can increase the productivity of household production processes. In other words, the same production objective can be achieved with fewer resources in a household with better technology than in a household with less powerful technology.

Economists can attribute differences in aggregate or individual data to variations in household production technology. Thus, human decision-making and resulting behavior

program at the N.O.R.C. in Chicago in the early 1980s, he became involved in designing and implementing large social surveys such as the National Longitudinal Survey of Youth and the National Health and Social Life Survey.

116 In this regard, the household production framework exhibits a similar instrumentalist approach to the social sciences as Milton Friedman's renowned essay, *The Methodology of Positive Economics* (Friedman, 1953).

become comparable in terms of the productivity technology with which each decision-maker is equipped. As Michael and Becker explained, "[t]he household production function approach incorporates into the theory of choice at a fundamental level the constraints of time, consumer knowledge and inter-household differences in consumption efficiency" (Michael, Becker 1973: p. 392). All these constraints define the technology with which households produce their desired outcomes.

Households are more efficient at achieving their goals because they have different amounts of goods, time, and skills at their disposal. Using the household production framework, members of the CEAHBSI community interpreted the socioeconomic variables of individuals in terms of their effects on household productivity. Thus, socioeconomic variables or geographical information about individuals were considered environmental variables. In his textbook, Becker wrote that, in the household production framework, "the effects of age, education, climate, ability, and other 'environmental' variables on behavior can be introduced through the household production functions instead through tastes" (Becker 1971, p. 47).[117] Altering one of these environmental variables would affect production efficiency, thereby changing the amount of time and goods needed to produce the same amount of the desired outcome.

For example, Becker (1971) argued that "households in warm climates could produce a 'comfortable indoor temperature' with smaller inputs of heating fuel, insulation, and clothing than could those in cold climates." Just as climate is considered part of the environment in which households and individuals make choices, socioeconomic variables such as education and age are also theoretically part of that environment. Becker wrote "[s]imilarly, educated persons may be able to produce a given level of 'health' with relatively small inputs of food and medical care because of greater awareness of the vitamin content of different foods, the deleterious effects of cigarette smoking, or the benefits of

[117] Michael and Becker (1973) wrote that "[w]ithin this framework the effects of climate (meteorological, political or social), the ability of household members, as well as differences in family size, age, sex, etc. may be analyzed" (Michael, Becker 1973: p. 390).

exercise." He also wrote that "'abler' housewives could produce better 'meals' from a given expenditure on food and time" (Becker 1971: p. 47f.).

In the household production framework, households become wealthier as they become more efficient. When environmental variables increase household efficiency, the cost of achieving desired outcomes decreases. For example, if an increase in an individual's education level increases their production efficiency for all their choice objectives, an increase in education would be analytically the same as an increase in available income. Since fewer resources are used to produce the same amount of choice objectives, the individual would have additional resources available for other purposes.[118] Households could produce more of their choice objectives or perhaps even some choice objectives that they were unable to produce with a lower level of education. This is theoretically the same as an income effect.[119]

In practice, the usefulness and appropriateness of the household production framework depends on myriad additional conditions. For example, it depends on whether it is possible to substitute production inputs, such as time, with other inputs, such as goods or increased levels of skill. It also depends on whether a change in an environmental variable affects the efficiency of producing all possible choice objectives or only a few. Other economists have criticized the household production framework for many of such limitations.[120]

The analytical explanation also hinges on the type of environmental variable. Level of education is the environmental variable that was most often considered by researchers from the CEAHBSI community. Other environmental variables appear much less plausible, useful, or ethically appropriate as determinants of household efficiency. Would you make the same arguments if you considered socioeconomic variables such as ethnicity,

[118] This idea has been developed in great detail by Becker's student Robert Michael in his PhD dissertation (see Michael 1972, 1973).
[119] The individual has more resources at their disposal, thus enlarging their opportunity set. Graphically, his or her budget constraint would move upwards, giving him or her access to more combinations of goods than before.
[120] See for example Pollak and Wachter (1975) or Folbre (1986).

gender, or intelligence quotient? Distinguishing households or individuals based on their socioeconomic or other characteristics by reducing these characteristics to one-dimensional efficiency differences carries the risk of theoretically justified discrimination.

Explaining behavior without taste

The formal means of describing human behavior impact the ability to describe human welfare. The way human welfare is described impacts policy recommendations. In his 1971 textbook, Becker argued that the household production framework "reduces the need to rely on differences in tastes and increases the importance of differences in prices and incomes, the two parameters that can be treated by our framework" (Becker 1971: p. 45). If changes can be broken down into differences in prices or income, then they can be expressed in price theory. Price theory can then be used to predict consumption behavior. As Michael and Becker wrote in 1973, "[b]y incorporating production concepts into the theory of consumption, the household production function approach implies that households respond to changes in the prices and productivities of factors, to changes in the relative shadow prices of commodities and to changes in their full real income as they attempt to minimize their costs of production and to maximize their utility" (Michael, Becker 1973: 386).

In terms of policy recommendations, it may be important to consider whether household or individual differences are described in terms of subjective tastes or objectively implied productivity. Michael and Becker write that "[i]f observed differences in behavior are assumed to result from differences in tastes, and if the satisfaction of each person's tastes is used as a guide to normative statements, then differences in behavior cannot be judged normatively." In that case, economic explanations of behavior partially depend on tastes. However, if "the observed behavior is assumed to result from different efficiencies with the same set of tastes, these can be judged by the level of full real income which they

produce: i.e., by their level of productivity" (Michael and Becker 1973: p. 392). Therefore, household production theorists must assume stable tastes.[121]

Michael and Becker (1973) demonstrate how the framework can be applied to education. The difference lies in whether tastes are assumed to change or household productivity is assumed to change. "[I]f education is said to alter tastes, one cannot speak of the effects of education on the level of utility: what is preferable to the college graduate may not be so to the grade school dropout and the two cannot, even in principle, reach an agreement on which set of tastes is 'better'" (Michael and Becker 1973: p. 392). They cannot reach an agreement because, in this case, utility is assumed to depend on tastes. The tastes of the dropout and college student differ due to their different levels of education. Therefore, economists have no special expertise to explain anything that happens in this case. First, tastes are subjective and thus inaccessible to economists. Second, economists have no theory about taste formation. Consequently, the formal descriptions of the observing economist fail to provide a full explanation that could serve as positive economics and form a consensus.

However, Michael and Becker (1973) argue that economists' expertise is entirely different when differences in tastes can be described as differences in household production technology. They claim that economists can comment on the effects of education on utility if one assumes that "education affects the efficiency of household production functions." In that case, "[w]hatever yields greater commodity output is preferable and can be considered as such by both individuals[,]" by the college graduate and the grade school dropout alike. "The school-dropout's behavior differs if his efficiency is less [compared to the college graduate] for the same reason it differs if he faces higher market prices - both restrict his opportunity set" (Michael and Becker 1973: p. 392). Thus, when differences in tastes are reduced to differences in household production technology, Michael and

[121] The chain of assumptions can be represented in two steps. First, the household production framework reinterprets initial differences in tastes as differences in productivity. This is done by using sociodemographic or other variables to describe the technology that households use to make decisions. Second, the framework assumes that there are no additional taste differences. Any observed change in behavior is then attributed to a change in productivity.

Becker claimed that the household production framework can provide descriptive statements about societal affairs that are relatively value-neutral. They claimed that such differences in terms of individual utility production efficiency actually explain different observed responses to price or income changes. This implied that individuals do not react differently because of their subjective tastes, which are inaccessible to economists. Rather, different individuals react differently because they are equipped with different utility production technologies. The household production theorists argued that these technologies could, in principle, be objectively identified by economists.

The household production function framework has welfare implications because public policies affect household production technology. Since individuals and households have different socioeconomic characteristics that determine their production technology, the same public policy will affect different households differently. The household production framework has been proposed as a descriptive model, primarily to improve the prediction of consumption behavior. However, as Michael and Becker (1973) explain, it also allows for theoretical differentiation between individuals.[122] This differentiation can be used to compare how different individuals are affected by different policies. It can also justify the discriminatory treatment of individuals or households.

To avoid misunderstanding household production theorists like Michael and Becker, it is important to realize that household production functions only indirectly describe tastes or preferences. Rather than describing preferences directly, household production theorists have mirrored the assumed effects of preferences as the effects of production constraints under which decisions are made. While traditional demand analysis uses a multifarious variable called "tastes," household production functions use a multifarious variable called "household production technology." Using the household production framework, we can conclude that when policymakers, including economists,

[122] For example, Michael and Becker wrote that "[i]f education and age increase one's capacity to evaluate correctly the long-run effects of behavior, the uneducated and the young might be expected to consume more 'irrationally'. From such reasoning, which is included here as only illustrative, welfare implications about the desirability of various policies might be obtained." (Michael, Becker 1973: p. 393).

wish to influence observed patterns of behavior, they should refrain from acting directly on preferences. Instead, they should focus on how actual behavior might change through changes in the factors that constrain decision-making. Economists like Becker usually refuse to act directly on individuals' preference structures, often justifying this with political arguments related to individual freedom and consumer sovereignty.

2.3 Household production as a common framework within the CEAHBSI community

> "Every cognition is a social act (…) for during every lasting exchange of thoughts there appear and grow ideas and standards which are not associated with any individual author. A communal mode of thinking develops which binds all participants, and certainly determines every act of cognition. Therefore, cognition must be considered as a function of three components: it is a relation between the individual subject, the certain object and the given community of thinking (Denkkollektiv), within which the subject acts; it works only when a certain style of thinking (Denkstil), originating in the given community is used."
>
> Ludwik Fleck [1986] cited in Wojciech Sady (2023)

When presenting the CEAHBSI in the 1973 NBER Annual Report, Fuchs and Michael described the research collectively done at the CEAHBSI as a concerted effort. They claimed that most of this collective research focusses on extending conventional economic analysis with regards to intangible wealth embodied in human beings and public and private institutions and with regards to human behavior outside formal markets (see Chapter 1). Citing the NBER founding father Wesley Clair Mitchell, they argued that

with these two research foci the CEAHBSI "fits quite comfortably into the longstanding objective of National Bureau research: to provide more adequate quantitative measures of the economic performance of society."[123]

The household production framework was developed over the 1960s and early 1970s. In the same year that Fuchs and Michael presented the CEAHBSI in the NBER Annual Report, Michael and Becker published their article, "On the New Theory of the Consumer," in which they described their use of the household production framework in great detail (Michael and Becker, 1973). During the 1970s, CEAHBSI researchers used the framework to explore several new applied fields of economics, including the economic analysis of population, family relations, health, and legal affairs. We argue that the framework served as a common epistemological foundation for the community to explore these new fields with a shared vision. However, the strictness with which the framework was applied varied among community members. In the rest of this section, we will provide examples of how different researchers from the CEAHBSI community used the household production framework.

Since this Ph.D. thesis focuses on the theory of rational addiction, we will discuss some research efforts that may be related to the later rational addiction model. First, we describe how Michael Grossman used the household production framework in his early research. Grossman's work is interesting for two reasons. First, he considered detrimental health effects, such as cigarette smoking and excessive alcohol consumption, in his doctoral work on the private production of health. Second, he is one of the key figures who contributed to the development of the rational addiction model in the field of applied

[123] They cite Mitchell in the NBER Annual Report of 1944 as follows. "Of course, this attempt to develop economics as an objective science of human behavior through the use of mass observations labored [at the time of World War I] under a material handicap. Speculating about what it is to the interest of men to do under imagined conditions can be carried on by a lonely thinker in his closet. He requires no staff of assistants, and no financial aid beyond a living salary. In contrast, the investigator who tries to utilize observations is in the position of an experimental scientist. He must have a laboratory, specialized equipment, and assistants. Lonely thinkers can and do make contributions in this field, but they must confine themselves to problems that require relatively few and easily accessible data. Larger undertakings call for teamwork. And the largest undertakings are often the most significant" ([Wesley Clair Mitchell] 1944 NBER Annual Report, cited in NBER 1973: p. 63).

health economics in the early 1990s (see Chapter 6). Second, we briefly present a variety of other studies by different researchers from the CEAHBSI community that address issues related to the intertemporal decision-making of non-market behavior.

2.3.1 Michael Grossman's theory of health capital

The study of unhealthy behavior was part of the NBER health economics program, which was started by Victor Fuchs in 1967. While other authors were interested in the determinants of health in the late 1960s, Michael Grossman carved out a place for healthy and unhealthy consumption behaviors in his PhD thesis using household production theory.[124] Grossman wrote his PhD thesis while working for Fuchs at the NBER and while being supervised by Becker. He finished his thesis in 1970 and published parts of it as an article in the JPE (Grossman 1972a), and as a monography as part of the NBER *Occasional Paper series* (Grossman 1972b). In the foreword to Grossman's NBER monography Fuchs describes Grossman's work as follows.

"The distinction between health and medical care has been a major concern of the National Bureau's health research program ever since its inception some five years ago. Evidence of this concern is apparent in most of the papers published in [Fuchs' edited volume] *Essays in the Economics of Health and Medical Care* [Fuchs (1972)] and especially in the contribution of Auster, Leveson, and Sarachek [(1972)], *The Production of Health An Exploratory Study*. The richest and most elegant theoretical treatment of this distinction, however, is in this new study by Michael Grossman. Drawing on some basic notions of Gary Becker's concerning the household's role in the production of ultimate commodities, Grossman has fashioned a model which is theoretically sound,

[124] In 1965 Fuchs circulated a paper called *Some economic aspects of mortality in the United States*. Merging data containing mortality rates with data containing different socioeconomic variables, Fuchs attempted in the paper to interpret the resulting correlations. Although he never published his paper, it became well-read and cited reference by others from the NBER health economics program (Auster et al. 1969, Leveson 1970, Silver 1972, Grossman 1972).

intuitively appealing, and yields significant testable implications." (Fuchs cited in Grossman 1972b: p. ix).

The research opportunities of young researchers like Grossman were in part shaped by their social intellectual environment. In a book published in 2017 Grossman resumes his lifetime research activities. In the book he recounts also his early years at the NBER. Grossman (2017) recalled that he was a third year PhD student looking for a dissertation topic in 1966. Working halftime as a research assistant at the NBER for Fuchs, he was consulting his teacher Becker. As research staff of the NBER Becker was in the reading committee for the paper *The Production of Health: An Exploratory Study* by Auster, Leveson, and Sarachek other junior researchers in Fuchs' health economics program. According to Grossman, Becker mainly criticized the paper for taking medical products and services as the ultimate object of demand from which people derive utility. According to Becker medical products and services should rather be taken as inputs in a household production process. The ultimate object of choice in such a process should be health. According to Grossman, Becker recommended him to look into this issue and into the effect of education on health. "Along the way he encouraged (some say demanded) me to broaden it into a theoretical and empirical analysis of the demand of health" (Grossman 2017: p. XV–XXIV).

In his thesis, Grossman described the demand for medical services as resulting from a more fundamental demand for health. Following Becker, Grossman described this fundamental health demand with a health production function, with good health as the objective. In this sense, individuals can be seen as paying for medical services in the market as part of their efforts to produce their own health. However, medical services provided by doctors are only one input in the health production process. According to Grossman, other inputs include a healthy diet, sufficient physical exercise, and abstaining from harmful substances, such as cigarettes and alcohol (see Grossman, 1972a; 1972b). According to Grossman, health is an output produced over the long term, throughout individuals' lives. Nonetheless, he believed that individuals contribute to their long-term

health status through their present actions. To describe this process, Grossman modeled health capital, which individuals accumulate over their lifetime. Health capital is related to, but not the same as, human capital.[125]

In theory, an individual's increased productivity should lead to a higher income in the labor market. According to Becker's theory of human capital (Becker, 1962), foregoing labor market income in the present should result in increased income in the future. In the CEAHBSI community, this was called a direct benefit of human capital. Grossman considered the indirect effect of education through health-maintaining activities. Health capital did not directly increase an individual's income-earning capacity. Rather, high levels of health capital would increase the total lifetime available to an individual in the future. With longer lives, individuals should have more time to earn income, produce household goods, and enjoy what they produce. In this sense, Grossman defined healthy and unhealthy goods and activities (see Grossman, 2003, p. 332). In Grossman's model, health-maintaining activities resemble a form of saving for the future, where the savings consist of expecting to have more time in the future.[126]

Grossman was interested in cigarettes and other instances of unhealthy consumption because he assumed they lower people's health capital. In his model, Grossman carved out a role for not only medical services but also healthy and unhealthy forms of consumption, such as cigarettes and alcohol. He viewed cigarette (or alcohol) consumption as a process of joint production (Grossman 1972: p. 74). Like medical services, Grossman assumed that cigarettes impacted the formation of gross investments in health capital. While medical services were assumed to contribute positively to increasing or maintaining the stock of health capital over time, cigarettes (and alcohol) were assumed to contribute negatively to it. Thus, individuals do not buy cigarettes to invest in their

[125] Human capital was a central concept in the CEAHBSI community and has been used by Mincer (1958, 1962, 1963) and Becker (1960, 1962) to describe investments in knowledge and skills that enhance an individual's productivity.

[126] Grossman's thesis included consumption and investment models of health (see Grossman, 1972a, Chapters 2 and 3). The title of his introductory chapter was simply *A Stock Approach to the Demand for Health*. However, in simplified versions, Grossman's model is often reduced to its investment aspects.

health. Rather, Grossman argued that these goods are purchased because they are inputs for producing other commodities, such as "smoking pleasure," which yield positive utility (Grossman 1972: p. 74). Since cigarettes appear as inputs for multiple production processes, Grossman spoke of joint production.

In his joint production model, Grossman grouped together all inputs that improve health, such as diet, exercise, recreation, and housing, into one composite input good. All inputs that "damage health," such as cigarettes, liquor, and rich food, were aggregated into another composite input good. By doing so, Grossman described a health production function reduced to three inputs: medical services; a composite representing health-improving factors; and a composite representing health-damaging factors. He showed that, when medical services and health-damaging factors were held constant, "an increase in [the amount of health-improving factors] will increase the marginal product of medical care and reduce the marginal cost of gross investment." Thus, he interpreted medical services and health-improving services as complementary production inputs. "On the other hand, an increase in [the amount of health-damaging factors] will reduce the marginal product of medical care and increase the marginal cost of gross investment." Thus, he saw medical services and health-damaging services as substitutes in the production of health (see Grossman 1972: pp. 74–76).

Grossman attempted to resolve a theoretical paradox he observed in empirical data. In his dataset, health (measured by healthy days per year) decreased with increasing income. Rather than interpreting health as an inferior good, Grossman explained the negative income elasticity of health as resulting from joint production. He argued that "the detrimental inputs in the gross investment production function have higher income elasticities than the beneficial inputs" (Grossman 1972, p. 77). In other words, as individuals become wealthier, they spend relatively more on health-damaging goods than on health-improving goods. He argued that "if the consumption of health-damaging goods were more responsive to changes in income than health-improving goods, health would be negatively correlated with income in the investment model." At the same time, medical

services might have a positive income elasticity. He argued that "wealthier persons might have an incentive to offset part of the reduction in health caused by an increase in [health-damaging goods in relation to health-improving goods] by increasing their medical outlays [...]. In this case, wealthier individuals would reduce their demand for health while increasing their demand for medical care" (Grossman 1972: p. 78).

As a student of Becker, Grossman considered the "law of the downward-sloping demand curve" to be "the most fundamental law in economics." Accordingly, he argued that the amount of health-damaging goods demanded by consumers depends on the prices of these goods. He argued that an increase in the price of a health-damaging good would raise the marginal product of medical care, lower the marginal cost of gross investment in health, and increase the demand for health (Grossman 1972: p. 78). Thus, the prices of health-damaging goods were potential variables of interest for public policy.

By describing the relationship between health and individual production environments, Grossman was providing an explanation based on productivity, pushing the role of tastes to the background. In the foreword to Grossman's NBER monography Fuchs commented Grossman's work as follows: "Prior to Grossman, studies of the demand for medical care were typically set in the framework of consumer demand for a final product and were thought to depend upon prices, income, and 'tastes.' Tastes were thought to depend in part on state of health, which was exogenously determined. In Grossman's model, people, to some extent, choose their level of health just as they choose the level of consumption of other 'commodities.' Variables such as age and schooling affect demand by altering the 'price' of health." (Fuchs cited in Grossman 1972a: p. IX). Michael and Becker (1973) described the household production framework similarly: "If households can affect the environment in which they live, they will substitute toward those aspects which enhance productivity. They can 'produce' higher education, better health, more favorable weather or greater political stability by attending school, exercising, moving, voting, et cetera" (Michael, Becker 1973: p. 393).

2.3.2 Other CEAHBSI studies related to risky and unhealthy behavior

Of all the researchers in the CEAHBSI community, Grossman's research on health production has perhaps come closest to later models of rational addiction. However, he was not the only CEAHBSI researcher interested in conventional non-market behavior and its intertemporal consequences. Other CEAHBSI researchers were interested in different aspects of intertemporal behavior. Like Grossman, they formulated their research in terms compatible with the household production framework.

Two NBER books from the mid-1970s exemplify these research efforts. The first, an edited volume published by the NBER, was financed by the *Carnegie Commission on the Future of Higher Education*. Titled *Education, Income, and Human Behavior*, the volume was edited by Thomas Juster (Juster 1975). Most of the authors were part of the CEAHBSI community at the NBER.[127] The second edited volume, part of the NBER publication series *Studies in Income and Wealth*, contains texts presented at the *40th Conference on Research in Income and Wealth*.[128] Titled *Household Production and Consumption*, the published volume was edited by Nestor Terleckyj (Terleckyj 1976). While many conference participants were associated with the CEAHBSI community, this was not true for all participants contributing to the volume.[129] Both volumes contain introductory chapters in which the editors summarize the authors' contributions. In this subsection, we use these introductory chapters to briefly present contributions from these two volumes that address non-market behavior and intertemporal decision-making.

[127] Except of Albert Beaton all of the authors of the different chapters where part of NBER research programs that formed from mid-1972 onwards the CEAHBSI.

[128] The conference took place in December 1973 and benefitted from funding from the *National Science Foundation*. Nestor Terleckyj from the *National Planning Association* headed the program committee of the conference that consisted next to him of Robert Michael and Jack Triplett. The program committee was advised by Becker.

[129] Not all of the participants of the conference were closely associated with the NBER and some of the participants like for example Ruth Mack were closely associated with the NBER, but not with the CEAHBSI community. Her distance from the community is reflected in her critical remarks on broader themes in the different contributions to the conference (see Mack 1976).

We selected research contributions from these two volumes that address three aspects of non-market behavior and intertemporal decision-making. First, we present studies that highlight the malleability of basic budgeting and planning capacities households need to allocate resources for non-market behavior. Second, we present studies addressing aspects of planning and budgeting particular to intertemporal choices and processes that unfold over long periods. Third, we present studies concerned with risky activities or lifestyles. Finally, we supplement these studies with a 1976 NBER staff report by Robert Michael illustrating the crucial role of time within the household production framework.

A formable budgeting capacity in the decision-making unit

In Section 2.2, we showed how education was viewed within the household production framework as an environmental variable that affects household production efficiency. The basic logic for this assumption was that education enhances the decision-maker's planning and budgeting capacity. One of those researchers in the CEAHBSI community who worked on the productivity-enhancing effects of education was Robert Michael, a close peer of Grossman. In his PhD thesis Michael took the proposition that human capital investments enhance the productivity of individuals in the labor force, and he extended this logic to the nonmarket sector.[130] Michael had a chapter in the collective volume edited by Juster titled *Education and Consumption* (Michael 1975). In that chapter Michael assumed that more educated people were better at allocating time and resources to achieve their production goals. Resuming Michael's chapter, Juster argued that, in Michael's model, "education should act much like an increase in money income insofar as household decisions are concerned; that is, if education increases household efficiency in the manner described above, households whose members are more highly educated have the equivalent

[130] As Grossman, Michael was a student of Becker and Mincer at Columbia and worked as a research assistant at the NBER in the late 1960s. As Grossman, Michael published a part of his thesis in the *JPE* (Michael 1973) and in extended form as a *NBER Occasional Paper* (Michael 1972). Both Grossman and Michael provided lecture material that Becker used to write a textbook in economics published in 1971.

of greater money income and should therefore act in the same way as households that actually possess greater money income" (Juster 1975: p. 26).

By articulating how education affects household productivity, Michael needs to describe the agency in terms of decision-making in the first place. Juster says that Michael's model views education "as affecting productivity largely by way of enhancing the ability to process information, to evaluate new ideas and techniques, to make decisions in the face of imperfect information, to acquire new information in a relatively less costly manner, etc." As education is seen as productivity-enhancing, "households with more education should be able to get more outputs out of a given quantity of inputs" (Juster 1975: p. 26). Juster also mentioned the similar work of Finis Welch, another CEAHBSI researcher, who was part of the CEAHBSI community in the early 1970s. As Michael, Welch was part of the CEAHBSI community in the early 1970s. Welch described the effects of education similarly as enhancing information processing skills (Welch 1970). Both Michael and Welch have assumed a general budgeting or planning capacity of individuals as something that can be shaped by environmental variables such as education. According to them, households have a formable capacity that enables them to allocate household production inputs like time and goods to different production objectives.

Aspects specific to budgeting and planning over time

Other researchers in the CEAHBSI community were interested in intertemporal behavior stretching over long periods of time. Many household production processes, for example, are extended in time. For instance, Grossman's production of health capital was assumed to occur over a lifetime (see subsection 3.1). Since certain activities extend beyond the current decision-making period, decision-making units must project income and consumption both today and in the future. In terms of available budget, individuals must define how much income is available today, how much will be generated in future periods, and how much will be necessary to cover future costs. Thus, allocating resources to different moments in time considerably complicates constrained optimization.

A young economist named Lewis Solmon focused on topics related to saving and time preference. In the volume edited by Juster, Solmon contributed a chapter titled "The Relation between Schooling and Savings Behavior: An Example of the Indirect Effects of Education" (Solmon 1975). In the chapter, Solmon compared how saving behavior changes with differences in education levels. Summarizing Solmon's chapter, Juster wrote that "those with more education are apt to have lower discount rates" and that there is a "possible effect of educational level on time preference or foresight" (Juster 1975, p. 28). Juster found Solmon's results highly relevant for policy. He argued that Solmon's results were "consistent with the notion that one of the effects of formal schooling is to expand the time horizon of the household and to increase its awareness of the future relative to the present" (Juster 1975: p. 29). Juster also argued that "the impact of education on present versus future choices might be one of the most important ways in which additional education results in behavior patterns that provide not only direct benefits to those being educated, but also an increased flow of indirect benefits to society as a whole." According to Juster, "a society whose citizens are able to strike a better balance between present and future claims on resources is surely one in which all manner of decisions, ranging from personal financial ones to population and fertility ones, are more compatible with improvements in the general welfare" (Juster 1975: p. 29).

Similar to the chapter of Michael, Solmon's chapter illustrates how the budgeting capacity of the household is used instantaneously. But Solmon's chapter connected this instantaneous capacity to evaluations regarding tradeoffs between the present and the future. In Juster's words "[d]ifferences in educational level have a major impact on the ability of individuals to adjust to changing circumstances, whether the question includes managing their economic affairs in the labor market, managing their own private financial affairs as consumers and investors, or planning the number and spacing of their children." Thus, education was assumed to increase the ability of people to adapt to changing life circumstances. Juster argued that "in a world where information flows are growing exponentially and where optimal decision making requires the efficient processing of

increasingly large amounts of new information, the ability to adapt effectively to changes is likely to be of major importance" (Juster 1975: p. 31).

Another young researcher from the CEAHBSI community was Gilbert Ghez. As Michael and Grossman, he was a student of Becker and Mincer at Columbia. Ghez's chapter in the Juster volume was called *Education, the Price of Time, and Life-Cycle Consumption* (Ghez 1975). In his chapter he focused on how education changes the subjective value of time and what consequences that effect had on lifetime consumption profiles. Given that more education should increase the wage level, Ghez asked how this would affect household production in the future. In particular, he asked how different wage rates would affect the substitution between one's time and goods that one would be willing to offer as household production inputs. Ghez derived some general implications. For example, if wage increases, he argued time becomes more valuable and makes labor-intensive household production costlier relatively to goods-intensive production. This should induce households to substitute their own time with goods as production inputs.

Since the individuals in Ghez models were assumed to take future periods into account, expectations about the future became important. The key expectation in Ghez's chapter was how the wage rate would develop in future periods, because potential substitution between goods and time in household production depends on it. Ghez assumed that any mistakes in anticipating future wage changes were unbiased meaning that mistaken anticipations should not be systematically too low or too high. In the introduction to the collective volume Juster resumed that "Ghez argues that the mean difference between expectations about wage rate changes and actual wage rate changes is best regarded as zero for any given group, although there may be positive and negative deviations for individual group members" (Juster 1975: p. 33).

Ghez chapter illustrates that in models of intertemporal utility agents were faced with an unknown future. Juster argued that Ghez "supposes that people will act as if they were absolutely certain of receiving the expected wage rate [...] and hence that positive consumption effects for those whose realized income exceeds expectations will be offset

by negative consumption effects for those whose income falls short of expectations." Somewhat critically, Juster stressed that "uncertainty itself [...] may affect the adjustment of consumption to income." He argued further that "people expecting a given increase in income may plan to increase consumption by less than would be the case if their expectations were certain, simply because the cost of being wrong is too high" (Juster 1975: p. 33). Households in Ghez's model were assumed to take the future in account by building on expectations formed by the past and the present. But since the future is still unwritten in the present, uncertainty interferes with the capacity of the decision-making unit to plan for the future. In Ghez's model expectation and uncertainty were crucial environmental conditions that shape the decision-making context. To extend the allocative budgeting capacities of individuals to take account of the future Ghez'model used agents that projected ongoing trends on an uncertain future. In doing so agents used the same decision-making technology that they also use in an environment marked by certainty.

Still another CEAHBSI researcher looked at a slightly different aspect of intertemporal decision-making. Sherwin Rosen looked at the consequences of the fact that learning processes are generally dated. His chapter in the volume edited by Juster was called *The Obsolescence of Knowledge* (Rosen 1975). In the chapter Rosen described how agents choose work opportunities not only with regards to the financial income, but also with regards to learning opportunities that might increase the knowledge or wealth embodied in themselves. So, an opportunity is a combination of income and an opportunity to accumulate human capital. To evaluate different opportunities the individuals in Rosen's model were assumed to consider their total discounted lifetime income and the effect that potential learning possibilities would have on the overall lifetime income. Rosen argued that when individuals are still young they are more likely to accept combinations of lower wages with better learning opportunities because they still face a long future over which they may generate additional income. The basic tenet of Rosen's model was that the income generating capacities of individuals in the form of human capital depreciate over time. Knowledge stocks may be maintained with investment, but dependent on which point individuals are in their working career, it may pay off to invest

in more learning opportunities, or alternatively, to live off one's already accumulated knowledge stocks.

Rosen's model considered behavioral patterns of investments in stocks and their depreciation over time. In Rosen's model consumption choices took place in a lifecycle context in which current learning possibilities depend on a depreciation rate and on the amount of time over which learning might contribute to affect income. Rosen's main argument was about labor market opportunities and not about non-market opportunities in household production. But to the extent that the organization of production processes in households might also represent mixes of classic household work and opportunities to learn, Rosen's model might be modulated for the household sector.

Engagement in risky behavior and its consequences

Compared to other activities risky activities imply increased chances to eventually suffer losses. These losses are certain in the sense that they are considered to occur with a certain probability. The consequences of risky behavior can either be consequential, pathbreaking consequences impacting one's future trajectory, or they could be consequences that are likely to arise due to continued or repeated engagement in an activity. In both cases engagement in activities was seen as connected with a certain probability to suffer negative consequences of it.

One student of Becker and Mincer at Columbia applied similar reasoning to look whether people engage in criminal behavior. This student, Isaac Ehrlich, was associated to the law and economics program of the CEAHBSI and analyzed under which conditions people were likely to engage in criminal behavior. His chapter in the volume edited by Juster was called *On the Relation Between Education and Crime*. Juster resumed Ehrlich's model as follows. First, he noticed that in Ehrlich's model "motivations that underlie decisions to engage in illegal activities are similar to those underlying decisions to engage in legal ones; i.e., criminal activity is viewed as an alternative 'occupation' to working at a regular income-producing job." Further he noticed that in Ehrlich's "view of the world,

the decision to engage in illegal activity is made because the expected income from that occupation is greater than the expected income from more traditional forms of work." For legal, but also for illegal activities, Ehrlich argued that individuals would decide to engage in them by comparing the expected value of income. But one of the main differences with illegal behavior was for Ehrlich that the expected illegal income depended also on the probability with which individuals are caught and punished. Or in Juster's words, the individuals in Ehrlich's model were "assumed to react to opportunities and costs; some will decide that the opportunities in illegal activities are greater than those in legal activities, and/or that the costs are less, and vice versa for others" (Juster 1975: p. 34) Whether individuals engage in more risky, illegal activities was for Ehrlich a question of the incentives that the individuals face – where the incentives were defined as the changes in expected income.

Risky behavior must not necessarily consist of illegal activities. Many risks were seen as potentially negative rather due to their negative effects on one's health. One chapter of the volume edited by Terlecky contained such an analysis. The chapter called *The Value of Saving a Life: Evidence from the Labor Market* was cowritten by Rosen and Richard Thaler, one of his PhD students from the University of Rochester. Their model resembled Rosen's model of the consequences of depreciation of human capital (Rosen 1975). In the model of Thaler and Rosen work opportunities were not described as a combination of income and learning possibilities, but as a combinations of income and safety, being free of risks. In the chapter Thaler and Rosen analyzed the age differentials of different types of jobs with regards to the health risks that are faced by the employees in the jobs. Resuming their chapter Terleckyj argued that they estimated "the implicit market price of the avoidance of risk of death." He argued that "Thaler and Rosen consider the workers to be selling labor, while at the same time purchasing nonmonetary aspects of jobs (safety); and [they] assume firms to be purchasing labor, as well as selling the same nonmonetary aspects [safety]." (Terleckyj 1976: p. 9f.) He resumed that in their model "the equilibrium wage differentials for risky jobs will be determined by the demand and supply functions for safety" (Terleckyj 1976: p. 10).

To demonstrate the implications of their model empirically Thaler and Rosen used actuarial data provided by a life insurance company.[131] With these data they developed "a theoretical model for cases of multidimensional risks (different injuries not comparable) and for different preferences in risk aversion among workers." For Terlecky the actuarial data presented by Thaler and Rosen measured "additional risks associated with certain occupations which are particularly hazardous" (Terleckyj 1976: p. 10ff.).

Thaler would later become an ardent critic of neoclassical microeconomics and of models that have become too unrealistic to predict actual human decision-making (see Chapter 7). In his later work Thaler would criticize the decision-making of the agents that inhabit the models of economists as modeled too optimistically in terms of rationality, self-control, and self-interest (see for example Thaler and Mullanaithan 2000). Through his supervisor Rosen Thaler may had chances to get closer into contact with the rather vibrant research community at the NBER. But as he has stated in his autobiography in 2015, he doubted whether neoclassical decision theory was appropriate and complex enough to describe human decision-making in many real-world situations (see Thaler 2015).

Rosen was much more immersed in the CEAHBSI community than Thaler. Rosen spent some time in the late 1960s in the NBER office in New York when Becker and many others from the CEAHBSI community were physically around.[132] When doing his PhD thesis, Thaler was geographically located in Rochester, over 500 kilometers north-west of New York city. From 1972 onwards the CEAHBSI community was also geographically more dispersed with local hubs in New York, Chicago, and Stanford. Although the CEAHBSI was institutionally more formalized by then, it functioned more properly as a research institution that organized funding and coordinated common research efforts among the different local sub-communities (see chapter 1). In 1977 Thaler

[131] To the benefit of Thaler, his father was an insurance actuary and provided him with the industry data set (see Thaler 2015: p. 14).

[132] Rosen might also generally have been more inclined towards neoclassical labor economics given that he obtained his PhD in economics from the University of Chicago in 1962, with H. Gregg Lewis as doctoral advisor.

obtained a research grant from Fuchs to stay some months in the NBER-West office at Stanford. But by that time Thaler was searching already the proximity of the cognitive psychologists Daniel Kahneman and Amos Tversky who were passing a year at the *Center for Advanced Study in the Behavioral Sciences* at Stanford (see Thaler 2015: p. 35). During that time Thaler presented his self-control model cowritten with Hersh Shefrin at a CEAHBSI workshop and placed it in the NBER Working Paper Series (Thaler, Shefrin 1977). For more on Thaler's later research efforts, see Chapter 7.

Although Thaler went into different research directions in the 1980s, his very early contributions on the statistical value of life are quite compatible with the household production framework of the CEAHBSI community. Ehrlich's model of participation in criminal activity and Thaler and Rosen's model of participation in risky occupations are both interested in explaining individuals' choices for engaging in risky activities. The risky behavior in Ehrlich's model puts the individual's long-term utility under the risk of detention and legal punishment. The risky behavior in Thaler and Rosen's model puts the individual's health under the risk of being impaired physically or psychically.

Efficient use of time

Among the resources considered within the household production framework time played a major role.[133] First, time was part of the intangible wealth that individuals were assumed to accumulate within themselves according to the household production framework. As time was seen as an input to production processes, utility could be maximized if time was used optimally by households. Second, time was allocated by individuals in markets, but also in non-market behavior. Thus, by evaluating how individuals allocated their time in different types of behaviors and by assuming an economic, efficiency-based allocation logic, the economists of the CEAHBSI community were able to extend economic principles to all different types of behavior.

[133] Both Mincer and Becker considered the effects of the valuation of time in the 1960s, see Mincer (1963) and Becker (1965).

A schema that has been used by Michael in a staff report on the CEAHBSI income distribution program in 1976 illustrates the role of time use that was assumed in the CEAHBSI community. Seen purely statically, Michael argued that individuals need to decide for which type of activity they are going to use their time. Generally, he argued that it is assumed that "the allocation of time is responsive to price incentives."[134] It is than possible to look at the use of time from two dimensions. First, time use can be distinguished by "the location of the activity," whether the activity is considered as part of the labor market or not. If not, it is seen as falling into the wide realm of "free time". In their free time individuals can pursue their non-work obligations and other leisure activities. In any case, free time or labor market time, individual behavior is modeled the same, as driven by constrained utility maximization.

Second, Michael argues that it is also useful to distinguish time use "the nature of the activity." With the nature of an activity Michael referred to whether the activity was seen as working (meaning the creation of present income), investing (increasing future income), or simply consuming. Figure 1 shows the table that has been used by Michael in his staff report to illustrate the different classifications of time use.[135]

[134] In other words, the choice how to spend one's time should be dependent on how the different options to choose affect expected income and wealth

[135] Michael placed child care in the nonlabor market in the first column that describes the time use in caring for its children as work. Thus, he sees child care as work that is not happening in the labor market. Other researchers from the CEAHBSI community like Arleen Leibowitz have described child care rather as an investment activity (see Leibowitz 1974).

Time Uses

Location	Activity: Working	Investing	Consuming
Labor market	Producing goods or services for remuneration Commuting	Job searching On-the-job training	Obtaining direct utility from work Leisure time at work
Nonlabor market	Housework Child care Shopping	Schooling Recuperating Tending capital investments Moving	Leisure Satisfying biological needs (sleeping, eating, etc.) Volunteer work

Figure 9: The table used by Robert Michael in a CEAHBSI staff report in the NBER Annual Report from 1976. The table shows different ways to classify activities by their type of time use. The two lines distinguish time by their location (whether time is used while an individual is in the labor market or while he or she uses his or her free time). The three columns distinguish time use by their nature (whether an activity can be seen as working, investing, or as consuming).

Looked at behavior from a more dynamic perspective, Michael argued that further reflections need to be taken in account. In particular, he argued that time allocation decisions in one period "significantly affect both the price incentives for time use in subsequent periods and the distribution of income in subsequent periods". With regards to the future "[c]onsidering the effects of current time use on future opportunities provides important insights," and with regards to the past "they permit researchers to view the current price vector (in particular the wage rate) as the cumulative result of how time was allocated in previous periods" (Michael cited in NBER 1976: p. 47).

If static and dynamic effects are taken together a view of human behavior emerges that is determined by time use and that can be applied to various situations. As a result, individuals can be described as differing with regards to "their ownership of income-producing assets at one point in time," and also with regards to "their opportunities for altering the stream of income over time from any given bundle of initial assets". The opportunities that an individual has in the present should be affected by his or her "[g]enetic endowments, family background, access to funds, luck, and time-allocation

decisions in previous periods" (Michael cited in NBER 1976: p. 47). These factors should consequently also have an impact on the "lifetime distributions of 'income'" of individuals.

Michael's staff report and the table that he has used in it illustrate well the crucial role of time in the household production framework. As time is used in all activities that we can imagine as human beings, the economic allocation of time made the household production framework very flexible and extendable to activities and decisions that were formerly not scrutinized with economic budgeting logic. This extension was done at the CEAHBSI not only by Becker, but by an array of young economists plunging onto different applied fields.

2.4 Conclusive remarks

In this Chapter we have shown that the household production framework can be seen as a style of thinking that was developed and put into practice in the CEAHBSI community at the NBER in the late 1960s and 1970s. The framework provided a vision of human behavior that was built on basic premises of demand theory and extended through the allocation of time to various non-market activities.

The example of Michael Grossman shows how young researchers benefitted from using the household production framework. Grossman was familiarized with economic theory as it was taught by Becker, with econometrics as it was taught by Mincer, and with the thought style of thinking in terms of household production technology that came to be at the NBER when he worked on his PhD thesis in the end of the 1960s. When Grossman formulated his own ideas on health, he was able to formulate them in formal terms very compatible with the framework that was becoming common practice in the CEAHBSI community.

But the benefits went also in the other direction. Becker, Mincer, or Fuchs also profited from having young researchers like Grossman or Michael around them who put many new ideas into practice in formal terms perfectly compatible with their general

approach of doing economics. Not only would Grossman, Michael, and the others cite Becker and Mincer's work, they would also fill an otherwise rather empty, abstract theory with life by contributing applied studies that used the general framework.

When working on their model of addiction, Stigler and Becker were part of the CEAHBSI program of law and economics. A staff report written by them is published in the NBER Annual Report of 1975 (NBER Annual Report 1975). That report was called *Economics without Taste Changes* and outlined already the main lines of the later article. Interestingly, it did not yet mention addiction as an application example. Instead it mentions increasing marginal utility and time preference. Stigler and Becker's later addiction model from 1977 resonated with Grossman's early work on health as a durable stock of human capital. As in Grossman's model, consumption capital stocks in the later Stigler-Becker model of addiction (see Stigler and Becker 1977) are inherited from the past and need to maintained by investing in it by engaging in the consumption activity that increases this stock. Otherwise they may vanish if individuals abstain from this activity. Stigler and Becker argue like Michael and Becker have argued four years before. Economists should take individual's tastes as a given, as something that should be assumed as constant for the sake of analysis. Instead of focusing on individuals' preferences, economists should rather explain economics puzzles in terms of productivity constraints that limit choices and can be described through the household production technology. We return to the details of the Stigler-Becker model in Chapter 4.

Part I: Conclusion

In Part 1, we provided a social-institutional prehistory of the rational addiction model by grounding the household production terms in which it was first formulated. In Chapter 1, we described the CEAHBSI community of scholars as an integral part of Becker's intellectual community during the 1960s and 1970s. In Chapter 2 we have described a general theoretic framework, the household production framework, as a commonly shared thought style that became collectively accepted, used, and disseminated in that community. When Becker began working on addiction in the mid-1970s together with George Stigler, he had already become an intellectual leader, leading workshops, teaching price theory, and shining brightly in formulating theoretic models for new applied fields of economics (see Becker 1976). When he turned to addiction he and Stigler used the household production framework to express how addiction should according to them be described in economic terms.

In Chapter 1 we described how the economic approach to behavior that is often strongly associated with Becker should be seen in a wider social-intellectual context. The economic approach may have been pushed strongest by Becker, but it was the result of collective research that was organized at the NBER in which Becker was surrounded by many more researchers many of whom engaged in complementary research activities. In this sense we would like to stress the intellectual group effort that made the individual contributions of Becker possible. We would also like to stress that some institutional changes within the NBER and the wider policy making environment in the US contributed significantly to the success of Becker and the intellectual community within which he flourished.

Both, the CEAHBSI community and the household production framework remain important throughout the different chapters of this thesis. The CEAHBSI community will fade a bit to the background in Part 2, but it will resurface prominently again in Part 3 when a former PhD student of Becker from the community will contribute significantly

to disseminate and apply the rational addiction model in applied health economics. The household production model will fade in coloration as well. With ongoing time, the framework would become less often invoked. But this should not obscure the fact that it will remain a theoretical underpinning for the rational addiction model and much of Becker's other theoretical contributions. Even though later work was not explicitly formulated in reference to the framework, for Becker and others from the CEAHBSI community the framework continued to constitute the foundation of their economic approach.

Part II:
Practice & practice innovation

Introduction

As we have seen in Part I the household production framework contained an array of conceptual practices that have been developed and promoted within the CEAHBSI community.[136] These practices are necessary to understand the rational addiction model developed by different economists in the 1970s and 1980s, with Gary Becker being the most central figure in this development. While certain practices were very important within the CEAHBSI community, they were less important or not at all practiced in the wider US economics discipline in the 1970s.[137] The CEAHBSI community that existed for several years at the NBER disintegrated in the late 1970s, but its former members continued to be academic economists in other places and other social and institutional research settings. As the CEAHBSI disintegrated, its former members moved on and took their familiarity with the household production framework with them. As many of them became centrally involved in many of the newly established applied fields of economics, the practices contained in the rational addiction model became more common in economics more generally. The story of the creation of the rational addiction model shows that even though these practices became more widely known in economics, other economists still viewed them as specific modeling approaches.

In Part 2 of this Ph.D. thesis we describe the various theoretic practices involved in the rational addiction model and in other attempts to model habituation processes in formal demand models in the post-WWII era. The main objective of this section is twofold. First, we describe the economic practices used to develop economic theories of habits and addiction in order to better understand the economic significance of these theories. Second,

[136] Thinking in terms of household production objectives that are produced with different market goods, production time, and skills levels as inputs frames one's perspective on consumption activities and constitutes for us a very general conceptual thinking practice.

[137] As the whole economics discipline can be imagined as composed out of multiple larger and smaller thought collectives, it contains a much wider array of theories and practices. It is usually rather difficult for specific practices from any one thought collective to make a big impact on the status quo of the whole discipline.

we compare the practices of the rational addiction model with those of similar habit formation models to illustrate the ways in which the rational addiction model was an example of practice innovation. In this way we are able to describe the innovation of rational addiction as a descriptive concept; it provided economic meaning for psychological and physiological terms like reinforcement, tolerance, or withdrawal. We will focus more on the political-ideological aspects of the model in Part 3 when we look at the reception of the model.[138]

However, we can already note some organizational observations concerning both the descriptive and political aspects of the model. In terms of geographical production sites, the rational addiction model is clearly Chicago-based. During the CEAHBSI years, Chicago was already a geographical hub with several researchers employed by the *University of Chicago*. This hub became stronger when the *Center for the Study of the Economy and the State* was established at the *Graduate School of Business* under the direction of George Stigler.[139] Regarding the modeling practices, we will see in this part of our thesis how the rational addiction model changed from being formulated in the distinctive terms of the household production framework in 1977 to being formulated in much more general terms referring to rational choice in 1988.[140]

By focusing on the rational addiction model, we consider how the CEAHBSI-internal way of modeling habituation related to other ways of modeling habituation from the wider economics discipline. First, in Chapter 3 we provide a second prehistory of the rational addiction model by focusing on relevant modeling developments in the wider economics discipline, external to the CEAHBSI thought collective. Neither Becker and Murphy (1988), nor Stigler and Becker (1977) were the first economists to express formally how

[138] This does not mean that political and ideological aspects play no role in the creation process. In fact, we believe that all descriptive theories have political and ideological consequences. However, these consequences are difficult to trace directly in official publications, such as technical economics articles.
[139] When Becker, Michael, and other scholars left the NBER to organize at the National Opinion Research Center (NORC) in Chicago instead, they became also less dependent on other economists at the NBER.
[140] Despite the change in terminology, it should be noted that the 1988 model was still compatible with the household production framework. Key terms as consumption capital remained unchanged.

the creation of dependence should theoretically impact the demand for goods. We describe how under the labels of habit persistence and habit formation different economists have described similar processes in the post-WWII decades. Second, in Chapter 4 we describe the creation of the rational addiction model focusing on three instances of the model, describing the creation process basically in three steps (Stigler and Becker 1977, Iannaccone 1984, Becker and Murphy 1988). Taken together, Chapters Three and Four enable us to compare how the rational addiction model fitted into the existing literature of habit formation.

We compare the rational addiction model to other habituation models by examining the modeling practices involved. On a very basic level, we describe the different economic practices that are involved in modeling habituation and addiction to provide a nuanced account of what the economists actually do while modeling. For example, economists use demand theory to estimate demand, and they use utility theory to evaluate human welfare. While utility functions play a crucial role in both, demand theory and utility theory, there are important differences in the practical use of utility functions depending on whether they are used to estimate demanded quantities in a market or to evaluate welfare. Other practices that are contained in the models of Chapters Three and Four come from the theory of revealed preferences, from neoclassical growth models, or from theories of applied welfare analysis like true cost of living indexes. Far-reaching differences in modeling consumption are also reflected in using static comparative analysis or dynamic optimization.

Our historic account is in many regards not too different from surveys of the literature that have been written by professional economists (see for example Chaloupka and Warner 2000). But our account is more detailed in describing the different practices that were used, in stressing semantic issues, and in highlighting methodological issues raised by the involved authors. Like many professional surveys, we stress the difference between models using myopic habit formation and those using rational habit formation models, between models principally based on static comparatives of a-temporal utility maximization and

fully dynamic models of intertemporal utility.[141] This is the most important discontinuity in practices that we observe underlying the different habituation models from the 1950s up to the 1980s. It is a change in practices that occurred more widely in the economics discipline and nothing inherently special to the rational addiction model. But the case of the rational addiction model illustrates well to what extend this fundamental change in modeling utility over time has urged economists to reconsider the way they conceive welfare of intertemporal consumption. We will follow this line of thought also in Part 3.

Some practices in the habituation models are quite directly related to social control by public policies. In contrast to existing models of habit formation, the rational addiction model stands out with its uncompromising focus on identifying the levers to change the behavior of economic agents within the agents' environment rather than within the agents themselves. By defining and fixating an immediate personal production environment while considering price changes, Becker and his co-authors were able to apply basic demand theory to an unconventional topic like addiction. By explaining addiction as a result of maladjustments in the personal production environment, and not as maladjustments in personal preferences, the authors of the rational addiction models follow a modeling practice that aligns the representation of addiction of model with policymaking allegedly preserving personal liberty and self-determination with regards to preferences.

What was praised as impartial theoretic descriptions by Becker and his coauthors, was criticized by other economists as an intrusion of value judgments through the backdoor. Becker and his colleagues presented the focus on the personal production environment as a liberal modeling strategy, as a great leap forward in extending the realm of the scientifically explainable and the impartially judgeable (see especially Stigler and Becker 1977). Other economists like Robert Pollak saw this semantic shift much more skeptical (Pollak 1978). While Pollak described habit formation in terms of changing preferences,

[141] But different to surveys by professional economists we are much more detailed in describing the different practices that are involved (many of which were probably assumed as common knowledge by professional economists).

he argued for much more caution in the application of demand theory and in the mobilization of demand theory for purposes of welfare evaluation.

As intellectual experts, economists build up economic expertise and create economic meaning. The meaning they create is tainted by the practices that they use. By contrasting the practices of the rational addiction model with the practices of other habituation models in economics in this Part 2 we provide an account of what economists did when they described habituation and addiction by setting up formal models of consumer demand. This account will be useful to us in Part 3 when we compare how the rational addiction model has been perceived by non-economists (behavioral psychologists) and by other economists (applied health economists and behavioral economists). While applied health economists received the use of practices in the Becker-Murphy model positively, behavioral economists were skeptical of certain practices in the model. To describe the agreement or disagreement, it helps to have first a description of the practices that are actually involved in the model.

3. From Past to Future Orientation: Habits in Formal Demand Models in the Post-WWII Decades

3.1 Introduction

Chapter 1 and 2 provided a prehistory of the rational addiction model as it developed out of a particular thought style, the household production framework. The prehistory in this chapter is complementary to the preceding chapters, as it focuses rather on developments in the wider economics discipline. We show how habits have been introduced in formal demand models in the post-WWII decades to explain at least briefly some key modeling practices that were involved in these models. The ultimate aim is to characterize how the rational addiction model fitted in the wider economics literature. But to be able to do so, we must first describe how habituation has been modeled by other economists before and parallel to Becker and his coauthors.

The main focus of this chapter is on small literature on the formation of habits and the endogenization of preferences resulting from the inclusion of habits. We describe modeling practices that were assumed in the different models and discuss different modeling issues that were taken up by the different economists that were engaged in these models. We mainly consider modeling practices such at assumptions, main definitions, and theoretic adaptations. Although tractability issues are a limiting background factor with regards to models of habit formation, we only take them up occasionally.[142]

The chapter is structured as follows. In Section 2 we resume early attempts to include habits in formal demand models. In these years, economists have mainly modeled habits as mechanisms that inform and constrain our present choices through our past consumption experience. While traditional demand theory assumed basically a static

[142] Although it would be nice to describe the authors from the wider economics discipline in this chapter also by their respective thought collectives, we will only provide cursory information on their careers as economists.

comparative analysis, habits were early on seen as an element that increases the dynamic content of demand estimation. In subsection 2.1 we describe how habits have been introduced in some demand models in the 1950s and 1960s as lagged consumption or later as psychological stocks. In subsection 2.2 we describe how in the 1970s the metaphor of habits as psychological stocks has been taken up also by more theoretically-oriented economists to model preferences as partly endogenous on past consumption. While habits and their past determination innovated static demand models, they posed also new questions with regards to their welfare implications.

In section three we describe how a new type of habit formation models became more popular in the late 1970s. Placing habit formation in an intertemporal utility optimization setup, models of rational habit formation looked at habits basically as the results of utility trade-offs involving comparisons between present and future consumption. The authors of rational habit models took habits not only as a mechanism that limits present choices through past consumption. They looked at habits also as a mechanism that limits present choices through its consequences for future consumption possibilities. We describe rational habit formation models through three main aspects. Each subsection illustrates on of these aspects with model examples from rational habit models. Subsection 3.1 focuses on the fact that rational habit formation models assume an intertemporal budget constraint to access an uncertain future. Subsection 3.2 focusses on the fact that rational habit formation models make habits implicitly an intertemporal resource that can and should be exploited by consumers in the intertemporal optimization of utility. Subsection 3.3 focusses on the fact that rational habit formation models basically assume rational consumers that are much more sophisticated and computationally-powerful agents that those agents that were assumed in earlier habit models.

3.2 Time traveling (I): From the past to the present

In the post-WW2 decades most empirical economists still used a fairly static demand theory. Occasionally, they used habits as an explaining variable in econometric studies of

demand, in part to make their analyses of demand more dynamic. More generally, they used some version of demand theory to describe consumption behavior. Demand theory provides concepts and procedures to theoretically predict which factors influence the quantity of a good that is sold in a market. Traditionally, demand theory was formulated in a static framework in which the demand of a good at one moment is explained by other variables at that moment.[143] Different situations could be compared, for example using elasticity measures, but the basic formulation of demand theory was static.[144]

3.2.1 Habits before the 1970s: Lagged effects, irreversible demand functions, and psychological stocks

Although the formal means of expression of were static in the immediate post-WWII decades, actual demand was not. In the 1950s, economists theorized about, discussed, and estimated various factors that made demand more dynamic. Next to expectations, uncertainty, or aspired standards of living, habits were considered as one such factor. Two papers from 1952 published in the journal *Econometrica* exemplify such efforts.

In one paper the British economist Michael Farrell proposed an irreversible demand function to estimate the demand of certain goods (Farrell 1952).[145] Referring to an econometric analysis of the demand for different goods in Britain from d 1870 to 1938, Farrell noticed that for goods like cigarettes, beer, and spirits actual economic variables

[143] Traditionally, the quantity of a good that is demanded in a market is explained by the price of the demanded good, by prices of other goods, by the income of consumers, and by taste variables.

[144] Elasticities are central measures in demand theory. The price elasticity of demand for example relates the percentage change in prices from situation A to situation B to the percentage change in demanded goods from situation A to situation B.

[145] Michael J. Farrell (1926 – 1975) was a British economist. After winning a scholarship Farrell studied mathematics and politics, philosophy and economics at New College, Oxford. During his studies he served two years of National Service at the Statistics Division of the Board of Trade. In 1949 moved to Cambridge University to the department of applied economics that was lead at the time by Richard Stone. From 1951 to 1953, he spent two years at the Cowles Commission for Research in Economics, in Chicago as a Commonwealth Fund fellow. When working on his 1952 article on irreversible demand functions, Farrell was familiar with Stone's work and with related work by researchers from the Cowles Commission such as Tygve Haavelmo. In 1953 he became assistant lecturer in the faculty of economics and politics at Cambridge in 1953, and in 1956 he became a lecturer. In 1957 he contracted poliomyelitis and spent most of the year in the hospital. He died in 1975 at the relatively young age of 49. For more on the life and contributions of Farrell see Fisher (1976) and Bliss (1987).

like prices or income do not very well explain changes in demanded quantities.[146] Instead temporal variables like time trends and discontinuity variables seemed to explain a greater share of the variance in demand. On the one hand, for Farrell this shed no good light on economic prediction.[147] On the other hand, he did not find it too astonishing, because "we are concerned with the sort of commodity whose consumption one would expect to be strongly influenced by social factors." For analyses covering a very long period "one would expect social changes to be relatively more important in the long than in the short run, while in matters of prediction we are usually concerned with fairly short periods" (Farrell 1952: p. 172).

Farrell had two social factors in mind that could operate through temporal trend variables, fashion and habits. He argued that "economic factors can produce changes in tastes [...] through fashion, where the individual's demand function depends on other people's consumption behaviour, and through habit, where it depends on the individual's own past behaviour" (Farrell 1952: p. 174). Since he analyzed consumption goods like tobacco, beer, and spirits, Farrell considered habits and fashion highly relevant as explaining variables. "Many people take up smoking or drinking because their friends and acquaintances smoke or drink, and, in Britain at least, tea is often drunk purely as a matter of social convention, while all four commodities are to a greater or lesser extent habit forming." He considered only the effect of habit in his paper as "it seems to be easier to investigate statistically" (Farrell 1952: p. 174).

To deal with habits econometrically, Farrell proposed irreversible demand functions. He wrote that "[t]he idea is, quite simply, that a man who has been induced by a rise in income or a fall in the price of tobacco to take up smoking, or to smoke more heavily, will form a habit, and will not, when price or income returns to its former level,

[146] Some years were excluded due to the wartime influence on the British economy, in the original study, as well in Farrell's re-estimation of some of the results. For the original study, see Prest (1949) published in the *Review of Economics and Statistics*.

[147] Farrell argued that "[f]or, although it is possible to 'explain' any series of consumption figures by fitting sufficiently complicated functions of time, this can hardly be regarded as establishing an economic law" (Farrell 1952: p. 172).

cut his consumption to its former level, though he will curtail it to some extent" (Farrell 1952: p. 174). Farrell's demand function is irreversible in the sense that "consumption of some commodities is more sensitive to upward than to downward movements of income[,]" meaning that "people will increase their consumption of some commodities more readily than they will curtail it" (Farrell 1952: p. 175).

In principle, Farrell assumed that irreversible demand functions could make sense also for other goods than cigarettes and alcohol. He wrote that "[t]he phenomenon need not be confined to commodities which are habit forming in a medical sense – a consumer may become attached to any aspect of a higher standard of living once he has experienced it" (p.174f.). At the same time, Farrell argued such an effect could not be observed for all goods at once, and for some goods an inverse effect should be observed.[148] He estimated a simple version of such irreversible consumption functions and obtained mixed results.

The other paper on habits published in *Econometrica* in the same year has been written by the Canadian economist T.M. Brown (Brown 1952).[149] As Farrell, he considered habits among the variables explaining current consumption expenditures. Brown wrote that "habits, customs, standards, and levels associated with real consumption

[148] Farrell mentioned that by the logic of a binding budget constraint a reverse effect of consumption adjustment should be observable for other goods. The effect of a decrease in income on consumption should be more intense for some commodities than for others. In general Farrell mentioned savings, but potentially also types of clothing like hats and suspenders "which the individual prefers to do without when once he has been induced to go without them[,]" for example by a decrease in income (see Farrell 1952: p.175).

[149] T.M. Brown was apparently living and working in Canada during the 1950s. In his 1952 paper he just provided Ottawa as his institutional address. In different published papers during the 1950s Brown states simply Ottawa as his institutional address, but in 1960 he publishes a paper mentioning Royal Military College of Canada in Kingston, and in 1963 he has provided Queen's University Canada also in Kingston as his institutional address. In a paper published in *Econometrica* in 1954 titled *Standard Errors of Forecast of a Complete Econometric Model* he provides a glimpse of information on his biographical background in the early 1950s. In the first footnote of the paper Brown writes that he "would like to express his deep appreciation to Dr. Lawrence R. Klein who encouraged him to work on this problem during the summer of 1950, in connection with the consumer behaviour model presented at the Santa Monica meetings of the Econometric Society. In the course of this work Dr. Klein provided crucial assistance from time to time. The writer would also like to express appreciation to Mr. S. J. May for many helpful discussions and especially for general assistance and suggestions of shortcuts in the design and layout of some of the computational procedures" (Brown 1954: p. 178). Historian of economics Erich Pinzon-Fuchs has described how Klein claimed that Brown's analysis predated Milton Friedman permanent income hypothesis (Pinzon-Fuchs 2017: p. 266).

previously enjoyed become 'impressed' on the human physiological and psychological systems and this produces an inertia or 'hysteresis' in consumer behaviour." Generally, demand theory assumes that a rise in income leads to a rise in consumption. Brown argued that due to the inertia caused by habits, "consumer demand reacts to changes in consumer income with a certain slowness, and thus past real consumption exerts a stabilizing effect on current consumption" (Brown 1952: p. 359).

Technically, Brown used a lag to represent habits econometrically. In his estimation of demand Brown estimated a consumption function explaining the level of current consumption expenditures by a set of explaining variables. He used annual consumption data and included the level of consumption of the previous year as a lagged variable among the explaining variables. "The presence of lags means that the full reaction of consumers to changes in income does not occur immediately but instead takes place gradually" (Brown 1952: p. 355)

He conceived habits as temporarily constituted through consumption existing within individuals over time. "[P]ast real consumption patterns and levels form consumer habits which persist long enough to slow down the effects of current income changes on current consumption." Brown wrote that "the habits from any real consumption vector experienced die away continuously as the time period between it and the present increases." So, in principle a habit is not something fixed within individuals. "As each new real consumption vector occurs it becomes the most recent, and hence the strongest habit-forming experience; but it[the new consumption vector], itself, has been influenced by earlier consumption experience and habits. Any level of actual consumption then represents the cumulation of all past experience, and hence a single lag of only one time period seems to be all that is required" (Brown 1952: p. 370).[150]

[150] In his paper Farrell argued similarly. "The most general form of irreversible demand function would make the individual's demand a function of all his past price-income-consumption positions, but it would obviously be impossible to estimate such a function statistically from the data available. A simpler form […] would make current demand depend only on current price and income and on the individual's price-income-consumption position in the previous period. This involves some loss of generality, although it should be noted that, since [the consumption level of last year] depends on [the consumption level of the

In the 1950s many economists proposed new theoretic and statistic propositions to advance demand theory.[151] Both, Farrell's and Brown's paper, can be seen as attempts in going beyond a purely static explanation of demand. Like other economists from their time they modeled habits mostly by including lagged variables.[152]

A decade later, another empirical demand study offered a similar, yet different view of habits, describing them as psychological stocks existing within consumers. In 1966

year before], and so on, the individual's history in the more distant past is allowed some influence on current consumption" (Farrell 1952: p. 175).

[151] Both Farrell and Brown cite the work of James Duesenberry explaining consumption by the relative income of households in society (Duesenberry 1949), a study by Franco Modigliani on the saving-income ratio (Modigliani 1949). Some years later Modigliani was involved in advancing the life cycle hypothesis, the idea that households smooth their consumption over different phases of their life (see Modigliani, Brumberg 1954). Farrell cites a forthcoming book by Richard Stone cowritten with D.A. Rowe (1954) who would present in 1954 the linear expenditure system as new model to estimate demand empirically (Stone 1954). Brown cites work from Tjalling Koopmans (1950) and Lawrence Klein (1950), both associated with the Cowles Commission. Later in the decade Friedman would publish a NBER monography in which he proposed to see consumption rather in terms of permanent income (Friedman 1958). As Jennifer Burns has described it might be more just to associate the development of the permanent income hypothesis also with Margaret Reid, Dorothy Brady and Rose Friedman who were decisively involved in the creative process preceding the NBER monography (Burns 2022).

[152] In the 1950s different economists contributed to the literature on distributed lags advancing the technical possibilities to estimate lagged effects that spread out over several episodes. See for example Koyck (1954) and Nerlove (1958a,b). Nerlove saw basically three reasons why short-run demand responses differ from long-run demand responses, and why it would thus be useful to include distributed lags in demand analysis. First, he saw psychological reasons like habit persistence of already established consumption patterns, but also uncertainty with regards to future consumption possibilities; second, he described technological reasons like knowledge about goods and techniques with which consumers might effectively substitute some goods; and finally technological reasons like institutionally imposed rigidities that impede consumers to switch in their expenditures (Nerlove 1958: p. 5f).

Hendrik Houthakker[153] and Lester Taylor[154] published the results of a large consumption study that they had begun in 1962 and that was financed by the *National Bureau of Labor Statistics* (Houthakker, Taylor 1966). Using time series data of the *U.S. Department of Commerce*, they estimated the future consumption levels for 83 consumption commodities. Most of their estimations were based on a dynamic model that assumed that "current decisions are influenced by past behavior" (Houthakker, Taylor 1966: p. 8).

Houthakker and Taylor used so-called state variables to describe the information environment through which the past influences present consumption. "The effect of past behavior is assumed to be represented entirely by the current values of certain 'state variables,' of which inventories are a concrete (but not the only) example. These state

[153] Hendrik Houthakker (1924 – 2008) was a Dutch-American economist. In 1949 Houthakker obtained his Ph.D from University of Amsterdam and he joined, like Farrell, the department of applied economics at Cambridge University. In 1950 Houthakker published an article in which he developed the Strong Axiom of Revealed Preferences (SARP) for which he would become well known. In 1952 he joined the Cowles Commission as a researcher. In 1955 he published the book *The analysis of family budgets* that he wrote together with the German-British economist Sigbert J. Prais. Like Houthakker, Prais worked at the department of applied economics at Cambridge University that was led by Stone. Both have thanked Stone in the preface of the book and Stone wrote the foreword for the book. Houthakker moved to the United States and joined the economics faculty at Stanford in 1954. In 1960, Houthakker moved to Harvard University where he stayed for the rest of his career. In 1963 Houthakker received the John Bates Clark Medal of the American Economics Association. During the Nixon Administration, Houthakker worked for the U.S. Council of Economic Advisers as a senior economist from 1966 to 1967. In 1969 Houthakker became one of three members of the U. S. Council of Economic Advisers, advising President Nixon. For more on Houthakker see https://www.econometricsociety.org/uploads/Obituaries%20Past%20Presidents/houthakker.pdf, last accessed 10.03.2025, https://news.harvard.edu/gazette/story/2009/04/hendrik-samuel-houthakker/, last accessed 10.03.2025, https://www.newnetherlandinstitute.org/history-and-heritage/dutch_americans/hendrik-samuel-houthakker, last accessed 10.03.2025. See also Pollak (1990), see also Taylor and Houthakker (2010: p. vii-x).

[154] Lester D. Taylor (born in 1938) is an US American economist and emeritus professor at the University of Arizona in Tucson. In 1960 he obtained a B.A. in economics and mathematics from the University of Iowa and in 1963 obtained a Ph.D. in economics from Harvard University. In 1969 he became an Associate Professor at the University of Michigan and in 1972 he became first Visiting Professor at the University Arizona, before becoming a Full Professor there in 1974. Lester was a former student of Houthakker at Harvard. Towards the end of his PhD thesis, Taylor was asked by Houthakker to participate in the project leading up to the 1966 book, see Taylor and Houthakker (2010: p. ix). Like Houthakker, Taylor was implied in government counseling during the 1960s. He was a senior staff economist at the President's Council of Economic Advisers in Washington, D.C. in 1964-65, and spent 18 months in 1967-68 with a group of Harvard economists as an advisor to the Ministry of Planning of the Government of Colombia. For more on Lester's early biographical path see the In Memoriam section in Taylor and Houthakker (2010: p. vii-x).

variables themselves are in turn changed by current decisions, and the net result is that of a 'distributed lag': current behavior depends on all past values of the predetermined variables, though more on recent values than on very remote ones" (Houthakker, Taylor 1966: p. 8).

Metaphorically, Houthakker and Taylor described habits very similarly to durable goods, as an inventory of stocks. They estimated the rate of demand at point t, $q(t)$, as depending on inventory of stocks at point t, $s(t)$, and the rate of income at t, $x(t)$, in the following way

$$(3.1) \quad q(t) = \alpha + \beta s(t) + \gamma x(t)$$

They interpret β as the "stock coefficient." Equation 3.1 can be used to estimate the demand of durable goods as well as the demand of habit-forming goods. The difference is the sign of the stock coefficient. For durable goods, Houthakker and Taylor argued, the stock coefficient, β, should be negative. A high preexisting stock of durable goods, $s(t)$, should be correlated with lower demand for the type of durable good in the present, $q(t)$. For habit-forming goods, they argued the stock coefficient, β, should be positive. A higher level of prior consumption should have created a higher stock of psychological stocks within the individual. Thus, the inventory of stocks, $s(t)$, should be positively correlated the current consumption level – the higher the level of existing stocks, the higher current consumption.

They explained habit formation functionally with regards to temporal adjustment. "By all accounts tobacco consumption is habit-forming, which means that it does not adjust immediately to changes in income (or prices [...]) and that current consumption is positively influenced by consumption in the more or less recent past. In this case we say metaphorically that the consumer has built up a psychological stock of smoking habits. His current consumption will be affected by that stock (or, if one prefers, 'state variable') just as it is for clothing, but the sign of β will now be positive: the more he has smoked in

the past, the more he will smoke currently (tastes and income again being given)" Houthakker and Taylor (1966: p. 9).

Expressing habits as stocks was a useful convenience for the authors, because they had found a way how they did not actually need to measure habit stocks as they actually existed within consumers. Postulating equation 3.2 as an accounting identity that described the change in the stock inventory from one moment to another, the authors can cancel actual stocks out of the equation.

(3.2) $\dot{s}(t) \equiv q(t) - \delta s(t)$.

Equation 3.2 shows the assumed accounting identity. It defines "the rate of change in the (physical or psychological) stock around time t,", $\dot{s}(t)$, as the level of consumption around t minus the psychological stock depreciated by the rate δ. Thus, the authors compared consumption levels while assuming that actual consumption adjustments behave as has been stated in the accounting identity. Doing so they estimated short-term income coefficients (γ) which represent instantaneous changes in consumption that do not represent the full effects of a change in income. These instantaneous changes can be compared to long-run or equilibrium levels of consumption, "the entire change in demand associated with a once-and-for all change in income, including any indirect effects through changes in state variables." (Houthakker, Taylor 1966: p. 10). In the long-run equilibria consumption, savings and income all would remain constant over time. When the consumption equilibrium of the short-run demand function differs strongly from that of the long-run demand function, economists often become interested in the direction or path a consumers should choose to approach their long-run equilibrium. Their econometric formulation permitted Houthakker and Taylor to estimate stock coefficient for most of the consumption items they analyzed in their study.

In 1966, the *Southern Economic Journal* published a review of Houthakker and Taylor's book by the quantitative economist and household data specialist Dorothy Brady.

In general, she reviewed the book positively.[155] Brady commented that "[t]he idea that stocks of goods affect the level of current expenditures is not new but in this analysis of the 83 time series from the national accounts it has been generalized to apply to all categories of expenditures." And further, she wrote that "[i]t is [...] the great detail on the results of the investigation that recommends the book to the reader. The charts included for every category show that the model offers a very good explanation of behavior in the past" (Brady 1966: p. 276f.). Brady also stresses the possibility that the Houthakker-Taylor model permits to identify some types of consumption as "a liability or a deficiency of some kind[,]" that "must be offset to maintain or increase the level of the stocks" (Brady 1966: p. 277). In other words, habit dependence might be so strong for some consumption items, that future consumption levels might increase in such a way that they may bind up a large amount of resources. To the extent that these resources could not be used in any other way, these habit-forming consumption items might become liabilities for the consumer.

3.2.2 Habits in the early 1970s: Habit-forming consumption, endogenous preferences, and path dependency

Like the demand models of Farrell and Brown from the 1950s, Houthakker and Taylor's model was primarily thought to measure demand while accounting for the effect that current consumption is partly determined by past consumption. This empirical focus of

[155] Dorothy S. Brady (1903-1977) was a US American mathematician and economist. In 1924 she obtained a BA in mathematics from Reed College. In 1926 she obtained a MA in mathematics from Cornell University. In 1927 she worked at the National Bureau of Economic Research as a research assistant on a study of labor statistics and in 1929 she obtained a PhD in economics from Columbia University. During her life Brady worked in numerous government agencies and consulting positions while publishing important papers in academic journals. The historian Jennifer Burns has retraced how Brady was one of the creative and analytic forces behind Friedman's book *A Theory of the Consumption Function* (Burns 2022). Burns' article reconstructs how the permanent income hypothesis has actually been the result of the thinking of Dorothy Brady, Rose Friedman, Margaret Reid, and Milton Friedman. Burns article shows as well that women were relatively disadvantaged in mid-century US academic economics. So, Brady returned to academia only relatively late in her career moving to the University of Chicago in 1956 and then to the Wharton School of Business at the University of Pennsylvania in 1958. For more on Brady see the very valuable biographical description of Brady's life collected by Judy Green and Jeanne LaDuke (2008) (see: https://www.ams.org/publications/authors/books/postpub/hmath-34-PioneeringWomen.pdf), see also Easterlin (1978) writing about Brady as an economist and colleague.

habit models changed in the early 1970s when habit formation attained the interest of more theoretically-minded economists. In 1970 Robert Pollak published a paper in the *Journal of Political Economy* elaborating on the theoretical implications of habit formation in dynamic demand models (Pollak 1970).[156] The habit model he proposed strengthened the metaphor of habits as psychological stocks.[157]

Pollak was interested in the differences between short-run and long -run demand functions when goods were thought to be habit forming. He wrote that "[i]f we regard demand theory as a theory of how a given amount of money (expenditure, called income) is allocated among goods, then […] there are three reasons why long- and short-run demand functions might differ." These three reasons were institutional rigidity, ignorance of alternatives, or changing tastes. In the case of institutional rigidity Pollak argued that "[t]he consumer may have contractually fixed commitments which prevent him from adjusting some portion of his consumption (for example, housing) in response to changes in prices or income." But once, his expenditure is not fixed anymore, Pollak argues that

[156] Robert Pollak (born 1938) is a US American economist. In 1960 Pollak obtained a BA in history from Amherst College. In 1964 he obtained a PhD in economics from the Massachusetts Institute of Technology (MIT) having written his thesis with Franklin M. Fisher. In 1964 Pollak became Assistant Professor at the University of Pennsylvania and in 1972 he became a Full Professor of Economics at the University of Pennsylvania. From 1968 to 1969 he worked as an economist at the Bureau of Labor Statistics (BLS) at the U.S. Department of Labor before returning to his academic position. He remained active as a consultant for the BLS from 1969 to 1981 and again later from 1994-1997. After having worked for the BLS Pollak wrote several theoretical papers on different aspects of cost of living indexes that he published as a book in 1989. In his historic account of cost-of-living-statistics in the US, Thomas Stapleford describes Pollak's 1989 book as a "standard reference in price index theory" (Stapleford 2009: p. 348). But Pollak also worked on other demand-related aspects in papers with Terence Wales. Together with Michael Wachter, Pollak published a widely-noted critique of the household production approach (Pollak, Wachter 1975). Later in his career Pollak became also more interested in questions of family economics. When discussing Becker's contributions to family economics Pollak refers to himself as "one of Becker's most persistent critics – indeed, I've spent much of my professional life criticizing Becker. […] this work, which could be described as criticizing Becker, could equally well be described as reshaping tools Becker has fashioned to address questions Becker has posed – in short, following Becker" (Pollak 2003: p. 112). For more on Pollak's role as a consultant of the Bureau of Labour Statistics see Stapleford (2009: p. 348-351). For more on general aspects in which Pollak was interested as a researcher see also the oral interview with him done by Orley Ashenfelter in 2023 (see https://irs100.princeton.edu/sites/default/files/2023-12/021-TWGO-Pollak_transcript-edit.pdf, last accessed 03.10.2025).

[157] While Houthakker and Taylor (1966) estimated their demand model for habit forming goods and durable goods, Pollak (1970) excluded durable goods from his analysis.

the consumer's expenditures can start to adjust to his long-run equilibrium. In the case of ignorance of alternatives, Pollak argued that "[t]he consumer may be ignorant of consumption possibilities or of his own tastes outside the range of his past consumption experience." In this case, he argued, consumers may need time to try out and learn about the optimal consumption response to a new situation of prices and income. And in the case of changing tastes, Pollak argued "goods may be 'habit forming' so that an individual's current preferences depend on his past consumption patterns". Then, he argue "a change in prices or income will cause a change in consumption which will induce a change in tastes, which will cause a further change in consumption" (Pollak 1970: p. 745). It was this third case of changing preferences that Pollak investigated in his article.

Pollak formulated his habit model in terms of a linear expenditure system.[158] The linear expenditure system is called a system because it consists of a system of parallel demand functions for specific goods that are consumed by a household. For each consumption good the household must attain a minimal or subsistence level of consumption. Thus, households theoretically split their budget into two parts. First, they allocate the part of budget necessary to consume the minimal levels of consumption for each good. Second, they allocate the remaining budget on all consumption goods in a proportional way according to the marginal expenditure share for each good.

For Pollak the "essence of the habit hypothesis" was that "past consumption influences current preferences and hence, current demand." Thus, "a higher level of past consumption of a good implies, ceteris paribus, a higher level of present consumption of that good" (Pollak 1970: p. 751). He implemented that hypothesis by making the subsistence level of consumption in the linear expenditure system dependent on past levels of consumption.

[158] The linear expenditure system has been proposed and developed by economists and econometricians in a series of papers after WW2 and is sometimes called the Klein-Rubin linear expenditure system (see Klein, Rubin 1948-1949, Samuelson 1947, Geary 1949-1950). It has been estimated empirically for the first time by Richard Stone (1954). The utility function implied by the system is often called Stone-Geary utility function. For more on the history of the linear expenditure system, see Johansen (1985) and Neary (1997).

(3.3) $U(X) = \sum_{k=1}^{n} a_k \log(x_k - b_k)$,

with $a_i > 0$, $b_i > 0$, $x_i - b_i > 0$, and $\sum_k a_k = 1$.

Equation 3.3 describes the utility function Pollak is using where a consumer is deriving utility from a vector of goods, X. The utility function is additive, as it is assumed that the consumer can add up the utility he derives for each of the *k* goods consumed, x_k. The parameter a_k represents the marginal expenditure share of each good. Taken together, the marginal expenditure shares of all goods must sum up to one. The parameter b_k represents the minimal level of consumption that a consumer is assumed to consume. Pollak implemented past-dependency by making the minimal level of consumption, b_{it}, proportional to the quantity of good i that has been consumed in the preceding period (t-1) so that

(3.4) $b_{it} = \beta_i x_{it-1},\ with\ 0 \leq \beta_i < 1$

where β_i is interpreted by Pollak as the "habit formation coefficient" for the i goods. With equation 3.4 Pollak made the minimal consumption level of the linear expenditure system endogenous, defined through preceding levels of consumption.[159] Equation 3.4 states that the minimal level of consumption in the present period is proportional by the factor β_i to the consumption level of good i in the preceding period. Pollak specified a second, more general functional form equation 3.5.

(3.5) $b_{it} = b_i^* + \beta_i x_{it-1},\ with\ 0 \leq \beta_i < 1$

In equation 3.5 Pollak further splitted up the minimal consumption level defined in equation 3.4 in an exogenously fixed component, b_i^*, and in an endogenous component, $\beta_i x_{it-1}$. The exogenous component b_i^* can be interpreted like a subsistence level of consumption necessary for survival. Pollak called b_i^* the "physiologically necessary

[159] Pollak stressed that in 1966 Stone had already emphasized the possibility to make the marginal expenditure shares, a_k, and the minimal consumption levels, b_k, partly dependent on the past consumption history of the consumer (see Pollak 1970: p. 759).

component" of b_{it}. On top of that, Pollak argued that individuals push these physiologically minimal consumption levels up by consuming goods. That is why there was a second component of the minimal consumption level that is endogenously determined by past consumption, $\beta_i x_{it-1}$. Pollak called this the "psychologically necessary component" (Pollak 1970: p. 749).

Pollak also made econometrically tractable, what has been just assumed in the models of Farrell and Brown. The habit strength in Pollak's model can be defined by reference to all past periods, and not by reference to the preceding period only.

$$(3.6)\ x_{it-1} = (1-\delta)\sum_{j=0}^{\infty} \delta^j x_{it-1-j}\,,\ with\ 0 \leq \delta < 1,$$

Equation 3.6 describes the consumption value of the preceding period as a geometrical mean of all past consumption periods weighting periods less as they are more distant in the past. The parameter δ is called by Pollak the "memory coefficient[,]" describing the strength with which the consumer memorizes past experience in the present (Pollak 1970: p. 1950).

In his research Pollak was very careful not to mix up demand theory and utility theory.[160] Using a set of Stone-Geary utility functions that correspond to the linear expenditure system, Pollak was able to express changes in behavior postulated in demand functions in terms of utility at the same time.[161] Pollak derived short-run demand functions by combining these utility specifications with a budget constraint. These short-run demand functions describe how the demanded quantity changes in the event of a price or income change, considering that current consumption levels depend on past consumption levels

[160] Demand theory provides economists with a means of predicting changes in consumption behavior and the quantities of goods demanded by consumers in markets. Utility theory provides economists with a framework for accounting for the welfare that consumers derive from the goods they have access to. In many economic analyses, economists use both demand and utility theories, which become practically intertwined. However, Pollak attempts to keep them separate when implementing habits in his demand models.

[161] For this reason, applied economists praised the linear expenditure system and Stone-Geary utility functions.

(Pollak 1970: p.749f.).[162] The optimal consumption level, as defined by the short-run demand function, can be viewed as a short-run equilibrium resulting from utility maximization.

Pollak also derived long-run demand functions, which specify a steady-state or long-run consumption equilibrium. By their computational nature, these long-run equilibria differed from short-run equilibria. The long-run equilibria did not result from static utility maximization. Rather, long-run demand functions were defined by considerations regarding dynamic adjustments to optimal consumption responses over time. In long-run equilibrium, the consumption vector for the current period must be the same as for the previous period and all future periods. In a theoretical long-run equilibrium, consumers have fully adjusted their consumption response because they have arrived at the optimal consumption vector (see Pollak 1970: p.752ff.).

In Pollak's linear expenditure system, short-run utility functions corresponded to short-run demand functions. He also described the theoretical conditions under which long-run utility functions would correspond to dynamic long-run demand functions.

[162] In principle, a demand function could describe how a change in taste affects the quantity demanded of a good. However, in the decades following World War II, neoclassical economists such as Friedman promoted the idea that economists do not have a theory of taste formation and therefore cannot comment on changes in taste. In his price theory textbook from 1962 Friedman argues that "[w]ants are to be taken in our analysis as givens or data." Referring to Marshall's *Principles of Economics*, Friedman argues that wants can be "both the cause and the result of action. There is the 'work to live' school, in which wants are treated as ends, and the 'live to work' school, in which activities are treated as ends" (Friedman 1962: p. 12). According to Friedman, the "work-to-live" school leads to a view of stable consumption, while the "live-to-work" school provides rather a view of innovation and development. But nonetheless, according to Friedman "economic theory proceeds largely to take wants as fixed." Friedman wrote that "[t]he economist has little to say about the formation of wants; this is the province of the psychologist. The economist's task is to trace the consequences of any given set of wants" (see Friedman 1962: p. 13). By justifying this restriction pragmatically as one of fruitful division of labor, Friedman contributes to the myth that post-WWII is void of psychology. But even if wants are taken as data, Friedman sees important implications in the relativity of wants. For Friedman "it means that the complete satisfaction of all wants – a literal economy of abundance – is impossible. Satisfaction of all the wants existing at any point of time would mean the emergence of a new series of wants." As a result, Friedman argues that it is impossible to define a standard of living in absolute terms. "There is a widespread misconception that such a standard can be determined 'scientifically,' by which is typically meant in terms of physical and biological laws, and without reliance on 'subjective values'[,]" (Friedman 1962: p. 12).

However, in 1970 Pollak did not describe what to do with such a long-run utility function in practice. He would have the chance to be more specific just a few years later.

Pollak was not the only economist who became interested in the more theoretical aspects of consumption habits. In 1971 the German economist Carl Christian von Weizsäcker published a paper in the *Journal of Economic Theory* that was called *Notes on Endogenous Change of Tastes* (von Weizsäcker 1971).[163] In his paper, he presented a consumption model with only two goods and addressed the problem of habit formation. Like in Pollak's model, changes in tastes depended on past consumption. However, while Pollak did not discuss any welfare implications, von Weizsäcker offered a more confident economic interpretation of habit formation for public policy.[164]

Von Weizsäcker's interpretation of welfare and habit dependence was tied to his definition of long-run demand. Like Pollak (1970), von Weizsäcker focused on the differences between the short-term and long-term effects of income (or price) changes on consumers. However, von Weizsäcker defined and interpreted long-run demand equilibrium differently. While Pollak defined a long-run demand function in a linear expenditure system, von Weizsäcker defined long-run demand in a two-dimensional goods model. He described a stable adaptation process that leads to a unique long-run

[163] Carl Christian von Weizsäcker (born 1938) is a German economist. He studied among others at the University of Basel and earned his Ph.D. in economics from the institution in 1961. From 1962 to 1964 went with a Post-doc Fellowship to the MIT. He worked as a researcher at the Max-Planck-Institute on Educational Research in Berlin before he became Professor of Economics at the University of Heidelberg from 1965 to 1972. From 1968 to 1970 von Weizsäcker was also Professor of Economics at the MIT. From 1972 to 1974 he was Professor for mathematical economics at the University of Bielefeld and from 1974 to 1981 he was Professor for economics at the University of Bonn. Before von Weizsäcker became interested in endogenous preferences he was publishing principally on questions of optimal growth. Although he had more publications in German, see for example his 1965 article on optimal growth models in the Review of Economic Studies (von Weizsäcker 1965). Except from a short article in 1986, von Weizsäcker continued to publish on endogenous preferences only in the early 2000s.

[164] Von Weizsäcker motivated his article in part by asking whether the usual efficiency theorems of economics were still "relevant to a world with changing tastes[.]" He wrote that „[t]here exists some literature on models in which past consumption influences present consumption. But as far as I can see their central theme never seems to be the welfare implications of this phenomenon." (von Weizsäcker 1971: p. 346). Among others, he cited a working paper version of Pollak's 1970 paper. He also cited Alfred Marshall's *Principles of Economics* (the 8th version) where Marshall briefly relates habits to the consumption of "good music." According to their own retrospective accounts, this citation also inspired George Stigler and Gary Becker's later model of addiction (Stigler and Becker 1977).

equilibrium of demanded goods for a given initial combination of goods. Consumers will converge to this equilibrium if prices and income remain stable. He defined long-run price elasticities and indifference curves corresponding to this long-run equilibrium (see Von Weizsäcker, 1971, p. 347 ff.).

Von Weizsäcker claimed that his analysis of long-run utility is analogous in method to the analysis of revealed preferences (von Weizsäcker 1971: p. 357). He explained that revealed preference theory "starts from the observed demand behavior of the individual. Given that this demand behavior is consistent in that it obeys the axiom of revealed preference, we can infer whether a certain change of prices and demand can be considered an improvement for the consumer or not." By using revealed preference theory, he argued, economists "are able to describe the implicit preference structure of a person by observing his behavior." Using an axiom of changing preferences and the axiom of revealed preferences, von Weizsäcker argued that "there exists a consistent preference structure such that the consumer behaves as if he would maximize utility given this preference structure" (von Weizsäcker 1971: p. 357).

As a consequence, von Weizsäcker boldly interpreted long-run demand equilibria in terms of the utility they should provide consumers. He defined long-run equilibria by making step-by-step comparisons of the utility of a sequence of preferred situations. In his notation q^0 represents an initial consumption situation, and $\bar{q}$ represents a corresponding long-run equilibrium of consumption. He argued that "it is possible for the consumer to go from q^0 to $\bar{q}$ in a finite number of periods and always feel improved compared to the already attained status quo of the last period if and only if $\bar{q}$ lies above the indifference curve going through q^0" (von Weizsäcker 1971: p. 352). If the consumer consumes q^0 in the present, then he would prefer the consumption situation q^1. Therefore, he will adapt his consumption to q^1 in the next period. When he consumes q^1 he would prefer q^2. He would then adapt his consumption to q^2. This process of comparison ends at the long-run equilibrium, $\bar{q}$. In this sense, the long-run equilibrium, $\bar{q}$, is judged superior to the intermediate short-run equilibrium, q^1.

In von Weizsäcker's model, consumers only compared the current consumption situation with the next one, not with any other future periods.[165] This has grave consequences for consumers. The consequences depend on whether consumers tend to stick with or change from the status quo. Consumers with a preference for change might be lured onto detrimental consumption paths by a deceptive sequences of consumption situations. In such a sequence each step-by-step change might be in itself an improvement. But looked at them globally, the total amount of change would be judged as harmful. Von Weizsäcker wrote that in such a situation consumers would have "myopic preference[s] for change [making them] blind to the global properties of [their] consumption path, [...] subjectively the path is considered an improvement but in reality it is not."[166] In this case he writes that consumers would suffer "from an insufficient degree of rationality" (von Weizsäcker 1971: p. 356). Consumers with a tendency to stick to the status quo faced a different problem. As they stuck to their present consumption situation they reject sequences of consumption situations even if these would lead long-run equilibrium positions providing a much higher utility level (see von Weizsäcker 1971: p. 357).

Whether consumers stuck to the status quo, or whether they wanted to change it, von Weizsäcker's described them as having a perception problem. Their perception of a change in their consumption basket deviated from what von Weizsäcker called "the 'real' quality of change." He argued that "the existence of consistent long-run indifference curves suggests that we take them [the long-run indifference curves] as the criterion for the 'real' quality of a change in the commodity basket" (von Weizsäcker 1971: p. 357). This

[165] Later, von Weizsäcker formulated a more cautious version of his welfare criterion. In general, von Weizsäcker assumes that consumers prefer consumption situation q^1 to q^0, q^2 to q^1, and finally, $\bar{c}$ to the second-to-last consumption situation in the sequence. This means that, as a consequence of having passed the sequence of situations in which they compared the present with the next future consumption situation, consumers prefer $\bar{c}$ to q^0. In the more cautious version, consumers also prefer $\bar{c}$ to any consumption situation in the sequence, and, most importantly, they prefer $\bar{c}$ to q^0 (see von Weizsäcker 1971: p. 361).

[166] Von Weizsäcker seems to have been the first in the habit formation literature to use the term "myopic" to describe short-sighted preferences. Kenneth Arrow also used the term in the 1960s (see Arrow, 1964). Arrow has been heavily involved in the development of intertemporal utility models in the post-WWII decades (see Cherrier and Duarte 2024).

perception problem was for von Weizsäcker among the causes that explain why demand reacts differently in the short-run and in the long-run.

According to von Weizsäcker perception problems were also linked to the formation of habits. For him, habits were intertemporal mechanisms that help consumers make choices when presented with large amounts of information. He wrote that "[a] realistic theory of consumer behavior should take account of the fact that in making his purchasing decision the consumer does not consider all possible alternatives open to him. He relies on his past experience and [...] changes his behavior usually only slightly from one period to the next. This may be a perfectly rational way of action. In every period he saves a lot of time when he does not review all possible consumption alternatives" (von Weizsäcker 1971: p. 359).

Next to perception problems and habits, von Weizsäcker named problems of information and learning as causes for diverging short-run and long-run demand functions. If consumers were risk averters, von Weizsäcker argued that initially, they "may shrink away from large changes in [their] consumption pattern." Only with time and extended experience can consumers explore "new consumption patterns." Thereby they would move "further and further away from [their] initial point." That is why he argued that "the long-run price elasticity of demand is higher than the short-run price elasticity of demand because the price change causes a learning process to start which will gradually shift demand towards a new equilibrium point where learning comes to an end" (von Weizsäcker 1971: p. 359).

Consequently, von Weizsäcker asserted that the preferences indicated by the long-run demand function were more significant for welfare considerations than the preferences indicated by the short-run demand function. He argued that "the long-run indifference curves exhibit the 'long-run preference structure' of the person" (von Weizsäcker 1971: p. 352). Further, he wrote that "the long-run preference structure is the 'real' preference structure prevailing under the assumption of perfect information and perfect imaginative powers." The preference structure implied by the short-run demand function are different

because of the limited information and limited imaginative powers" of consumers (von Weizsäcker 1971: p. 359).[167]

To stress the policy consequences of his argument, von Weizsäcker gave the example of a farmer and the decision to move to the city.[168] In the example a person works currently as a farmer on the countryside being thus in the consumption position q^0. Now, the farmer "has the chance to leave his farm and to move into the city where he can work, say, in a factory." That would be the long-run equilibrium position, $\bar{q}$. The budget constraint in q^0 (in the countryside) would be different than in $\bar{q}$ (in the city), as he would be faced with different relative prices. Von Weizsäcker argued that "[u]nder a regime of *laissez faire* the farmer would remain farmer. And he would remain a factory worker if he happened to begin his life in the city. There is a certain degree of immobility in such a state of affairs. It is the consequence of the fact that with a *laissez faire* policy the status quo receives the benefit of the doubt, if the status quo is a state of laissez faire" (von Weizsäcker 1971: p. 361, italics like in the original citation). In the following von Weizsäcker argued that such a laissez faire policy favoring the status quo is not necessarily always Pareto optimal. He stressed the relevance of his argument especially in cases of structural change of industries where the government might be in a better information position than single individuals who are employed in deteriorating industries (see von Weizsäcker 1971: p. 361-363).

In 1976 the *Journal of Economic Theory* published an issue that contained four papers that dealt more or less closely with the issue of habit formation and endogenous tastes. One of the papers was written by Pollak (1976). The title of his paper was *Habit Formation and Long-Run Utility Functions*. In it, Pollak refined his definition of long-

[167] Von Weizsäcker provided a related explanation of the consumer's decision problem in terms of satisficing. Satisficing and bounded rationality were terms that were developed by Herbert Simon in the 1960s and 1970s. Simon is usually considered as a forerunner of later behavioral economists (see for example Sent 2004). Altough von Weizsäcker refers to the "theory of satisficing" he did not cite any work of Simon (see von Weizsäcker 1971: p. 359f.).

[168] His example illustrates that von Weizsäcker imagined that his basic consumption model could be applied very broadly.

run utility functions and explained how economists should and should not use and interpret them. At the same time, he strongly rejected von Weizsäcker's proposal a few years earlier regarding the welfare implications of habit formation.

In general, Pollak revisited his model of habit formation, refining the conditions under which long-run demand could be interpreted in terms of a long-run utility function. In a linear expenditure system, demand functions can be interpreted in terms of utility if short-run demand functions yield linear Engel curves. However, linear Engel curves were implied by only a narrow set of additive utility functions. Only then do long-run utility functions rationalize long-run demand functions (see Pollak 1976, p. 284 ff.). Otherwise, Pollak argued that utility interpretations of long-run demand were incorrect because corresponding long-run utility functions would not exist. He wrote that "[i]t might appear paradoxical that in each period the short-run demand functions can be rationalized by a short-run utility function, while the long-run demand functions cannot be rationalized by a long-run utility function. Indeed, one might reason that, as the short-run demand functions converge to the long-run demand function, the short-run utility function should converge to the long-run utility function. But this is incorrect" (Pollak 1976: p. 284). Whether the long-run demand function can be interpreted as a long-run utility function hinged on the thorny issue of integrability.[169]

[169] Pollak explains the issue in greater detail (see Pollak 1976: p. 283-285). More generally, integrability is a key condition in both utility and demand theory. In demand theory, integrability is provided when the Slutsky matrix is symmetric. The Slutsky matrix contains the own-price elasticities and cross-price elasticities of goods in a demand model. An own-price elasticity shows the percentage change in the demanded quantity of a good relative to a given percentage change in its price. It measures how sensitive the demanded quantity is to changes in price. Cross-price elasticities describe the percentage change in the demand for one good relative to a given percentage change in the price of another good. Depending on whether the cross-price elasticity is positive or negative, the two goods are either complements or substitutes. An asymmetric Slutsky matrix means that the effect of a price increase on one good differs in magnitude from the effect of the inverse price increase on the other good. This may indicate issues that cause the formulated demand system to not run symmetrically. In the case of habit formation, the most prominent issue is that the order in which different items are consumed might affect the utility an individual derives from consumption. When the Slutsky matrix is symmetric, the order in which goods are consumed does not matter. The issue of integrability has been vividly discussed by past economists, see Hands (2006).

For Pollak it was far from obvious that long-run utility functions generally exist when consumption is habit-forming. Therefore, he criticized von Weizsäcker's general claims about welfare based on the existence of such functions. Pollak's critique of von Weizsäcker's claims was rather severe. He wrote that von Weizsäcker's "entire discussion rests on the claim that the long-run demand functions can be rationalized by a utility function" (Pollak 1976: p. 273). Unfortunately, Pollak argued, "where integrability conditions are concerned, the assumption that there are only two goods does change the substance of the argument." The reason is that the conditions for symmetry in the Slutsky matrix are much easier fulfilled in models with two goods than in models with more than two goods.[170] "Hence, there is no presumption that either an argument or a result which holds in the two-goods case will generalize to the n-good case, where $n > 2$." For models with more than two goods Pollak showed in his article that long-run utility functions would exist "only in certain exceptional cases" (Pollak 1976: p. 273f.). Therefore, Pollak rejected von Weizsäcker's attempt to use the long-run utility function as "the appropriate criterion by which to judge the welfare effects of changes in consumption." At most, he argued long-run utility functions might be used as a welfare criterion only in those cases in which they exist. But even in those cases, he wrote, "there are compelling objections to it […]" (Pollak 1976: p. 292).

The problem of long-run utility functions is related to path-dependency. Depending on what individuals have consumed first, they will develop short-run tastes that are likely to strengthen the demand for what they have consumed first. Pollak provided an example in a two goods case where a long-run utility function technically exists. Two individuals might be imagined. One consumes initially six quantities of good 1 and four quantities of good 2 (6,4). The other consumes initially four quantities of good 1 and seven of good 2 (4,7). In this situation the second individual consuming (4,7) would be on a higher long-run indifference curve. According to von Weizsäcker, this higher long-

[170] Pollak wrote that "the Slutsky symmetry conditions are always satisfied in the two-good case, provided the demand functions satisfy the budget constraint and are homogenous of degree zero in prices and income" (Pollak 1976: p. 274).

run utility level could be taken as a welfare criterion. Pollak disagreed. He argued that "[i]f the individual is offered a nonmarket choice between these two baskets – for example a political choice in which he must vote for one or the other of these two consumption patterns – then his choice will depend on his past consumption history. If his previous consumption has been (6,4), then he will prefer (6,4); if it has been (4,7), he will prefer (4,7). The fact that the long-run utility function assigns a higher value to one than the other does not imply that it will be selected in this binary choice situation, and it does not imply that it is a point of higher welfare." (Pollak 1976: p. 295).

Pollak also stressed the difference between step-by-step and startpoint-endpoint comparisons when evaluating preferences. He argued that „[t]he issue [...] is whether the existence of a von Weizsäcker sequence which enables us to go from q^0 to $\bar{q}$ in a finite number of steps, feeling improved at each step, implies that the individual is better off – in terms of his preferences – $\bar{q}$ and q^0."[171] But Pollak rejected von Weizsäcker's use of step-by-step comparisons. He wrote that "I interpret the individual's willingness to move from q^0 to $\bar{q}$ in a sequence of small steps when he is unwilling to do so in a single step as indicative of his failure to understand the habit formation mechanism and not of the underlying superiority of $\bar{q}$" (Pollak 1976: p. 294).

Pollak used the example of smoking to explain how this issue related to welfare evaluations. He argued that "a nonsmoker might prefer to remain a nonsmoker rather than smoke three packs of cigarettes a day, but he might choose to smoke half a pack a day rather than abstain completely. After becoming accustomed to smoking half a pack a day, the individual might prefer to remain a light smoker rather than smoke three packs a day, but he might choose to smoke a pack a day rather than continue at half a pack a day. By this process, the myopic nonsmoker is led to become a heavy smoker. This scenario is entirely consistent with von Weizsäcker's assumptions, yet I am loath to conclude that the individual is better off at $\bar{q}$ than at q^0" (Pollak 1976: p. 295).

[171] In the original Pollak uses capital letters to describe the consumption vectors, q^0 and $\bar{q}$.

The long-run utility function is problematic as a welfare criterion, because the long-run equilibrium that it provides is the result of path dependency. If our preferences in the endpoint of a consumption sequence are fundamentally shaped by what we have consumed in the past, should we take them as authentically informed expressions of our (long-run) well-being? Pollak said no, we should not. We should not, because the long-run utility function did not coincide with what Pollak called "our intuitive notion of an individual's long-run preference ordering" (Pollak 1976: p. 293).

Confronted with von Weizsäcker's interpretation of long-run demand as reflecting consumers' long-run preferences, Pollak stressed the different interpretations of a utility function in demand theory and utility theory. Demand theory came to him close to positive economics. "From the standpoint of positive economics, the fact that the long-run demand functions were not generated by maximizing the long-run utility function [...] is completely irrelevant; the utility function is just a convenient device for coding all of the information about demand behavior." Utility theory was for him clearly normative. "From the standpoint of normative economics, an individual's utility function is significant because it represents his preferences. If we assume that social welfare depends on individual welfare and that each individual is the sole judge of his own welfare, then individual utility functions are germane to welfare economics" (Pollak 1976: p. 295).

While economists are usually versatile to jump from the positive to the normative interpretation, Pollak argued that habit models demand more caution. He wrote that "[o]rdinarily, there is no need to distinguish between these two interpretations of the utility function. If a utility function rationalizes an individual's demand functions, we usually assume that it also represents his preferences. In the habit formation model, this is an unwarranted assumption; there is no long-run preference ordering, and the distinction between the demand and preference interpretations of the utility function is critical" (Pollak 1976: p. 295).

That is why he rejected von Weizsäcker's welfare interpretation of the long-run utility function. "The long-run utility function is the same type of construct as a

community indifference map which rationalizes market demand functions; if it exists, it is a convenient device for coding all of the information about demand behavior, but this is all [...]. In general, market demand functions cannot be rationalized by a 'market utility function.' In those special cases in which they can be, the utility function must be scrupulously interpreted in terms of positive economics; it has no normative or welfare significance" (Pollak 1976: p. 295). Technically, "the individual's long-run demand behavior is consistent with the hypothesis that he is maximizing the long-run utility function [...], but we cannot conclude that a movement from a lower indifference curve to a higher one [...] would make him better off" (Pollak 1976: p. 295).

From the 1950s to the 1970s, habits have been discussed as important determinants of consumer demand. In the late 1950s economists like Farrell and Brown were interested in habits to render statistic demand estimations more dynamically accurate. To represent habits formally they used lagged consumption or irreversible demand functions. In the 1960s Houthakker and Taylor treated habits somewhat analogously to durable goods. Estimating the US demand for a wide array of consumption items, they described habits as durable, psychological stocks that can be accounted for without being measured.

The metaphor of habits as psychological stocks has been taken up by more theoretically-minded economists in the 1970s. Pollak used this description of habits and strengthened its economic interpretation by implementing a process of habit formation in a model using the linear expenditure system. Similar to durable goods, habit stocks are acquired by consumers during consumption processes that span multiple periods. Existing habit stocks, like durable goods with which a consumer is already equipped, impact the consumption level of a good. However, unlike durable goods, habit-forming items, such as cigarettes, are consumed much more frequently. Habit stocks are also treated as something different from the goods and services that consumers bought in the first place and that created a habit stock. These goods and services are often perishable.

In the models that we have considered in this section habits were described as psychological mechanisms that helped consumers to learn from the past consumption.

Habits were modeled basically as mechanisms that accumulated past consumption experience and projected and that projected this accumulated consumption experience on the present impacting present consumption decisions. As Pollak's formulation showed, habit formation is dependent on the strength of memory with which past experiences are remembered in the present. In this sense, we have described habit formation in this section as time traveling. As consumers travel from the past to the present, some of their past experiences travel with them through time in the form of habit stocks that individuals carry with them.

Although habits rendered traditional demand models more dynamic, it was not immediately clear what consequences such dynamization had for welfare considerations. The contradictory interpretations of von Weizsäcker and Pollak show that the formulation of habits in a static demand model had its limits. The discussions of the welfare implications of habit formation by von Weizsäcker and Pollak illustrate as well that in consumption studies utility functions are sometimes used with more descriptive, positivist intentions to describe and predict demand behavior. And other times, utility functions are interpreted more normatively, referring to theories of economic welfare that make explicit value judgments about the goodness of consumption.

3.3 Time traveling (II): From the present to the future, and back to the present

As we have seen, habits have often been discussed as mechanisms that limit present consumption choices through past consumption. Therefore, present choices are partly dependent on past choices. Since the mid-1970s, however, economists have also described habits as mechanisms that limit present choices through the lens of the future. In this section we describe how rational habit formation models evolved as a new type of habit model. We characterize these models of rational habit formation and stress how they differ to the habit models of the preceding section. In a nutshell, they use intertemporal utility optimization which makes habits not only related to the past consumption history, but

also to the projection of future utility. As a consequence, these models provide additional descriptions of habits as intertemporal pathways into the future.

A new type of habit formation was proposed by economists from the mid-1970s onwards. Several economists used intertemporal utility optimization to model habit formation. That meant that consumption was now considered as an activity stretching over several periods and consumers derived utility from consuming in different periods. These new models differed from the earlier habit formation models by Houthakker and Taylor (1966), Pollak (1970), or von Weizsäcker (1971) that were basically set up in one period. The earlier models used variables like lagged consumption and psychological habit stocks that represented the influence of past consumption. But apart from that there was just one present period in which consumers were modeled to react to changes in prices or income as it was specified by the short-run demand function. Although the long-run demand function was assumed to capture adaptation behavior in the future of the short-run, the basic demand model was organized in one period.[172]

In 1975 Robert Pollak explained some of the shortcomings of the earlier models. In a paper published in the NBER journal *Annals of Economic and Social Measurement* he discussed the implications of habit formation for the construction of intertemporal cost of living indexes.[173] One shortcoming he argued was that one-period habit models take total expenditures in every period as exogenously given. How much a household spends in one period is taken from the data and not determined by the model. The other main

[172] In the words of Pollak, the earlier habit models were "intended to provide an empirically useful dynamic generalization of the traditional static model of utility maximization and [have] been reasonably successful in providing a theoretical foundation of empirical work" (Pollak 1975: p. 188f.).

[173] A cost-of-living index is a statistical measure that compares the cost of living under different circumstances. In cost of living indexes, the cost of living is defined by access to a set of goods and services. These goods and services are assumed to provide utility to consumers, thereby approximating their welfare. All goods and services have prices and must be purchased. Therefore, access to goods can be expressed as the sum of expenditures needed to obtain them. A traditional cost of living index compares the minimum expenditure required to obtain a certain level of utility in one situation to the minimum expenditure required to obtain the same level of utility in another situation. The two situations differ only in terms of the prices consumers pay for their baskets of goods. For more on the history of cost of living indexes see Stapleford (2009) and Banzhaf (2004). For an overview of Pollak's contributions to the cost of living literature see Pollak (1989).

shortcoming was according to Pollak that "expenditure can be allocated among goods available in each period without considering the future."[174] An assumption that was according to Pollak "carried over from traditional demand theory" (Pollak 1975: p. 191) It was assumed that consumers did not recognize the impact of their current consumption on their future preferences. But, as Pollak recognized, "an individual whose current tastes depend on his past consumption might be expected to realize that his future tastes will depend on his current consumption; and once he realizes this, his choice of a current consumption pattern will take account of its impact on his future tastes" (Pollak 1975: p. 191).

Pollak (1975) made a distinction between naive and rational habit formation. "I call a specification of habit formation in which an individual does not recognize that his present consumption has an impact on his future tastes, 'naïve habit formation.'" In contrast, Pollak wrote that "'rational habit formation' refers to a specification in which the individual takes full account of the effect of his current consumption on his future preferences" (Pollak 1975: p. 188). While the earlier models of Houthakker and Taylor (1966), Pollak (1970), or von Weizsäcker (1971) were models of naïve habit formation, Pollak saw an intertemporal model by the economist Constantino Lluch (1974) as an instance of rational habit formation (see Pollak 1975: p. 191, footnote 7). Most contemporary surveys of the literature on the economic analysis of habitual and addictive consumption use the distinction between naïve and rational habit models.[175] However, these surveys usually do not spend much time on the profound consequences of this change in conception of habit formation.

Actually, switching from naïve to rational habit formation came with wide-ranging consequences in terms of modeling assumptions. As total utility is generated over multiple periods, and as the utility of later periods is path-dependent on consumption of earlier

[174] For example, in von Weizsäcker's sequences of step-by-step change consumers were assumed to compare their situations always step by step with the one next period, but they were generally not assumed to compare their initial situation at once to the endpoint situation, the long-run equilibrium.
[175] See for example Grossman et al. (1998), Chaloupka, Warner (2000), or Hofmeyr (2015).

periods, the intertemporal utility in rational habit models is not separable over periods.[176] This means that the utility derived from consumption in each period is depending on consumption in other periods. Therefore, Pollak argued that "the allocation of expenditure within each period cannot be understood without reference to behavior in future periods" (Pollak 1975: p. 192). This meant also, argued Pollak that "[f]rom the standpoint of empirical analysis of the allocation of expenditure within each period, rational habit formation provides a much less tractable model than naive habit formation" (Pollak 1975: p. 191f.). The problem of optimization with a multitude of different paths was much more complex.

In the late 1970s and early 1980s several economists have published models of rational habit formation. In 1974 Constantino Lluch published the paper *Expenditure, Savings and Habit Formation* in the *International Economic Review*.[177] In 1978 Marcel Boyer published a paper titled *A Habit Forming Optimal Growth Model*, also in the *International Economic Review*.[178] In 1981 Frans Spinnewyn published the paper *Rational*

[176] Separability is a crucial simplifying assumption in demand theory. Additive separability means that a utility function can be partitioned into different groups of items, and total utility is the sum of each group's utility. For this addition to be mathematically valid, the utility derived from items in one group must be independent of the consumption of items in other groups. In studies of household budgets, for example, different household items are sometimes grouped together, such as clothing or food items. Economists speak of separable utility only when the utility consumers derive from food items is independent of their consumption of clothing items. For example, Pollak explained that "[s]eparability is the crucial simplifying condition for the construction of one period [cost of living] indexes, since it allows us to ignore consumption outside the period for which we are constructing the index" (Pollak 1975: p. 187).

[177] Constantino Lluch was an economist employed by the *Research Development Center* of the *World Bank* in Washington, D.C.. In the early 1970s, Lluch proposed an econometric demand model that he called the extended linear expenditure system (Lluch 1973). Lluch's model of habit formation is an extension of his extended linear expenditure system. Together with economist Ross Williams, Lluch estimated the model with different data (Lluch, Williams 1975a,b). In 1977, they published a book together with the economist Alan Powell titled *Patterns in Household Demand and Saving* (Lluch, Powell, Williams (1977). In the preface the authors write about the World Bank program with which Lluch is associated that "[i]n 1972 a research program on patterns of demand and saving in the development process was initiated at the Development Research Center of the World Bank. The project was conceived as a systematic examination of the consumption and savings behavior of households in countries at different levels of development. It was believed that inter- and intra-country comparisons of such behavior might yield empirical regularities useful for broad characterizations of the development process" (Lluch et al 1977: p. v).

[178] Marcel Boyer (born in 1943) is a Canadian economist. Boyer has obtained a B.A. and M.A. in economics from the University of Montréal in 1966 and 1968. After finishing a second Master in

Habit Formation in the *European Economic Review*.[179] And in 1983 Boyer published a second paper titled *Rational Demand and Expenditures Patterns under Habit Formation* this time in the *Journal of Economic Theory*. These models share several common features that illustrate the profound differences in practices compared to the earlier, naïve habit models.

Below, we present three features of rational habit formation taken from the models of Lluch (1975), Boyer (1978, 1983), and Spinnewyn (1981) that clarify how consumers, intertemporal consumption, and consumption habits are represented by these models. First, we focus on how these models account for consumption by imposing an intertemporal budget constraint that links the past, present, and future. Unlike the earlier models, habits are not merely a means of learning from the past. Now, habits also constitute potential liabilities that tie up future resources. Second, we examine how these models incorporate habits into human wealth. These models build on earlier models by establishing a central role for human wealth in the intertemporal consumption process.

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economics at the Graduate School of Industrial Administration at Carnegie-Mellon University in 1971, Boyer obtained a PhD in economics from the same institution in 1973. He has written his PhD thesis with the macroeconomist Robert Lucas who popularized the idea of rational expectations in macro-economic models. From 1971 to 1973 Boyer was Assistant Professor at York University, from 1973 to 1974 he was Professor at the University of Quebec at Montréal, and from 1974 to 2008 he was Professor at the University of Montréal. Like von Weizsäcker Boyer came to the question of habit formation after having been engaged with optimal growth theory (see Boyer 1975). Boyer's first model of rational habit formation is literally titled *A Habit Forming Optimal Growth Level* (Boyer 1978). Boyer also seems to have been the first adopter of the use of the distinction into adjacent and distant complementarity (Boyer 1983) that has first been proposed in another optimal growth model by Harl Ryder and Geoffrey Heal (1973). Boyer has been a Visiting Professor at the *Center for Operations Research and Econometrics* (CORE) at the *Catholic University of Louvain* in the early 1980s. In his 1983 article Boyer thanks Frans Spinnewyn, an economist at CORE, for comments on his model. As Boyer, Spinnewyn formulated a model of rational habit formation.

[179] Frans Spinnewyn is a Belgian economist who has been associated with the CORE at the Catholic University of Louvain. Spinnewyn has been working on the implications of habit formation since at least the late 1970s. In 1979 he has published a first paper titled *The Cost of Consumption and Wealth in Models with Habit Formation* in the journal Economics Letters (Spinnewyn 1979). In both his articles on habit formation Spinnewyn thanks the Belgian economist Louis Phlips for comments. In 1984 Spinnewyn has published a paper cowritten with Phlips in which they derive true cost-of-living indexes for the case of rational habit formation (Phlips, Spinnewyn 1984). Phlips could be taken as another economist among the authors of models of rational habit formation. As Spinnewyn, Phlips was based at CORE at the Catholic University of Louvain. In 1974 he published a book with North Holland titled Advanced Consumption Analysis in which he proposes a model of rational habit formation (Phlips 1974).

While earlier models described habits as psychological stocks, these models view these stocks as resources that can and should be used to optimize utility from consumption over time. Third, we provide more details on the enhanced imaging and computational powers of consumers assumed in rational habit models. In these models, consumers are typically assumed to be aware of and knowledgeable about the habits with which they are currently equipped. Moreover, they are assumed to be able to predict future habit trends and, if necessary, act in the present to counterbalance the development of harmful habits.

3.3.1 An intertemporal budget constraint overarching past, present, and future

Models of rational habit formation are problems of intertemporal utility optimization. As Pollak (1975) noted, rational habit formation employs an intertemporal utility function that generates total utility through consumption over multiple time periods. The optimal solution to a consumption problem defined in this way considers not only the present consumption choice but also consumption projections for the future. Or to take up Pollak's terms, it makes a difference whether a problem is considered in a one period setting or in a multiperiod setting.

The difference that an intertemporal utility function can make can be seen by considering the one used by Constantino Lluch (1974). Equation 3.7 displays the intertemporal utility function used in his model.

$$U\big(q(t), s(t)\big) = \int_0^\infty e^{-\delta t} u\big(q(t), s(t)\big) dt \tag{3.7}$$

The left-hand-side of equation 3.7 posits that consumers derive utility from a vector of goods that they consume, $q(t)$, and from a vector of goods-specific habit stocks, $s(t)$. Each good has its specific habit stock, so the vector of goods, $q(t)$, has the same length as the vector of habit stocks, $s(t)$. Lluch has formulated his model in continuous time as an optimization problem with an infinite time horizon.[180] This explains why the

[180] As economics became strongly formalized in the post-WWII decades, economists began to differentiate between two ways of how the passage of time is represented in economic models. Discrete

integral representing total intertemporal utility on the right-hand side of equation 3.1 ranges from zero (the present moment) to infinity. The integral aggregates the different utility values from each moment in time. The utility of each moment within the integral is multiplied by an exponential discounting term, $e^{-\delta t}$, where δ is the discount rate.

Intertemporal utility models, such as the one formulated by Lluch (1974), assume two types of utility: instantaneous utility, which is derived from current consumption, and anticipated utility, which is projected onto future periods.[181] In Lluch's model the instantaneous utility is the utility that consumers derive in the present at $t = 0$, see equation (3.8).

$$U\big(q(0), s(0)\big) = e^{-\delta 0} u\big(q(0), s(0)\big) \tag{3.8}$$

With regards to instantaneous utility there is no temporal discounting involved.[182] But next to the instantaneous utility, in intertemporal models the total utility that is perceived by consumers also contains anticipated utility from future periods or the "imagined" utility from the future. For example, equation (3.9) displays the anticipated utility that the consumer expects to obtain in the moment $t = 1$.

$$U\big(q(1), s(1)\big) = e^{-\delta 1} u\big(q(1), s(1)\big) \tag{3.9}$$

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time assumes the passage of time in steps $(t = 0,1,2, \dots, T)$. The steps of discrete time can be measured in very large units (from year to year) or in small units (from minute to minute). Continuous time assumes a smoother flow of time. The passage of time is represented as a continuum $(t \in [0, \infty))$. Not only are all the discrete steps part of this continuum, also all the moments between two steps are part of the continuum of time. In the case of discrete time values from different periods can be aggregated by simple addition. In the case of continuous time aggregation over time is done by integrating values over the whole continuum.

[181] The philosopher Ole Rogeberg has argued that intertemporal utility models could also be read as if consumers only care about present utility. One part of present utility is derived from consumption, the other part is derived from imagining the future (see Rogeberg 2003: p. 292). In his article Rogeberg actually commented Becker's extended utility approach, but his remarks should be applicable to a welfare reading of the rational habit formation models as well. We will present Becker's extended utility framework in Chapter 6.

[182] As the sum of utility is already located in the present, the present valuation becomes equal to multiplying the present sum of utility by one. In the present t is equal to zero, thus the exponent becomes 0 and therefore the whole exponential expression becomes equal to 1.

As equation (3.9) shows, at the moment $t = 1$, the exponential term becomes $e^{-\delta 1}$. The utility projected onto the future moment, $u\big(q(1), s(1)\big)$, is discounted using this exponential term. This process of valuation is called exponential discounting. The farther in the future a moment t is, the more the utility consumers project onto it will be discounted, or in other words the smaller its present value will be. In this intertemporal valuation process, the discount rate, δ, is a crucial parameter. The larger the discount rate, the more consumers discount future periods relative to instantaneous utility in the present.[183]

To solve intertemporal utility models economists have usually carried over the methods of constrained optimization from the one period case to the multiperiod case. In the post-WWII decades, economists relied extensively on constrained optimization techniques to determine optimal consumption.[184] Constrained optimization can be seen as

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[183] Exponential discounting can be used independent of whether utility is represented in discrete or in continuous time. With discrete time $(t = 0,1,2, \dots, T)$ exponential discounting of utility is usually formalized as follows.

$$U = \sum_{t=0}^{T} \delta^t \, u(c_t)$$

In the preceding equation the temporally aggregated utility, U, equals the sum of the discounted utility of each period t. For each period t the utility value, $u(c_t)$, is multiplied by the exponential discounting term, δ^t. The parameter δ is called the discount rate.
With continuous time $(t \in [0, T))$ exponential discounting of utility is usually formalized as follows.

$$U = \int_0^T e^{-\rho t} u\big(c(t)\big) dt$$

In the preceding equation the temporally aggregated utility, U, equals the integral running over the interval from 0 to T. Before utility is integrated utility at each moment t, $u\big(c(t)\big)$, is multiplied by the exponential discounting term, $e^{-\rho t}$. The parameter ρ is called the discount rate.
Exponential discounting with discrete time is mathematically equivalent to assessing present values in the financial literature. This can easily be seen in the following equation which provides the formula to compute the present value, PV.

$$PV = u(c_0) + \frac{u(c_1)}{(1+r)} + \frac{u(c_2)}{(1+r)^2} + \cdots + \frac{u(c_T)}{(1+r)^T} = \sum_{t=0}^{T} \frac{u(c_t)}{(1+r)^t}$$

If the internal rate of return, r, is replaced by $r = \frac{1-\delta}{\delta}$, the formulation of the present value is the same as the formulation of exponential discounting used in the first equation of this footnote.

[184] Constrained optimization was developed by mathematicians and economists during and after WWII and spread through economics in the following decades. The method of linear programming were integrated into economics by different groups of economists, but people as Tjalling Koopmans from the

a pair of scissors with two blades. One blade relates to the desired (competing) ends of production, which were determined by the wants and preferences of consumers, approximated by the utility function. The other blade related to the means of production and the scarce resources that limited production possibilities. Using these two blades together cuts out optimal solutions to problems of constrained optimization. In intertemporal utility models such optimal solutions are not bundles of goods like in the one period case, but sequences of temporal consumption levels that define optimal consumption over time.

The idea of intertemporal optimization is usually traced back to Irving Fisher who used the budget constraint to imagine intertemporal utility optimization in the early 20th century. Fisher (1930) described a situation in which a consumer has a total income to allocate over two time periods: period 0, the present; and period 1, the future. In this intertemporal consumption problem, total utility does not come from consuming different goods in the same period but rather from consuming the same good in different periods. Fisher (1930) and many economists after him used a budget constraint to account for the allocation of resources over time. Since the future is unknown, the budget constraint serves as a bridge to the unknown by predicting future possibilities based on current expenditures, assuming that prices and consumer preferences remain the same. Thus, by allocating a certain amount of income for consumption in period 0, the consumer also determines his future possibilities, which depend on the remainder of his present income (his savings) and the income he expects to receive in period 1. In this way economists in the post-WWII decades saw the future possibilities of consumers determined by their present consumption. In this way economists used the intertemporal budget constraint to account for how consumers decide in the present.

The usage of the intertemporal budget constraint as an accounting tool can be seen also in the models of rational habit formation. This is clearest in the model of Frans

Cowles Commission and Paul Samuelson from the MIT were leading figures in setting up the techniques of constrained optimization as basic means of expression in post-WWII microeconomics, see for example Düppe and Weintraub (2014: chapter 5).

Spinnewyn (1981). Spinnewyn's modeling strategy consisted in creating a rational habit formation model that was "formally equivalent to an intertemporal consumer model without habit formation[.]" He started with a normal intertemporal consumption model assuming an intertemporal budget constraint. By "redefining the cost of consumption and wealth" he described how rational habit formation would play out in such a context. He used his results also to compare them to results under naïve habit formation (Spinnewyn 1981: p.91). Spinnewyn looked on an intertemporal consumption model like an accountant, correcting the results of the model by assuming rational habit formation.

Spinnewyn redefined the cost of consuming a good with regards to the future of the consumer. Generally, he assumed that consumers use financial wealth that is accumulated over time to budget for future commodity expenses. Spinnewyn took commodities as durables assuming that they provide services and that they depreciate over time. He stated that each commodity has a rental price that needs to be paid by the consumer and constitutes a cost of consumption. Like Pollak (1970), Spinnewyn argued that habits can be seen as mechanisms that raise the psychologically necessary minimal levels of consumption of a commodity. Habits that exist in the consumer in the present augment their psychologically necessary level of commodities in the future. So, habits induce future consumption. By this logic, Spinnewyn added the costs of induced future consumption to the rental prices of commodities in the present. Each commodity comes thus with a rental price in the present period and the cost of induced consumption in future periods (see Spinnewyn 1981: p. 91).

Assuming rational habit formation, Spinnewyn also redefined the wealth of a consumer with regards to the past. He argued that existing habits bind resources and thus constrain the choice of consumption plans. Therefore, the habits that exist within the consumer in the initial period impose already a cost. He computed the cost of initial stocks of habits for the present and for each future period. Then he subtracts this cost from the wealth of the consumer in the present. He showed that "initial wealth in any period does not only consist of financial wealth, but also of the depreciated stock of durables carried

from the past" (Spinnewyn 1981: p. 95). Since "the formation of stocks of habits depends on past consumption behavior", Spinnewyn argued that the cost of habits is due to the accumulation of habit stocks in the past. Therefore, Spinnewyn calculated the part of the costs of future habits that is due to past decisions to consume the according goods (see Spinnewyn 1981: p. 96).[185]

Like Lluch and Spinnewyn, Boyer (1978, 1983) also assumed an intertemporal budget constraint. In Boyer's model, utility is generated from a vector of consumption goods and the consumption goods vector from the preceding period. Like Lluch, Boyer used present valuation to represent utility from future periods, assuming exponential discounting with a parameter representing a time discount rate. He maximized total utility (present and discounted future utility) while respecting an intertemporal budget constraint. The intertemporal budget constraint defines consumers' income and determines their consumption potential. Therefore, the intertemporal budget constraints limits implicitly the future possibilities of consumers. Or as Boyer noted "intertemporal links are present both in the preferences and in the aggregate wealth constraint of the consumer" (Boyer 1983: p. 29).

3.3.2 Habits become part of human wealth

Intertemporal demand models typically rely on a concept of wealth. Using an intertemporal budget constraint, economists posit that consumers accumulate something over time that they carry with them and that they can use as a resource either for consumption today or to provide for the future. As mentioned above, models of rational habit formation use wealth constraints to describe the intertemporal budget constraint. Regarding habits, the authors of rational addiction models give "human wealth" a special

[185] Spinnewyn described his accounting process as follows. "Formal equivalence between a model with habit formation and a model without habit formation is obtained by redefining wealth and the cost of current consumption in the following way. Starting a period with a stock of habits constrains the choice of a consumption plan and thus imposes a cost. The cost of the initial stocks of habits is computed for each period and is subtracted from wealth. Current consumption affects the stock of habits in future periods. The cost of induced consumption through habit formation is added to the cost of current consumption" (Spinnewyn 1981: p. 92).

place in the intertemporal consumption process. In addition to financial wealth, human wealth is considered another form of wealth located within consumers themselves. While habits were described as psychological stocks in naïve habit models, rational habit models explicitly treat them as exploitable resources that are part of a consumer's overall wealth.[186]

In intertemporal models of consumption, the utility function is always maximized while being constrained by a wealth constraint that describes the financial means of the consumer in each period. Wealth is a stock that consumers carry with themselves moving from period to period. But in the case of rational habit formation, consumers carry not only the stock of financial wealth, but also their habit stocks with them while moving forwards in time. In the process of intertemporal optimization, habits are treated in the same way as wealth. This can be seen in the model of Lluch. In Lluch's model the intertemporal utility function (see equation 3.7) is maximized with regards to a wealth constraint (see equation 3.10) and with regards to a constraint defining how habit stocks evolve from one moment to the other (see equation 3.11).

$$\dot{w}(t) = \rho w(t) + y(t) - p'q(t),\ w(0) = w, \tag{3.10}$$

Equation 3.10 presents the wealth constraint from Lluch's model. The change in financial wealth from one period to the other, $\dot{w}(t)$, is described as the sum of the current wealth level multiplied with the rate of reproduction of wealth, $\rho w(t)$, of exogenous labor income, $y(t)$, minus the consumption expenditures in the current period. It is assumed that the individual is endowed with an amount of wealth w in the first period $w(0) = w$.

$$\dot{s}(t) = q(t) - \alpha s(t),\ s(0) = s \tag{3.11}$$

Equation 3.11 presents the second constraint of Lluch's model that defines how the stock of habits changes from one period to the other. The change in habit stocks from one period to the other, $\dot{s}(t)$, is described as the vector of current consumption minus the

[186] Although Lluch (1974), Boyer (1978, 1983), and Spinnewyn (1981) have considered habits implicitly as part of human wealth and thus as an exploitable resource, they have reflected very little on the physiological constraints that may limit the intertemporal optimization of habit creation of consumers.

vector of current habit stocks, $s(t)$, multiplied by the "rate of memory loss," α. It is assumed that the individual is endowed with a level of habit stocks, s, in the first period, $s(0) = s$. Lluch describes equation 3.5 also as "akin to an investment function […] linking consumption flows and changes in the stocks of habits" (Lluch 1974: p. 788). Lluch used optimal control theory to solve the optimization problem by treating the consumer problem as a dynamic system of which he tries to find the equations of motion. To do so he sets up the Hamiltonian equation, a set of differential equations that describe the evolution of the system's generalized coordinates and momenta over time.[187]

How the rational habit models define habits as human wealth can also be in the model of Spinnewyn (1981). Spinnewyn's definition of the intertemporal utility function is a little peculiar, but very interesting with regards to habits. Spinnewyn follows authors like Pollak who have defined habit formation in the context of the linear expenditure system. He explained that "the preference structure underlying the demand behavior of the consumer can be defined with respect to a reference bundle different from the origin. This reference bundle has been called the 'subsistence' bundle or the 'committed consumption' bundle." Like in the linear expenditure system, he assumed that "because of physical or other constraints, minimal requirements of the different commodities can be assigned in advance." Spinnewyn introduced habit formation in his model "by expressing the intertemporal utility function in terms of uncommitted commodity stocks available in each period" (Spinnewyn 1981: p. 93). Spinnewyn's intertemporal utility function is displayed in equation (3.12).

(3.12) $$U(x_1, \dots, x_k, \dots, x_{T-1}, w_T)$$

[187] The Hamiltonian equation for Lluch's consumer problem is the following equation. $H\big(w(t), s(t), q(t), \lambda(t), \phi(t)\big) = e^{-\delta t}u\big(q(t), s(t)\big) + \lambda(t)\big(\rho w(t) + y(t) - p'q(t)\big) + \phi(t)'(q(t) - \alpha s(t))$
For a quick overview of the role of optimal control theory in post-WWII economics, see Dorfman (1969). For an overview and interpretation of the mathematics involved in optimal control theory, see also Sent (1997) and Wulwick (1990).

Equation (3.12) states that utility is generated from the vectors of uncommitted stocks at time k, x_k, and from the wealth that is left, w_T, at the end of the consumption process. Equation (3.13) states how Spinnewyn defined uncommitted commodity stocks.

$$x_k = q_k - q_k^c, \quad k = t, \dots, T-1 \tag{3.13}$$

In equation (3.13) Spinnewyn defined the uncommitted commodity stock in period k, x_k, as the difference between the vector of total commodity stocks, q_k, and the vector of already committed commodity stocks, q_k^c. With regards to budgeting resources to future periods, this means that "only the consumption of commodities in excess of the minimal requirements varies with the level of income and is sensitive to price variation" (Spinnewyn 1981: p. 91).

Spinnewyn's peculiar definition of intertemporal utility means that consumers derive no utility from just attaining the minimal consumption levels of the linear expenditure system. He defined the minimal consumption levels in the same way as they were described by Pollak (1970). In part they are exogenously defined physically-necessary minimal levels, but in part they are also acquired minimal levels that are endogenously created by past consumption of the respective goods or services. Spinnewyn argued that "the preferences for current consumption are then related to a reference bundle which depends on past experience." (Spinnewyn 1981: p. 92) In other words, the consumers in Spinnewyn's model derive utility only from those commodities that they consumed deliberately in excess of what their path-dependent consumption history demands.

In his procedure to account for habit-forming effects in a normal intertemporal consumption model, Spinnewyn used a variable of human wealth to account for the effects of intertemporal consumption. He defined human wealth as the difference between exogenous income and the cost of minimal necessary consumption, plus the discounted human wealth of the subsequent period (see Spinnewyn 1981: p.97). Therefore, his concept of human wealth was dependent on the habits that exist already within consumers and the commodity expenditures that are predetermined due to the existing habits. The

creation of habit stocks increases the generalized costs of consumption due to the future consumption costs associated with additional habit stocks. If the costs of consuming a good increase, human wealth decreases because expenses to reach the minimum level of consumption increase. In his accounting exercise, Spinnewyn also redefined his concept of total wealth over which a consumer has control. Total wealth in the current period consists of the sum of financial wealth, human wealth, and physical wealth, minus the cost of induced consumption of habit stocks in the current period. Physical wealth represents simply the depreciated stock of durable commodities from the previous period, priced in the current period (see Spinnewyn 1981: p.97).

Although it is less explicit, habits were seen as a part of human wealth also in Boyer's models (1978, 1983). Boyer described Spinnewyn's model as looking at habit formation as a change in the possibility set of consumers. In his own models Boyer looked at habit formation rather as "a controlled change in the preferences over time" (Boyer 1983: p. 36). In short, Boyer created a concept that he called the extended marginal utility of consuming a good in the present instead of putting money aside for saving. In his model habit stocks increase the extended marginal utility that consumers derive from consuming a good in the present (see Boyer 1983: p. 35). So while Spinnewyn located habit formation on the side of consumption constraints, Boyer located the habit formation process in the utility generating capacities of individuals, within their preferences.

3.3.3 A new type of rational consumer: consciously observing, projecting, and counterbalancing

Rational habit models changed the perspective on habits by placing them in an intertemporal optimization process. The new multiperiod set up was more complicated. By using an intertemporal budget constraint, the authors of the rational habit models described the present choice not only partly determined by past experience, but also partly by the future. Consumers were assumed to anticipate their future consumption while their future consumption was dependent on their present consumption choices. While doing so they assume a concept of wealth, something that is accumulated with passage of time that

is used by the consumer to provide for the future. By including habits as psychological stocks in intertemporal wealth, these economists made habits exploitable resources. Even if habits might not directly enter the budget constraint, like in the models of Boyer, the intertemporal budget constraint was at least modified by the way habit stocks were cultivated by consumers.

An intertemporal utility function is more complicated than a one period utility function, in part because utility is path dependent and non-separable over periods. But for consumers to be able to provide for the future, they need to be capable to assess the future consequences of habit formation in the first place. This is the third distinctive aspect of the models of rational habit formation. Compared to the other two characteristics, it is widely described in the secondary literature (see for example Chaloupka and Warner 2000). The authors of these models assumed explicitly that the agents in their model were capable enough to evaluate their past actions that have led to their present habits. But more than that, they described the agents in their models as capable to deduce trends and patterns from their own consumption history, and to project the consequences of these trends on their future. In comparison to the myopic consumers from earlier habit models, "rational" consumers were assumed to act on these future consequences already in the present (before the consequences would actually realize). Therefore, the consumers of rational habit models were much more sophisticated than the consumers assumed in the earlier naïve demand models.

In 1974 Lluch was the first who made this distinction between myopic and non-myopic habit models. Lluch argued that in most models of habit formation at the time "the consumer is assumed myopic: he does not recognize the effect of today's expenditure allocation on future utility." As an alternative to this myopic view, Lluch proposed his model in which "consumer behavior is not assumed to be myopic" and "total consumption expenditures are endogenous," and not exogenous. In his formulation "the consumer problem [...] allows for simultaneous treatment of the consumption-saving and the expenditure allocation decisions in the presence of habit effects." Although the

intertemporal utility problem is a lot more complicated, Lluch claimed "that there is not much lost in simplicity of demand behavior" (Lluch 1974: p. 786).

Lluch argued that his results were "formally analogous to the ones obtained under 'myopic' habit formation, but contain additional parameter specifications." Lluch argued further that "the basic reason for simplicity [in his model] is the focus on explicit solutions of the consumer problem at t=0, assuming planning under certainty, intertemporal additivity in the criterion function, explicit functional forms for instantaneous utility, and [the] naïve hypothesis on price and interest expectations." In fact, Lluch assumed that when consumers make their optimal consumption plan they expect that prices stay at their present levels forever. He argues that "departures from these assumptions are likely to complicate the analysis [...]" (Lluch 1974: p. 796). Although models of habit formation like the one by Lluch were called models of rational habit formation, they still relied on some naïve supplementary assumptions.

Spinnewyn (1981) argued similarly. He refered to Pollak's distinction between naïve habit formation and rational habit formation. Under naïve or myopic habit formation "the consumer recognizes that his current satisfaction depends on past habits, but he neglects the impact of current decisions on his future preferences." Under the assumption of rational habit formation "the consumer is aware of the habit forming effect of current consumption" (Spinnewyn 1981: p. 91).

Spinnewyn made similar assumptions as Lluch. He argued that "if consumer tastes change endogenously through habit stocks depending on past consumption, the rational consumer will make allowance of the future habit forming effects of current consumption" Spinnewyn 1981: p. 91). He wrote further that "we fully abstract from the uncertainty, which naturally arises in an intertemporal framework." Instead, he assumed "either that the consumer is fully informed about the future, or, in the absence of complete information, that he holds deterministic expectations about future unknown parameters" (Spinnewyn 1981: p. 93).

As a result of his accounting procedure, Spinnewyn distinguished two types of habit formation. He derived short-run marginal shares of total expenditure for different commodities. The short-run marginal shares indicate how much of total expenditure is used by each commodity. All marginal shares together must add up to one. He derived these shares under naïve habit formation and under rational habit formation and compared the results. He observed that these short-run marginal shares were different under naïve and rational habit formation. He argued that "if future costs of induced consumption are included in current expenditures" under naïve habit formation, the marginal shares of the naïve habit model become identical with those from rational habit formation. Thus, he deduced that "it must be that a rise in some of the short-run marginal shares under rational habit formation [...] is offset by a fall in the others." Following this logic Spinnewyn defined two different types of commodities. As "weakly habit forming" he described those commodities "which have slowly developing habits." Those commodities that have quickly forming habits he called "strongly habit forming" (Spinnewyn 1981: p. 100). When calculating intertemporal cost of living indexes in a later section of his paper, Spinnewyn called the strongly habit forming commodities even "the more addictive commodities" (Spinnewyn 1981: p. 106).

Using the distinction of weakly and strongly habit-forming commodities, Spinnewyn described a specific way in which rational consumers need to act on their consumption history to be or become rational consumers. He argued that "the rational consumer recognizes that the demand for commodities which are strongly habit forming will be stimulated through habit formation." When current expenditures rise, the demand for weakly habit forming commodities would decrease stronger than the demand for strongly habit forming commodities. After calculating long run marginal shares, Spinnewyn argued that in the long-run "commodities which are strongly habit forming [...] will have their long-run marginal budget shares increased at the expense of commodities which are weakly habit forming." He stated that "if the consumer is rational, the demand of commodities which are strongly habit forming is discouraged in the short

run in favour of commodities which are weakly habit forming." If the consumer is myopic, "the consumer overlooks the induced demand of habit stocks" (Spinnewyn 1981: p. 101).

In his model from 1978 Boyer assumed, as Spinnewyn, a rational and thus anticipating consumer. He argued that "habit formation is explicitly recognized by the household." This meant for Boyer that the dynamic demand functions in his model are "full information short run demand functions," compared to "limited information short run demand functions" as those in Pollak (1970). Boyer acknowledged von Weizsäcker's conclusion that "habit formation creates efficiency problems[,]" and he argued that "insofar as the householder does not in the short run take into account the effects of his consumption on his tastes, the consumption-savings path he chooses sequentially will be non-efficient" (Boyer 1978: p. 592).

In his model from 1983 Boyer specified further to what extent he saw habit formation as a case of endogenous preferences. Boyer argued that "the proper interpretation of the habit formation effect is not unambiguous" in the habit literature. Referring to an advanced textbook by the Belgian economist Louis Phlips (1974), Boyer said there might be "two sorts of reasons why tastes may change: better outside information and 'built-in' taste changes being related to past decisions" (Boyer 1983: p. 28).[188] He argued that "it seems desirable to restrict the concept of habit formation to changes in the consumer's indifference map induced by his own past consumption." He argued that this "is different from the effect of incomplete information or information gathering through experience or social interaction." Further he says that "a theory of the consumer, taking

[188] According to Phlips (1974) better outside information and habit formation are different phenomena. Better outside information arethe result of "external influences on a consumer." Phlips argues that in these cases "a taste change results from social contacts: the consumer may talk with neighbours, be influenced by a demonstration effect or impressed by advertising." In this way "a consumer may learn about the usefulness of a durable good which he has not yet purchased [...] or which he has already consumed (he learns how to use fuel more efficiently or discovers that a particular food is dangerous to his health." Habit formation is for Phlips a case of built-in changes related to past decisions. He argues "smoking habits are a positive function of past consumption: the more you smoke, the more you want to smoke." He argues that "the phenomenon is 'auto-regressive' and obeys a 'built-in' mechanism, which is typical for non-durable goods" (Phlips 1974: p. 172). Using Phlips' categorization Boyer stresses to focus on habit formation in his 1983 model (Boyer 1983: p. 28).

into account incomplete information and learning, would explicitly model behavior under uncertainty, but such is not the case with habit formation." Boyer argued "the consumer may be assumed to be conscious or not" of the effects of the process of habit formation. The consumer "is then either fully rational or myopic in his behavior" (Boyer 1983: p. 29).

Although the intertemporal optimization process was a complicated, multi-stage calculation, Boyer argued that it is based on fundamental principles that may also guide real-world consumers. He argued "the consumer's problem is approximated as an infinite horizon problem, which is then reduced to a two-period fisherian model to be solved sequentially." He said that "in doing so, [a] 'reduced utility function' is introduced to insure full dynamic rationality on the part of the consumer."[189] The two-period fisherian problems are the following

$$Max\ u(x_t, x_{t-1}) + \beta\ V(w_{t+1}; x_t) \tag{3.14}$$

Equation 3.14 displays the decision problem of the consumer in Boyer's model where x_t, x_{t-1} represent the consumption vectors of the present and the preceding period, and where w_{t+1} represents the wealth level of the following period. The function V is determined by the utility function and the household production function of the consumer. Boyer says that "the assumption of full dynamic rationality of the consumer means that he can derive [the function] V from [the utility function] and [the household production function] which he knows, and then solve [the optimization problem] sequentially to determine his optimal intertemporal consumption bundles x_t and w_t. He argued that "the basic idea is that such a reduction process is undertaken by the consumer, possibly in a very imperfect way" (Boyer 1983: p. 29).

[189] In econometric jargon the reduced form of a model explains the endogenous variables of a model only in terms of exogenous variables. The reduced form differs from the structural form of the model that explains all model relationships in a system of simultaneous equations. In the structural form endogenous variables might also be explained by other endogenous variables.

Boyer also acknowledged that his model may be difficult to compare to observations and hedged his assumptions against potential conflicting evidence. He argued that "the habit formation model with full dynamic rationality is tractable if one is ready to specify the habit formation process." But as others like Pollak, Spinnewyn and Phlips have argued, Boyer acknowledged that in doing this "it becomes clearly more difficult to model the demand behavior." He argued that "if it could be observed that the consumer is not fully rational dynamically rational, it would not be because he insists on being myopic, but rather that attaining full dynamic rationality would require too much time and too many resources." For his model, he argued, "it is enough that the consumer aims at full dynamic rationality" (Boyer 1983: p. 29).

Somewhat similar to Spinnewyn's two types of habits, Boyer (1983) also defined two general types of habits. In his stability analysis Boyer defined conditions for the stability of the stationary expenditure and wealth levels, y^* and w^*, and he defines the long-run consumption bundle $x^*(y^*, p)$. He investigated the habit-forming effect around the stationary long-run vector $(y^*, w^*, x^*(y^*, p)\ for\ i = 1, \dots, n)$ and characterized immediate habit formation and delayed habit formation two types of habit formation. These habit formation impacts were of dynamic nature and they described the evolution of expenditure levels in the neighborhood of the stationary long-run vector. Boyer showed that the past expenditure level, y_{t-1}, affects the present consumption vector, x_t, in two ways. There was a direct effect through the past expenditure level, y_{t-1}, and an indirect effect through its impact on current expenditures, y_t.

Under immediate habit formation "expenditures are increasing with respect to both past expenditures and current wealth." But, writes Boyer "a given change in past expenditures will bring a smaller change in current expenditures". This meant that "increases in current expenditures will be made at the expense of future wealth." In other words, "net savings decrease with wealth" (Boyer 1983: p. 49). Under delayed habit formation, "current expenditures are decreasing with past expenditures, but increasing with current wealth." This meant that "future wealth must then increase with past expenditures"

(Boyer 1983: p. 50). Boyer argues that delayed habit formation might describe well the habit-forming effects for music or wine. "Although music is habit forming, one may not want to hear a concert in [period] t if one has heard one in [period] $t-1$; and similarly with wine" (Boyer 1983: p. 49).[190]

Rational habit formation changed the perspective on the role of habits in consumption by extending the timeframe in which habits are considered to the future. While naive habit models focused on past consumption experiences that limit present choices, rational habit formation models also extend habits to the future. Since habit stocks travel with consumers from one period to the next, they will also travel with consumers into the future. However, for consumers to access the future in the present, they must be conceived as more powerful and sophisticated than before.

To be considered rational, consumers must observe their habits developed through past consumption, project these habits onto the future, evaluate the projected outcomes, and adjust their current consumption choices to avoid an undesirable future. Although economists' models became much more complicated when assuming intertemporal utility optimization, they often relied on restrictive secondary assumptions, such as ruling out uncertainty. For consumers to be able to project the ongoing development of their current habits into the future, they must assume that important variables, such as prices or income, will remain as they are in the status quo. Otherwise, the already complicated search for optimality would become even more difficult. With regards to all those consumption items

[190] Boyer links to a paper by Harl Ryder and Geoffrey Heal from 1973 in the Review of Economic Studies. In that paper Ryder and Heal analyze the stability of a growth model when consumption is partly dependent on a customary or expected level of consumption. In their analysis they distinguish in two forms of intertemporal complementarity in consumption, adjacent and distant complementarity. Imagine a person who expects to eat a heavy dinner. If the consumption of food is characterized by adjacent complementarity, the consumer would prefer to eat a light breakfast, then a heavy lunch to be followed by a heavy dinner. Two adjacent (or consecutive) periods are complementary. With distant complementarity the consumer would rather prefer a heavy breakfast, then a light lunch, and then a heavy dinner. The consumption of food over time is complementary, but temporally satiated so that heavy meals are followed by pauses (see Ryder, Heal 1973: p. p. 5).

that are potentially habit-forming, rational habit formation demanded an immense amount of calculation, projection, and imagination of consumers.

As economists shifted their perspective on modeling habits, the resulting descriptions of habits changed as well. Habits were now conceived as psychological stocks that are constantly evaluated in terms of the desirability of potential future consumption. Theoretically, habits became a means to achieve a desirable future. Similar to wealth, habits shaped present and future possibilities for consumers. Since rational habit models consist of several periods, habit stocks develop over time and may reveal informative patterns. According to Spinnewyn and Boyer, it should be possible to detect behavioral differences in the temporal development of habit stocks from different consumption items. Since rational consumers are assumed to plan for their future, they should monitor their habit stocks to ensure that future liabilities remain within acceptable limits. In this sense, rational habit models portray consumers as being in control of, not only their future fate, but also their past dependencies.

3.4 Conclusion

Early demand models in the post-WWII decades used habits as means to make present consumption behavior dependent on past consumption. In the 1950s and 1960s habits were mainly used in empirical demand models as a means to render statically estimated demand a bit more dynamic by including trend variables or lagged consumption levels. In 1966 Houthakker and Taylor came up with a dynamic model describing habits as psychological stocks in analogy with durable goods. Their empirical implementation was useful as it could be implemented quite easily, and as it could be interpreted somewhat similarly as stocks of inventories for durable goods. In the following years the partial analogy of habits as durable psychological stocks was a taken up by theoretically-minded economists when proposing demand models for habit forming goods. While habits made demand estimation more dynamic, habits posed tricky questions with regards to the economic welfare when consumption was past-dependent.

From the mid-1970s onwards habits were also thought as important means that should shape current consumption behavior by their consequences for future consumption possibilities. Several researchers proposed rational habit formation models. Although the optimization process in these models was much more complicated, they had the apparent advantage that consumers were not assumed ignorant of the future consequences of habit formation. They were assumed as developing habits as the result of past consumption, like in the earlier habit models. But additionally, consumers in rational habit models were assumed to include the consequences of their habit patterns in intertemporal trade-offs. So they should be capable to recognize their present habit patterns, project these patterns on their future consumption possibilities, and change their present consumption choices in the light of the future consequences. This switch to rational habit formation was reflected in changes in modeling practices.

Over time, consumer behavior may change as a result of either habit formation or self-correcting actions taken by consumers to adjust their behavior regarding the future. Regardless of how this change in behavior is described, it contradicted the working hypothesis of economists like Michael and Becker to assume no changes in consumer tastes or preferences when analyzing non-market behavior (see Chapter 2). Instead, stressing endogenous preferences might even provide space for other disciplines in providing explanations of habits or other taste-determining factors that could complement economic analysis. Stressing endogenous preferences had also the potential to question economically-liberal governance principles as Pollak remarked. If the preferences of consumers reflected only what they had consumed in the past, why attribute a lot of weight to personal freedom and consumer sovereignty?

4. The Creation of the Rational Addiction Model, 1975 – 1988

4.1 Introduction

In 1988 Gary Becker and Kevin Murphy published an article in the *Journal of Political Economy* titled *A Theory of Rational Addiction* (Becker, Murphy 1988). In the article Becker and Murphy described addiction as the outcome of economizing behavior and therefore, as the rational outcome of a consumption process. As the title of their article indicated, their model contained a double definition of rational behavior and addiction that was put together in the term rational addiction. In the following the rational addiction model would become a widely discussed model and one of Becker's most cited articles.[191] While the model was taken up by economists to provide demand estimates for addictive consumption goods (see Chapter 6), it was also discussed more critically by behavioral psychologists (see Chapter 5) and behavioral economists (see Chapter 7).

During the late 1970s and 1980s, economists began to study addiction. Some authors in the habit formation literature used smoking as an example to illustrate the implications of their models. And occasionally, these authors spoke about immediate habit formation, strongly habit-forming consumption, or even addictive consumption. However, those who brought addiction to the spotlight of applied economics did not originally come

[191] Citation counts indicate that *A Theory of Rational Addiction* has been one of Becker's most often cited articles. According to a brief research on the platform *Web of Science* it is Becker's fifth-most-cited article of all times with approximately 1910 citations. The most cited article is *Crime and Punishment* (Becker 1968) with roughly 7380 citations, the second-most-cited article is *A Theory of the Allocation of Time* (Becker 1965) with roughly 4600 citations, the third-most-cited article is *Investment in Human Capital – A Theoretical Analysis* (Becker 1962) with roughly 3300 citations, and the fourth-most-cited article is *De Gustibus Non Est Disputandum* (Stigler, Becker 1977) co-written together with George Stigler with roughly 1960 citations. The first three articles are key articles from Becker's early years in New York. Books are not included in the citation counts provided by Web of Science. Although we do not have any reliable numbers on it, we assume that many of Becker's books have been even more often cited than his articles. A quick search on Google Scholar for "Gary Becker" indicates very high citation counts for Becker's books *A Treatise on the Family* (Becker 1981), *The Economic Approach to Human Behavior* (Becker 1976), or *The Economics of Discrimination* (Becker 1971).

from the habit formation literature. Rather, they came from the household productivity enhancement literature.[192] In this section we focus on the economic analysis of habit formation and addiction that grew out of the household production framework.

We present the household production approach to addiction as a process in three stages. In the first stage, from 1975 to 1977, George Stigler and Becker addressed addiction as part of a programmatic article aiming to denounce arguments about changing tastes. While they were still associated with the CEAHBSI at the NBER, Stigler and Becker described addiction in terms of the household production framework. In the second stage, from 1984 to 1986, a PhD student of Becker from the University of Chicago, Laurence Iannaccone, developed a model of habit formation and addiction as a part of his dissertation. Iannaccone took up the general framework of Stigler and Becker and fused it with the rational habit formation literature. In the third stage, from 1986 to 1988, Becker and Kevin Murphy published a full-fledged theoretical model describing addiction in a dynamically more sophisticated set-up than the earlier Stigler-Becker sketch of a model.

The aim of this section is to show how the rational addiction model of Becker and Murphy fits in the wider economics literature. We chose to do so by focusing mainly on the habit formation literature that we presented in Chapter 3. Working out the collective creation on which the rational addiction model builds, provides us with more material that can be used to characterize the rational addiction model. Comparing how it fits into the wider literature on habit formation enables us also to describe how the rational addiction model took up certain modeling practices (like intertemporal utility optimization) in favor

[192] In the 1970s there were also some policy-related articles on heroin, law enforcement related to illicit drugs, and the evaluation of drug-related programs like the provision of drug substitutes like methadone, see for example Rottenberg (1968), Maidlow and Berman (1972), Holahan (1973), Moore (1973), Boudouris (1975), Deininger (1975). It would be interesting to see in which way this literature is related (or not) to the empirical or theoretical literature on habit formation in the post-WWII decades. Unfortunately, we will not have the occasion to do this in this PhD thesis. It should be only briefly be noted that in 1976 Bernard Backhaut defended a PhD thesis with the title *An Economic Analysis of the Methadone Maintenance Treatment Program* at the *Graduate Faculty in Economics* at the *City University of New York*. In the acknowledgements Backhaut acknowledged Victor Fuchs for "his contributions in the early stages of this research[,]" and Michael Grossman for being "simply invaluable in his supervisory role in this dissertation" (Backhaut 1976: p. 2).

of others (strictly one-period utility from the present). The discussions that have been taken place in the habit formation literature qualify the claims of the rational addiction model and provide contrast in front of which the contours of the rational addiction model become clearer.

One of our main arguments is that the biggest conceptional change has not been the step from habits to addiction as such, but rather the switch to models with intertemporal utility and rational habit formation. Nonetheless, the story of this subsection tells a curious story as well: the beginning of Becker's assimilation of the assumption of stable taste into the framework of extended lifetime utility with stable meta preferences. At the same time, we hope to characterize the rational addiction model and its contributors by reconstructing how the peculiar and controversial term of rational addiction was put into the (academic) world.

The rational addiction model has been developed somewhat parallel to the habit formation literature (see Chapter 3). Although the authors involved in the rational addiction model made similar assumptions with regards to the optimization of intertemporal utility, they addressed the question of habit formation from within the household production framework. We describe the creation of the rational addiction model as a process with three steps. In Section Two we describe how in a first step George Stigler and Gary Becker addressed addiction in the late 1970s in the terms of household production technology. In Section Three we describe how in a second step the Stigler-Becker model was taken up and adapted by Lawrence Iannaccone, a PhD student of Becker, in the early 1980s. In Section Four we describe the theoretical model that has been developed by Becker and Murphy in the middle of the 1980s as the final step in the creation process.

4.2 1975-1977: The Stigler-Becker model

The central person behind the rational addiction model is Gary Becker. He has been involved in the development of the model over several years and he is one of the coauthors

of the Becker-Murphy addiction model from 1988 that created the term rational addiction. He was also one of the authors of the article *De Gustibus Non Est Disputandum* that he wrote together with George Stigler in the *American Economic Review* (Stigler, Becker 1977). Often Stigler and Becker are mainly associated with the so-called Chicago School of economics. Back in 1977, both were employed by the *University of Chicago*, but both were also still associated with the *Center of Economic Analyses of Human Behavior and Social Institutions* (CEAHBSI), at the NBER.[193]

The whole 1977 article of Stigler and Becker reads like a militant proposal to adopt the methodologic assumptions carried forward by the household production framework. The household production framework explained behavior in terms of household production technology. Stigler and Becker promised expanded explanatory power of basic principles of demand theory to explain types of behavior that were usually considered (at least partially) irrational. But for demand theory to provide convincing explanations, tastes were delegated to the background of analysis and assumed to be sufficiently stable, as we have argued in chapter 2. Their article also contained a sketch of a model of addiction set up in the terms of the household production framework.

Stigler and Becker have been working on a version of their 1977 article already in 1975. In the *NBER Annual Report* of 1975 Stigler and Becker had a rather short staff report on a project called *Economics without taste changes* (NBER 1975: p. 64).[194] In the

[193] The CEAHBSI was a research organization within the NBER that existed from 1972 to 1978. It was directed by Victor Fuchs. Becker was the research policy advisor of the center. It was located from 1973 onwards in the NBER West Offices on the campus of Stanford University in Palo Alto. Becker and other researchers associated with the CEAHBSI used the CEAHBSI mainly to organize larger research projects, collect funding, finance research activities, and disseminate research outcome. For more on the CEAHBSI see chapter 1.

[194] The staff report section of the NBER Annual Reports are structured by areas of research in which NBER research staff is active. Becker and Stigler's staff report is part of section three reporting the activities that are belonging to the CEAHBSI. In 1975 the CEAHBSI activities were further separated into four main areas: "income distribution and education, law, health, and population" (NBER 1975: p. 48). The Becker-Stigler staff report on economics without taste change was part of the subsection law that was titled *Law and Economics*. As the other staff reports in that subsection indicate, the law and economics branch of the CEAHBSI was very much Chicago-centered. The other staff reports in that subsection in 1975 were written by William M. Landes, Isaac Ehrlich, William Landes together with

staff report they describe their "working hypothesis" that "economists should treat the tastes of people as stable and uniform." They write that "the explanation of phenomena in terms of changes in tastes has no explanatory power." To the contrary, they argue, "the phenomena for which taste changes have usually been proposed as an 'explanation' can in fact be fruitfully analyzed on the assumption of stable, uniform tastes." They argue that their hypothesis "rests heavily on Becker's theory of household production functions[,]" and that it is supported by a respective analysis of increasing marginal utility, advertising, custom and tradition, fashion and fads, and time preference (NBER 1975: p. 64). The example that they provide for increasing marginal utility is that "hearing good music increases one's appreciation of additional music[,]" an example that has also been briefly mentioned by Alfred Marshall and that has been taken up also in the economic literature on habit formation in the early 1970s (see von Weizsäcker 1971: p. 346).

Although the staff report by Becker and Stigler was rather short, its basic structure and proposition can be recognized also in the *De Gustibus* article by Stigler and Becker (1977). The most striking difference is that "increasing marginal utility" has been replaced by "addiction", and time preference is no longer considered a phenomenon in its own right. Addiction, customs and tradition, advertising, and fashions and fads were all taken up as phenomena to make a case for the fruitful applicability of economic analysis while assuming non-changing tastes (stable preferences) and therefore neglecting it as a source of explanation. Unsurprisingly, economic analysis was for Stigler and Becker synonymous with analysis in terms of household production technology.[195]

Stigler and Becker explain addiction as the result of a production process that uses household production technology. The model can be summarized in three modeling

Richard Posner, William Landes together with Richard Posner, Richard Posner, Richard Posner, Peter Pashigian, Sam Peltzman, Sam Peltzman, Melvin Reder, and George Stigler.

[195] Stigler and Becker cite only nine different bibliographic sources. Three out of nine of these sources are texts from authors from the CEAHBSI community (Becker 1974, Grossman 1971, Michael and Becker 1973). Four out of nine of the cited sources are texts by famous economic thinkers (Eugen Böhm-Bawerk, Alfred Marshall, John Stuart Mill, and Adam Smith). The other two cited sources are from contemporary US social thinkers: an encyclopedia entry written by the sociologist Herbert Blumer and John K. Galbraith's book *The Affluent Society* from 1958.

decisions. First, they define a specific type of human capital that captures consumption experience. They call it consumption capital.[196] Second, they partition overall individual utility into utility resulting from an addictive good and utility resulting from all other consumption.[197] And third, they define a state of addiction as beneficial or harmful by using the marginal utility of consuming a good coupled with the own-price elasticity of that good. Taken together addiction is explained as a condition that is the result of changes in the production technology of individuals. According to Stigler and Becker addiction affects the overall utility that individuals draw from consuming a certain combination of goods – not as a result of a specific taste for addictive goods, but rather as the result of the changes that have happened in the individuals' production technology with which they are equipped.[198]

First, Stigler and Becker write that "[t]he essence of our explanation lies in the accumulation of what might be termed 'consumption capital' by the consumer[,]" a specific form of human capital that accumulates as a stock within individuals over time. They argue that the accumulation and depreciation of consumption capital captures the learning by

[196] One might wonder whether the term "consumption capital" fits the description of an oxymoron, or not. The proposed logic behind the term is that it is an intangible human capital stock that is accumulated through consumption that will facilitate the production of ultimate utility in the future. It is considered a form of capital in the household production model as it changes the personal utility production technology with which each individual is equipped.

[197] Shoshana Grossbard has argued that models of household production differ with regards to the type of decisionmaking that they assume (Grossbard 2006). While some models assume family decisionmaking, others assume individual decisionmaking. All household production models model processes that are located outside the labor market. Chicago influence

[198] Stigler and Becker write that "[t]astes are frequently said to change as a result of consuming certain 'addictive' goods. For example, smoking of cigarettes, drinking of alcohol, injection of heroin, or close contact with some persons over an appreciable period time, often increases the desire (creates a craving) for these goods or persons, and thereby cause their consumption to grow over time. In utility language, their marginal utility is said to rise over time because tastes shift in their favor." (Stigler, Becker 1977: p. 77f). They cite Marshall's brief mention of music consumption as an illustration of their idea. But instead of analyzing listening to music while assuming a role of individual tastes, they promote an analysis of music in terms of the productivity with which individuals are able to produce music appreciation. In their analysis individual tastes are ignored, as they are assumed to be unimportant, unchanging background variables. They write that "[w]e believe that the phenomenon Marshall is trying to explain, namely that exposure to good music increases the subsequent demand for good music (for some persons!), can be explained with some gain in insight by assuming constant tastes, whereas to assume a change in tastes has been an unilluminating 'explanation' (Stigler, Becker 1977: p. 78).

doing of consumption processes (that are at the same time production processes in the household production framing). For example, they describe the case of listening to music. When consumers listen to music they are imagined not only to consume music as a good or a service, but to produce the choice objective music appreciation.

$$M = M_m(t_m, S_m) \tag{4.1}$$

Equation 4.1 shows how Stigler and Becker describe the production function for music appreciation, M, where M_m is the production function of music appreciation that has as inputs the time allocated to music, t_m, and human capital conducive to music appreciation, S_m.[199] They assume that the production of music appreciation is higher if consumers use more time to listen to music or if they have higher stocks of music appreciation capital (see Stigler, Becker 1977: p. 78).[200] They assume that repeated consumption of a music increases the stock of music appreciation capital.

$$S_{m_j} = h(M_{j-1}, M_{j-2}, \dots, E_j) \tag{4.2}$$

Equation 4.2 shows how Stigler and Becker describe that the stock of music appreciation capital in period j, S_{m_j}, is a function of the amounts of music appreciation produced in the past, M_{j-1}, M_{j-2}, and of "the effect of education and other human capital on music appreciation skill" in period j, E_j.[201]

Similarly, one might imagine the production of euphoria. Stigler and Becker write "consider the commodity 'euphoria' produced with input of heroin (or alcohol or

[199] Equation 3.9 does not contain a variable representing a good or service that is consumed. According to Stigler and Becker's verbal description of the music production the access to music in the form of a durable good (a vinyl or CD) or in form of a service (a concert ticket or a music subscription service) should enter the production function of music appreciation as well.

[200] This makes intuitively sense in the case of a live concert. The pleasure derived from listening to an artist performing live will be probably higher on average for strong fans who have listened to the music of the artist very often compared to other fans who used to listen to the music of the artist only occasionally.

[201] In earlier presentations of the household production framework the variable E usually represented environmental variables like education or other sociodemographic variables (see Michael, Becker 1973: p. 393).

amphetamines [.])" The production of euphoria should also depend on the time a consumer devotes to produce euphoria (to drink alcohol or to take drugs) and on the stock of "euphoric capital" (Stigler, Becker 1977: p. 80). As human capital stocks are part of the individual production technology, stocks of consumption capital like 'music appreciation capital' or 'euphoric capital' are assumed to impact the efficiency of producing individual (choice) objectives like music appreciation and euphoria.

Second, Stigler and Becker partition the overall utility that individuals derive into utility arising from consuming an addictive good (or service) and into utility arising from the consumption of what they call a normal good. Normal goods are those goods for which individuals do not accumulate any significant consumption capital stocks over time.

$$(4.3) \quad U = \sum_{j=1}^{n} a^j \, U(M_j, Z_j)$$

$$(4.4) \quad U = \sum_{j=1}^{n} a^j \, U(H_j, Z_j)$$

Equations 4.3 and 4.4 display Stigler and Becker's assumed intertemporal utility functions that show the partition of overall utility, U, in utility coming from normal goods and in utility coming from a beneficially or harmfully addictive good. Equation 4.3 represents the case of beneficial addiction. Individuals are assumed to derive utility from the production of music appreciation, M_j, and from the production of other production objectives, Z_j. Many normal choice objectives could in principle be subsumed under the variable Z_j. What matters for Stigler and Becker's model is the fact that there are some goods that are assumed to create consumption stocks within individuals and normal goods for which any such stocks can be ignored.[202] Equation 4.4 represents utility in the case of a harmful addiction to euphoria where the individual is represented as deriving utility from producing euphoria, H_j.

[202] This theoretic definition of normal or usual goods versus (beneficially or harmfully) addictive goods is remarkably different from the empirical approach chosen by Houthakker and Taylor in 1966 that we have described in section 2.1. As long as their data was permitting it, Houthakker and Taylor were operationally defining goods either as durable goods depending on the sign of the estimated stock coefficient for any consumption item.

Stigler and Becker assume a problem of intertemporal utility maximization. They maximize the utility functions displayed in equations 4.3 and 4.4 while subjecting them to the following constraints.

(4.5) $$M_j = M(t_{m_j}, S_{m_j})$$

(4.6) $$Z_j = Z\left(x_j, t_{z_j}\right)$$

(4.7) $$S_{m_j} = h(M_{j-1}, M_{j-2}, \dots, M_{j-v}, E_j)$$

(4.8) $$\sum \frac{px_j}{(1+r)^j} = \sum \frac{wt_{w_j} + b_j}{(1+r)^j} = W$$

(4.9) $$t_{w_j} + t_{m_j} + t_{z_j} = t$$

Equation 4.5 displays the production function for music appreciation. If all capital M's and all small m's are replaced by capital H's and small h's, the equation would display the production function for euphoria induced by, for example, heroin consumption. Equation 4.6 displays the production function of a "normal" choice objective that does not depend on any stocks of consumption capital. Equation 4.7 defines the level of consumption capital stocks (here music appreciation capital) in each period. It says that consumption capital for music appreciation in the period j, S_{m_j}, is dependent on the amount of music appreciation in earlier periods, M_{j-v}, and on the effect of education, E_j. Equation 4.8 displays what Stigler and Becker call the full income constraint.[203] Equation 4.9 displays another resource constraint that describes time as a further resource that needs to be allocated and accounted for in the process of producing choice objectives. In equation 4.9 it is stated that total available time, t, can be split up in hours worked, t_{w_j}, in hours

[203] The full income is for Stigler and Becker another term for real income. "The real income of a household does not simply equal its money income deflated by an index of the prices of market goods, but equals its full income (which includes the value of 'time' to the household) deflated by an index of the [shadow] prices of the produced commodities. Since full income and commodity prices depend on a variety of factors, incomes also take subtle forms. Our task in this paper is to spell out some of the forms prices and full income take" (Stigler, Becker 1977: p. 77).

spent on producing music appreciation, t_{m_j}, and in time producing other choice objects, t_{z_j}.[204]

Third, Stigler and Becker define addiction operationally as resulting from the marginal utility of consuming goods. Consuming addictive goods repeatedly over time changes the marginal utility that individuals derive from producing a given amount of a production objective. Depending on the type of change consumption can either be beneficially addictive or harmfully addictive. Stigler and Becker take the example of listening to music to explain what they call a beneficial addiction.

In cases of beneficial addictions individuals become more productive in producing choice objectives. Stigler and Becker argue that the shadow price of music appreciation in a period becomes smaller when the stock of music appreciation capital is higher. With a smaller shadow price of music appreciation individuals can produce music appreciation relatively cheaper compared to their former situation with a higher shadow price.

$$\pi_{m_j} = \frac{w}{MP_{t_{m_j}}} - A_j \tag{4.10}$$

Equation 4.10 displays how Stigler and Becker describe the shadow price of producing one more unit of music appreciation, π_{m_j}, as the ratio of the wage rate of the individual, w, over the marginal productivity of the time devoted to the production of music appreciation, $MP_{t_{m_j}}$, minus the effect of addiction, A_j. The effect of addiction "measures the value of the saving in future time inputs from the effect of the production of M [music appreciation] in [period] j on subsequent music capital" (Stigler, Becker 1977: p. 79). In other words, the effect of beneficial addiction is described as savings in future time. These savings can be made because the creation of music appreciation capital in the present enables the individual to produce the same amount of music appreciation in

[204] In the case of harmful addictive consumption hours spent on producing music appreciation, t_{m_j}, is replaced by hours spent in producing euphoria, t_{h_j}.

the future with less inputs of time. As music production is now relatively cheaper to other commodities, individuals should produce more music appreciation.[205]

In case of harmful addiction, Becker and Stigler describe individuals as becoming less productive. In cases of harmful addiction Stigler and Becker assume that producing a harmfully addictive commodity reduces the consumption capital that will be available in the future. This means that the effect of addiction, A_j, in equation 3.16 becomes negative and thus the shadow price of producing the addictive choice objective increases when a good or service is harmfully addictive. Stigler and Becker provide the example of heroin and euphoria as an example of harmful addiction. They write "consider the commodity 'euphoria' produced with input of heroin (or alcohol or amphetamines.) An increase in the consumption of current euphoria raises the cost of producing euphoria in the future by reducing the future stock of 'euphoric capital'" (Stigler, Becker 1977: p. 80).

Stigler and Becker argue that the demand for harmful consumption goods, such as heroin, needs to be sufficiently inelastic for these goods to be consumed in increased quantities despite the fact that they become less and less productive in producing utility. They explain that "[t]he effect of exposure to euphoria on the cost of producing future euphoria reduces the consumption of euphoria as exposure continues. If the demand curve for euphoria were sufficiently inelastic, however, the use of heroin would grow with exposure at the same time that euphoria fell." (Stigler, Becker 1977: p. 80). Therefore, they write that "addiction to heroin – a growth in use with exposure – is the result of an inelastic demand for heroin, not, as commonly argued, the cause of an inelastic demand." The argument is similar for the case of beneficial addictions. "In the same way, listening to music or playing tennis would be addictive if the demand curves for music or tennis appreciation were sufficiently elastic; the addiction again is the result, not the cause, of the particular elasticity" (Stigler, Becker 1977: p. 81).

[205] Stigler and Becker write that « [a]n alternative way to state the same analysis is that the marginal utility of time allocated to music is increased by an increase in the stock of music capital. Then the consumption of music appreciation could be said to rise with exposure because the marginal utility of the time spent on music rose with exposure, even though tastes were unchanged" (Stigler, Becker 1977: p. 79).

By explaining addiction purely in terms of individual production technology, Stigler and Becker make addiction accessible to economic policy making. They argue that "we do not have to assume that exposure to euphoria changes tastes in order to understand why the use of heroin grows with exposure, or why the amount used is insensitive to changes in its price." Having explained the increased use of heroin in terms of individual productivity differences caused by former exposure to heroin, they argue that "[e]ven with constant tastes, the amount used would grow with exposure, and heroin is addictive precisely because of the insensitivity to price changes" (Stigler, Becker 1977: p. 81).

Having sketched out their model of addiction, Stigler and Becker take implications of the theoretical model and project them back on the real world. For example, they predict that younger people should consume less drugs. They argue that "the amount of heroin used at younger ages would be reduced because of the negative effect on later euphoric capital." With regards to people abstaining from using drugs they argue that "no heroin at all might be used only because the harmfully addictive effects are anticipated, and discourage any use." And with regards to drug users they argue that "if heroin were used even though the subsequent adverse consequences were accurately anticipated, the utility of the user would be greater than it would be if he were prevented from using heroin" (Stigler, Becker 1977: p. 81).

Although, they seem to imply that it might be possible that consumers do not anticipate adverse consequences correctly, they do not consider the implications of these possibilities any further. They also argue that their model could also be used to infer beneficial or harmful addiction operationally by using the logic of their model.[206] In cases where an addiction might be suspected, but where "it were not clear whether the addiction were harmful or beneficial, the elasticity of demand could be used to distinguish between

[206] Stigler and Becker write that "[w]e should state explicitly, to avoid any misunderstanding, that 'harmful' means only that the derivatives [of the stock of euphoric capital with regards to past levels of euphoria production] are negative, and not that the addiction harms others, nor, as we have just indicated, that it is unwise for addicts to consume such commodities" (Stigler, Becker 1977: p. 80).

them: a high elasticity suggests beneficial and a low elasticity suggests harmful addiction" (Stigler, Becker 1977: p. 81).

Having described addiction basically as a problem of demand, it is just a minor additional step for Stigler and Becker to highlight the importance of prices for regulation of addiction. According to what Becker used to call the law of the negatively-shaped demand function consumers should demand more heroin if the price goes down, and they should demand less if it goes up. Having translated the problem of addiction into a situation of demand, Stigler and Becker used the model to provide policy arguments that could be used against extensive taxation or for legalization of illicit drugs. They wrote that "[a]n exogenous rise in the price of addictive goods or time, perhaps due to an excise tax, such as the tax on cigarettes and alcohol, or to restrictions on their sale, such as the imprisonment of dealers in heroin, would have a relatively small effect on their use by addicts if these are harmfully addictive goods, and a relatively large effect if they are beneficially addictive." Thus "excise taxes and imprisonment mainly transfer resources away from addicts if the goods are harmfully addictive, and mainly reduce the consumption of addicts if the goods are beneficially addictive" (Stigler, Becker 1977: p. 81).

By using the household production framework Stigler and Becker (1977) also claimed to provide more "scientific" explanations of addiction. They did not explicitly describe their own approach as behavioral, but they implied such a view by speaking of "our sister behavioral sciences" (Stigler and Becker 1977: p. 90). By having "partly translated 'unstable tastes' into variables in the household production function for commodities[,]" Stigler and Becker claimed to provide explanations that are "relying only on changes in the arguments entering household production functions[,]" and that, therefore, "all changes in behavior are explained by changes in prices and incomes" (Stigler and Becker 1977: p. 89). We interpret Stigler and Becker as claiming to subject phenomena like addiction to scientific discipline that would limit ad-hoc explanations based on subjective variables like tastes with many degrees of freedom. Instead, the household production framework would make addiction amenable to the behavioral analysis

contained in traditional demand theory by expressing consumption in objective terms of prices and income.[207]

Like the intertemporal utility models of the rational habit formation literature, the Stigler-Becker model of addiction is formulated in terms of intertemporal utility. Like the models of rational habit formation, the Stigler-Becker model relates present consumption to individual stocks that have been accumulated through past consumption. But while endogenous preferences were part of habit formation models, changing preferences were banished by Stigler and Becker. We do not know whether the literature of habit formation was known or read by Stigler and Becker in 1977. In the case that they knew it, it looks like they did at least not find it worthy to cite any sources from that literature.

4.3 1984-1986: Iannaccone's synthesis

In 1984 the gap of citation between the habit formation model and the Stigler-Becker model of addiction was formally closed by a PhD student of Becker at the University of Chicago. In his PhD thesis Laurence Iannaccone took up the Stigler-Becker model of addiction and used it to describe participation in religious activities (Iannaccone 1984).[208]

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[207] Although Stigler and Becker do not explicitly describe their article as objective, value-neutral, or simply as positive economics, such associations were hovering largely between the lines. The economic historian Deirdre McCloskey for example has called the Stigler-Becker article as on of the main references of economic modernism after Friedman's famous essay on positive economics from 1953 (see McCloskey 1983). In the 1970s, McCloskey was a colleague of Becker and Stigler in the University of Chicago's economics department. She described what she called "modernism" in post-WWII microeconomics. According to McCloskey, this attitude is often reflected in economists' public self-descriptions. In these descriptions, economists declare themselves "scientists in the modern mode," which is "an amalgam of logical positivism, behaviorism, operationalism, and the hypothetico-deductive model of science" (McCloskey 1983: p. 484). McCloskey described modernism among others as seeing prediction and control as the goal of science, as properly respecting only observable and objective facts and rejecting introspection, and being deprived of normative elements such as aesthetic or moral values (see McCloskey 1983: p. 484). For McCloskey this attitude was nothing specific to the University of Chicago. Rather ". Chicago is merely a particularly clear and candid version of a dogmatic impulse common to all economics, expressing itself in methodological imperatives" (McCloskey 1983: p. 485).

[208] Laurence Iannaccone has obtained a M.A. in economics in 1982 and a Ph.D. in economics in 1984, both from the University of Chicago. His PhD thesis was supervised by Becker. From 1985 to 1990 he was Associate Professor and from 1990 to 1996 Assistant Professor at Santa Clara University. In 1989 he was a National Fellow at the Hoover Institution. Iannaccone published some of the results of his thesis as a paper in the Journal *Economics Letters* (see Iannaccone 1986). Apart from that publication

The first chapter of his thesis contains "a life-cycle model of the household in which commodity specific human capital […] is accumulated as a by-product of commodity production" (Iannaccone 1984: p. v). While taking up the idea of consumption capital of the Stigler-Becker model, Iannaccone also compared how the Stigler-Becker model with its emphasis on unchanging tastes relates to otherwise similar models like those of the rational habit formation literature. By embedding the Stigler-Becker model within the other rational habit models, Iannaccone was able to propose some improvements in modeling addiction by using stocks of consumption capital, or rather by stocks of experience as Iannaccone called them.[209] In his thesis he used experience effects to model how individuals participate in religious organizations over their lifecycle.

The *De Gustibus* article went not unnoticed by other economists. In the following years it became a widely-read paper among economists and non-economists. Judged by the different comments that the article attracted over the years Stigler and Becker's obsession with the assumption of stable preferences was controversial and far from overwhelmingly shared by economists.[210] When Iannaccone took up the Stigler-Becker model, in the early 1980s, he observed also some criticism of the model.

Iannaccone refrained from research related to addiction or substance abuse. Instead he pursued a professional career in the economic analysis of religion. For example, in 1988 he published a paper titled "A Formal Model of Church and Sect" in the American Journal of Sociology, and in 1990 he published a paper titled "Religious Participation: A Human Capital Approach" in the Journal for the Scientific Study of Religion.

[209] We do not know whether it was the PhD student Iannaccone, his advisor Becker, or rather other discussants of Iannaccone's work who urged for a comparison of the Stigler-Becker model with the habit formation literature. But in the Becker-Murphy model of addiction published in 1988, Becker and Murphy quote Iannaccone prominently. They write that "[o]ur analysis builds on the model of rational addiction introduced by Stigler and Becker (1977) and developed much further by Iannaccone (1984, 1986). He [Iannaccone] also relates the analysis of addiction to the literature on habit persistence, especially to the work by Pollak (1970, 76), Ryder and Heal (1973), Boyer (1978, 1983), and Spinnewyn (1981)" (Becker, Murphy 1988: p. 676).

[210] While the De Gustibus article was often cited as an example representing how certain economists have approached rather unusual economics topics, the article was criticized by other economists. For example, in 1978 James March criticized Stigler and Becker's approach as overstretching of a formal neoclassical model paired with "doubtful ideology" (March 1978: p. 597). Richard McKenzie (1979) criticized the Stigler-Becker model for its behaviorist undertones, James Buchanan (1979) criticized the model for denying the human agency to reimagine themselves and limiting the researcher's image of human beings. Albert Hirschman criticized the model in 1985 for prioritizing greater formal parsimony instead of focusing on the reflective abilities of people to reconsider their preferences (Hirschman 1985). Nancy

Two of the critics that are especially relevant to our history are Robert Pollak and Carl Christian von Weizsäcker who contributed both to the literature on habit formation (see Chapter 3). One year after the publication of the *De Gustibus* article Pollak published a short paper also in the *American Economic Review* carrying the title *Endogenous Tastes in Demand and Welfare Analysis* (Pollak 1978). In 1983 von Weizsäcker also criticized the Stigler-Becker approach of endogenous utility production technology in a short article. But his article appeared in a German journal. Compared to Pollak's critique it was less visible to US scholars and also published five years later. Basically, von Weizsäcker argued that the production objectives or commodities of the household production framework might be too abstract to be subject to empirical verification. Differently to what Stigler and Becker claim in their article, von Weizsäcker argued that the hypothesis deduced with their model could actually not be refuted by empirical evidence and might come close to a tautology.[211]

Folbre (1986) or Paula England (1989) have criticized the assumption of stable preferences contained in the Stigler-Becker model. The philosopher Alexander Rosenberg has criticized not explicitly the Stigler-Becker model, but the general household production framework on which the Stigler-Becker model was built (Rosenberg 1979, 1985).

[211] Von Weizsäcker's (1983) article was about the influence of property rights on habit formation. In the article he first stated how he had perceived the *De Gustibus* article. "Stigler and Becker [1977] have advanced the hypothesis that preferences, properly defined, are fixed and indeed are the same for all people. Differences of behaviour of different persons as well as of the same person at different moments of time are to be explained by differences in the opportunity set and not by differences in preferences." Von Weizsäcker remarked that although Stigler and Becker argued very strongly to focus on constraints and to delegate preferences to the background, the Stigler-Becker model would make implicit assumptions about preferences nonetheless. He wrote that "[t]here exists of course an ambiguity in the term 'preferences'. Preferences with respect to goods traded on the market may differ because people have different information or because their household production functions are different. Thus, the only reasonable way in which the Becker-Stigler hypothesis can be understood is in terms of intrinsic preferences defined with respect to certain more abstract goods." But von Weizsäcker doubted whether the abstract goods of the Stigler-Becker approach were not a bit too abstract to be really object to scientific observation. He argued that "[b]y way of several examples the authors give their hypothesis empirical content. It is at this time not clear whether the specific form which the Stigler-Becker hypothesis takes in their examples stands up to the empirical facts. But even if it does not it probably can be reformulated and it is not yet refuted as a general hypothesis. But then the question arises: is it at all an empirically refutable hypothesis - or is it rather a tautology? We do not have to decide this issue here. But I believe that substantial methodological as well as substantive difficulties are associated with the Becker-Stigler research strategy" (von Weizsäcker 1984: p. 90f.).

Pollak's critique of the Stigler-Becker was much more visible to the audience of professional economists in the late 1970s and so also to Iannaccone when he took up the Stigler-Becker model some years later. In his 1978 article Pollak remarked that recently, the interest in taste formation has been rising in the economics discipline despite the "economist's traditional reluctance to investigate taste change[,]" (Pollak 1978: p. 374). He made two critical comments that were also addressed in direction of the Stigler-Becker model of addiction. First, Pollak argued that the whole promise of household production models should be deflated. Whether differences in choices between individuals were expressed in terms of household production technology or in terms of different tastes would not make any difference in the results. In his words, "[w]hether one accounts for the observation that '… exposure to good music increases the subsequent demand for good music…' […] in terms of taste change (as I would) or in terms of the accumulation of music capital (as Stigler and Becker do) is a matter of semantics, not substance. There is no more explanatory power in a household production model which postulates the accumulation of a specific but unobservable 'consumption capital' […] than in a habit formation model of the type proposed by Richard Stone […], Hendrick Houthakker and Lester Taylor, the author […], or Louis Phlips […]" (Pollak 1978: p. 375).

Second, Pollak rejected the Stigler-Becker model as a valuable foundation for welfare analysis. He reiterated part of his previous critique of von Weizsäcker's welfare interpretation of habit formation, which he still considered relevant given the ongoing interest in taste formation. Thus, this second point of critique was not explicitly directed at the Stigler-Becker model, but rather applied more generally to intertemporal consumer models that describe the utility of consumption using the tools of demand theory.

Pollak (1978) believed that making tastes endogenous came with significant consequences. Therefore, he set out to qualify why and when economists should take tastes as exogenously given. Pollak associated the economist's traditional reluctance to investigate taste change strongly with the views of Milton Friedman (Pollak 1978: p. 374). Pollak described this reluctance briefly by citing Friedman's 1963 textbook in which he had

written that "economic theory proceeds largely to take wants as fixed. This is primarily a case of division of labor. The economist has little to say about the formation of wants; this is the province of the psychologist. The economist's task is to trace the consequences of any given set of wants" (Friedman [1962]: p. 13). For Pollak this meant that economists should neglect taste formation, but not taste differences as such.[212] For example, Pollak claimed that "the use of demographic characteristics in the analysis of household budget data does not violate his [Friedman's] dictum."[213] Pollak argued Friedman's division of labor between economists and psychologists could be seen instrumentally as an empirical question. Whether it would still make sense or not would then depend on whether such division of labor would increase the economists "power to predict." Further, Pollak stressed that when Friedman proposed to take wants as given, he was speaking in the purely descriptive terms of positive economics. Pollak argues that "whether this division of labor between economics and psychology is appropriate for welfare analysis is a distinct issue which Friedman's argument does not address" (Pollak 1978: p. 375).

But according to Pollak it is in welfare economics where changing tastes or changing preferences pose the most important problems. He argued that "[v]ariable tastes undermine the normative significance of the fundamental theorem of welfare economics which asserts (in a precise sense and under fairly stringent assumptions) that in competitive equilibrium everyone gets what he wants, subject to the constraints imposed by technology, resources, and the satisfaction of the wants of others." However, he continued, "if tastes

[212] By embracing so vigorously the assumption of stable preferences, Pollak argued that "George Stigler and Gary Becker appear to take the more extreme position that economic analysis should not only shun taste formation and change but also taste differences. They rightly object to invoking taste differences as a *deus ex machina* [god-like machine] to 'explain' whatever we cannot otherwise explain, but they do not take an equally critical view of attributing observed differences in or changes in behavior to unobserved differences in or changes in household technology" (Pollak 1978: p. 375). In the summary section of the De Gustibus article Stigler and Becker have written "We have not considered systematic differences in tastes by wealth or other classifications. We also claim, however, that no significant behavior has been illuminated by assumptions of differences in tastes. Instead, they, along with assumptions of unstable tastes, have been a convenient crutch to lean on when the analysis has bogged down. They give the appearance of considered judgement, yet really have only been ad hoc arguments that disguise analytical failures." (Stigler and Becker 1977: p. 89).

[213] Occasionally, Friedman himself used demographic differences when analyzing demand (see Friedman 1962).

are sufficiently malleable, then this may be no more than a corollary of the more general proposition that people come to want what they get" (Pollak 1978: p.374). In other words, when everybody comes to prefer only what he or she has consumed so far in the past, the authenticity of preferences might be marked more by path-dependency and prior conditioning than by an expression of freedom or rational deliberation.

Pollak himself was engaged in providing descriptive demand models making tastes or preferences endogenous. But he argued that the preferences that were implied in such demand models cannot be used as an informational basis for welfare economics. "Welfare comparisons require a different interpretation of preferences than demand analysis." (Pollak 1978: p. 376). Pollak argued that in demand analysis preference orderings are conditional. Past consumption or other people's consumption are state variables that are like a reference point in the decision making process of individuals. That means that the preferences from demand models depend on predetermined state variables (psychological habit stocks or other people's consumption levels). "Since the individual takes other people's consumption as fixed, demand analysis need never ask how an individual would choose between alternatives which differ with respect to other people's consumption" (Pollak 1978: p. 377).

The crucial difference between demand and welfare analysis was for Pollak that welfare analysis must be concerned with unconditional preference orderings. Pollak argued that "[w]elfare analysis must compare the individual's well-being in alternative situations which differ with respect to the state variables, as well as the private decision variables." He argued that "whether the individual is better off in the status quo or an alternative situation […] cannot be based on conditional preferences but requires a framework in which the objects of choice include other people's consumption as well as his own." And further, "general welfare analysis requires us to redefine the objects of choice to include not only the private decision variables but also the state variables which, from the standpoint of conditional preferences, are predetermined." (Pollak 1978: p. 377). In principle, Pollak argued, many variables could be used in demand analysis to define

conditional preferences. For example, "state variables may be the individual's own past consumption (habit formation) or the consumption of others (interdependent preferences)[,]" or "environmental variables (for example, climatic conditions or pollution), health states, or goods or services provided by the government (for example, highways, schools, recreational facilities)[,]" or "socioeconomic variables or demographic variables such as the number, age, and sex of children in a family" (Pollak 1978: p. 377). But, he argued that "[i]n all of these cases, conditional preferences provide a foundation for analyzing the effect of the state variables on market behavior, but welfare analysis requires unconditional preferences." And unconditional preferences "cannot be inferred from market behavior or any other conditional choices" (Pollak 1978: p. 377).

Pollak's critique might be resumed as follows. First, in purely descriptive terms, the Stigler-Becker model was not significantly different from habit formation models. And second, with regards to welfare interpretations, the preferences that are implied by the Stigler-Becker model of addiction cannot be used to judge the welfare of addicts and non-addicts. For evaluating the welfare of addicts or non-addicts, economists would need to resort to other types of observations that reflect the unconditional preferences of people. The preferences implied by Stigler and Becker's addiction model are dependent on the stocks of consumption capital that are assumed pre-determined by past consumption. With unconditional preferences, on the contrary, people would need to choose between situations with different levels of consumption capital.[214]

[214] In 1990 Pollak repeated this criticism in an article discussing the empirical contributions of Hendrik Houthakker. Commenting on the habit formation literature he wrote that "[i]n 'De Gustibus Non Est Disputandum,' Stigler and Becker (1977) argue for treating tastes as fixed (and as identical across individuals), but they do so by ascribing to changes in household technology many phenomena that others attribute to changes in tastes. For positive economics, the language chosen makes no difference because changes in unobserved technologies are empirically indistinguishable from changes in unobserved tastes. For positive analysis, it is thus a harmless simplification to assume that all individuals have fixed tastes and that it is only technology that changes. It might be argued that Occam's razor – the principal that assumptions should not be multiplied further than strictly necessary – favors changing technology over changing tastes, but this is incorrect: there is no basis for thinking that one of these empirically indistinguishable descriptions is 'simpler' than the other. Yet even if changing technologies were simpler than changing tastes, the relevance of Occam's razor to normative analysis is dubious." (Pollak 1990: p. 152).

We do not know whether Iannaccone was aware of Pollak's critique of the Stigler-Becker model.[215] When justifying the use of the Stigler-Becker model for his own analysis in his thesis, Iannaccone also faced some of the criticism that was associated with the *De Gustibus* article.[216] Reviewing the existing literature on habits, he described that the Stigler-Becker broke with some basic views in the literature. He wrote that "[m]ost authors have equated habit formation with changes in tastes." But, he argued, "this interpretation is challenged by Stigler and Becker (1977) who point out that habits can be viewed as 'consumption capital' which affects productivity while leaving the utility function unchanged." By imagining habits through individual consumption capital, "[e]xperience […] alters the marginal utility of goods and time devoted to commodity production, but not the marginal utility of the commodities themselves" (Iannaccone 1984: p. 3). He acknowledged criticism of the model like it was verbalized by Pollak (1978) that "household commodities are unobservable."[217] That is why, he argued, "it is impossible to determine whether experience, S_t, enters the utility function indirectly as a productivity parameter, $U = U(Z(X_t, L_t, S_t))$, or directly as a taste shifter, $U(Z(X_t, L_t), S_t)$" (Iannaccone 1984: p. 3, time subscripts have been added to the original citation).[218] In his 1986 article, based on his PhD thesis, he restated his opinion on experience effects as productivity parameter or taste shifter very similarly.[219]

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[215] In his thesis Iannaccone cites two of Pollak's papers (Pollak 1970, 1976), but not Pollak's 1978 paper.

[216] It should be kept in mind that Becker was Iannaccone's supervisor and Stigler was also on Iannaccone's thesis committee. It is hence not surprising that Iannaccone's assessment of the model is rather favorable. Nonetheless, his discussion of the model illustrates well some of the issues that were at stake in the discussion.

[217] Iannaccone also took up criticism of rational habit formation models by the applied economists Angus Deaton and John Muellbauer (1980) and criticism of the Stigler-Becker addiction model by Gordon Winston (1980). We will come back to the critique of Winston when discussing the reception of the rational addiction model among behavioral economists (see chapter 6).

[218] X_t is a vector of goods consumed in period t, L_t is a vector of durations of time dedicated to the production of the different choice objects, and S_t is a vector of "experience stocks."

[219] In his 1986 article Iannaccone argued that some authors like Pollak (1976) or Spinnewyn (1981) assume subutility functions where "Y_i and S_i enter utility in additive [or additively separable] form $a(Y_i) + b(S_i)$" and that this reflects "the notion that habits alter 'needs'." This corresponds to the interpretation of habits as taste shifters and myopic habit formation. He argued that Stigler and Becker (1977) assumed a household production function with a "multiplicative specification" like $Z =$

The main difference between the two approaches came for Iannaccone close to a difference in the way of thinking about the problem. "One might argue that this distinction is purely semantic, since the underlying mathematics are the same in either case." Yet, he argued, "it seems to have affected the ways in which experience has been analyzed." He argued that the earlier models of habit formation by Houthakker and Taylor, Pollak, von Weizsäcker and others assume "myopic decision making" where individuals are assumed to maximize instantaneous utility subject to present habit stocks and exogenously fixed expenditure. Iannaccone criticized that "[a]lthough current consumption affects future habits (and hence also future utility), the individual is assumed not to take this into account when determining current consumption." In Becker and Stigler's model the individual is instead "assumed to be fully aware of the addictive effects of consumption and to plan his life-cycle consumption pattern so as to maximize life-cycle utility" (Iannaccone 1984: p. 3).

Unsurprisingly, Iannaccone followed the footsteps of his PhD supervisor Becker. He modeled habit formation with an intertemporal utility function inseparable over periods. Like Stigler and Becker, Iannaccone located habits on the side of production constraints within the individual utility production technology of consumers and not within tastes or preferences. His way of restating intertemporal habit formation contained both, the basic framework of the Stigler-Becker model and elements from the rational habit formation literature like a distinction in two different types of intertemporal complementarity of utility. A distinction into adjacent and distant complementarity had been used as well by Boyer (1983) to describe optimal consumption choice around dynamic equilibrium points. Harl Ryder and Geoffrey Heal had proposed this distinction in an optimal growth model in 1973 (Ryder, Heal 1973). This distinction would later also be adopted by Becker and Murphy.

$a(Y_i)b(S_i)$ for the subutility form. He argued that this "is Smore appropriate when [...] consumption alters the productivity of time and goods devoted to specific activities" (Iannaccone 1986: p. 98).

Iannaccone assumed a wide range of application for his basic model. He broke experience effects down to processes of learning by doing and to habit formation. First, he argued that his model "simply extends learning by doing to household production." In this aspect Iannaccone took learning processes from labor market studies and described them analogically for household activities outside of the labor market. "Just as a worker's job-specific skills may depends on his experience performing that job in the past, so also his ability to produce household commodities may depend on his experience producing those commodities in the past." He provided a far-ranging set of skills as examples, such as "domestic chores, such as cooking, cleaning, and child care[,]" or "recreational activities, be they athletic, aesthetic, or romantic[,]" or "social skills, such as the ability to interact with family members." What was common in each case was that "current productivity depends on the history of past production," and "current output and additions to human capital are joint products of the production process" (see Iannaccone 1984: p. 2).

These processes of learning by doing were linked to habit formation and addiction. He argued that experience does "not only affect one's ability to perform an activity; it can also affect one's ability to appreciate that activity." He argued that "one must 'cultivate a taste' for Verdi, Shakespeare, and Lafite Roth[s]child – not to mention punk rock, Harlequin romances, and generic beer."[220] So too, argued Iannaccone does it take time "to become 'hooked' on drugs, alcohol, or tobacco." But a difference between processes of learning by doing and habits and addiction came from the fact that learning is usually positively associated, while habits and especially addiction were often negatively associated. While learning as doing is usually assumed "to enhance productivity, habits can be either harmful or beneficial" (Iannaccone 1984: p. 2).

Grouping both, learning by doing and habit formation, in one term, Iannaccone characterized consumption activities simply by "experience effects." His definition of experience effects was pretty similar to the Stigler-Becker model and to the rational habit

[220] Lafite Rothschild is a rather expensive wine brand, Harlequin is a publishing house of popular pocket literature.

models. He argued that "an activity exhibits 'experience effects' if in addition to (possibly) providing immediate utility it also alters stocks of experience which affect future utility" (Iannaccone 1984: p. 1). He set up a problem of intertemporal allocation of resources and argued that "the rational individual's problem is to choose the consumption path that will maximize lifetime utility subject to his wealth constraint, commodity production function, and experience accumulation process" (Iannaccone 1984: p. 2).

As Stigler and Becker did, Iannaccone defined cases of beneficial and harmful addiction with regards to the marginal products of experience stocks. This meant that an addiction is harmful or beneficial dependent on whether additional experience stocks increase the amount of the choice objective that can be produced with it. As in the Stigler-Becker model, Iannaccone's model of addiction defined operationally whether the dependence that an individual has developed over time was beneficial or harmful. For beneficially addictive experiences the marginal product of experience, S, is positive, $\frac{\partial Z}{\partial S} > 0$. This meant that additional stocks of experience result in an increase in output of the choice object. This is not the case for harmful addictions. In the case of harmful addictions additional stocks of experience decrease the output of the choice object. So, in the case of harmful addiction the marginal product of the experience stocks, S, is negative, $\frac{\partial Z}{\partial S} < 0$. This means that additional stocks of experience that are accumulated within individuals decrease the production output (see Iannaccone 1984: p. 6).

Iannacone set up his intertemporal optimization problem very similarly to the rational habit model of Lluch (1974). Like Lluch, Iannaccone used optimal control theory to solve the intertemporal allocation problem. He described the problem by setting up a Hamiltonian equation with two laws of motion, one for a wealth constraint, one for a habit stock constraint. Then, he derived optimality conditions that should hold in dynamic equilibria and that could be used to determine the optimal values for habit stocks and present consumption.

As in the rational habit formation literature, the consumers in Iannaccone's (1984) model differed from myopic consumers because they should be able to project the costs of habit creation onto the future. Rational consumers should not only calculate the usual shadow prices of engaging in different forms of production processes today. They should calculate the true shadow prices of these processes by projecting the costs and benefits of habit creation today on their future production possibilities. In the optimum the marginal utility of producing choice objects should be equal to the marginal cost of producing them, their shadow price. Experience effects change the marginal costs of producing choice objects. He argued that with experience effects the marginal cost of production consists not only of the direct costs of the goods and time inputs. To get the true shadow price the value of jointly produced experience stocks needs to be subtracted from the direct marginal costs of time and goods. Dependent on whether experience effects are beneficial or harmful the value of the jointly produced experience is negative or positive. That is why he argues that rational consumers need to take the true shadow price to produce optimal amounts of choice objects (see Iannaccone 1984: p. 10).[221] In slight variation, he described the consequences of habit-forming consumption in his 1986 model similarly, as driving a wedge between the marginal utility of consuming a good and the marginal costs of consuming a good.[222]

[221] Interpreting the optimality conditions, Iannaccone stated that "along the optimal path the marginal utility derived from additional goods or time devoted to [producing the choice objective] Z equals the marginal cost (in utility foregone) of that input". He showed that the marginal utility derived from additional goods and additional time consisted of a direct component and an indirect component. The direct component reflects "the immediate enjoyment from consuming more Z at age t." The indirect component reflects the costs that are induced by habit creation projected onto the future. In Iannaccone's words the indirect components consists of "the discounted stream of future utility (or disutility) generated by the additions to experience that accompany current consumption." He argued that non-myopic consumers should "[take] account of the fact that inputs affect both immediate and future utility" (Iannaccone 1984: p. 9f.).

[222] In that article he argued that for a normal good, the trade-off between consuming more at any moment in time depends only on instantaneous utility of consumption and the comparison of expenses in terms of wealth usable for future consumption. Habit formation would change this trade-off. He argued that habit formation "drives a wedge between immediate marginal utility and direct marginal cost" (Iannaccone 1986: p. 97). In the case of habit formation, the marginal utility of consuming an additional good would still be the same. But with habit formation the marginal costs of consuming an additional unit would contain an additional component projecting the consequences of present habit creation on

Building on the literature on rational habit formation, Iannaccone went beyond the model of his PhD supervisor. As Stigler and Becker, Iannaccone characterized addiction in intertemporal allocation terms. He defined "addiction as experience[-increasing] or age-increasing demand for a commodity's inputs" (Iannaccone 1984: p. 5). But differently to Stigler and Becker, he derived sufficient conditions for addiction and satiation based on adjacent and distant complementarity. In the case of rational habit formation, Iannaccone argued that whether consuming a good is addictive or satiating is not dependent on the "comparative-static own-price elasticity of demand," like it has been proposed in the Stigler-Becker model. Rather, he argued, addiction would depend on the "intertemporal elasticity of commodity substitution" (see Iannaccone 1986: p. 98).

Stigler and Becker used a comparative-static measure of own-price elasticity to define harmful addiction. They wrote that only goods with very inelastic demand are likely to create harmful addiction. Iannaccone defined harmful addiction in terms of the dynamic relationship between consumption at one moment and consecutive consumption. He used the distinction between adjacent and distant complementarity that has also been used by Boyer (1983) and Ryder and Heal (1973). He argued that rational individuals "tend to become addicted only to commodities that display 'adjacent' intertemporal complementarity." Adjacent complementarity of intertemporal utility "can exist only if experience reinforces subsequent consumption by raising marginal utility of commodity inputs." Distant intertemporal complementarity, he argued, "induces satiation-age-decreasing demand for commodity inputs" (Iannaccone 1984: p. 5).

Iannaccone's role in the creation of rational addiction should not be underestimated. By bringing the Stigler-Becker model closer to the rational addiction literature, he rendered Stigler and Becker's controversial claims more coherent with similar claims that have been made without being committed strongly to the methodological presumptions of the household production model. At the same time, Iannaccone qualified

future production possibilities. For beneficial habits the marginal costs of additional units of the consumed good were thus smaller compared to the case without habit formation. But, for harmful habits the marginal costs of an additional unit of the consumed good were bigger (see Iannaccone 1986: p. 97).

the Stigler-Becker results by rooting the definition of addiction in dynamic conditions linked to the intertemporal complementarity of utility. Whether the PhD student Iannaccone or his supervisor Becker was the driving force behind these innovations does to some degree not matter very much. It is already interesting to see how a PhD student innovated a model of his supervisor by carrying on and adapting central ideas of the household production framework.

4.4 1986-1988: A Theory of Rational Addiction

In 1986 Iannaccone published his article *Addiction and Satiation* in (Iannaccone 1986). In the same year his former PhD supervisor published a working paper in the working paper series of the *Center for the Study of the Economy and the State* (CSES) at the *University of Chicago*.[223] The working paper carried the title *A Theory of Rational Addiction* and was co-authored with a young Assistant Professor from the economics department named Kevin Murphy.[224] In the acknowledgments of the 1988 article Becker and Murphy appreciate financial funding from the *Lynde and Harry Bradley Foundation*

[223] The *George Stigler Center for the Study of the Economy and the State* has been an organizational unit at the University of Chicago that was lead by George Stigler. Edward Nik-Khah has described Stigler's efforts to shape the intellectual orientation of the center and its links to funding organizations (Nik-Khah 2011). The working paper series started in 1980 and lists 156 papers in the first 20 years up to 1999. Becker and Murphy's paper is working paper number 41. The three other working papers of the year 1986 are authored by Samuel Peltzman, Barry Chiswick and Kip Viscusi. The full list has been published on the website of the University of Chicago in 2000 (see https://web.archive.org/web/20060902010132/http://gsbwww.uchicago.edu/research/cses/GSCworkingPapersPDFs.htm, last accessed 03.10.2025).

[224] Before obtaining a Ph.D. in economics in 1986 from the University of Chicago, Kevin Murphy did undergraduate studies in economics at the University of California, Los Angeles. He became Assistant Professor in 1986, Associate Professor two years later, and Full Professor in 1989, all at the University of Chicago. In 1997 Murphy obtained the John Bates Clark Medal of the AEA. In 2005 he was selected as a MacArthur Fellow. The website of the MacArthur Foundation praises Murphy as "a wide-ranging economist with an aptitude for applying careful empirical analyses within rigorous theoretical frameworks to economic questions of immense social import. […] Murphy also considered the phenomenon of addiction from an economic perspective. Contrary to widely-held beliefs that addiction distorts economic judgment, Murphy and colleagues developed a model of 'rational addiction', in which consumers anticipate the expected future consequences of their current actions; he developed empirical analyses supporting this model from data on cigarette consumption" (see https://www.macfound.org/fellows/class-of-2005/kevin-murphy, last accessed 03.10.2025).

that they received through the CSES.[225] The article will become a very popular research article in the aftermath, one that is noticed and commented not only by economists, but also by psychologists and other social scientists.

As the title *A Theory of Rational Addiction* suggests, Becker and Murphy's model containd two definitions: one of rational behavior and one of addiction. The combination of these two definitions seemed counter intuitive and controversial compared to common views of rationality and addiction. By defining rationality in the phenomenon of addiction, and by defining addiction in terms of rational behavior, the Becker-Murphy model broke new analytic ground for microeconomics. The model itself became widely used and discussed by different social scientists (see chapters 4, 5, and 6). As a byproduct the model put the term "rational addiction" into the world, a term that rests quite ambiguous. In order to provide a more comprehensive description of the concept of rational addiction, we have organized this subsection as follows: First, we present briefly the formal model. Second, we describe how the model describes rational behavior. Third, we describe how the model describes addiction.

4.4.1 The model

As the models of the rational habit literature, the Becker-Murphy model conceives addiction in an intertemporal utility setting. Equation 4.11 displays the intertemporal utility function used by Becker and Murphy.

$$U(t) = \int_t^T e^{-\sigma t} u\big(y(t), c(t), S(t)\big) dt, \;\; with\; t = (0, \dots, T) \tag{4.11}$$

Equation 4.11 states that individuals derive utility over a temporal horizon reaching from the present period, t, to the final period, T. Before the utility of all moments are

[225] Roger Backhouse has described the Bradley Foundation as part of a major funding effort of conservatives in the 1970s and 1980s aiming to strengthen free market ideology in economics (Backhouse 2005). Like the Heritage Foundation, The Scaife Family Foundation, or the Olin Foundation, the Bradley Foundation was part of a wave of conservative funding unleashed upon US academia in the 1970s and 1980s. Backhouse has argued that although these foundations had smaller budgets than the very big foundations like the Ford Foundation, they were nonetheless effective by concentrating their efforts on funding liberal ideas in economics (Backhouse 2005: p. 381).

integrated, the utility from future periods is discounted with a rate of time preference, σ.[226] In each moment individuals derive utility from the consumption of a normal, non-addictive good, $y(t)$, from the consumption of an addictive good, $c(t)$, and from the stock $S(t)$ that Becker and Murphy call consumption capital.[227] The stock of consumption capital in the present is dependent on the consumption of the addictive good in the past. The utility in their model would not be separable if they would only include the consumption of the nonaddictive and the addictive good as inputs in their intertemporal utility function, since present values of addictive consumption depend on past values of addictive consumption. But as these dependencies are accounted for in the stocks of consumption capital, $S(t)$, utility is separable over different moments if consumption capital is included (see Becker, Murphy 1988: p. 677).

The intertemporal utility function is maximized by subjecting it to a constraint defining the change in consumption stocks and to a wealth constraint. Equation 4.12 displays how consumption stocks are assumed to change from one moment to the next. Becker and Murphy called this equation also the "investment function[.]"

$$\dot{S}(t) = c(t) - \delta S(t) - h(D(t)) \tag{4.12}$$

The change in stocks of consumption capital from one moment to the next, $\dot{S}(t)$, is defined as "the gross investment in 'learning'", $c(t)$, minus the current stock of consumption capital, $S(t)$, that is depreciated with the "exogenous rate of disappearance of the physical and mental effects of past consumption c", δ, minus a function of "expenditures on endogenous depreciation or appreciation," $h(D(t))$. The function represents an effort or cost that could be made by the individual to counterbalance the growth or decline of stocks of consumption capital.

As time goes on, individuals are assumed not only to accumulate habit stocks, but also financial wealth. Equation 4.13 represents the wealth constraint.

[226] The rate of time preference is at times also called the rate of preference for the present.
[227] One could also refer to this stock simply as addiction capital or dependence formation capital.

(4.13) $\int_t^T e^{-rt}\big(y(t) + p_c(t)c(t) + p_d(t)D(t)\big)dt \;\leq\; A_0 + \int_t^T e^{-rt}\, w\big(S(t)\big)dt$

Equation 4.13 states that the lifetime expenditures (on the left-hand side of the equation) must be smaller or equal to the lifetime wealth of the individual (right-hand side of the equation). The lifetime expenditures are calculated as the sum of consumed quantities multiplied by their prices.[228] The lifetime wealth of the individual on the right-hand side of equation 4.13 consists of the sum of "initial value of assets," A_0, and the lifetime earnings or income profile of individuals that is the income that they obtain in each moment, $w\big(S(t)\big)$, discounted with the interest rate, r. Becker and Murphy assumed that the income in each period depends on the stock of consumption capital. They abstract from imperfect capital markets.

In the Becker-Murphy model the value of consuming an addictive good is determined through intertemporal optimization and marginal comparison. By maximizing the intertemporal utility function (4.11) subject to the consumption capital constraint (4.12) and subject to the wealth constraint (4.13), Becker and Murphy derive optimality conditions. Using these optimality conditions, they describe how the marginal utility of a nonaddictive good differs from the marginal utility of an addictive good. Equation 4.14 displays the marginal utility of a nonaddictive good and equation 4.15 displays the marginal utility of an addictive good.

(4.14) $\qquad u_y(t) = \mu e^{(\sigma - r)t} = \Pi_y(t)$

(4.15) $\qquad u_c(t) = \mu p_c(t) e^{(\sigma - r)t} - a(t) = \Pi_c(t)$

In equation 4.14 the term $u_y(t)$ represents the marginal utility of consuming one unit more of the nonaddictive good that is also interpreted as the shadow price of the nonaddictive good, $\Pi_y(t)$. The parameter μ represents the marginal utility of wealth. As

[228] Becker and Murphy use the nonaddictive good as a numeraire that is why there appears no price for it next to the quantity of the nonaddictive good, $y(t)$. Using one good as a numeraire means using that good to display all other prices in terms of what the numeraire good costs. The quantities of the addictive good, $c(t)$, are multiplied by the price of the addictive good, $p_c(t)$, and the quantities of disinvestment, $D(t)$, are multiplied by the price of disinvestment, p_d.

the nonaddictive good is the numeraire, there is no further price variable. In equation 4.15 the term $u_c(t)$ represents the marginal utility of an addictive good that is also interpreted as the shadow price of the addicted good, $\Pi_c(t)$. Becker and Murphy call $\Pi_c(t)$ also the full price of consuming a unit of the addictive good. Like in Iannaccone's model, this full price for the addictive good has a direct and indirect component. The direct component of the full price of an addictive good consists of "the sum of its market price[,]" $\mu p_c(t)e^{(\sigma-r)t}$. The indirect consists of "the money value of the future cost or benefit of consumption" that is represented in equation 4.15 by the shorthand notation $a(t)$. It is further detailed in equation 4.16.

$$a(t) = \int_t^T e^{-(\sigma+\delta)(\tau-t)} u_s d\tau + \mu \int_t^T e^{-(r+\delta)(\tau-t)} w_s d\tau \tag{4.16}$$

Equation 4.16 states that the shadow price of an additional unit of stocks, $a(t)$, has itself two components. The first component describes the discounted future utility arising through the effect of future stocks. The second component describes the monetary cost or benefit of additional consumption c and the associated future stocks of S that come with it. Becker and Murphy describe $a(t)$ as the "discounted utility and monetary cost or benefit of additional consumption of c through the effect on future stocks" which measures "the shadow price of an additional unit of stock" (Becker, Murphy 1988: p. 678). Becker and Murphy call $a(t)$ at times as well "[t]he stock component of full price of an addictive good." Depending on the signs of the marginal utility of stocks, u_s, and the change in income induced by a change in stocks, w_s, $a(t)$ will positive or negative. Becker and Murphy argue that "a future cost is added to the current market price of harmful addictive goods, whereas a future benefit is subtracted from the current price of beneficial goods" (Becker, Murphy 1988: p. 684).

Compared to the earlier Stigler-Becker model, Becker and Murphy focused more on the dynamic aspects of optimal consumption over time. In particular they analyzed consumption behavior around the long-run equilibrium of the demand of the addictive good, around steady states. To analyze consumption near the steady state, they simplified

the initial model.[229] They showed how the optimization problem for the consumer can be reduced to the choice of the optimal levels of the potentially addictive good, $c(t)$, and the corresponding stocks of consumption capital, $S(t)$. The resulting choice of $c(t)$ and $S(t)$ depends only on the initial dotation of financial wealth, A_0, the initial dotation of consumption stocks, S_0, the price of the potentially addictive good, p_c, and the discount rate, σ.

As the many habit formation models before them, Becker and Murphy assumed a positive relationship between the addictive stocks, $S(t)$, and consumption of the addictive good, $c(t)$. With regards to consumption over time, they assumed that $c(t)$ is increasing and concave in $S(t)$.[230] This relationship is represented in figure 1 where the curve p^1 describes this relationship. The consumption level in the present, c, is represented on the vertical axis and the consumption capital, S, that has been accumulated in the past is represented on the horizontal axis.

[229] To simplify they assumed an infinite time horizon, equality of the rate of time preference and the interest rate ($\sigma = r$), no expenditures on addiction capital depreciation ($D(t) = 0$), the continuation of the present price of the addictive good for all future periods, and they assumed quadratic utility and earnings functions with linear first-order conditions to analyze choice behavior around stationary state (see Becker, Murphy 1988: p. 678f.).

[230] This means that as the stock of consumption capital, $S(t)$, increases, the consumption level, $c(t)$, increases as well but less and less strongly.

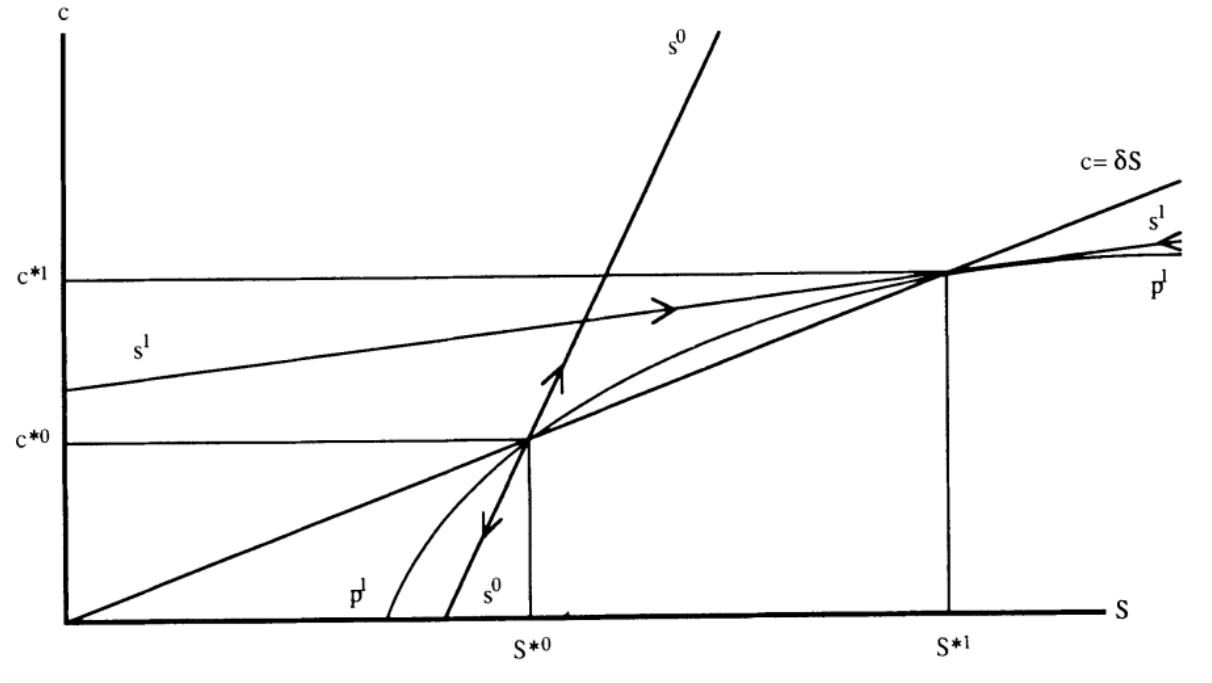

Figure 10: Figure 1 one from Becker and Murphy (1988: p. 681).

Figure 10 shows the relationship between the optimal level of consumption and the optimal amount of consumption stocks of the potentially addictive variable good c. The optimal consumption level of c is represented on the vertical axis and the optimal amount of consumption capital S is represented on the horizontal axis. The relationship between optimal S and optimal c is concave and represented by the curve denoted p^1. With the accumulation of additional units of consumption capital, S, the optimal consumption level increases less and less. The figure also shows two steady states of consumption and consumption capital, S^{*0} and S^{*1}. A steady state is steady because in it the state variables, here c and S, do not change anymore and stay the same. Both c and S are higher in S^{*1} than in S^{*0}. S^{*0} denotes an unstable steady state. If S is only slightly smaller or slightly bigger, c and S move iteratively towards another position. This is represented by the arrows on the line s^0-s^0. S^{*1} denotes a stable steady state. If S is slightly smaller or slightly bigger than S^{*1}, c and S will move towards S^{*1}. This is represented by the arrows on the line s^I-s^I.

Becker and Murphy argued that "[u]nstable steady states […] are crucial to the understanding of rational addictive behavior" (Becker, Murphy 1988: p.682). Becker and Murphy interpret Figure 10 in the following way. Dependent on their initial dotation of consumption capital, S_0, individuals are likely to initiate consuming the potentially addictive good or not. When the initial dotation of consumption capital is smaller than a certain threshold ($S_0 < S^{*0}$), individuals may consume initially a small amount, but will converge toward zero consumption and zero consumption capital. When the initial dotation of consumption capital is exactly the same as that threshold ($S_0 = S^{*0}$), individuals will consume a lower amount of the potentially addictive good. When the initial dotation of consumption capital is bigger than the threshold ($S_0 > S^{*0}$), individuals will consume the potentially addictive good and converge over time toward the consumption level associated with S^{*1}.[231]

Compared to the Stigler-Becker model from 1977, the Becker-Murphy model is not coined in the explicit terms of the household production framework anymore. Except from the term consumption capital that has been defined in the Stigler-Becker model, Becker and Murphy do not frame their model explicitly in terms of household production technology. They also do not cite any of the sources of the household production function literature that Becker cited a decade before together with Stigler. Nonetheless, Becker and Murphy stick with the interpretative frame of addiction in terms of consumption capital and they also define beneficial and harmful addiction in the same way as it has been done by Stigler and Becker. But instead of labeling their approach with reference to the household production framework, now they label their approach as a rational choice model.

[231] Another steady state that is not presented in figure 1 is in the origin of the diagram where an individual consumes zero units of the potentially addictive good, c, and has zero stocks of consumption capital, S. In fact, Becker and Murphy argue that "goods that are highly addictive to most people tend to have a bimodal distribution of consumption, with one mode located near abstention" and the other at higher levels representing the stable steady state consumption levels of people that are represented as S^{*1} in figure 1. Note that the exact levels of these steady state consumption levels, S^{*1}, differ from person to person.

4.4.2 Describing rational behavior

The Becker-Murphy model defined behavior as rational in a particular way.[232] In the Becker-Murphy model "rationality means a consistent plan to maximize utility over time." The types of addiction that they describe in their model "are usually rational in the sense of involving forward-looking maximization with stable preferences" (Becker, Murphy 1988: p. 675). Their model relied on a "weak concept of rationality that does not rule out strong discounts of future events" (Becker, Murphy 1988: p. 683). So their basic definition of rationality is a very weak intertemporal optimization version of rationality that is very empty in the sense that it does not contain any commonplace definitions of rationality. Primarily, their definition is informed by and expressed in the language of intertemporal utility maximization. All that is needed for rational behavior is that it can be seen as based on consistent-planning, forward-looking utility maximization, and stable preferences. As a consequence, what Becker and Murphy define as rational might deviate importantly from commonly-hold definitions of rationality.[233]

Examining the weak definition of rationality from the Becker-Murphy model alongside the developments in the habit formation literature gives us a clearer view of the

[232] The definition of rationality contained in the Becker-Murphy model is also interesting with regards to Becker's intellectual career. In 1962 Becker defined market rationality as the rationality that should be relevant to economists, and he explained basic concepts of demand theory in terms of scarcity imposed by limited budgets. At many occasions, Becker referred back to his 1962 article, most centrally in justifying his approach to microeconomics in his 1971 textbook (see also chapter 2). In the introductory chapter to his 1976 book The Economic Approach to Human Behavior Becker proposed his view of the economic approach explicitly against a counterweight against other approaches to economics that are allegedly greater emphasis on the consequences of irrational behavior (see Becker 1976: p. 6f.). After having received the Nobel Prize in 1992, Becker restates the economic approach to behavior in terms of rational choice (see Becker 1993). As Becker indicates in his Nobel lecture he chose addiction as a research object quite intentionally to mark a case for analysis in terms of rationality. "I have intentionally chosen certain topics for my research-such as addiction-to probe the boundaries of rational choice theory. William Blake said that you never know what is enough until you see what is more than enough (Jon Elster brought this proverb to my attention). My work may have sometimes assumed too much rationality, but I believe it has been an antidote to the extensive research that does not credit people with enough rationality." (see Becker 1993: p. 402).

[233] This point has been remarked by several observers. Don Ross for example has argued that the rational addiction model is actually not about addiction, but about habit formation more generally (Ross 2011). Charles Djordjevic and Catherine Herfeld have argued that rational addiction as an economic concept deviates considerably from the folk concept of addiction (Djordjevic and Herfeld 2021).

conception of rationality assumed by Becker and Murphy. As in models of rational habit formation, present choices are constrained through past consumption, by the psychological stocks that have accumulated over time. On top of that present choices are constrained also through future consumption possibilities that consumers are assumed to trade-off optimally with consuming in the present. The extent to which present decisions are shaped by the past and the future is reflected in the parameters of the model. With a higher depreciation rate on past consumption, δ, the habit strength or the influence of past consumption in orienting present consumption is lower (see equation 4.12).[234] With a higher rate of preference for the present, σ, individuals value costs and utility in the present relatively stronger than in the future (see equation 4.11).[235] Allowing for different parameter values for δ and σ, the Becker-Murphy model can describe a variety of consumers that differs with regards to their degree of habit strength (δ) and time preference (σ). Even more than providing classification, the model can be used to infer the consumption behavior of different types of consumers. When δ and σ are greater, Becker and Murphy argue, "consumption of a harmful c is larger, and consumption of a beneficial c is smaller" (Becker, Murphy 1988: p. 678). At the same time Becker and Murphy argue that an increase in the parameter values for δ and σ "raise the degree of adjacent complementarity, and hence they raise the extent of potential addiction to both beneficial and harmful goods" (Becker, Murphy 1988: p. 684). We will explain the role of adjacent complementarity in more detail below.

Defining rational behavior, the Becker-Murphy model also described how and why rational consumers behave when consumed goods are addictive. Just like the consumers in Iannaccone's model of addiction, consumers in the Becker-Murphy model were assumed to assess the true shadow price of consuming an addictive good as it is represented in equation 4.15. Contrary to myopic persons, rational persons should recognize the value of

[234] The stock depreciation rate appears in the law of motion that states how the stock of consumption capital changes from one moment to the other, see equation 3.18.
[235] The rate of time preference or preference for the present is a parameter of the intertemporal utility function that defines how consumers value utility from future moments in time, see equation 3.17.

the stock component of the shadow price of consuming the addictive good, $a(h)$. That is why, Becker and Murphy argued, "a rational person recognizes that consumption of a harmful good $(u_s, w_s < 0)$ has adverse effects on future utility and earnings while a beneficial good $(u_s, w_s > 0)$ has positive effects" (Becker, Murphy 1988: p. 678).

Like the consumers in rational habit formation models, the consumers in the Becker-Murphy model should in principle also take action to counteract harmful addictions. The general problem for addicted consumers is that they face considerable short-run losses in utility that would be balanced out by utility gains only in the long-term.[236] Becker and Murphy wrote that "a rational addict might postpone terminating his addiction as he looks for ways to reduce the sizable short-run loss in utility from stopping abruptly." They imagined addicts engaging in a trial and error process. "He may first try to stop smoking by attending a smoking clinic, but may conclude that this is not a good way for him. He may try to substitute gum chewing and jogging for smoking. These too may fail. Eventually, he may hit on a successful method that reduces the short-term loss from stopping." As individuals do not know the optimal methods of quitting, and as there are substantial short-term costs, Becker and Murphy argued that "[n]othing about rationality rules out such experiments and failures" (Becker, Murphy 1988: p. 693). Instead, they argued, such failures and experimentation should rather be common.

Implicitly, Becker and Murphy acknowledge that quitting is hard, once dependencies are sufficiently strong. That is why they argue the most effective method to quit is abrupt cessation, also known as cold turkey. Using their model, they demonstrate how going cold turkey decreases the consumption level and how remaining abstinent should initiate a process of stock depreciation. So after time, addicts might return to pre-addiction levels of consumption (see Becker, Murphy 1988: p. 692).

As Iannaccone did in his PhD thesis, Becker and Murphy use myopic habit formation as a theoretic reference to distinguish their own modeling approach. They

[236] Over time the short-run loss in utility even gets bigger as the addiction grown in the individual gets stronger.

argued that their model "implies that an anticipated increase in future prices of addictive goods lowers current consumption[,]" because rational consumers take in account the future changes in prices. They claimed that "[t]hese negative effects of anticipated future price changes on the present consumption of addictive goods are a major way to distinguish rational addiction or rational habit formation from myopic behavior […]" (Becker, Murphy 1988: p. 689). They criticized that myopic habit formation is not a realistic approach since it abstracts from future consequences, and takes expenditure levels as exogenously given. However, they were silent on the fact that intertemporal utility maximization is a much more complicated optimization process that is empirically difficult to implement.[237] While addressing one source of unrealism, they introduced a different type of unrealism.

Becker and Murphy were ambiguous on whether they actually consider all people as rational. At times they indicated that some people may be myopic. For example, they argued that even myopic consumers could formally be seen as rational consumers. They wrote that "[t]he consumers in our model become more and more myopic as time preference for the present (σ) gets larger." In the extreme case when sigma goes to infinity "[i]t is then 'rational' to ignore the future effects of a change in current consumption". Technically, they argue that "time preference for the present is not necessary for addiction[,]" but "fully myopic consumers ($\sigma = \infty$) do have the potential to become addicted whenever the increase in past consumption raises the marginal utility of current consumption[.]" They seemed to recognize an ambivalence in including fully myopic

[237] Iannaccone mentioned such difficulties of rational habit formation in his PhD thesis citing Angus Deaton and John Muellbauer criticizing demand models with rational habit formation (Deaton, Muellbauer 1980). Deaton and Muellbauer have argued that "[i]ntertemporal models in which tastes in each period depend upon past consumption and in which this is foreseen by the consumer are technically very difficult to handle and, by making no concession to imperfect knowledge or to questions of calculation, are extremely implausible as descriptions of observed behavior" (Deaton, Muellbauer 1980: p. 374). While Becker received the Nobel Prize for his creative extensions of price theory in 1992, Deaton received the Nobel Prize in 2015 for his analysis of consumption and its links to human welfare, and for showing "how data on consumption can be used to analyze welfare, poverty, and economic development" (see NobelPrize.org, https://www.nobelprize.org/prizes/economic-sciences/2015/deaton/facts/, last accessed 17.06.2025).

consumers within their definition of rationality asking "[a]lthough fully myopic behavior is formally consistent with our definition of rational behavior, should someone who entirely or largely neglects future consequences of his actions be called rational?" (Becker, Murphy 1988: p. 683f.). It depends on the situation. For example, they argued old people can be seen as rationally myopic since they have only a few years left to live. "If lives are finite, the inverse of the number of years of life remaining is an approximation to the rate of 'time preference' for people who do not discount the future" (Becker, Murphy 1988: p. 684).

Whether everyone is rational or not is not important for market rationality, as Becker has argued in 1962. Some people might be individually myopic, but this does not mean that budget constraints do not apply to them. Those who are not rational can continue to consume myopically until their resources are over or they can adopt the market rationality. In any case it is in the first place the consumers themselves who are most capable to evaluate whether the consumption of an addictive good is harmful or beneficial to them. And it is the consumers themselves who need to find the best method to quit their addiction. What happens to myopic consumers once they have depleted all of their resources, even their psychological stocks, is not addressed in the Becker-Murphy model.

By formulating their model as a model of rational habit formation, Becker and Murphy impose rational behavior as the behavioral norm in the model. Rational behavior can in principle take many forms, but it should consist of intertemporal balancing of costs and benefits in terms of utility, and it should be intertemporally consistent. Addiction had often been described as involving conflicted behavior. The definition of addiction in the Becker-Murphy model reflects also the attempt of economists to defend economically-liberal governance principles.

4.4.3 Describing addiction

Addiction is for Becker and Murphy in the first a place a consequence of a strong intertemporal complementarity to consume the same good in different moments. As a

result, consumers may find themselves in consumption situations that might be perceived as harmful to them. Due to the dependency that they have developed they might escape from these consumption situations only by enduring high losses of utility, discomfort and pain. The dependence that is created through such intertemporal complementarities comes with the difficulty for consumers that certain steady-state consumption levels to which they deviate over time are highly unstable. Even a tiny bit of overshooting the steady state level of consumption might send them on a higher-level path of consumption.

Becker and Murphy wrote that "[t]he basic definition of addiction at the foundation of our analysis is that a person is potentially addicted to c if an increase in his current consumption of c increases his future consumption of c." And they qualify this statement by arguing that "[t]his occurs if and only if his behavior displays adjacent complementarity" (Becker, Murphy 1988: p. 681).[238] A necessary condition of their definition of addiction is that "someone is addicted to a good only when past consumption of the good raises the marginal utility of present consumption" (Becker, Murphy 1988: p. 681). The sufficient condition is that the intertemporal complementarity of consumption of that consumer can be described as adjacently complementary. In the case of adjacent complementarity, the marginal utility of an addictive good exceeds the full price of the addictive good. The rise in the full price of the addictive good is larger when the future is less heavily discounted (a smaller σ), and when the stocks of consumption capital decrease less rapidly (a smaller δ). Higher values for σ and δ imply a higher degree of potential addiction, independent of whether the addiction is harmful or beneficial.

As consumers come in different shapes, in the Becker-Murphy model addiction comes in subjective degrees and with subjective associations of being harmful or beneficial. Consumers are likely to differ with regards to their rates of time preference, σ, and with regards to their rate of stock depreciation, δ. Therefore, Becker and Murphy argued that "a good may be addictive to some persons but not to others, and a person may be addicted

[238] They build on the work of Boyer (1983) and Iannaccone (1986) who have related addiction to adjacent complementarity.

to some goods but not to other goods." They argued that "liquor, jogging, cigarettes, gambling, and religion are addictive to some people but not to others" (Becker, Murphy 1988: p. 682). "Obviously, cigarettes and heroin are more addictive than sweaters and sherbet. Yet not all smokers and heroin users become addicted" (Becker, Murphy 1988: p. 694).

Whether a consumer in the Becker Murphy model becomes addicted or not depends technically on an array of variables. The variable that is most stressed by Becker and Murphy is the subjective time preference of consumers. They argued that "[o]ur analysis implies the common view that present-oriented individuals are potentially more addicted to harmful goods than future-oriented individuals. The reason for this is that an increase in past consumption leads to a smaller rise in full price when the future is more heavily discounted" (Becker, Murphy 1988: p. p. 682). Therefore, "individuals who discount the future heavily are more likely to become addicted" (Becker, Murphy 1988: p. 694). One of the reasons for this emphasis is that the rate of time preference depends only on the individual, while other variables that also shape the degree of potential addiction depend on the consumer and on the good that is consumed, like "[t]he rate of depreciation of past consumption (δ), complementarity between present and past consumption [...], and the effect of changes in the stock of consumption capital on earnings depend on the individual as well as on the good."[239] Despite their emphasis on the role of individual time preference, they argued at other places in the article that "[w]hether a potentially addictive person does become addicted depends on his initial stock of consumption capital and the location of his demand curve." (Becker, Murphy 1988: p. 683). And in the conclusion they write as well that "[t]he level of incomes, temporary stressful events that stimulate the demand for addictive goods, and the level and path of prices also affect the likelihood of becoming addicted." (Becker, Murphy 1988: p. 694).

[239] With regards to the relationship between consumption stocks and wage income they provide the example that "drunkenness is much more harmful to productivity in some jobs than in other jobs." (Becker, Murphy 1988: p. 682).

They illustrate addiction with a technical concept that is familiar to economists, unstable steady states. Steady states are long-run equilibrium positions in models of dynamic optimization. Steady states are those positions to which consumers would converge, in the case that no other external shock or change in condition moves the long-run equilibrium to another position. In a steady state consumers or economies have stopped to adjust their levels of consumption and investment, because they are already in the optimal position. Steady states can be stable or unstable. When they are stable, a shock might induce a change in the consumption level, but with additional time the consumption level moves back towards the steady state level. When they are unstable, a shock induces a change in the consumption level, but now the consumer or the economy is drawn towards another stable state with a higher or lower consumption level.

Becker and Murphy apply the logic of steady states to the consumption of an addictive good. They argue that "an increase in the degree of potential addiction (i.e., an increase in the degree of adjacent complementarity) raises the likelihood that the steady state is unstable." (Becker, Murphy 1988: p. 682f.). At one point in the paper Becker and Murphy distinguish between "pathological" and "normal addictions." In the case of pathological addictions, they write that "a person's consumption of a good continues to increase over time even though he fully anticipates the future, and his rate of time preference is no smaller than the rate of interest." Normal addictions "may involve rapid increases in consumption only for a while." (Becker, Murphy 1988: p. 683). According to Becker and Murphy, a move towards a pathological addiction can be imagined as moving away from an unstable steady state position. A move towards a normal addiction can be imagined as a moving away temporarily from a stable steady state position.[240]

[240] It is interesting that Becker and Murphy use the distinction between pathological and normal addiction only one time in their article. With regards to the steady state metaphor the pathological-normal distinction does not fully overlap with the harmful-beneficial distinction of addiction. Although it is plausible to describe harmful addictions as moving away from an unstable steady state, it is also plausible to describe beneficial addictions as moving away from an unstable steady state. In both cases the individual converges towards a new consumption position, a worse one or a better one – in terms of overall utility. Becker and Murphy do not define any further what normal addictions are.

To justify their economic definition of addiction, Becker and Murphy also cite some non-economic literature, but only very sparsely. Among the 27 references that they list below their article, only five are references from outside the economics discipline.[241] Among the psychology research literature that they cite, Becker and Murphy identify the concepts of reinforcement and tolerance as key characteristics of addiction. They write that "reinforcement means that greater current consumption of a good raises its future consumption. Reinforcement is closely related to the concept of adjacent complementarity." They write that "[t]olerance means that given levels of consumption are less satisfying when past consumption has been greater." And they argue that "harmful addictions (but not beneficial addictions) do imply a form of tolerance because higher past consumption of harmful goods lowers the present utility from the same consumption level" (Becker, Murphy 1988: p. 682).[242]

Becker and Murphy (1988) shortly address some critique that had been leveled towards the Stigler-Becker model of addiction. They wrote that "[s]ome critics claim the model of Stigler, Becker (1977) – presumably also the model in this paper – is

[241] They cite one article on juvenile delinquents published in the *Journal of Abnormal Psychology*; they cite a chapter on heroin consuming veterans of the Vietnam War in the *Yearbook of Substance Use and Abuse*; they cite the *1980 Surgeon General's Report on Smoking and Health*; they cite a book by the psychologist and psychotherapist Stanton Peele; and they cite a chapter in a book titled *Commonalities in Substance Abuse and Habitual Behavior* that was edited by the *National Research Council* of the *National Academy of Sciences*. That last book is the outcome of reviewing research by members of the *Committee on Substance Abuse and Habitual Behavior* that has been formed in 1976 by the *National Research Council*. Among the members of this committee was one economist, Thomas Schelling. For more on Schelling and the Committee see Fontaine (2024). For more on the developments of addiction research in the 1980s, see Campbell (2007).

[242] They cite a chapter in the book edited by members of the *Committee on Substance Abuse and Habitual Behavior*. The chapter has been written by three psychologists and a psychiatrist and is called *A Learning Approach to Commonalities*. The authors of the chapter review research on substance abuse and habitual behavior and propose six properties that that they see relevant in both addiction and habitual behavior: First, the "[a]bility of the substance to act as an instrumental reinforcer[;]" second, "[a]cquired tolerance" or the fact that "[r]epeated use can result in reduced effectiveness of the substance[;]" third, "[d]evelopment of psychological and physiological dependence with repeated use[,]" or the fact that "[r]epeated use produces withdrawal effects that motivate further use[;]" fourth, "[a]ffective contrast[,]" meaning that "[t]he substance tends to produce an initial affective state (euphoria) which is then followed by an opposing state (dysphoria)[;]" fifth, "[t]he ability of the substance to act as an effective Pavlovian unconditioned stimulus[;]" and sixth, "[t]he ability of various states (general arousal, stress, pain) to influence substance abuse" (Donegan et al. 1983: p. 111f.). Becker and Murphy explicitly take up only the first two properties.

unsatisfactory because it implies that addicts are 'happy,' whereas real-life addicts are often discontended and depressed (see, e.g., Wilson 1980)." According to Becker and Murphy it is rather the other way around. They argued that their addicts in their model "would not be happy if their addiction results from anxiety-raising events, such as a death or divorce, that lower their utility[,]" even if they are assumed to rationally maximize lifetime utility. They argued that their model "recognizes that people often become addicted precisely because they are unhappy." They added that addicts "would be even more unhappy if they were prevented from consuming the addictive goods" (Becker, Murphy 1988: p. 691).

Similar as Stigler and Becker have argued in 1977 in the *De Gustibus* article, Becker and Murphy (1988) argued that "[i]t might seem that only language distinguishes our approach to the effects of events on addictions from approaches based on changes in preferences. But more than language is involved." In the late 1970s Stigler and Becker criticized economic explanations based on changes of tastes mainly as ad-hoc, non-scientific research. In 1988 Becker and Murphy disregarded approaches that stressed intertemporal inconsistencies of decision making. They argued that alternative modeling approaches would often stress "different preferences or personalities fight for control over behavior."[243] They cite related work of the economists Thomas Schelling, Gordon Winston, and Menahem Yaari, and of the philosopher Jon Elster.

Becker and Murphy used these alternative approaches to distinguish their own modeling approach. They wrote that "[b]y contrast in our model, present and future consumption of addictive goods are complements, and a person becomes more addicted at present when he expects events to raise his future consumption. That is, in our model, both present and future behavior are part of a consistent maximizing plan" (Becker, Murphy 1988: p. 691f.). They argued that "[w]eak wills and limited self-control are not needed to understand why addictions to smoking, heroin, and liquor can end only when the

[243] For example, the nonaddictive personality makes commitments when in control of behavior that try to reduce the power of the addictive personality when it is in control. The nonaddictive personality might join Alcoholics Anonymous, enroll in a course to end smoking, and so forth" (Becker and Murphy 1988: p. 691).

consumption stops abruptly" (Becker, Murphy 1988: p. 693). Instead Becker and Murphy explain cold turkey abstention in the terms of their own model. What often seems to be the result of the struggle of will can also be explained in terms of trial and error processes to find the subjectively optimal method to realize long-term benefits in the presence of considerable short-term losses. They argued that "[t]he claims of heavy drinkers and smokers that they want to but cannot end their addictions seem to us no different from the claims of single persons that they want to but are unable to marry or from the claims of disorganized persons that they want to become better organized. What these claims mean is that a person will make certain changes – for example, marry or stop smoking – when he finds a way to raise long-term benefits sufficiently above the short-term costs of adjustment." (Becker, Murphy 1988: p. 693).

The Becker-Murphy model can be interpreted as a preventive defense of microeconomics as it was practiced by Becker and Murphy. They proposed their definition of addiction as a challenge for other research, while recognizing that the phenomenon of addiction itself constitutes a challenge to microeconomics. They argued that "[a]ddiction is a major challenge to the theory of rational behavior. Not only cigarettes, alcoholic beverages, and cocaine are obviously addictive, but many other goods and activities have addictive aspects" (Becker, Murphy 1988: p. 695). According to them "[p]eople can get addicted not only to alcohol, cocaine, and cigarettes but also to work, eating, music, television, their standard of living, other people, religion, and many other activities."[244] But, they argue that if addiction must be explained in another way, "much behavior would be excluded from the rational choice framework" (Becker, Murphy 1988: p. 676) As in the Stigler-Becker model, Becker and Murphy argued to propose their own model as a challenge in the direction of scholars of other disciplines to come up with better explanatory frameworks.[245]

[244] At times, Becker and Murphy are contradictory or imprecise. For example, they claim that people can become addicted to their standard of living, people, or religion. Yet, in another instance, they state that "[a]ddictions involve an interaction between persons and goods" (Becker & Murphy, 1988, p. 682).
[245] Becker and Murphy wrote that "[w]e do not claim that all the idiosyncratic behavior associated with particular kinds of addictions are consistent with rationality. However, a theory of rational addiction does

Whatever was feared by Becker and Murphy in taste-based approaches, their own definition of addiction is a definition in terms of individual utility production technology. Instead of describing addiction as a result of changing preferences, Becker and Murphy describe addiction as a result of changing constraints, the changing state of individual production technology with which consumers continue to use addictive goods. Whether they dress this explicitly in the terms of household production theory, or not, the basic logic is the same. They assume a simple learning process by which consumers become more efficient in extracting utility from the addictive good, while at the same time they become used to the level of consumption they have obtained in the past. Therefore, they tend to demand higher levels of consumption than in the past. If problems like addiction can be described in terms of constraints, they can be addressed easily through economic policy – at least in principle.

4.5 Conclusive remarks

As models of habit formation became increasingly formulated in intertemporal, dynamic terms, the addiction model also evolved into a full dynamic model. Picking up the basic ideas from the Stigler-Becker model and embedding them dynamically in the literature of rational habit formation made the initial sketch of a model a full-fledged intertemporal explanation. Although Becker has been the central force behind this process, the whole construction process of the rational addiction model contains also the work of Iannaccone and of Stigler and Murphy. Given the centrality of Iannaccone's synthesis, one might say that Becker contributed to the development not only as a researcher, but also as a PhD supervisor.

Rational addiction has been modeled initially as a form of productivity enhancing consumption in the household production framework. While being adapted, the model

explain well-known features of addictions and appears to have a richer set of additional implications about addictive behavior than other approaches. This is the challenge posed by our model of rational addiction" (Becker, Murphy 1988: p. 695).

has been placed by Iannaccone in the rational habit formation literature. All main characterizations that we have identified in rational habit models also hold for the rational addiction model. The biggest difference is a difference in rhetoric emphasis on the importance of describing change in terms of production constraints and not in terms of individual preferences that was repeatedly put forward by Becker and his coauthors. In terms of general criticism of the unrealistic and complicated intertemporal optimization procedure that economists assume, both rational addiction and rational habit formation are similarly vulnerable. While others have criticized the rational addiction model for its representation of addiction as unconflicted, consistent planning of future consumption, Becker and Murphy used addiction to make an argument for modeling human behavior as consistent, intertemporal optimization of utility that should be valid and useful even for a twisted phenomenon such as addiction.

Part II: Conclusion

In Part 2, we examined the methods economists used to describe habits and addiction in the post-WWII era. We described the rational addiction model, comparing it to other habituation models from the 1970s and 1980s. We provided such a detailed history of the modeling of rational addiction because we believe it helps one better understand the meaning embedded in the Becker-Murphy model of addiction.

In Chapter 3 we have described how different economists from the 1950s to the 1980s have introduced habits in formal demand models. We can note two big changes in these years. First, we have shown how habits were seen as a means to make the empirical demand estimations more dynamic in the 1950s and 1960s. In addition, in the 1970s and 1980s theoretically-minded economists became interested in the effects of habit formation to describe how preferences can partly be made endogenous on the past. In Chapter 4 we have looked in particular at the development of the rational addiction model from the mid-1970s to the late 1980s. Second, we have shown how intertemporal utility models became more prominent among economists in the 1970s and 1980s. While intertemporal utility optimization made it possible to model consumers more sophisticated in taking account of the future, it made finding optimal solutions much more complicated.

With regards to habit formation the introduction of intertemporal utility models had profound consequences for the assumptions implicit in demand models. It led to the development of so-called rational habit formation models that differed from the former habit models, often called myopic or naïve habit formation models. First, consumers were assumed to be engaged in allocating resources at any moment with regards to the future. This meant that their lifetime opportunities were limited by an intertemporal budget constraint and this budget constraint can be used to make the generally unpredictable future accessible. Second, habits were not only seen as psychological stocks, but as resources that could and should be used to maximize utility over time. Third, consumers were assumed much more sophisticated in their capacity to assess the future effects of their

current actions and of the habits that they build up with their consumption. While estimating demand with habit formation is one thing, doing welfare analysis with habit formation is still another thing. We have seen how the introduction of habits posed thorny questions for welfare analysis and how models of naïve and of rational habit formation both were limiting the representation of habits in the model in different ways.

We have described how the rational addiction model was first described as an extension of a household production model, how it was placed in the literature of rational habit models, and how it was later reframed as a rational choice model. It provided conceptual innovation for microeconomics as the model described concepts like reinforcement, tolerance and withdrawal in microeconomic terms. While the authors of the rational addiction model positioned their model close to rational habit formation models, they followed a convention to describe habituation in terms of production constraints and not in terms of preferences.

Part III:
Reception & Dissemination

Introduction

Quite literally, rational addiction was a product of intertemporal optimization, imagined by looking at individual persons as micro enterprises. In Part 2 we have retraced what economists like Becker and Murphy meant when they were speaking about addiction in economic terms. We can trace conceptual changes in the description of habituation processes by looking mainly at published articles, reviewing the literature from far. But tracing the more political and ideological aspects of the conceptual changes of descriptive theory is often more complicated.[246] It is difficult to make these aspects visible in historic sources without falling back into shallow readings of historical sources that can be too easily denounced as personal projections by political or ideological a-priori's that are projected in the sources by the historian.[247] As historians of economics we are thus confronted with a historiographic difficulty to capture also the more political, ideological, or otherwise value-laden aspects of descriptive theory.

In Parts One and Two we highlighted the value-ladeness of descriptive theories occasionally. In Part 3 we approximate some ways in which the rational addiction model is value-laden more systematically. As we continue to do a history "from far," we chose to approach the different values and virtues associated with the model through a comparative analysis of the reception of the rational addiction model. Focusing on the reception of the model by others extends the collection of sources horizontally – adding further views on the rational addiction model after the model had been published. By comparing the reception of model in different communities of scholars, we illustrate how rational

[246] While peer-reviewed articles are often highly specialized and technical, books contain usually a self-confirming frame of their authors. Published critical accounts by other researchers usually mirror only that part of criticism that is conceived as publicly expressible.

[247] I want to stress that I believe that everybody reads the world around him in some political and ideological terms. That is ok, but that is no good justification for historical research. It would be fallacious to strive for false objectivity, but historical expertise should also be more as just the projection of one's personal a priori's on a collection of historic sources. (At least if one has no reason to assume that one's own personal a priori's are meaningful more generally for society.) As stated in the general introduction, approaches from feminist epistemology seem most promising to us as inspiration for a situated historiography with regards to one's own partiality as an observer.

addiction has not only been created as a descriptive concept by its authors, but also how it has been perceived by others as a political fiction.[248]

In our comparative reception study, we look at the rational addiction model as a virtual benchmark. We do not look at the model as a benchmark in the marketing sense of the term benchmark, as a measure of comparative performance. Rather we use the term benchmark to describe a model as a generally known reference that is collectively perceived and received. For each of the communities considered in Part 3 we describe the rational addiction model as benchmark focusing on different practices reflected in the model. Looking at the model as a virtual benchmark is for us also a means to discipline and organize our reception study along some key aspects that we identified as important in reading the literature referring to the model. As a matter of method, the results of our comparative studies are crucially dependent on the cases that we have selected for comparison in the first place.

Each chapter in Part 3 consists of one case in our comparative reception study. Each case represents a different community of researchers and a different subfield of research. In each chapter, in each of the communities, the rational addiction model is seen slightly differently. In fact, we have chosen the communities in part because they mirror these different receptions of the model.[249] As the rational addiction model has been created in several steps (see Chapter 4), we describe the different receptions as they evolved in parallel to the creation of the model culminating in the reception of Becker and Murphy's

[248] In light of the strong criticism of the War on Drugs by Becker and the context of US policymaking, it would also make sense to read the model as if Becker construed it as a political fiction supporting alternative policy directions that could change the country's fate.

[249] The three communities of Chapters Five, Six, and Seven are not fully separate. Some researchers that appear in one of the chapters could also appear in one of the other chapters. For example, the work of George Ainslie has been a great source of inspiration among behavioral economists, but Ainslie has built his theory of motivational conflict on results from animal experiments. His theory is partly built on behavioral psychology results such as the Matching Law. Jonathan Gruber is another example, although we look on Gruber in Chapter 7 as a behavioral economist, it would not be wrong to describe Gruber as an applied health economist who has been part of the NBER health economics problem doing research on the health behavior of adolescents. Some researchers like the psychologist Richard Herrnstein saw the rational addiction model actually as a methodologic and as prescriptive benchmark.

model from 1988. We report the results of our comparisons along the way in the chapters, but we provide a brief summary of our comparative study in the conclusions of Part 3.

In Chapter 5 we look at how the rational addiction model has been seen by behavioral psychologists. Sharing similarities in the view of individual behavior over time and between the hedonistic character of utility and reinforcement, behavioral psychologists saw addiction similarly as a result of dynamic adaptation. But for them the rational addiction model was clearly an instance of maximization methods. Due to these methodological connotations we describe the rational addiction model as a methodological benchmark for behavioral psychologists.

In Chapter 6 we describe how the model has been taken up by applied health economists. Applied health economists adapted the model quite quickly as a theoretic guide to model health habits, activities that had detrimental effects on personal health. Providing a pivotal role for personal discount rates and an economic sense to habituation, we describe the reception of the rational addiction model in this community as theoretic benchmark that served as guidepost to model health related intertemporal consumption activities. The applied health economics community is not fully independent of Becker and Murphy. In fact, one of the key researchers that we look in this chapter, Michael Grossman, has been cowritten several papers about addiction after 1988. We use this chapter also to present Becker's wider framework of meta preferences seems to be quite complementary to the work of the health economists.

In Chapter 7 we sketch out how the rational addiction model has been received by behavioral economists. From the 1980s onwards, the meaning of behavioral economics was consolidated while the label behavioral economics was being appropriated by a movement of economists organized around people like Richard Thaler and George Loewenstein. From the early days of their formation as a group, behavioral economists saw the rational addiction model as a partial representation of addiction as best, as a blunt misrepresentation at worst. As we show in Chapter 7, they did not agree with the prescriptive implications that they saw associated with the partial representation of

addiction contained in the rational addiction model. That is why we describe the rational addiction model as seen by behavioral economists as a prescriptive benchmark.

Instead of using the term reception, we could also use the terms transmission, dissemination, or adoption. Part 3 illustrates not only some normative aspects of the rational addiction model, it illustrates as well how theories and concepts become known and become used in a collective discipline. Before the propositions of researchers become popular and public references, they are disseminated, used, adapted, discussed, and criticized. The engagement of the wider disciplinary public with the initial proposition can be quite different. Observing the process of how the rational addiction model has been transmitted in different communities attributes some agency in the transmission process to those who adopt, criticize, or disseminate the model.

5. Becoming a methodological benchmark: The rational addiction model seen by behavioral psychologists

5.1 Introduction

One question that has repeatedly occupied the minds of economists and historians of economics in the post-WWII decades is the relationship between economics and psychology. Some have advanced the view that economists have tried to withdraw all references to psychology with the adoption of an ordinal vision of utility. In this view neoclassical economists are described as having tried to minimize links to psychology in order to establish economics as a separate, scientific discipline. Especially, Paul Samuelson has been associated with behaviorism for his proposition of revealed preference theory. According to similar historical narratives, psychology was brought back into economics in the late 20th century by so-called behavioral economists. Behavioral economists have often argued that more accurate psychological underpinnings of economic theory make the predictions derived from it more precise and realistic and therefore better.

Others have argued that this story is too simple and misrepresents the relationship of post-WWII neoclassical economics to psychology. Neither have neoclassical economists like Samuelson been true behaviorists, nor has psychology been really out of economics. Although economists like Samuelson were probably impressed by the wider scientific norms of their time, post-WWII economics was not a behaviorist discipline like psychology.[250] Although both behavioral psychology and microeconomics stressed the

[250] The historian of economics José Edwards has remarked, in the post-WWII decades, both behaviorist psychologists like Burrhus Skinner and microeconomists like Samuelson were applying theories of behavior permitting social control (Edwards 2016). But as the observational and interpretative techniques differed greatly in the two disciplines, the resulting behavioral expertise differed greatly as well. For example, statistical control in applied economics or econometrics is very different from the observational control in animal laboratories (see Edwards 2016: p. 185).

scientific aim to predict behavior, both disciplines differed in important aspects about the interpretations of any such predictions.[251]

In this chapter we look at the reception of the rational addiction model among a group of psychologists in order to describe how the economic analysis of the rational addiction model relates to psychology. We show how the model has been picked up by behavioral psychologist and we describe how they translated what was expressed in terms of utility theory into expressions of reinforcement theory. To the extent that the rational addiction model represented a certain style of doing microeconomics, we argue that these interdisciplinary discussions might provide an interesting perspective on microeconomics in the 1970s and 1980s more generally. Although there remain many crucial differences between the behavioral psychologist's vision and the microeconomist's vision, we argue that some basic similarities express a certain affinity between the two approaches.

Whether economists emulated behaviorism, or whether they tried to keep it at distance, the rise of behaviorism in the early 20th century and its impact on the social sciences more generally seems to be uncontested among most observers. According to the historian Rüdiger Graf the rise of behaviorism in the 1920s can be seen as the beginning of a profound change in the social sciences more generally that pushed forward the rise of behavior as an analytic category (see Graf 2024). While behavior had initially a narrow and clearly normative meaning, behavior has become a widely used descriptive term at the end of the 20th century.[252] Graf argues that although behaviorism has lost attraction in the

[251] The historian of economics Wade Hands have argued that although behaviorist psychology and microeconomics might resemble each other on a superficial level, the two disciplinary communities differ with respect to the role that is provided for personal responsibility and volitional behavior (Hands 2010). While economists like Milton Friedman have historically assigned an important role to personal responsibility and volitional aspects of behavior, behavioral psychologists like Skinner have promoted a theory of behavior that was assigning a much more peripheric place to the free will of individual agents.

[252] Graf argues that at the end of the 19th century the term behavior had a very narrow meaning referring mostly to norms indicating how to behave properly. At the end of the 20th century, the meaning and scope of the term behavior have greatly expanded and it has become a central concept in many different social sciences according to Graf (see Graf 2024: chapter 1). Graf has described how three historical contexts have contributed to the normative discharge of the term behavior: first, "the development of behaviorist and non-behaviorist psychological sciences and their expansion since World War II[,]" second, "the behavioral revolution, i.e., the reorientation of US social sciences as behavioral sciences in the 1950s and 1960s[,]" and third "the establishment of ethology or behavioral research on animals in

1960s and 1970s with the rise of cognitive psychology, many behaviorist practices remained in practice in psychology and were complemented with practices from cognitive psychology (see Graf 2024: p. 62). As a result, "behaviorism was more pluralistic and less monolithic than is often claimed" (Graf 2024: p. 68).[253]

Although there have been different forms of behaviorism, Graf (2024) argues that they shared some family similarities with regards to how they put a conception of behavior to the heart of their analytical approaches. He describes several of these behaviorist family positions: "[conforming] to the epistemological ideal of the natural sciences[,]" "[accepting] only intersubjectively accessible, objective evidence, and therefore seek to dispense with introspection[,]" "[regarding] behavior as molar and thus distinguish it from physiological processes,"[254] "[translating] mental into non-mental vocabulary," and "[concentrating] on investigating the relationships between bodies and environments" (Graf 2024: p. 49).

Graf (2024) suggests that over the second half of the 20th century many initially behaviorist practices were normalized in parts of the social sciences. As a consequence, he argues that "some of the family similarities that characterized behaviorist approaches were also shared by the social sciences after the cognitive revolution […]" (Graf 2024: p. 68). We argue that the behaviorist positions identified by Graf fit well to describe post-WWII

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the middle third of the century" (Graf 2024: p. 87). As Graf's book has been written in German and as it has not been translated into English so far, all citations from the book has been translated into English by me, mostly by using the automated translation provided by DeepL. Each translation was doublechecked by me.

[253] Other observers of the social sciences seem to share Graf's description of behaviorist pluralism. The economist and philosopher Don Ross has described behaviorism as "the most influential school of thought in academic psychology, particularly in America" during the first half of the twentieth century. He has argued further that "[b]ehaviorism is not a single, unified doctrine, and the views of leading behaviorists have evolved as their research program has advanced." Ross distinguishes further into eliminative behaviorists and ecological behaviorists (see Ross 2014: p. 198). Historian of economics José Edwards also stresses different strands of behaviorism comparing the functionalism of John Watson, with purposive behaviorism of Edward Tolman and the radical behaviorism of Burrhus Skinner (Edwards 2016: p. 179f. and p. 188f.)

[254] When behavior is described as molar it means that it is understood as a global process or pattern happening over time. When behavior is described as physiological or molecular it is understood as a local process or pattern that happens at one moment.

neoclassical microeconomics as it has been practiced by economists like Becker. For example, in the *De Gustibus* article, Stigler and Becker conform to the epistemological ideal of the natural sciences by appealing strongly to the formulating theoretic hypotheses and testing these empirically (see Stigler and Becker 1977). Similarly, in the post-WWII decades many economists preferred methods associated with objective evidence. See for example how the health economist and former NBER-colleague of Becker, Victor Fuchs, describes "the economic approach to understanding behavior." In 1984 Fuchs has written that "[e]conomists, as a rule, are not concerned with the internal thought processes of the decision maker or in the rationalizations that the decision maker offers to explain his or her behavior. Economists believe that what people do is more relevant than what they say" (Fuchs 1984: p. 14).[255] In this chapter we show how also the other three behaviorist positions might fit to describe economists like Becker – at least with regards to the rational addiction model.

Our historic account of the reception of the rational addiction model can be read as a case in Graf's broader narrative. We have seen already how Becker, Fuchs, and others around them have cultivated an economic vision of non-market behavior at the CEAHBSI in the 1970s (see chapter 1 and 2). We have described how their conception of behavior in terms of the household production framework has shaped the creation of the rational addiction model (chapter 4). In this chapter we characterize the similarities that this conception of behavior shared with behavioral psychologists, but also the key differences

[255] This passage of Fuchs general audience book How to Live has also been cited as evidence for behaviorist tendencies within economics by Richard Easterlin, a contemporary of Fuchs who had crossed paths with Fuchs in the 1960s at the NBER (see Easterlin 2004: p. 21). The passage is also cited by Edwards (2016) who argues that it exemplifies a somewhat misguided use of the label behaviorism among economists. Edwards bases his argument on a distinction into fundamentally different visions of control among behaviorist psychologists and economists that have led to fundamentally different measurement practices in the two disciplines. We agree with Edwards to the point that behaviorist practices in economics were not the same as in behavioral psychology. In fact, that is what we hope to show also in this chapter. But we see expressions like the one of Fuchs also as evidence of a kind of behaviorist epistemological ideal to which economists some economists in the post-WWII decades might have appealed more than others.

that must not be ignored. To do so we look at how behavioral psychologists have looked at the rational addiction model with their vision of behavior in terms of reinforcement.

In short, behavioral psychologists saw utility theory and constrained optimization as a general theory to explain behavior. They saw the Becker-Murphy model as an instance of that general theory of behavior. Most behavioral psychologists preferred to explain addiction rather in terms of reinforcement theory. As a consequence, their interpretation of addiction differed from Becker and Murphy's interpretation. Therefore, we argue that the rational addiction model was seen among behavioral psychologists as a methodologic benchmark, as a common reference with methodological connotations.

The chapter is structured as follows. In Part 2 we describe first how in the 1980s behavioral psychologists came to discuss utility maximization as it was used by microeconomists in comparison with their own vision of behavior in terms of reinforcement called melioration. In Part 3 we describe how behavioral psychologists perceived the rational addiction model and how they countered the rational choice vision of addiction with a vision of addiction in terms of melioration that started from fundamentally different assumptions, but that was nonetheless remarkably similar. We end in part four with drawing brief conclusions.

5.2 A short primer on experimentation in economics and psychology in the post-WWII decades

Before we jump into the debate about economic maximization techniques in behavioral psychology, it is useful to quickly sketch out the different disciplinary attitudes towards experimentation as an appropriate scientific method. While experiments where largely shunned in academic circles in microeconomics in the post-WWII decades, they flourished in behavioral psychology. Despite these differences both disciplines were interested in explaining individual behavior. Out of this intellectual context grew interdisciplinary collaborations that nurtured the methodologic discussions that we discuss in section three.

5.2.1 Experiments in Microeconomics

In the early 20th century economists were traditionally skeptical of experimental techniques as it has been described by the historians of economics Annie Cot and Samuel Ferey (2016).[256] In the late 19th century and early 20th century experiments became widely used in the nascent discipline of psychology. Behaviorist psychologists like John Watson used experiments as a tool for predicting human behavior and making this knowledge accessible for the design of social institutions (see Edwards 2016: p. 180f.; see also Graf 2024: p. 43-49). The historian of sociology Charles Camic has described how the aggressive rhetoric of behaviorists had profound consequences for other social scientists like sociologists (see Camic 1986).[257] Economists in the early 20th century differed with regard to the extent with which they complemented their analyses with psychological insights, but they abstained largely from engaging themselves in experimentation.[258] Instead economists specialized over the course of the 20th century in interpreting an increasing an widening array of already collected statistical data.

The non-use of experimental techniques has at times been actively defended from within the economics discipline. In 1942 the statistical economists Allen Wallis and Milton Friedman criticized experiments as a technique for the measurement of utility (Wallis and Friedman 1942).[259] Wallis and Friedman criticized an experiment that has

[256] Most famously, the 19th century economic philosopher John Stuart Mill had stressed fundamental differences between observing nonanimated objects and animated objects. One of his key arguments had been that animated objects might react in unpredictable ways to experimental variation. Given that human beings in society are animated creatures, experiments are thus not well suited to study humans in an abstract and logical framework of science built on hypothetical-deductive reasoning (see Cot and Ferey 2016: p. 12).

[257] Camic describes how behaviorist psychologists like Watson proclaimed scientific authority in explaining habits in psychological terms. As many sociologists competed fiercely about few academic tenured positions, they were directly affected by the authoritative claims of behavioral psychologists. As a consequence, Camic has argued that many sociologists retreated from explanations in terms of habits (see Camic 1986).

[258] José Edwards has described how institutional economists like Wesley Mitchell were also inclined towards functional forms of psychology to strengthen the predictive powers of economics as a science about human behavior (Edwards 2016: p. 190f.).

[259] In the 1930s, both Wallis and Friedman were graduate students at the University of Chicago. And in the 1940s, both were employed by the Statistical Research Group of the Office of Scientific Research and Development, a US state agency coordinating research for military purposes during WWII. For more

been conducted by the psychologist Leon Thurstone in 1931.[260] Their discussion focused on the role of utility functions for economics and the difficulties of quantifying indifference curves. They compared the quantitative indifference function derived from the Thurstone experiment to quantitative indifference functions inferred from statistical demand data before they rejected experimental techniques as a quantitative base for economics (Wallis, Friedman 1942: p. 188f).[261]

Despite the intellectual efforts of Wallis and Friedman, experimental methods became increasingly popular among economists in the second half of the 20th century. In the immediate post-WWII decades some economists were occasionally engaged in forms of experimentation on a small scale, but in academic circles this remained rather an exception than the norm.[262] In the late 1960s, however, some economists were drawn towards experimentation from outside of the academe, as Elizabeth Popp Berman has described (2022). As the Great Society programs by the Kennedy and Johnson administrations expanded some federal programs, they demanded heavily the quantitative expertise of economists. In the course of events some economist became involved in large-scale policy experiments like the *New Jersey Income Maintenance Experiment* (see Berman 2022: p. 119). Other large-scale social experiments followed some years later, most

on the intellectual environment at Chicago in the 1930s or the work within the Statistical Research Group, see the bibliography of Friedman by Jennifer Burns (2023). For more on the Wallis-Friedman critique, the contested issues, and its reception in the economics discipline see Ivan Moscati (2007) and Jean Sébastien Lenfant (2012).

[260] In the experiment Thurstone offered hypothetical combinations of hats, shoes and overcoats to participants to observe when they were indifferent between two options. With the responses he tried to estimate an overall indifference function. Such an overall indifference function has been proposed by Henry Schultz, economics professor at the University of Chicago and colleague of Thurstone (see Schultz 1938). Economists like Schultz assumed general indifference functions and used them to describe those combinations of goods among which individuals were indifferent. Both Wallis and Friedman were students of Schultz in the 1930s, Friedman became even his research assistant.

[261] Wallis and Friedman discussed how both approaches faced considerable differences linked to the instability of tastes of individuals (Wallis, Friedman 1942: p. 188f).

[262] For a concise description of some of the early experiments of academic economists, see Moscati (2007: p. 372) and Cot and Ferey (2016: p. 14-21).

famously maybe the RAND Health Insurance experiment in the 1970s and 1980s (see Berman 2022: p. 125).[263]

5.2.2 Experiments in behavioral psychology

Psychologists were much less aversive to experimental techniques. Graf (2024) has described how the early behaviorism of Watson fell out of fashion. While the early behaviorism à la Watson was rejected as too brute, many of its basic principles were put in action by other behavioral psychologists (see Graf 2024: p. 47f.). One of the most popular reformers of the classic behaviorism was the behavioral psychologists Burrhus Frederic Skinner. Skinner formalized and popularized a new type of conditioning called operant conditioning. Operant conditioning is sometimes called new behaviorism, because operant conditioning differs from classic stimulus-response conditioning.

Both, classic and operant conditioning, were usually observed in laboratory experiments. Under laboratory conditions living organism and their behavior can be artificially observed and isolated from the environment in which they take place. In both cases the organism is conditioned through past situations, but how this conditioning is happening is different. See for illustrative purposes figure 1. On the left of figure 1 we have represented classic conditioning. A dog has been conditioned in the following way. In the past whenever the dog received food, a bell was ringing some minutes before. As a consequence, the same dog shows a particular behavior response when he hears the bell ring, his mouth salivates even if the food has not yet arrived. The conditioned behavior is involuntary, the stimulus induces the response like a reflex. This type of conditioning is sometimes also called Pavlovian conditioning after the Russian physiologist Ivan Pavlov who experimented on conditioning with dogs in the late 19th and early 20th century.

[263] Unlike locally and temporarily limited experiments in laboratories, the *New Jersey Income Maintenance experiment* and the *RAND health experiment* were experimental set-ups for welfare policies. They were called experiments, but today one would describe them also as randomized control trials in which participants are randomly assigned into different forms of experimental treatment.

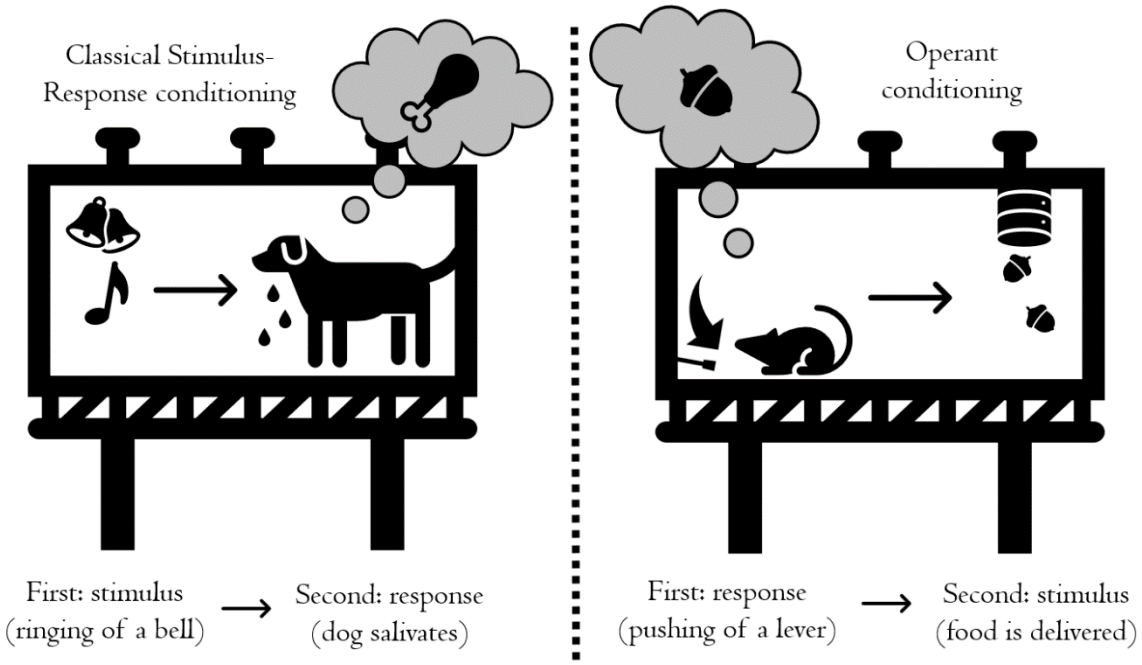

Figure 11: A representation of classical stimulus-response conditioning (on the left) and operant conditioning (on the right)

On the right of figure 1 we have represented operant conditioning as it has been practiced by Skinner and his followers. In operant conditioning the conditioned behavior can be reflexive or voluntary. In the past a rat has been conditioned in the following way. It has been in the operant chamber in which there was also one lever that could be pulled by the rat. Whenever the lever is pulled, a certain amount of food is delivered to the rat in the operant chamber.[264] The food is like a reward that the rat obtains and is called a reinforcer. After the rat has been conditioned by having learned the reinforcement contingencies of the experimental situation, it is likely to pull the lever also in future situations. Over time some behavior may be reinforced in the rat when the behavior has been sufficiently rewarded, or the behavior might be extinguished by punishing it sufficiently.[265] In both cases, in classic stimulus-response conditioning and in operant

[264] Operant chambers are sometimes also called Skinner boxes. For a description of Skinner's contributions as a scientist and public intellectual, see Alexandra Rutherford (2009).
[265] For a concise description of stimulus-response conditioning and operant conditioning see for example Herrnstein et al. (1996: p. 4-7).

conditioning the present behavior of an organism is explained by its history of interaction between the organism and its (experimental) environment.

Skinner became known in academic and non-academic circles for his scientific contributions in the 1940s and 1950s.[266] He established the Harvard pigeon lab at Harvard Universityin 1948 and was its director and until his former PhD student Richard Herrnstein became the director and intellectual leader of the lab in the early 1960s. Till Grüne-Yanoff (2015) has described how under Herrnstein's leadership the research done in the lab changed in several aspects, but generally continued to focus on operant conditioning as it has done by Skinner.[267]

Although there were some parallel developments in the post-WWII decades in behavioral psychology and microeconomics both disciplines evolved rather parallelly without much interaction. Grüne-Yanoff has described four reasons for the non-interaction between the two disciplines: institutional separation, conceptual differences between reinforcement and utility, methodological differences with regards to theoretic formulation and empirical foundation of behavior regularities, and different research subjects (animals in psychology and humans in economics), see Grüne-Yanoff (2015: p. 690).

[266] For more background information on Skinner see Grüne-Yanoff (2015: p. 686) and Rutherford (2009).

[267] Grüne-Yanoff argued that with Herrnstein's leadership the research changed in certain ways. First, under Herrnstein research became much more empirically oriented on measurement issues. Second, in Herrnstein's time as a leader new experimental designs and theoretic representations linked to the so-called Matching Law were introduced. The Matching Law is an empirical behavioral regularity popularized by Herrnstein. Third, Grüne-Yanoff has argued that in Herrnstein's time as a leader the behaviorist research principles were softened, providing theoretic space for the integration of concepts from cognitive psychology or economics (Grüne-Yanoff 2015: p. 688f.). Grüne-Yanoff has argued that "the new orientation of the Pigeon Lab under Herrnstein led to change in terminology, which in the longer run opened up their work for interdisciplinary exchange with economists" (Grüne-Yanoff 2015: p. 690).

5.2.3 Microeconomists meet behavioral psychologists

In the post-WWII decades, experimental techniques flourished in psychology but were shunned in microeconomics. In this intellectual context some economists dared to join their forces with behavioral psychologists around the partially common objective of explaining individual behavior. Two economists who reached out to behavioral psychologists in the 1970s were John Kagel and Raymond Battalio. They engaged in research projects with behavioral psychologists doing experiments in so-called token economies and in animal laboratories.[268]

In the early 1970s, Kagel and Battalio approached psychologists to find new sources of data with which to test the theory of consumers as taught in microeconomics. Both did a joint PhD thesis at *Purdue University* with an econometrician called Robert Basmann. Doing their PhD with Basmann, Battalio and Kagel searched for "data sources that would really match up to what Basmann would call the primitives of the economic theory" (Kagel cited in Svorencik 2015: p. 70).[269] The historian of economics Andrej Svorencik (2015) has described how the two young economists came into contact with behavioral psychology by coincidence. "Kagel's brother in law was an animal operant psychologist. Upon hearing about Battalio and Kagel's problems with acquiring suitable data about consumer choice, one of the brother in law's colleagues suggested that token economies could be a source of such data" (Svorencik 2015: p. 71).[270] In the following, they teamed up with psychologists like Robin Winkler who were involved in managing a token

[268] These efforts have been described to some extent in the secondary literature, see Mirowski (1994), McDonough (2003), Svorencik (2015), and Ortmann (2016).

[269] Interviewed by historian of economics Andrej Svorencik, Kagel remembered that "Basmann was interested in finding what one could call well-controlled data. […] He was looking for data that would allow economic theory to be tested without worrying about the auxiliary assumptions that standard field data require" (Kagel cited in Svorencik 2015: p. 70).

[270] Token economies are therapeutic devices that assumed operant conditioning. More concrete token economies were organizational set-ups in therapeutic institutions like mental health clinics in which patients obtained an artificial exchange unit called token money as a reward for showing desired forms of behavior. Patients can exchange the tokens they accumulate against different goods like sweets, coffee, or cigarettes, or against services like walks or a different sleeping dorm. In other words, token economies simulate market-like structures to obtain and exchange goods and rights in limited contexts of applications.

economy at *Central Islip State Hospital* in New York (see Svorencik 2015: p. 71). Together they set up experiments that were designed to test the implications from consumer theory.

Having entered the psychologist's discussion on token economies, Kagel and Battalio were able to meet another central figure of the boundary crossings between microeconomics and behavioral psychology. According to Svorencik it was a talk on their token economy experiment that Kagel was giving in the early 1970s in a psychology seminar at the *State University of New York at Stony Brook* that attracted the attention of the psychologist Howard Rachlin (see Svorencik 2015: p. 71). Rachlin was a behavioral psychologist who graduated from Harvard in 1965 studying under Burrhus Skinner and Richard Herrnstein, both widely-acknowledged for their work on operant conditioning. First Skinner and later Herrnstein were heading the Harvard pigeon laboratory in the 1960s and 1970s. The Harvard pigeon lab was a hotspot for animal experiments based on operant conditioning as has been described by the philosopher of sciences Till Grüne-Yanoff (Grüne-Yanoff 2015).[271]

By the time of Kagel's talk in the psychology seminar, Rachlin ran a pigeon laboratory at *Stony Brook University* that was modelled after the Harvard pigeon lab. Together with his PhD student of the time, Leonard Green, Rachlin engaged in extensive cooperation with Kagel and Battalio. As Svorencik stresses "they started a fruitful collaboration to which Rachlin and Green brought their expertise in running experiments with animals in operant chambers and Battalio together with Kagel, their economic expertise to interpret the collected data." Soon after, Svorencik noted, Battalio and Kagel were able to obtain a grant of the *National Science Foundation* allowing them to build an animal laboratory at *Texas A&M University* where both were employed at the time

[271] Grüne-Yanoff recounts how behavioral psychologists around Herrnstein have provided quantitative bases for the formulation of hyperbolical discounting (Grüne-Yanoff 2015: p. 683ff.). As an alternative technique to exponential discounting commonly applied in economic analyses, hyperbolical discounting became later popularized as a source of time-inconsistency by the psychiatrist George Ainslie (see Ainslie 1975, 1992, for more on the later period see section 2.3).

(Svorencik 2015: p. 71).[272] In the late 1970s and early 1980s Rachlin, Green, Battalio and Kagel published in different constellations several articles in psychology and economics journals.[273]

The joining of disciplinary efforts during the 1970s has been an innovative cooperation that lead to a kind of intellectual cross-fertilization among the microeconomists and behavioral psychologists who were involved. Diverging from what was usual in both disciplines, the research resulting from this cooperation can be considered innovative in both disciplines. But these innovations were far from being commonly praised or accepted in their respective disciplines. In economics, animal experiments were seen generally more of an exotic topic. After all, economics was traditionally seen as dealing with rational choices stemming from economic calculation – something that was expected from human agents, but not from animals. Markets were human institutions that built on a whole set of skills, capacities and institutionalization that was not expected from animals. Using animals, creatures considered lower-levelled as humans, to test economic theory met considerable skepticism.[274]

The situation was similar in behavioral psychology, as we show in the following section. The maximization tools imported from economics were not welcomed by all behavioral psychologists. Many psychologists saw the apparatus of constrained optimization with all its auxiliary assumptions and theoretic axioms as a heavy burden for the ability of theory to describe empirical observations.

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[272] As Svorencik stresses Kagel and Battalio benefited from Battalio's experiences as an electrician in the Navy in setting up their animal laboratory, and from Green's advice in buying material and programming experiments (Svorencik 2015: p. 71f.).

[273] Two articles were published in economic journals in which the team of researchers tested whether the observed behavior conforms to the implications of consumer theory. One article was published in the journal *Economic Inquiry* (Kagel et al. 1975), the other one in the *Journal of Political Economy* (Battalio et al. 1981). Two other articles were published in psychology journals, one in an edited series called *Psychology of Learning and Motivation* (Rachlin et al. 1976), the other one in the journal *Psychological Review* (Rachlin et al 1980). In these articles they promoted the idea to use key concepts from microeconomics to interpret results from operant conditioning (Rachlin et al. 1976, Rachlin et al. 1980).

[274] Rüdiger Graf has described how the approach has been strongly criticized by Herbert Simon in the 1990s (Graf 2024: 134).

5.3 The most general theory of behavior: Maximization versus Matching

In the behavioral psychology, the late 1970s and early 1980s were in the marked by considerable methodological and theoretical discussions among others about the role of maximization. This happened as the field of quantitative behavioral psychology became more organized as a scientific field. In 1978 the *Society for the Quantitative Analyses of Behavior* (SCAB) has been founded by the psychologists Michael Commons and John Nevin. Richard Herrnstein was its first president. The Society organized research symposia on different topics in operant psychology and published peer-reviewed collective volumes based on the symposium presentations (see Commons 2001: p. 275). For the first years the symposium was held annually at *Harvard University* where Herrnstein was a faculty member in the psychology department. The society organized the first symposium in 1978 and the respective collective volume appeared in 1981. Rachlin joined Herrnstein, Commons and Nevin for the organization of the second symposium that was held in 1979 and that had as a theme matching and maximization.

Some behavioral psychologists argued for considering maximization techniques to describe behavior and reinforcement over time, others argued against it. Rachlin and Green were outspoken advocates for including maximization in behavioral analysis. Herrnstein was among those who saw maximization more as a rosy, theoretic promise than a useful set of assumptions for a general description of behavior. Herrnstein was an important academic reference in the community of behavioral psychology, but also as a public intellectual in magazine texts and TV shows.[275] In the following years, Herrnstein became one of the most visible critics of maximization models of reinforcement.

275 In 1971, Herrnstein published an article in the magazine the Atlantic Monthly titled I.Q. (Herrnstein 1971). In the article Herrnstein claimed that intelligence is inheritable and he discussed changes in intelligence as measured by IQ-tests in different segments of the population among others in different racial groups. Herrnstein continued to engage in the public discussion of race, crime and intelligence over the years while using his scientific reputation as a behavioral psychologist. In 1985 he co-authored the book Crime and Human Nature: The Definitive Study of the Causes of Crime together with the political scientist and public intellectual James Q. Wilson who became known in the 1980s for the broken-window

While the community of quantitative behavioral economists grew stronger together, they discussed with quite some fervor whether maximization or melioration would be the more general and thus more important concept for behavioral psychology. This was reflected in publications. In 1980 a collective volume was published that was edited by the behavioral psychologist John Staddon carrying the title *Limits to Action: The Allocation of Individual Behavior* (Staddon 1980). Both promoters and critics of maximization had chapters in the volume.[276] Another example is the second volume of the book series called *Quantitative Analyses of Behavior* published in 1982. Having as a subtitle *Matching and Maximization Accounts*, the second volume was edited by Herrnstein, Rachlin and Commons (Commons et al. 1982).

The Matching Law had been developed and popularized by Herrnstein as an empirical regularity holding widely in animal experiments. In 1961, Herrnstein had proposed a simple equation to summarize how organisms distribute their responding behavior to different reinforcement schedules imposed by experimental environments (see Herrnstein 1961). He named this equation the Matching Law. It states that organisms distribute their behavioral responses (i.e. push different buttons) to different reinforcement schedules (i.e. obtaining an amount of food) in the same relation as the schedules deliver amounts of reinforcement (see Herrnstein 1961). With repeated engagement over time, Herrnstein argued that the allocation mechanism may reach an equilibrium in which the response frequencies for each behavioral option would have stabilized. In such a behavioral equilibrium an organism would usually tend to match the response rates with which they

theory (Wilson, Herrnstein 1985; see also Fleury 2022). In 1994 died shortly before his book The Bell Curve: Intelligence and Class Structure in American Life co-written with the political scientist Charles Murray appeared (Herrnstein, Murray 1994). Since its publication, the book has been repeatedly criticized for suggesting policy implications based on purported connections between race and intelligence.

[276] In the volume edited by Staddon Richard Herrnstein had a chapter co-written with William Vaughan in which they developed a molecular view of behavior that they called melioration which was leading to the matching law on the molar behavioral level (see Herrnstein and Vaughan 1980). The maximization theorists around Rachlin also had chapters in the volume (see Rachlin 1980 and Kagel et al. 1980).

engage in different behavioral responses with the reinforcement rates that they obtain in that environment.[277] That is why it is called "Matching" Law.

At the end of the 1970s the Matching Law had become a theory widely used to explain behavior observed in animal experiments. It was at the time simple and very widely applicable. It was consistent with a wide array of experimental findings (most with rats, pigeons, but some also with monkeys or humans) and it had been extended by other behavioral psychologists to account not only for the amount of reinforcement (the amount of food), but also for the delay in reinforcement and other aspects.[278]

The Matching Law is what is called in behavioral psychology a molar theory of behavior. That means it describes behavior over larger temporal contexts. While molar theories describe behavior as extended temporal patterns over time, molecular or physiological theories of behavior describe how organisms behave at one moment in time.[279] Resuming Herrnstein's contributions in 1997, Rachlin and Laibson have argued that Herrnstein's framework conceived the whole behavioral situation fundamentally as temporally constituted. They have argued that Herrnstein deviated from Skinner by putting less emphasis on reflex and more emphasis on the contingencies of responses and reinforcers over time (Herrnstein et al. 1997: p. 8). In other words, he has developed his theory of operant conditioning more in terms of temporal intervals and rates of behavior over these intervals, than in terms of single events.

When Rachlin and others were proposing maximization techniques as the base to define molar behavior, they were putting into question the generality of Herrnstein's

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[277] The formula of the Matching Law is as follows. $\frac{B_1}{B_1+B_2} = \frac{R_1}{R_1+R_2}$, where B_1 and B_2 are the response rates for two different behavioral responses and R_1 and R_2 are the reinforcement rates obtained for the behavioral responses. Even simpler, the formula could be expressed as well as follows, $\frac{B_1}{B_2} = \frac{R_1}{R_2}$ (see Herrnstein et al. 1997: p. 101f., footnote 1).

[278] For a description of how the Matching Law has been applied to delay in reinforcement, see Grüne-Yanoff (2015: p. 689).

[279] As Rachlin and David Laibson have argued Herrnstein deviated from Skinner putting less emphasis on reflex and more emphasis on the contingencies of responses and reinforcers over time (Herrnstein et al. 1997: p. 8). In other words, he has developed his theory of operant conditioning more in terms of temporal intervals and rates of behavior over these intervals than in terms of single events.

Matching Law. At the same time the mathematically formulated Matching Law was a possibility for them to bridge the gap between behavioral psychology and microeconomics.

5.3.1 Reinforcement maximization: The "behavioral economics" of Rachlin and his coauthors

Although several behavioral psychologists were interested in economic principles in the late 1970s, we will focus mostly on Howard Rachlin.[280] After having come more closely into contact with microeconomics through his collaborations with John Kagel and Raymond Battalio, Rachlin became a promoter of constrained optimization and utility theory among other behavioral psychologists who were on average less enthusiastic towards economic principles. Together with Kagel, Battalio, and Green, he tried to demonstrate the usefulness of maximization theory in animal experiments. In different constellations they published several cowritten articles in the late 1970s and early 1980s.

In this subsection we have selected some of their publications from the early 1980s to describe their view of "behavioral economics" as a fusion of techniques from behavioral psychology and microeconomics. An essay from 1980 titled *Economics and Behavioral Psychology* illustrates Rachlin's hope for the methodological integration of maximization principles in reinforcement theory.[281] Rachlin believed that through the development of maximization theory in behavioral psychology a "new economics based on functional

[280] Rachlin and Green were not the only behavioral psychologists that argued for using concepts from microeconomics to explain laboratory behavior. The English psychologist Stephen Lea from the University of Exeter published an article called *The Psychology and Economics of Demand* in the *Psychological Bulletin* in 1978 in which he discusses the demand curve and compares how demand curves are measured with different methods (Lea 1978, 1981). Another psychologist who proposed economic concepts as orientation for behavioral psychology was Steven Hursh from the *Walter Reed Army Institute of Research*. He published two articles in 1980 and 1984 in which he highlighted parallels between microeconomics and behavioral psychology in their focus of explaining behavior and argued for constructing an interdisciplinary behavioral economics (see Hursh 1980 and Hursh 1984).

[281] The essay was part of a collective volume titled *The Limits to Action: The allocation of individual behavior* that was edited by John Staddon. In his introduction to the volume Staddon writes that "[i]t seems timely [...] to bring together in one volume chapters primarily of a survey nature by biologists, economists, and psychologists interested in individual resource allocation" (Staddon 1980: p. xv). He writes further that "[t]he chapters in this book emphasize the intimate relation between the concepts of utility, reinforcement, and Darwinian fitness" (Staddon 1980: p. xviii).

analysis of reinforcement" could be developed, similar as it has been proposed by Skinner in 1953 (see Rachlin 1980: p. 231). Next that essay we have selected two peer-reviewed articles that exemplify how Rachlin and his coauthors have put their behavioral economic fusion into practice. In 1980 Rachlin, Kagel and Battalio published an article in the *Psychological Review* in which they modeled the behavior allocation of rats as a trade-off between labor and leisure emulating contemporary economic theories of labor supply (Rachlin et al. 1980). In 1981 they published an article together with Leonard Green called *Maximization theory in behavioral psychology* in the journal *Behavioral and Brain Sciences* (Rachlin et al. 1981).[282] Even more boldly than in the 1980 article, they argued that behavior should rather be explained in terms of maximization than in terms of the Matching Law.

As a behavioral psychologist, Rachlin (1980) looked at microeconomics with a behaviorist perspective. Mentioning recent critique of economics by psychologists, Rachlin noted that there has not been much economics critique from behaviorists.[283] Describing what such a critique would look like, he argued that a behaviorist would "see the economist

[282] The 1981 article was published together with several pages of peer commentary by related psychologists and economists. Articles published in the journal *Behavioral and Brain Sciences* are usually published with several pages of peer commentary by researchers interested in similar questions and a rejoinder of the author to the comments of her or his peers. Given that the 1981 article has been commented by many behavioral psychologists and some economists, we use the article in exemplary manner to see what Rachlin and his coauthors promised other behavioral psychologists when taking up maximization theory.

[283] Rachlin argued that economists were frequently criticized "for not taking 'psychological variables' into account[,]" by psychologists like George Katona or economists like Herbert Simon. According to Rachlin these critiques did not generally question "the division of behavior into rational and irrational components." (Rachlin 1980: p. 212). Rachlin saw many recent critiques of economics coming from cognitive psychologists. To his judgment decision theory was "[p]erhaps the part of psychology already most integrated with economics[.]" He argued that "[t]he basic strategy of decision theory is to assume a set of preferences shared by humans in a given culture and to derive a strategy for maximizing value according to those preferences." When behavior fails to conform to the 'rational' predictions, decision theory would retreat "from the assertion that human behavior is rational and postulates various forms of less-than-rationality." In these cases, maximization would no longer hold true, and the resulting behavior would be explained differently. As examples, he cited Herbert Simon's concept of satisficing (see Simon 1956) and Kahneman and Tversky's prospect theory (see Kahneman and Tversky 1979). In cases of such theoretical-empirical mismatches, Rachlin claimed that "the main theoretical effort of decision theory is spent on revisions and elaborations of the internal cognitive mechanism that mediates between environment and behavior" (Rachlin 1980: p. 227). Rachlin described his version of "behavioral economics" as less cognitive and more behaviorist.

as already taking psychological variables (such as choice, incentive, delay of reinforcement) into account, but not realizing that they were psychological variables." Rachlin argued that "[t]his lack of realization might seem to be only a semantic issue […] [b]ut the consequences are actually considerable." The consequences were considerable to Rachlin because "[i]t is not just a question of labeling, but also a question of method by which behavior is studied." While most economists would not consider economics an experimental science, Rachlin wrote that "[t]he behavioral psychologist, in identifying a part of economics as psychology, is saying that a part of economics is subject to direct experimental verification" (Rachlin 1980: p. 212).

Having cooperated with economists like Kagel and Battalio, Rachlin described his perception of economics as a science of social organization. He described economics as a collection of mathematical and conceptual systems that was developed "for relating the principles of individual behavior (microeconomics) to larger economic systems such as firms and nations (macroeconomics)." To a psychologist, Rachlin argued that these systems were "remarkably worked out on the level of individual behavior, but [it is] not quite so clear as to how one moves from predictions about individuals (which are rarely tested directly) to predictions about aggregates of individuals in a real economy." As the theoretic assumptions are rarely tested, Rachlin argued that the conceptual systems of economic thought would "stand on shaky ground" (Rachlin 1980: p. 213).

Testing fundamental assumptions of microeconomics was for Rachlin one of the most promising areas of a potential "behavioral economics." He criticized that economists "have focused narrowly in the direction of the applications of their work in large-scale economic systems where costs (and often political and ethical considerations) make experimentation impossible." But in the course of applying theory through policy, economists have not turned in the other direction to test the fundamental assumptions on which their expertise is grounded argued Rachlin.[284] Psychologists, on the other hand,

[284] As a psychologist Rachlin claimed that "[t]hese assumptions are not just influenced by psychology. They are the very behavioral facts that are the providence of psychology" (Rachlin 1980: p. 221).

would have the "experimental techniques to discover the shapes of indifference contours and how they vary as circumstances change." Therefore, he claimed that "economists and psychologists have not realized that microeconomics and behavioral psychology are one and the same field" (Rachlin 1980: p. 221). Although Rachlin anticipated resistance on both sides, from within economics and from within behavioral psychology, he believed that it would be worth to develop a behavioral economics along the lines he proposed it. He claimed that economics might become "a more precise, if no less dismal, science" as the intuitive assumptions on which its predictions were founded would become "empirically based assumptions" (Rachlin 1980: p. 230). But psychologists might profit as from the development of "behavioral economics" as it could make their theories more widely applicable outside of the laboratory.[285]

For Rachlin, the behavioral psychologist, economics was strongly associated rational behavior and with utility maximization. He described what he perceived as a standard view of rationality in economics. "If a person behaves within the limits of his freedom to behave, so as to maximize something good, he is behaving rationally." Otherwise, he argued, economists would interpret the person as irrational, the behavior of the person as outside the scope of economics, and the explanation of such behavior would be delegated to other disciplines like psychology. Rachlin argued that such a definition of rationality does not make much sense. He wrote that "all behavior, free to vary, can be considered rational." That meant for him that "[i]f a psychologist accepts the economist's definition of rational behavior and then sets out to study what is left over, he will find himself with little or nothing to study" (Rachlin 1980: p. 205f.).

Instead of accepting the economics definition of rationality, Rachlin provided an adjusted definition of rationality in terms of operant conditioning. He stated that "all behavior of all organisms, human and nonhuman, varies so as to maximize something

[285] Rachlin argued that "[e]conomists, as opposed to psychologists, have exerted considerable influence in business and government[,]" even though "[t]heir influence, it seems, is more due to their willingness to make recommendations and predictions than to the utility or accuracy of the recommendations and predictions they make" (Rachlin 1980: p. 230).

good[.]" But, he excluded one class of behavior from it: reflexive, nonvoluntary behavior. What Skinner called respondents, the responses from classical conditioning, should not be considered as rational.[286] 'The reason was for Rachlin that respondent behavior is "completely constrained in the sense that given a stimulus and a certain physiologically defined state of the organism, the response invariably occurs" (Rachlin 1980: p. 206). But what Skinner described as operant behavior was for Rachlin overlapping with rational behavior. Rachlin wrote that "operants are behaviors that are manipulable by reward and punishment: they are increased in rate by rewards contingent upon them and decreased in rate by punishment." When operants occur they "tend to vary so as to increase rewards and decrease punishments – the same sort of thing that rational behavior is said to do." That was why Rachlin concluded that if behavior would actually "vary so as to actually maximize reward, the rational behavior appropriated by the economists would be operant behavior" (Rachlin 1980: p. 207). Freed from the usual rationality connotations, Rachlin saw maximization basically as a theoretical tool open for use also by behavioral psychologists.[287]

Describing rational behavior meant for Rachlin, Green, Battalio, and Kagel to provide theoretic rationalizations of behavior that are likely to hold over a defined set of situations – whether this was done by economists or by other social scientists. What counts for them to provide rationalizations of behavior was not whether research subjects can express their rationality understandably. Rather rationalizations depend on whether observed behavior can be rationalized from a third person perspective by testing whether the observed behavior confirms principles that are associated with other forms of rational behavior. Rachlin and his coauthors argued that "[w]hen a human explains his own

[286] Rachlin wrote that "[t]hese behaviors may or may not be beneficial in some ways, for example, salivation is beneficial in digesting food. However, no one considers them rational – or irrational" Rachlin 1980: p. 206).

[287] Rachlin argued that if one defines economics not in terms of rationality, but only "as the study of behavior as a maximization process[,]" one also "strips it of some generally accepted limitations." Rachlin argued that measured by what economists say about maximization under constraints, the "behavior of seemingly irrational biological entities can be shown to be a maximization process[.]" Thus, one could say that "economics as a principle of maximization, is thus a theoretical tool applicable in field and laboratory studies of plant, animal and human behavior" (Rachlin 1980: p. 210).

behavior, we may want to say that he is rationalizing his behavior, just as we may want to say that he is rationalizing another person's behavior when he explains it; or, as we may want to say, he is rationalizing an animal's behavior when he explains it." In the same way, "this article and most theoretical papers in psychology are exercises in rationalization" (Rachlin et al. 1981: p. 385).

In principle, Rachlin and his coauthors argued, rationalizations of behavior could be obtained for human decision behavior (as usually in microeconomics), but also for animal decision behavior (as in behavioral psychology). Their kind of behavioral economics assumed the possibility to compare animal and human behavior via economic theory. That was far from generally accepted – neither in economics, nor in psychology.[288] Rachlin and his coauthors reported that economists often raise the common objection to their work "[…] that the behavior of nonhuman animals can have no relevance to human behavior because animals behave irrationally, whereas human behavior is, at least sometimes, guided by rational principles" (Rachlin et al. 1981: p. 384). For Rachlin and his coauthors the main difference was that humans can express the causes for their own behavior, while animals cannot. But this did not mean that the causes of animal behavior were not accessible to observers. Instead of deeming animals simply as irrational and thus uninteresting, they argued to interpret animal behavior given their experimental environment and their behavioral history (see Rachlin et al. 1981: p. 385).

Rachlin, Green, Battalio, and Kagel saw their view of rationalized observations very fitting in behavioral psychology, but also in microeconomics. As microeconomists rationalize the behavior of consumers making consumption decisions in their own best

[288] Philip Mirowski has described the animal experiments as disciplinary trials to renegotiate what counts as natural and social (see Mirowski 1994). He argued that these experiments were used and could be used as defenses of traditional neoclassical economics as the boundaries between animals and humans were explicitly fuzzy in the way how economic theory was applied in these experiments. According to Mirowski some renowned economists as Nicholas Georgescu- Roegen quitted their membership in the *American Economics Association* in order to express their resentment with the publication of animal experiments in the *American Economics Journal* (see Mirowski 1994: p. 461). Rüdiger Graf has described as well how the animal experiments as applications of economic theory were criticized by Herbert Simon later in the 1990s (Graf 2024: p. 134).

interest, they proposed to rationalize the laboratory behavior of rats or pigeons with regard to that animal's best interest. As economists use revealed preference theory to discover human preferences, behavioral psychologists could use similar principles in animal experiments. By analogy with consumer theory, rationalizations of animal behavior could be obtained by "[…] discovering what that animal chooses in one situation, constructing a theory of preference (a utility function and set of indifference contours) and applying that theory to other behavior[,]" just as economists use the theory of revealed preferences (see Rachlin et al. 1981: p. 385).

The basis for "behavioral economics" was for Rachlin (1980) the introduction of maximization principles to model choice behavior of organisms in experimental situations. He argued that behavior in most operant conditioning situations can be described as an interplay of three variables: Reinforcers, operants, and alternative behaviors. First, there are reinforcers, in animal experiments usually water or food, which are contingent on the response behavior of the organism. Second, there are operant responses (or simply operants) which are the behavior on which the reinforcers are contingent. In most animal experiments the operants were "pressing a lever, packing a key, [or] pushing a button[.]" And third, there are other types of behavior that are available to the organism in the experimental situation, for example doing nothing or discovering the experimental chamber. Rachlin argued that "[a] maximization approach views operant behavior not as reinforcement of the response, but as the adjustment of all three behaviors [reinforcer, operant response, and other behavior] so as to achieve a maximum value." As in economics, Rachlin argued that "substitutability among the alternatives must be considered along with constraints among the alternatives."[289] If properly done, Rachlin argued that "a maximization mechanism and a reinforcement mechanism are indistinguishable" with regards to steady-state equilibria of behavior over time (Rachlin 1980: p. 222f.).

[289] In this chapter, but even more in journal articles, Rachlin has been much more detailed in formalizing his ideas mathematically. As microeconomists, the behavioral psychologists engaged in operant conditioning experiments with animals were formulating the behavioral regularities and concepts usually in mathematic formula. Like economists, they were well trained in mathematics.

Rachlin represented his reasoning also graphically by translating the key variables of operant conditioning into graphic representation common in microeconomics. Figure 2 shows how Rachlin imagined operant conditioning basically as the outcome of maximizing a level of reinforcement given to behavioral constraints. While the figure shows indifference curves like in economics, it does not display budget constraints as they are seen in economics. Instead the figure show feedback functions that specify the behavioral constraints as they exist in operant conditioning. Such behavioral constraints are the reinforcement contingencies contained in the different reinforcement schedules that were set up by the behavioral psychologist in animal experiments.

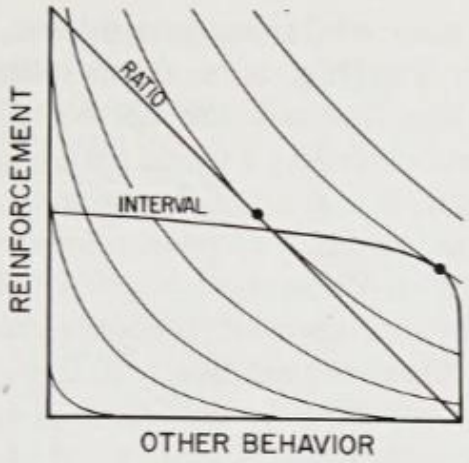

Figure 7.2. A space defined by various combinations of behavior involved in consumption of a reinforcer (labeled *C* in the text) and other behavior (labeled *N* in the text). A point in the lower left of the space would represent low amounts of both reinforcement and other behavior. A point in the upper right of the space would represent high amounts of both. The thin curved lines are indifference contours representing hypothetical loci of points of equal value. Higher contours are of greater value. The thick lines are budget lines representing limitations on attainable points imposed by ratio and interval schedules of reinforcement. The black dots at the points of tangency of the budget lines and the indifference contours are the highest possible values attainable within the limitation imposed by the budget lines.

Figure 12 A reprint of Figure 7.2 from Rachlin (1980: p. 223). The figure represents different schedules of reinforcement as feedback functions in a similar manner as budget constraints are represented in microeconomics

Figure 2 shows how an organism in an experimental environment can choose a combination of different behaviors. They can engage in the operant behavior and obtain

reinforcement (represented on the vertical axis), or they might otherwise do other things, rest or look around for example (represented on the horizontal axis). Engagement in different types of behavior on the two axes are measured as rates over time. No matter how an organism behaves during an experimental session, the combination of behavior ratios of the organism will be on the feedback function. Figure 2 contains one feedback function for a ratio schedule of and another feedback function for an interval schedule. According to maximization theory, Rachlin argued that an organism will be on that spot of the feedback function that permits the organism to obtain the highest level of utility.[290] In Rachlin's words, an experimental subject "essentially adjusts operant responding and other behavior within the limits of the schedule constraints so as to achieve a maximum" (Rachlin 1980: p. 224).

The main interest of the behavioral maximizers around Rachlin was to explain "how organisms allocate time to various activities" over an interval of time. Such explanations were called molar theories of behavior by behavioral psychologists. As Rachlin et al. (1980) explained that molar theories were about "the allocation of behavior to one or another activity over the course of time." As such they would abstract from "the occurrence of particular responses and the mechanism by which responses are integrated" over time. Rachlin, Battalio, and Kagel noted some disciplinary differences with regards to molar theories of choice. They wrote that "[p]sychologists (and economists) often assume that organisms cannot automatically integrate events over time. Although economic theories are all molar theories as we have defined the term, economists assume that temporal integration is a function of the rational mind of man, hence, that economics applies only to human behavior." Behavioral psychologists experimenting on animals were not necessarily assuming a fully rational mind. But nonetheless, Rachlin and his coauthors

[290] Rachlin specified that in Figure 2 the value of the operant response is ignored for the sake of simplicity. If the operant response should be displayed as well, one need to add a third axis (Rachlin 1980: p. 223).

argued that "there is a great deal of evidence, however, that not only humans but all animals integrate over greater or lesser intervals" (Rachlin et al. 1980: p. 359).[291]

Rachlin, Kagel and Battalio (1980) described how their molar theory could describe the adaptation behavior of an animal to its environment. Figure 3 contains the copy of one of the figures from their article that shows this process as a flow diagram. In figure 3 "[a]n animal (A) must choose between two environments, E1 and E2. For instance, a bird (A) might choose between sitting on a nest (E1) and looking for food (E2)." For measurement reasons "the time of observation is fixed at unit value so that T1 + T2 = 1." As a consequence of choosing environmental situations (E1 or E2) the animal obtains food or other reinforcements represented (C1 or C2)." Conceptually, the authors stressed that T1 and T2 were outputs emitted by the animal, while C1 and C2 should conceptually be seen as inputs to the animal, reinforcement or feedback. The molar theory represented in figure 3 is an incentive theory in the sense that it expresses "choice (the ratio T1/T2) as a function of reward (C1 and C2)" (Rachlin et al. 1980: p. 360).

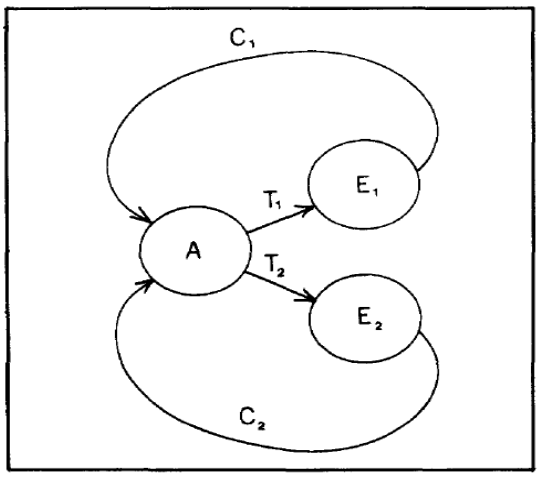

Figure 1. Flow diagram of a molar choice situation. (An animal [A] in a period of time [$T_1 + T_2$] allocates part of the period [T_1] to an environmental situation [E_1] and part of the period [T_2] to another environmental situation [E_2]. The animal receives commodity C_1 from E_1 and C_2 from E_2.)

Figure 13 A molar choice process according to Rachlin et al. 1980: p. 360)

[291] Rachlin and his former PhD student Green had made experiments with pigeons on their intertemporal consumption behavior and their ability to abstain from immediate consumption of food in order to access a higher amount of food that was delayed in time (see Rachlin and Green 1972, see also Rachlin 1974).

Figure 3 illustrates also what behavioral psychologists call schedules of reinforcement. A schedule of reinforcement defines the reinforcement contingencies with which organisms in the experiment are confronted. In figure 3 the schedule of reinforcement is represented by the commodities C1 and C2 that result from choosing the environmental situations E1 or E2. The behavioral psychologist observes the behavioral responses that are chosen by the organism (T1 or T2) and the reinforcements that are obtained as a consequence (C1 and C2) in order to interpret how the environmental situations reinforce patterns of choosing. As behavior is observed during a limited experimentation period the choices of behavioral responses and reinforcements are also measured over an observation interval. As they are measured over the same interval of time they can be expressed as relative ratios (T1/T2) and (C1/C2) that express how much one environmental situation (T1) was chosen relatively to another one (T2).

Rachlin, Kagel, and Battalio (1980) explain how the molar choice might resemble a maximization process. First, the authors introduce a utility function that models reinforcement as utility. It describes how overall reinforcement is created from the two commodities C1 and C2. The utility function takes the form displayed in equation 5.1.

(equation 5.1) $$U = x_1 {C_1}^y + x_2 {C_2}^y$$

In equation 1 the parameter y represents an "index of substitutability" indicating the relationship between the two reinforcers as in demand theory. The case where y equals 1 represents perfect substitutability. In this case the "indifference contours would be straight lines with a slope depending on the fraction, x1/x2 [...] that represents the degree to which C1 and C2 contain the desired, completely substitutable, commodity" (Rachlin et al 1980: p. 364). The authors argue that in most concurrent-operant experiments C1 and C2 are the same commodity, so argue that x1=x2 and the utility function simplifies to U=C1+C2. They argued that this is the case for most of the experimental environments that were described with the Matching Law.

For other experimental environments, for example with different kinds of commodities as reinforcers, Rachlin, Kagel, and Battalio argue the exponent y should be

included. In such cases they argue that the exponent y provides a "rationalization [...] in terms of substitutability" (Rachlin et al 1980: p. 371). In the case where y is inferior to I the implied "indifference contours depart from straightness and bend inward [...]" being convex to the origin. In economics this is the case of imperfect substitutability. Such "less-than-unity exponents [...] represent diminishing marginal rates of substitution as more and more of a given commodity is accumulated" making trade-offs with the other commodity more attractive. The slope of the indifference contours at any combination of C1 and C2 is the marginal rate of substitution that is interpreted as "the rate at which C2 would be exchanged for C1" (Rachlin et al 1980: p. 364). The authors argue that "[s]ubstitutability is a concept that makes intuitive sense, can be expressed in mathematical terms (as slope of indifference contours), and seems to be consistent for the same groups of commodities from one experimental situation to another" (Rachlin et al. 1980: p. 371).

Rachlin and his co-authors found the concept of substitutability attractive because it could be used to describe interactions with different reinforcers and explain how organisms interact with their environments. Rachlin, Kagel and Battalio (1980) assumed that "a subject faced with a choice [to allocate experimental time] chooses, within the constraints of the situation it is in, the package [of commodities] [...] of maximum value." The rats in their experiment were "assumed to be choosing not among individual commodities but along packages of commodities." As in microeconomics, the reinforcement maximization analysis of Rachlin et al. (1980) implied "a relationship of substitutability between two commodities, in terms of how much of one [commodity] must be added when a unit of the other is removed to maintain the package at constant value" (Rachlin et al. 1980: p. 357). Therefore, they argued that the capacity of different environmental reinforcers to reinforce behavior in an organism depends on their degree of substitutability with other reinforcers.[292]

[292] In other lab experiments Kagel et al. (1975) showed how the demand of rats for different reinforcers differed in their degree of substitutability. They compared the substitutability between two kinds of sugared drinks with the substitutability between food and water. They observed a much higher degree of substitution for the sugared drinks (see Kagel et al. 1975).

Rachlin and his coauthors propose maximization theory as an alternative to the Matching Law. But first, to make maximized units of utility commensurable to the mathematical units of reinforcement theory, Rachlin, Kagel, and Battalio (1980) expressed their maximization theory in mathematical terms comparable to Herrnstein's matching law. They derive a quantitative equation that describes time allocation resulting from a maximization process. Putting the time and efficiency constraints in the utility function, deriving first and second order conditions, and substituting some terms, the authors derive the following equation from their utility function (see equation 5.2).

(equation 5.2) $$\frac{T_1}{T_2} = \frac{m_1}{m_2}\frac{x_1}{x_2}\left(\frac{C_1}{C_2}\right)^y$$

Equation 5.2 displays how the relative time allocation resulting from a molar maximization process T_1/T_2 on the left-hand-side of the equation is dependent of the parameters m_1 and m_2 (representing the shape of the feedback function), of the parameters x_1 and x_2 (representing the relative rate of reinforcers in the experimental environment), and of y (representing the shape of the indifference contour and thus the degree of substitutability between any two commodities, C_1 and C_2).[293]

Once expressed mathematically, Rachlin, Kagel and Battalio compared their maximization equation to the quantitative expression of the matching law which is shown in equation 5.3.

(equation 5.3) $$\frac{T_1}{T_2} = \frac{V_1}{V_2} = \frac{R_1}{R_2}$$

In equation 5.3 T_1 and T_2 represent rates of time allocated to two behavioral responses. R_1 and R_2 represent rates of reinforcement. According to the matching law time is allocated to different behavioral responses $(\frac{T_1}{T_2})$ so to match the amounts of

[293] Technically the authors distinguish between a specific and a general meaning of substitutability from their formalization. Generally, substitutability means that "for every two commodities a single number (the exponent y) may represent their substitutability." Specific substitutability means that "[e]ach package of commodities has its own marginal rate of substitution – the slope of the indifference contour […] representing the package".

reinforcement obtained by these two behavioral responses ($\frac{R_1}{R_2}$).[294] According to the matching law "organisms will allocate time to various alternatives in proportion to reinforcement obtained [from these alternatives]" (Rachlin et al. 1980: p. 365).

Rachlin, Kagel, and Battalio (1980) argued that by using maximization of overall reinforcement the predictions of the matching law might be improved. They argued that the matching law is the best approximation of molar choice processes when two conditions are met: when the experimental schedules of reinforcers come in form of concurrent ratio schedules and when reinforcers are basically the same commodity. In that case the feedback functions would have the same shape (m1=m2=1) and the reinforcers are perfectly substitutable (x1=x2 and y=1). Thus, they argued the matching law and maximization of overall reinforcement would lead mathematically to the same behavioral result. But whenever "m1≠m2 or x1≠x2, maximization theory predicts matching with a bias in one direction or another[,]" and whenever reinforcers differ in type or quality y is unequal to 1 and "maximizing theory and matching diverge in their predictions" see (Rachlin et al. 1980: p. 365).

Rachlin and his coauthors used maximization techniques to describe behavior on the molar level. That meant that constrained maximization would describe well toward which distribution of time to different behavioral responses an organism would tend when it engages repeatedly with a given environment over a period of time. Rachlin, Kagel, Battalio, and Green were quite aware that the derivation of maximization equilibria was just a scientific rationalization. They argued that "[m]aximization, as we have presented it, is a way to describe behavior on a molar level over the course of a session." It did probably not correspond to the molecular choice process that animals use in one moment of time to choose a behavioral response. They did not argue that "a rat, or a pigeon, or a person, calculates, at the beginning of each hour, (either consciously or unconsciously) the best allocation of time for alternatives and then simply distributes time in an optimum way."

[294] On a more basic level this includes the attribution of scalable value to behavioral responses ($\frac{V_1}{V_2}$).

They argued that "[i]n economics, a package of goods is assumed to be collected as a whole and possibly saved or traded. But an animal in an experimental chamber does not literally 'obtain' a 'package' of goods. As time passes the animal consumes whatever goods are available." Nonetheless, maximization theory "[…] predicts what steady-state behavior will be under specific environmental conditions, but it does not indicate how behavior gets from one steady state to another" (Rachlin et al. 1981: p. 386). In other words, they used maximization to rationalize animal behavior on the molar level (over a period of time) while abstracting from how the animal actually behaves on the molecular level (at one moment in time).

Rachlin and is coauthors were able to use maximization techniques to model reinforcement, because they exploited some general similarities in the way how individual behavior was imagined in behavioral psychology and in microeconomics. Both disciplines described individual behavior as the result of interaction with an environment. In post-WWII microeconomics, constraints were usually represented in a budget constraint. The budget constraint relates the objects of choice, often called commodities, with constraining variables, traditionally income, prices, or production possibilities.[295] This might seem a trivial point to many, but the presentation of microeconomics in the behavioral psychology literature illustrates well how demand theory provided economics at least superficially with a behavioral theory.[296] Thus, on a very basic level demand theory provides economists also with a framework to describe the behavior of individuals in given environments consisting of prices, income, and production possibilities (including prices of complementary or substitutable goods).

[295] Income represents the maximum of available resources that a consumer has at disposition and that constraints the consumption possibilities of the consumer (the opportunity set). Prices define amounts of income that need to be given away to obtain or access one unit of the object of choice. Production possibilities define the amount of goods a consumer could have at disposition to exchange them against other goods.

[296] We agree with Wade Hands (2010) and José Edwards (2016) not to set equal, what has not been equal in practice. Control, measurement and basic conception of behavior were different in economics than in behavioral psychology.

The behavioral maximizers looked at demand theory and constrained maximization in exactly this way. They saw similarities in behavioral psychology and microeconomics in the way how both disciplines explained behavior as resulting on the one side from a given environment and on the other side from a given organism or individual that behaves in that environment. For example, Rachlin, Battalio, Kagel, and Green (1981) argued that "[t]he essence of the economic approach is to view behavior as free choice within constraints imposed by either the external environment or the biological structure of the organism" (Rachlin et al. 1981: p. 372). While the "external environment" has its analogical counterpart in the budget constraint or production possibilities frontier, the "biological structure of the organism" has an analogical counterpart in the preferences of an individual that are usually approximated by utility functions in microeconomics.

How the experimental environment is represented mathematically in a constraint is shown in the 1980 article of Rachlin, Kagel, and Battalio. Like in labor supply theory, they introduced two types of constraints that limit "a subject's ability to choose." The first constraint that they introduced states that allocation of behavior is limited by time ($T1+T2=1$).[297] The second constraint that they introduced, maintains that reinforcement is limited by "the efficiency of time invested [in each reinforcement schedule], that is, how much time is required to obtain a certain amount of a commodity ($Ci=gi(Ti)$)." For each commodity Rachlin et al. (1980) assumed such function gi that limited time efficiency. These functions were called feedback functions and they were like individual production functions relating amounts of time to commodity outputs.[298] All constraints together (the overall time constraint and the feedback functions for each commodity) "determine the restriction on the subject's behavior, within which utility may be maximized" (Rachlin et al. 1980: p. 361). Rachlin, Kagel, and Battalio describe in detail how different forms of

[297] In 1965 Becker has introduced a similar time constraint (see Becker 1965). Allocating additional time to work the consumers in Becker's model traded off leisure time against increased amounts of salary and were thus able extend the set of consumption opportunities financially accessible to them.

[298] The efficiency constraints resemble what is described as household production technology in household production functions such as commodity-specific consumption capital as in the Stigler-Becker model of addiction (see Stigler, Becker 1977).

feedback functions are equivalent with different schedules of reinforcement.[299] Although the behavioral responses of organisms are much easier measured in laboratory environments than otherwhere, the theoretic propositions that are drawn from observations could be used to predict behavior also in nonexperimental environments that are similar for the organism in terms of the environmental constraints (see Rachlin et al. 1981: p. 371ff.).[300]

Behavioral psychology and microeconomics are similar in that behavior is partly determined by environmental context. They are also similar in that behavior is partly determined by internal context provided by individual preferences. In a maximization problem the optimal solution is derived not only from the environmental constraints, but also from the individual organism. Thus, Rachlin et al. (1981) argue that the optimal solution is partly determined also from "the preferences that the organism brings to the situation" (Rachlin et al. 1981: p. 376). Mathematically preferences are approximated by utility functions that provide indifference contours. They argue that the "[…] general form of the indifference contour is assumed [,]" most often "[o]n the basis of previous

[299] The feedback functions, gi, describe how rewarding each commodity is. Rachlin, Kagel and Battalio assumed different types of feedback functions.

[300] Becker was very skeptical of experiments in economics (see for example Herfeld 2012: p. 79). But apart from that he had a similar conception with regards to how human consumption behavior is structured over time. In his 1971 textbook Becker writes that in his analysis "[t]ime is used in two basic senses." First, he argued time is used in the sense that the demanded quantity of a good "is a flow per unit of time and increases in proportion to the time unit. A firm demands so many manhours a week, approximately 4 times that per month, or 52 times that per year." Becker argued that "[t]his use of time increases one's confidence in the continuity of the demand curve[,]" in the fact that demand actually stretches out over time, even when a demand function is only specified at one moment. For example, he argues that "[a] piano is purchased only in discrete units, say once every ten years, but the rate of purchase can be considered continuous: 1/200 of a piano per month or 1/10 per year." This conception of demand behavior is basically molar, quite similar to the molar conceptions of behavior of Herrnstein or Rachlin. Second, Becker argued that time is used in his economic analysis in the sense that "[a] demand curve measures alternatives as of a moment in time or under given situations." In slightly different words, Becker sees demand behavior embedded in an environmental and temporal conditions. He argues that "[s]ince these conditions include the history of purchases, a single demand curve would not necessarily predict the sequence of purchases as prices actually change over time. These dynamic patterns are partly captured in the differences between short and long run curves […]" (Becker 1971: p. 20). Like behavioral psychologists, in principle, Becker sees the demand behavior at one moment as the result of a historical consumption history. This is vaguely similar as in operant conditioning theories where current behavior of organism depends on their reinforcement history of the organism.

experiments, intuition, or simple convenience." In order for maximization theory to predict the behavior of an organism in different environments, maximization theorists must assume that the organism has the same indifference contour in each environment. Citing Stigler and Becker's 1977 article *De Gustibus Non Est Disputandum*, the authors argue that "[m]aximization theory is meaningless without fixed (or relatively fixed) utility functions" (Rachlin et al. 1981: p. 376).

According to Rachlin (1980) both discilines had a similar methodologic stance on the problem of changing preferences. He argued that "[a]lthough the strictly economic approach does not simply assume a set of preferences, it does assume (to avoid tautology) that preferences, once discovered, remain constant from situation to situation." For Rachlin this assumption was similar to "the assumption in psychology that reinforcers remain constant from situation to situation." In theory this might be a problem, but in practice psychologists would "know that the assumption of reinforcement constancy (the 'empirical law of effect') does not hold widely[,]" argued Rachlin. Similarly, he argued, economists would "know that preferences do not remain constant" (Rachlin 1980: 229). He argued that behavioral psychologists have developed procedures to circumvent this problem of changing preferences. For example, behavioral psychologists have included setting up of baseline situations in experimental protocols (see Rachlin 1980: p. 230).[301]

Although the reinforcement maximizers around Rachlin were ready to accept the assumption of stable preferences as a useful working hypothesis in behavioral theory, they also stressed the necessity to empirically investigate utility functions that would accurately approximate demand behavior in different situations. This empirical foundation would be necessary to determine if the theoretical framework fits the data or if it should be adapted. For Rachlin and his co-authors, this did not mean that experimenters should search for

[301] Rachlin argued the maximization of reinforcement can be imagined similarly as the situation in economics with revealed preferences, "the idea [is] that performance with one budget line reveals something about the indifference structure which will persist across changes in the budget line." But he also acknowledged that neither in behavioral psychology, nor in microeconomics "can one expect the indifference contours to remain absolutely constant across all changes in feedback function or budget line" (Rachlin 1980: p. 226).

the one and only utility function. Rather, they argued for assuming certain utility functions as working hypotheses for given situations and testing whether they generalize to other situations. (see Rachlin et al. 1981: p. 376). But not engaging in any search of empirically estimated indifference curves would not have been an option for them. To the contrary, putting maximization theory on more stable ground by finding empirically grounded indifference curves would be a crucial contribution of behavioral economics as they defined the term (see Rachlin 1980).

The behavioral maximizers strived to illustrate the usefulness of their interdisciplinary approach by applying it to concrete examples. One of such examples was the theory of labor supply taken from contemporary labor economics. In his 1980 essay Rachlin claimed that when economists apply their theories to real-world phenomena they often need to assume the validity of the theories they use to derive predictions. He argued that with the tools of behavioral psychology some of the theoretical assumptions could be directly confronted with experimental data. According to Rachlin this was the case with "the effect of various systems of taxation on the size of the labor force." The crucial question was to Rachlin whether " heavily progressive taxation systems [...] would reduce the incentive to work and thereby reduce the labor force." Describing the economist's usual analysis of this effect, he argues that "[t]he effect of taxation on motivation to work is represented in economics by a set of indifference contours relating income to leisure" where "[t]he slope of the indifference contours represents the rate at which a person would trade extra income for extra leisure." Rachlin argued that "beyond a few fundamental (and supposedly axiomatic) 'psychological' facts little is known about indifference contours." He criticized that "the underlying assumption, that the income-leisure indifference contour has a certain invariant shape, is never tested." Instead, he claimed that "[w]hen making predictions, economists simply assume that indifference contours take a certain shape" (Rachlin 1980: p. 214).

In the 1981 article Rachlin, Battalio, Kagel, and Green use the labor-leisure trade-off imagined by economists to describe the behavior of laboratory animals in experiments.

They argued that "[o]ne of the most important concerns in economics is how people trade income, which they obtain by working, for leisure, which they obtain by not working." [302] They argue that the terms income and leisure are very abstract concepts in economics, so abstract that they might even describe non-human behavior: "Abstractly, income is a positive good earned by giving up leisure. Thus, the bar-pressing of a rat fits the economic definition of work and the food delivered as a consequence of bar-pressing fits the economic definition of income." The same goes for leisure as it is abstractly defined in economics. "Leisure for a rat may be defined in terms of the absence of bar-pressing and may include any activity of which the rat is capable except bar-pressing" (Rachlin et al. 1981: p. 378).

The experimental logic undergirding the labor-leisure trade-off was in itself not so special as many large-scale policy experiments in the 1970s were organized around such experimental logic as well. The real innovation was rather that Rachlin et al. argued that "[…] the income-leisure tradeoff of rats is in many respects similar to that of humans" (Rachlin et al. 1981: p. 378f.). To make their point they referred to the *New Jersey Income Maintenance Experiment* (*NJIME*) that has been done in the early 1970s.[303] They described that the *NJIME* has been "[…] an attempt to determine, once and for all, the effects of a negative income tax on the amount of labor supplied." According to them the experiment supposes that "[…] there exists a function that relates fairly directly the amount of work a person does to the amount of money he earns." They argued that the *NJIME* has been "[…] an attempt to manipulate the constraints on a large sample of New Jersey workers (by instituting a negative income tax) and to measure the consequent change

[302] Rachlin et al. (1981) argued that "[i]n economics the terms income and leisure have assumed a very wide scope. Income may mean money income or income in kind (income of a commodity). Leisure may mean rest, or recreation, or simply the opportunity to do another kind of work" (Rachlin et al. 1981: p. 378).

[303] For more information on the *New Jersey Income Maintenance Experiment* (NJIME), see Kershaw and Fair (1976). For more information on how the NJIME has been put into practice, and how it is related to general conceptions of adequate public policy and changes in the larger US policy making environment in the 1960s and 1970s, see Popp-Berman (2022).

in work (if any)" (Rachlin et al. 1981: p. 379).[304] In earlier experiments with pigeons Green, Kagel, and Battalio had used the maximization approach to implement constraints similar to those assumed in the *NJIME* (Rachlin et al. 1981: p. 380). Citing these experiments, Rachlin et al. (1981) claimed that "[…] the data obtained from rats and pigeons […] conform more closely to economic theories designed to describe human behavior" than the results from the *NJIME* (Rachlin et al. 1981: p. 380).

Becker has been cited several times by the reinforcement maximizers around Rachlin as reference representing microeconomics. In the 1960s and 1970s, labor economists used constrained optimization to describe the supply of labor that consumers offer in the labor market. Economists like Becker or Jacob Mincer did so by modeling overall labor supply as a result of individuals choosing to offer their workforce, or alternatively, to prefer to have more leisure. By describing leisure as a commodity or basic choice objective, Becker was one of those applied economists who described the labor-leisure tradeoff in a formal model (Becker 1965).[305] The maximization model of Rachlin et al. (1980) to explain behavior observed in animal experiments resembles Becker's theoretic model of time allocation. While Rachlin, Kagel, Battalio, and Green were readers of Becker, Becker must have been aware of (at least) part of the work of Rachlin and his coauthors. In acknowledgement footnotes, Rachlin (1980) and Rachlin et al. (1980) thanked Becker for comments they have received of him on earlier versions of their texts.

Given their aim of combining behavioral psychology with microeconomics, Becker seemed to have been an attractive methodological reference. In his 1980 essay Rachlin criticized psychological critique of economics à la Kahneman and Tversky. Rachlin claimed that cognitive psychologists give up on rationality of individuals too early when observed behavior does not conform to the predictions derived from decision theory. Instead, he favored an alternative approach to link psychology with economics, an

[304] In theoretic terms, a negative income tax is a change in the constraint that define the choice of the level of leisure time and the level of income.

[305] Although many of the core ideas of Becker's 1965 article have been put forward already by Jacob Mincer a bit earlier (see Mincer 1963), Becker's formal model of time allocation became the more widely-known reference over time.

approach more like behavioral psychology and more strictly economic at the same time. He saw such an alternative in Becker's "'economic approach' to everyday decisions" (Becker 1976).[306] He argued that "[w]hen behavior fails to maximize utility (as determined from intuitively-arrived-at preferences) the blame is put, not on the rationality of the subject, but on the intuition of the theorist." He saw behavioral psychology methodologically closer to Becker's economic approach than to cognitive psychology, "because the economic approach relies on external variables rather than internal mechanisms to explain behavior" (Rachlin 1980: 229).

Making maximization analysis applicable to operant conditioning experiments has been one of the key contributions of the interdisciplinary joint venture between Rachlin and Green on the side of the behavioral psychologists, and Battalio and Kagel on the side of the microeconomists. Their proposition of reinforcement maximization has been the common analytical core in many of their different experimental studies conducted during the 1970s and 1980s. It permitted them to push the use of experimental techniques in the wider microeconomics community. And it permitted them to push the maximization approach in the community of quantitative -oriented behavioral psychologists.

As a consequence, maximization was discussed in behavioral psychology as an alternative to the Matching Law. In 1981 Rachlin, Battalio, Kagel, and Green claimed that "[a]s a molar theory by which behavior over a session can be predicted, maximization is more accurate than reinforcement theory alone because it sets limits on when and where reinforcement will be effective." They proclaimed superiority of maximization compared to alternative behavioral theories like "Catania's [...] response inhibition theory and Allison's [...] conservation theory, as well as Herrnstein's [...] matching theory." From the point of view of maximization theory, they argued that "these other theories, so long

[306] In the acknowledgments statement of his chapter Rachlin thanked several psychologists and two economists: Gary Becker and John Kagel. He thanked Kagel in particular for having "patiently corrected my many misapprehensions of economics and economists" (Rachlin 1980: p. 233). According to that note Kagel has been the more important interlocutor for Rachlin with regards to economic theory. Becker is used by Rachlin more as a publicly more known researcher who is associated with a certain styleof economic analysis.

as they are considered on a molar level, are actually versions of maximization[,]" that are more specific for certain environments (Rachlin et al. 1981: p. 386).

With regards to policy application, they also claimed that maximization theory is better to make implications from behavioral psychology more relevant in society more generally. Rachlin, Battalio, Kagel, and Green (1981) argued that "maximization theory provides at least as good a bridge from animal behavior to human behavior, and from the laboratory to the real world, as reinforcement theory does" (Rachlin et al. 1981: p. 372). Although maximization theory would be "silent on more molecular and biological mechanisms of memory and expectation[,]" Rachlin and his coauthors argued that "there is no point in devising more and more precise descriptions of behavior on a molecular level in restricted laboratory situations when there is nothing but a vague hope of further extension." Alternatively, maximization theory could be used to extend reinforcement theories of behavior to non-experimental situations. They argued that "[m]aximization theory provides a quantitative framework for expansion to other variables when these are found to affect the behavior of animals in the laboratory; it provides a framework for expansion to conditions of everyday life of humans and suggests ways in which changes in behavior can best be brought about" (Rachlin et al. 1981: p. 388).

5.3.2 From Matching to Melioration: Herrnstein's counter arguments to maximization

In the community of quantitative behavioral psychology maximization techniques were discussed at several occasions, but not everyone was convinced that maximization techniques provided better a better theoretic means than alternative reinforcement theories. Ricard Herrnstein was one of the very central figures in the *Society for Quantitative Analyses of Behavior* (SQAB) and a fierce critic of maximization. Herrnstein was a respected figure as the director of the Harvard pigeon lab and PhD supervisor of many young behavioral psychologists. Since the early 1960s Herrnstein has been strongly involved in proposing and promoting the Matching Law as a quantitative summary equation for many operant conditioning experiments (see Herrnstein 1961, 1970).

In this subsection we present the critique of the use of maximization techniques in behavioral psychology that surged after Rachlin and his coauthors had contested the general validity of matching equilibria. For example, the second volume of the five-volume series *Studies in Quantitative Analyses of Behavior* was dedicated to maximization and matching accounts in behavioral psychology and contained a section of (Commons et al. 1982).[307] We focus mainly on the counterarguments to reinforcement maximization coming from Richard Herrnstein. Herrnstein was not the only behavioral psychologist who criticized reinforcement maximization, but as he was a central figure in the community his voice counted much.[308] During the 1980s Herrnstein was also critically involved in developing and promoting a molecular theory of behavior called melioration that lead to the Matching Law on the molar level of analysis.

To describe Herrnstein's critique of reinforcement maximization inspired by microeconomics we use mainly three texts in this subsection. The most immediate published reaction of Herrnstein might be found in a comment published in the peer commentary section on Rachlin, Kagel, Battalio, and Green's 1981 article in the in the journal *Behavioral and Brain Sciences* (Herrnstein 1981). Next to his peer comment we use Herrnstein's chapter in the second volume of *Studies of Quantitative Analyses of Behavior* called *Melioration as Behavioral Dynamism* (Herrnstein 1982). In that chapter Herrnstein defines melioration as a molecular, dynamic theory that describes how organisms behave at one moment in time to allocate time and effort to alternative forms of behavior. We also use a later article published in the journal *Psychological Science* called *Behavior, Reinforcement and Utility* (Herrnstein 1990). This article illustrates how Herrnstein promoted his behavioral psychology approach and distinguished it from more

[307] The volume contains a part called *Economic Maximization Theory* with chapters of Rachlin, Barbara Burkhard, and Green, Kagel, and Battalio. And it contains a part called *Matching Theory* with chapters by Herrnstein, and Gene Heyman, a former PhD student of Herrnstein (see Commons et al. 1982).
[308] Other behavioral psychologists who supported matching rather than maximization as a molar theory of behavior were Gene Heyman, William Vaughan, or Drazen Prelec, all of whom did their PhD with Herrnstein as a supervisor.

critical approaches coming from cognitive psychology at the same time as neoclassical microeconomics became more widely contested.

Herrnstein (1981) was among the commenters that published a reaction to Rachlin, et al. (1981)'s maximization account of reinforcement.[309] In his peer comment Herrnstein generally agreed with Rachlin et al. that microeconomics and behavioral psychology shared some common interest. But he was much less inclined to accept common methodologic prescriptions from economics. He wrote that "[p]sychology and economics share a common problem: to describe objectively how behavior is governed by its consequences." He observed that recently there have been efforts "[…] to dissolve the barriers of different vocabularies, different styles of analysis, and different kinds of data[,]" and that the result from these efforts is "[…] likely to be neither psychology nor economics (nor behavioral biology) but a new synthesis, interdisciplinary in a historical sense, but more purely concerned with the analysis of behavior than the disciplines it combines" (Herrnstein 1981: p. 392).

Despite the commonalities between behavioral psychology and microeconomics, Herrnstein was critical of Rachlin, Battalio, Kagel, and Green's proposition to use "the guiding assumption of neoclassical economics […], the maximization of overall utility [...]" as "a fundamental principle for the analysis of behavior" (Herrnstein 1981: p. 392). Herrnstein disagreed, because he thought maximization was an inferior molar theory than the Matching Law. He argued that "[m]aximization theory […] has not been shown, here or elsewhere, to account for even a small fraction of the data reasonably well described by matching" He wrote that "the greatest weakness of maximization theory is simply that it is refuted by the evidence at hand" (Herrnstein 1981: p. 394).

While behavioral psychologists such as Rachlin, Stephen Lea, and Steven Hursh had favorable views of demand theory and maximization as they were practiced in

[309] Psychologists in the peer commentary section to Rachlin et al. (1981) were among others William Vaughan, John Staddon, Gene Heyman, Steven Hursh, and Stephen Lea. Economists who commented the article were Richard Thaler, Harvey Rosen, Susan Motheral, Robert Mofitt, and Michael Keeley.

microeconomics, Herrnstein was not convinced by using microeconomic theory to model reinforcement. Herrnstein (1981) held that economics could maybe be used as a "possibly useful formal structure for summarizing information about different constellations of reinforcers."[310] But having summarized some information usefully, "we still cannot take another step in maximization theory without the empirical indifference contours, which means looking at the behavior itself" (Herrnstein 1981: p. 394). Without utility functions, he argues, "[…] maximization theory makes no concrete predictions for responding because it cannot define the crucial indifference contours." (Herrnstein 1981: p. 393f.). He argued that "[e]conomic theory may provide a useful nomenclature for discussing motivational dynamics, but the danger, exemplified all too well by the present paper, is that nomenclature is easily mistaken for explanation" (Herrnstein 1981: p. 394).

In 1982 Herrnstein described in greater detail how he perceived maximization techniques and microeconomics. He argued that "[t]he idea of maximization" holds that "[b]ehavior is depicted as seeking an equilibrium that maximizes something – be it total subjective utility, hedonic value, reinforcement, energy intake, or reproductive fitness – within limitations of memory and discriminative acuity as well as the limitations imposed by the environment." Maximization would assume that "[e]ach mixture of behaviors and their outcomes is viewed as a unique bundle, and the organism is supposed to select the best bundle[.]" Over time, Herrnstein argued, "[e]quilibrium is reached with a distribution of activities that cannot be detectably improved upon a redistribution of choices; that is, the obtained outcomes are maximized" (Herrnstein 1982: p. 433). Thinking in terms of maximization was for Herrnstein "the central conception of economic theory, around which the formal structure of economic analysis has developed." But he argued that it is also prevalent in many other behavioral sciences like psychology citing the research efforts of Rachlin, Battalio, Kagel, and Green as evidence.[311] Behavioral maximizers would assume

[310] For example, Herrnstein said that "[r]einforcers that satiate at different rates have different 'demand elasticities' […]; they are also less 'substitutable'" (Herrnstein 1981: p. 394)

[311] Herrnstein acknowledged in his 1982 chapter that "[c]hoice between alternatives with the same reinforcer bypasses variations in demand elasticity, mutual substitutability, and diminishing marginal utility, complications well handled by microeconomic analysis." Ha also acknowledges that "[w]ith only

maximization as the general form of behavior. At times, maximization would yield the same result at equilibrium as matching, but matching would be just a special case of the more general rule of maximizing (Herrnstein 1982: p. 433).

In his 1990 article Herrnstein criticized the deductive character of many microeconomic applications. He argued that "[e]conomics has been formalistic or deductive when it characterizes individual behavior, rather than naturalistic or inductive." Economists, so he argued, assume that "individuals are fundamentally rational" meaning that "individuals tend to maximize utility." As a consequence, he argued, "[t]heoretical economists invest time and effort in deducing the implications of utility maximization in myriad circumstances" (Herrnstein 1990: p. 218). He cited Becker's economic approach to human behavior as a good illustration of such methodologic attitudes. Although the deductive approach might not have posed many problems within economics, Herrnstein criticized that "[t]o outsiders, it is hard to tell whether economists believe in rationality as fact or definition, which is to say, by virtue of empirical evidence or as a useful tautology" (Herrnstein 1990: p. 218).

After a wider critique of microeconomics had accumulated throughout the 1980s, Herrnstein framed his critique of maximization within this broader criticism. Given increasing amount of research showing a "mismatch between theory and data[.]" Herrnstein (1990) argued that "[m]uch seems to be at stake for economic theorists in their assumption of utility maximization[.]"He complained that although "[e]conomists recognize that the rationality assumption is often contradicted by actual behavior, […] rarely does this inspire a search for some other fundamental assumption about behavior."[312] Instead of reevaluating the fundamentals, economists would rather "search for subsidiary principles, concerning systematic distortions of perception of probability and time, failures

a few exceptions […] matching theory has been applied to choices within single classes of reinforcers, from which some theorists (Hursh, 1978; Rachlin et al. 1981) have concluded that it cannot readily be applied across classes of reinforcers. However, as regards classes of reinforcement interactions, there is no essential incompatibility with matching nor any essential compatibility with maximization" (Herrnstein 1982: p. 452).

[312] Herrnstein argued that in economics "[b]ehavior is seen to be unaccounted for until it can be shown to be consistent with utility maximization or it is explained why not" (Herrnstein 1990: p. 218).

in memory, insufficient information, erroneous rules of thumb for calculating outcomes, and the like." Maybe, Herrnstein argued that for economists "any assumption about behavior other than that of maximization would exact too great a price in lost rigor" (Herrnstein 1990: p. 218)

One of Herrnstein's central arguments against maximization techniques was the proposition of melioration theory. The focus on melioration consisted in change of perspective from the molar level observation to the molecular level. In his comment on Rachlin et al. (1981) Herrnstein noticed and criticized that economic maximization does not propose any molecular theory of behavior allocation. Economic theory as a molar theory "[…] does not specify the path taken by the subject to reach the equilibrium condition [.]" Neither did matching as it was also a molar theory of equilibrium behavior over time. But when he was commenting on Rachlin et al. in 1981, Herrnstein was already committed to a specific molecular theory of behavior called melioration. Herrnstein had proposed melioration as a molecular theory of responding behavior in 1980 together with William Vaughan, a former PhD student of Hernstein (Herrnstein and Vaughan 1980).[313] Meliorating behavior on the molecular level leads logically to the Matching Law on the molar level (as seen over time).

In general, Herrnstein contended that behavior on the molar level would be better described by matching and melioration, and not by maximization. The difference between the two approaches resulted from different assumptions about how individuals perceive, process, and account for value in their behavior. For Herrnstein (1982) reinforcement and utility were in itself very similar concepts, both describing the "subjective value" of a behavior response at one moment in time. But important differences were introduced through the assumptions about how individuals process subjective value. On the molecular level, Herrnstein argued that melioration theory assumes that individuals respond only to the rates of reinforcement as they are immediately perceived locally at that moment in time.

[313] Herrnstein and Vaughan's text was part of the collective volume *Limits to Action* (Staddon 1980) that was edited by John Staddon who was also a former PhD student of Herrnstein.

By contrast, a molecular maximization process would require a higher level of sophistication. It would require "the selection of the biggest aggregation of reinforcement across behaviors[,]" meaning taking into account how the local rate of reinforcement impacts the future rates of reinforcement and ultimately the aggregate of all these local rates of reinforcement (see Herrnstein 1982: p. 433). On the molar level, the fundamental difference to microeconomic utility maximization was that "matching is based on average returns (in utility or reinforcement) over some extended period of activity, while maximization requires a sensitivity to marginal returns at each moment" (Herrnstein 1990: p. 219).

Although matching and melioration would under some circumstances lead to the same equilibria, Herrnstein (1982) argued that in many situations the equilibria implied by the two theories would differ. He based his arguments mostly on experiments with pigeons (see Herrnstein 1982: p. 450).[314] When average and marginal returns to a behavioral response are equal, both theories would be correct. But whenever they differ, there is a gap between the matching and the maximization equilibrium. This gap could be small or large "depending on the characteristics of the environment and of the organism interacting with it" (Herrnstein 1982: p. 451). Without further knowledge on the reinforcement contingencies, Herrnstein argued that equilibria should rather be viewed as matching equilibria.

As microeconomics became more and more contested by behavioral economics over the 1980s (see also chapter 7), Herrnstein (1990) promoted melioration theory as a competing theory to maximization. He argued that behavioral psychology provides "a body of evidence from the psychological laboratory consistent with the notion that an individual's allocation of behavior tends to approach an equilibrium, but not necessarily the equilibrium required by utility maximization." Citing research by his former PhD

314 Some experiments had also been done with other animals and some with humans. He acknowledged that "[i]t remains conceivable that brighter creatures than pigeons do not meliorate but maximize, matching only when it involves no large costs in overall reinforcement." But, he argued as well that "it is also conceivable that melioration can account for bright creatures as well [...]" (Herrntein 1982: p. 451).

students William Vaughan and Dragen Prelec, Herrnstein argues that the behavioral psychologic approach "takes the view that behavior [is] generically suboptimal, though still orderly, and that optimality is the exception rather than the rule[.]" Contrary to this, he argued melioration theory would be "built around the idea that choice is guided by the law of effect [and] produce[s] a particular sort of limited optimization [. . .] that happens to be susceptible to serious lapses from rational choice" (Herrnstein 1990: p. 218).

For Herrnstein the two theories represented two visions of choice behavior implying different types of agency. Both visions of behavior were inherently limited by the underlying theory. For Herrnstein (1982) melioration and maximization were both evolutionary processes of adaptation. He argued that melioration "presupposes a set of response topographies with associated rates of reinforcement." He argued that "the acquisition of a new response topography itself exemplifies melioration, as less highly reinforced movements lose time allocation to more highly reinforced alternatives." As a consequence, he argued, "[t]he movements that survive exposure to a new contingency of reinforcement must, by this view, have equal local rates of reinforcement[,]" according to the Matching Law (Herrnstein 1982: p. 435).

In a perfect behavioristic world melioration and maximization equilibria would lead to the same molar equilibrium. But in reality, he argued neither melioration, nor maximization work perfectly. In general, one could imagine behavior allocation as a scale with melioration and maximization as two extremes. He argued that "[d]ifferent species no doubt fall on different points along this continuum." In the higher evolutive states "melioration approaches maximization[,]" so that melioration can be seen as a stage of evolutionary development. (Herrnstein 1982: p. 454). In other words "[a]s an organism meliorates over varying response topographies, larger time frames, and a more differentiated set of environments, it approaches the ideal maximizer of economic analysis" (Herrnstein 1982: p. 454).

In reality, melioration would not lead to maximization equilibria, because of some "constraints on responding [that] impede melioration in the formation of new

topographies of responding." He argues that these constraints of melioration "probably arise from several sources, such as congeniality of certain movements as compared to others […], the organism's capacity to integrate reinforcement rates over longer or shorter time periods or to categorize certain movements as operants, and the reversibility in the repertoire of responses" (Herrnstein 1982: p. 453f.). But if we would imagine an "ideal organism" with a "perfectly plastic behavioral repertoire, melioration yields maximization."[315] Although he argued that no such organism exists, at least such an ideal organism "represents a benchmark for the adaptive potentialities of melioration" (Herrnstein 1982: p. 454).

As he saw melioration inherently limited, Herrnstein (1982) saw maximization inherently limited in its vision of choice behavior as well. He argued that actually, economists would not believe that maximization always functions perfectly. Rather, he held that "[m]ost economic theorists realize that their theory is built on a convenient fiction, that of maximization" (Herrnstein 1982: p. 454). In reality Herrnstein argued that there would be also some factors that would "spoil an organism's progress toward perfect maximization[,]" for example "[l]imitations of or defects in an organism's understanding, [and] effects of uncertainty and time discounting[.]" If these constraints for maximization would be specified realistically enough, Herrnstein claimed that "maximization […] may approximate melioration, with a drift toward higher local rates of reinforcement at the cost of more remote gains" (Herrnstein 1982: p. 454).

Although Herrnstein fiercely criticized maximization theory as inferior to melioration, he acknowledged many similarities between behavioral psychology and microeconomics. In 1982 Herrnstein wrote that both melioration and maximization actually "resemble each other in various aspects[.]" First, he argued that both theories "are

[315] Herrnstein argued "to achieve perfect plasticity, the organism would have to be indifferent, motivationally speaking, to the physical characteristics of its own movements, capable of abstracting any contingency of reinforcement for any of its movements, no matter how subtle, unnatural, or over how large a time frame, and the effects of its past history of reinforcement would have to be totally reversible." On top of that, he argues that "the subject would also need something approaching perfect stimulus control" (Herrnstein 1982: p. 454).

hedonistic, utilitarian theories" assuming that "behavior is held to be driven by its psychological consequences[.]" Second, he argued that both melioration and maximization, "can claim descent from the commonsense idea of reward and punishment and from the formal law of effect[.]" Third, he argued that "both theories involve adaptation in the sense of bettering a state of affairs, although melioration is a more limited adaptation than maximization[.]" And fourth, he argued that both melioration and maximization "require knowledge of environmental feedback functions and internal motivational dynamics before any actual behavior can be predicted" (Herrnstein 1982: p. 434). In 1990 he argued that in both disciplines "behavior is governed by its consequences and the relevant consequences can only be inferred from behavior." Neither microeconomists, nor behavioral psychologists would believe that they "can get at the essential but subjective hedonic facts, the utility functions or the drives and the associated rewards and punishers, except by how they are revealed in behavior" (Herrnstein 1990: p. 222).

But despite these similarities Herrnstein saw also methodological differences between the two disciplines. Economics would rather provide "a 'grammar' for deriving and expressing the utility functions, but no economic theory says where they [the utility functions] come from." As a consequence, the economist's "utility functions are inferred but not explained." In contrast, behavioral psychologists were traditionally concerned with "[t]he evolutionary origins and physiological mediation of the rewards and punishers for species or individuals[.]"[316] Compared to economics psychology would have "less grammar and more laboratory data than economics" (Herrnstein 1990: p. 222).

The disciplinary differences have led to different visions of behavior prevalent among behavioral psychologists and microeconomists. Herrnstein (1990) argued that

[316] In the article Herrnstein cited the economist Jack Hirshleifer who argued in 1985 that economists should be seen as intellectual imperialists who provide the universal grammar for a unified social science (Hirshleifer 1985). Herrnstein shared the view that "there is only one social science." He argued that "to pursue that social science, and to use it to design social institutions, we need to reconcile the divergent answers provided by empirical approaches, such as that of behavioral psychology, with the formal structures of economic theory" (see Herrnstein 1990: p. 221-223). Within such a unified social science behavior would be better described as melioration and matching and not as maximization according to Herrnstein.

"[b]ecause of the invisibility of utility, economists have argued that the ostensible irrationalities involved in obesity, addiction, etc., are really not irrationalities at all, but only the result of peculiarities of one sort or another in utility functions." He argued that economists often argued that "Economic Man may harm himself objectively, but he cannot fail to satisfy the demands of utility maximization[.]" By contrast, the principle of rationality was much less embraced by behavioral psychologists in their vision of behavior. Behavioral psychologists would rather assume that "the principle of action itself, above and beyond the sources of utility, can lead to maladaptive behavior."

As a consequence, Herrnstein argued that a considerable gap in consensus might arise regarding the welfare consequences of these two different visions of behavior. In certain environments or with certain activities people might actually not tend towards a maximizing equilibrium, but rather get stuck in suboptimal matching equilibria. People might do perfectly fine in maximizing equilibria. But in matching equilibria, Herrnstein argued that "people may need help in their pursuit of subjective satisfaction, let alone objective well-being." (Herrnstein 1990: p. 223).

Over the 1980s matching and maximization were two competing views of behavior that had been discussed in the academic circles of the *Society for the Quantitative Analysis of Behavior*. Some psychologists like Howard Rachlin promoted to view behavior over time as the result of maximization within constraints, similarly as it has been practiced in microeconomics. Other psychologists like Richard Herrnstein were much more skeptical of maximization techniques. Instead, they promoted matching behavior as a kind of limited form of maximization behavior and melioration behavior as the instantaneous decision behavior happening at each moment and leading to matching behavior over time. Both sides of the debate agreed that both melioration and maximization each were superior for some sets of behavioral situations (defined among others in terms of reinforcement contingencies). Disagreement pertained mainly about which of the two theories should be seen as the more general one. Addiction would become a phenomenon that was proclaimed by both camps.

5.4 Similar, but competing visions of addiction: Maximization vs. melioration

Gary Becker and Kevin Murphy published their model of rational addiction in 1988, it became quickly part of the methodologic debates in behavioral psychology in the early 1990s. Their model was clearly seen as an instance of the maximization approach to model utility or reinforcement. With their model Becker and Murphy pointed the finger at highly relevant social problem while claiming to explain the problem in terms of rational choice. Becker has been a very visible researcher proposing to push economic principles into many adjacent academic disciplines, especially to sociology (see Becker 1976, 1981). But with the rational addiction model, he was also perceived as stepping on the intellectual territory of psychology.[317]

In 1988, Becker and Murphy have published their article *A Theory of Rational Addiction* in the *Journal of Political Economy* (Becker and Murphy 1988). Although Becker and Murphy cite only a few sources from psychology, they do not hesitate to make psychological terms such as reinforcement and tolerance central part of their argument. Using a dynamic optimization model, they describe conditions under which forward-looking agents consume dependence-creating goods that create past-dependent habit stocks within individuals. Optimizing their intertemporal utility, the agents in the Becker-Murphy model of rational addiction might become addicted in the sense that they get settled on high-level consumption paths of addictive goods. The model assumes a molecular process that describes the decision to consume or not to consume a particular level of an addictive good today as a rational trade-off weighing off current pleasure with future utility. The model also describes a molar process by which consumers may drift off to harmful addiction equilibria due to unexpected lifetime events and failure to maintain a low consumption equilibrium of addictive goods (see chapter 4).

[317] For example, Rachlin and Laibson have written in 1997 that "[s]ome economists (for example, Gary Becker and Kevin Murphy, 1988) have extended economic theory into the realm of psychology, to cover behavior such as addiction and habits, behavior not ordinarily conceived as rational" (Herrnstein et al. 1997: p. 9).

We do not know to what extent behavioral psychologists read academic economics journals. But many behavioral psychologists have read and commented Rachlin, Battalio, Kagel, and Green's 1981 article in which the earlier Stigler-Becker model of addiction was briefly explained. Therefore, it is likely that the article contributed significantly to the early the dissemination of the earlier version of the rational addiction model.[318] Rachlin et al. (1981) stressed the possibility to test the effects of price variation of addictive goods in animal experiments and mentioned experimental addiction studies as a potential future research topic. They argued that "[i]f Stigler [and] Becker's theory is correct, patterns of price variation ought to interact in predictable ways, resulting in artificially created positive and negative addictions. Such addictions could be studied in the laboratory as instances of compulsive behavior in general and could, perhaps, provide clues as to how addiction could be alleviated" (Rachlin et al. 1981: p. 384).[319] Outside of their cooperation with Rachlin and Green, Kagel and Battalio came also directly into contact with drugs through another research project. In the end of the 1970s they were involved in a social experiment with human subjects on cannabis consumption and work productivity (see Kagel et al. 1980).[320]

After the Becker-Murphy model has been published it took not long for behavioral psychologists to model addiction in terms of melioration and the matching law. In the early 1990s Herrnstein proposed a melioration model of addiction together with his

[318] Citing Stigler and Becker (1977), Rachlin et al. (1981) wrote that "[t]hese economists propose that there are two kinds of addiction: positive addiction, where a commodity for which demand is elastic decreases in effective price with use, and negative addiction, where a commodity for which demand is inelastic increases in effective price with use." They argue that if one relaxes Stigler and Becker's assumption of unchanging indifference contours, one could probably "trace a possible course for the development of negative addiction from initial positive addiction." They explain that as "[t]he demand for a 'high' is at first elastic but may become inelastic with time[,] [t]he initial learning to recognize the effect [...] may cause an initial decrease in effective price before habituation begins to occur, eventually increasing the price" (Rachlin et al. 1981: p. 384).

[319] Similar experiments were later done by behavioral pharmacologists, see Campbell (2007, chapter 7)

[320] In Kagel et al. (1980) the coauthor mentioned already Becker's theory of time allocation. In their conclusion they argue that "the formulation presented here focuses attention on the fact that, under conditions of self-regulated consumption, when and how much cannabis is consumed, and consequently its relationship to economic activities, is an endogenously determined variable. Thus, its effects cannot be understood independently of economic parameters in the environment – in particular, wage rates, the nature of the job task, and the relative valuation placed on goods with high market price." Although they argue not to have the place to do it in the article, they suggest that a formal model of "[...] the effects of marihuana on work behavior [could] be done within the context of a full cost pricing model[,]" and they refer to Becker's 1965 model of time allocation. They argue that such a model could account "[...] for the fact that while the direct time cost of smoking is small, its use serves as an input into both household and income earning production functions" (Kagel et al. 1980: p. 393f.).

former PhD student Drazen Prelec. While the Becker-Murphy model assumes maximization of utility, the Herrnstein-Prelec model assumes melioration behavior on the molecular level and matching on the molar level of behavior. Although the melioration model starts from very different assumptions, its description of addiction as a dynamic adaptation problem is surprisingly similar with the description from the rational addiction model.

This section is mainly based on two texts written by Herrnstein and Prelec from the early 1990s. The first text is an article published in the Journal of Economic Perspectives titled *Melioration: A Theory of Distributed Choice* (Herrnstein and Prelec 1991). In the article they discussed addiction as a behavioral pathology in terms of melioration and explained melioration to an economics audience.[321] The second text is a chapter in the collective volume *Choice over Time* that was edited by the economist George Loewenstein and the political philosopher Jon Elster (Loewenstein, Elster 1992).[322] Herrnstein and Prelec's chapter was titled *A Theory of Addiction* (Herrnstein, Prelec 1992). In it they provided an extended melioration account of addiction and they also described how they positioned their approach with regards to similar theories of addiction. Although Herrnstein and Prelec positioned their vision of addiction as a form of improvement far from Becker and Murphy's rational choice vision, the chapter illustrates the basic similarities between the two approaches.[323]

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[321] Until the early 1990s, Herrnstein (and also Prelec) had published mostly in psychological journals. But by publishing their 1991 article in the Journal of Economic Perspectives, they clearly addressed an economics audience.

[322] Loewenstein and Elster were part of a group of social scientists who saw themselves as behavioral economists. The book was the outcome of several years of meetings and discussion by that group. In this chapter we focus particularly on the reception of the rational addiction model among behavioral psychologists like Herrnstein and Rachlin. In chapter 7 we will focus more specifically on how the rational addiction model has been received among behavioral economists. We treat the reception of the rational addiction model among the two groups separately, as we see the groups of behavioral psychologists and behavioral economists are partly overlapping, but not fully. Proceeding in this way we can stress the links between behavioral psychology and microeconomics and at the same time describe the role of behavioral psychologists within behavioral economics.

[323] Such methodological positioning has been taken on both sides. While Herrnstein and Prelec stressed constantly their interpretation in terms of melioration, Becker and Murphy stressed throughout their article the ability to describe addiction as a rational choice. What unites the two sides is their positioning

By changing the audience from psychology to economics, Herrnstein and Prelec (1991) also adapted their vocabulary. What was a molar theory of behavior in psychology journals, became a theory of distributed choice in the economics journal. Herrnstein and Prelec criticized that economists did not generally distinguish between explanations of behavior on the molar and on the molecular level. They wrote that "[i]n modern expositions of the theory of rational choice, the notion of what constitutes an object of choice is kept deliberately vague, so as not to restrict unduly the range of possible problems to which the theory will be applied later on."[324] They criticize that this vagueness has enabled to speak similarly about two different kind of choice behaviors. They argue that economists suppose that "[…] in applying the theory it does not matter whether: A) the 'choice' corresponds to an actual decision, made at a specific point in time; or B) the 'choice' is an aggregate of many smaller decisions, distributed over a period of time" (Herrnstein, Prelec 1991: p. 137).

By contrast, Herrnstein and Prelec (1991) argued that distinguishing between Type A and Type B choices is crucial. Their "theory of individual choice called melioration" relied on that distinction. The distinction was crucial for them, because their theory implied that "choices of type B may be reliably and predictably suboptimal, in terms of the person's own preferences." More generally, this would imply that "preferences as revealed in the marketplace may be a distortion of the true underlying preferences whenever the measured economic variables are aggregates of a stream of smaller decisions." In other words, type B choices might be systematically biased in the form as they are perceived with revealed preference theory. As an example, for such distributed choices they name "expenditure rate on various non-durables; frequency of athletic exercise; rate of work in free-lance type occupations; allocation of leisure time; rate of savings (or dissavings);

to describe addiction quantitatively as a behavioral phenomenon. Both sides prioritized actual observations of behavior over subjective intentions of consumers.

[324] As an example, they describe an advanced textbook on consumer demand written by Angus Deaton and John Muellbauer (1980). Herrnstein and Prelec notice that the authors of the textbook initially define "the objects of choice as 'individual purchases of commodities' (p. 269), but this concrete definition yields quickly to the more abstract notion of a commodity 'bundle,' which is rarely obtained through an individual purchase" (Herrnstein and Prelec 1991: p. 137).

expenditures on lottery tickets, and other forms of gambling" (Herrnstein and Prelec 1991: p. 137).

Addiction was the prime example of Herrnstein and Prelec to discuss suboptimalities of distributed choice (melioration). But Herrnstein and Prelec argued that "such obviously disastrous consumption patterns [as addiction] are surrounded by a penumbra of less clear cases." They argued that as a behaviorally defined phenomenon addiction potentially extends to a wide range of activities. Citing Becker and Murphy (1988), they argue that "television has been labelled addictive by some, as has gambling, shopping, athletic exercise, personal relationships, and even plain work." In effect, "[i]f the concept of choice is broadened to cover choice of lifestyle, or character, we would find a host of tenacious yet unsatisfying patterns of behavior, ranging from the traditional seven deadly sins (lust, wrath, avarice, pride, envy, sloth, gluttony), to those that modern psychiatry recognizes as personality defects" (Herrnstein, Prelec 1991: p. 149). The common element that all these activities share, was for Herrnstein and Prelec that they can all be seen as distributed choices.

Viewed in terms of maximization, Herrnstein and Prelec (1992) argued that distributed choice problems like addiction are paradoxical forms of behavior. Although addiction is perceived as harmful to the agents who are engaged in the consumption of addictive goods, they still continue to consume these goods. That means that "[t]heir stated preferences are inconsistent with the preferences that they reveal through behavior." More than that, "[t]he addict's revealed preferences are inconsistent with society's view that addiction is a losing proposition for the addict" (Herrnstein and Prelec 1992: p. 331f.). Whether the utility of addiction is self-assessed or assessed by others, it is usually a suboptimal situation. But some people still turn out addicted.

According to Herrnstein and Prelec (1991) the theory of melioration was more realistic in describing how people actually make choices. People do not engage in calculations of marginal utility to determine the optimal amount and type of consumption. In reality, people follow simpler rules of value accounting in terms of average utility rather

than marginal utility. Therefore, most people in distributed choice situations would rather behave as meliorators than as maximizers (see Herrnstein, Prelec 1991: p. 141).

For Herrnstein and Prelec (1991), the main problem with maximization was that it demanded too much imagination, projection, and calculation of utility from people. In general it would not be a problem for people "to assess how much they like specific activities or objects: whether they like a good book more than TV[.]". It would be more difficult for people to assess "the relative standing of entire distributions of activities or objects – [for example] whether a 20-80 mix of reading and TV is preferred to a 50-50 mix […]". The source of the difficulty is according to Herrstein and Prelec that pairs of time distributions for different activities need to be imagined, while both activities as such might actually be available (see Herrnstein, Prelec 1991: p. 141f.). Over an interval of time one can engage only in a certain ratio of distributing one's time to botch activities. That is why, Herrnstein and Prelec argued that meliorating consumers "[…] will generally not home in on the optimal distribution, and may, in some situations, settle at the worst possible distribution" (Herrnstein, Prelec 1991: p. 148).[325] Therefore, melioration should have very broad implications for many activities that are spread out in time in which consumers engage repeatedly.

Herrnstein and Prelec (1991) saw addiction as perfect instance of melioration. They distinguished their vision of addiction from the Becker-Murphy vision of rational addiction. They wrote that "[t]he approach [that was] initiated by Stigler and Becker (1977) and further developed by Becker and Murphy (1988), builds a taste-changing mechanism into a global, multi-period consumption function, so that the marginal substitutabilities among various commodities change as a function of consumption history." In the rational addiction model behavioral responses of the consumer "result from a once-and-for-all maximization of the intertemporal utility function[.]" As the current behavioral response (consumption of an addicted good) depends on past

[325] Technically, Herrnstein and Prelec assume separate value functions for each good and not utility functions that derive value for all goods jointly in symmetric manner.

consumption, the response behavior over time exhibits "changes over time (in demand elasticities, for example) that mimic 'harmful' and 'beneficial' forms of addiction" (Herrnstein and Prelec 1990: p. 149).

For Herrnstein and Prelec (1991) addicted consumers might be at a behavioral equilibrium, but not at an optimal equilibrium. Addicted consumers might have meliorated their way towards their addiction equilibrium, but in no way was the molecular process by which they went there for Herrnstein and Prelec a form of rational behavior. Although Becker and Stigler repeatedly emphasized that economists should ignore changes in taste (Stigler and Becker 1977), Herrnstein and Prelec argue that the rational addiction model views consumers as creating their own preferences or tastes. In the model this preference creation process is the result of maximization according to "a global utility function." According to rational addiction, Herrnstein and Prelec argued that "each consumer, no matter what his or her consumption pattern, is still at a personal optimum[,]" even if that would be an equilibrium of strongly harmful addiction (Herrnstein and Prelec 1990: p. 149). As a logical consequence, they suggested, that consumers would "presumably benefit from a reduction in price, or increased general availability, of any commodity or substance, no matter how lethal by ordinary standards" (Herrnstein, Prelec 1991: p. 149).

In 1992 Herrnstein and Prelec saw four scientific explanations of addiction: the disease view of addiction, the rational self-medication view, the view of addiction as a primrose path, and the divided self view on addiction. Each view provides another vision of addiction and addicted individuals. According to the disease view an addict is viewed "as having lost the power to choose whether or not to indulge his habit[.]"As a consequence, the behavior in question is not seen as "controlled by its potential consequences." Therefore, "the addict's behavior would not need to be accounted for by any theory of choice, including economic theory." They called the disease view also the no choice view and they claimed that "[s]uch arguments reflect a tendency to subtract the volitional component from choice [...]" (Herrnstein and Prelec 1992: p. 331).

The opposite to the no choice view of addiction was what Herrnstein and Prelec (1992) called the rational self-medication view. This view sees addiction "as part of a rational lifestyle, which only appears unusual and self-destructive because we do not understand its environmental and constitutional context." They describe the Becker-Murphy model (1988) as a "sophisticated example" of this view treating "addictive behavior as part of an optimal intertemporal consumption plan." While the disease view assumed no choice, Herrnstein and Prelec argue that the rational self-medication view assumes that "[b]ehavior is […] perfectly controlled by its consequences[,]" and that "[a]ddicts take full account of the impact of their current behavior on the future, including their future taste for the addictive substance[.]" As "[t]he addictive commodity or activity is an expensive, inconvenient, but nevertheless rational treatment for special psychological conditions, such as depression, stress, and low self-esteem[,]" Herrnstein and Prelec claim that "Becker and Murphy depict addiction as a form of medication[.]" (Herrnstein and Prelec 1992: p. 333f.).

Herrnstein and Prelec (1992) described their own view of addiction as the middle ground between the disease view and the rational medication view. According to their own view "addiction truly does depend on a person's choices[,]" like in the rational addiction model. But, they argue "that those choices can sometimes fail the test of rationality." Like in the rational addiction model they see behavior as controlled by its consequences, due to melioration "the result may be far from perfectly adaptive." They call their own view the "primrose path[,]" implying that addiction is rather like "a trap into which one is lured, because the latent costs of addiction are initially hidden or because the underlying behavioral process is deficient at making rational choices" (Herrnstein and Prelec 1992: p. 334).

At the core of their primrose approach was the evolutionary view of adaptation also present in melioration[326]. Herrnstein and Prelec (1992) argued that in their approach

326 The importance of the evolutionary view of adaptation and rationality assumed by psychologists as been stressed also by the historian of economics Nicolas Vallois (2012). Vallois has argued that the evolutionary rationality contained in melioration contains a strong criticism of the rather static rationality

"[t]he key observation is that the typical addict goes down the primrose path believing that there is little danger of losing control[.]" But as they go down the path "[t]he danger arises because the availability of certain substances or activities creates a situation in which a person's normal behavior rules are inadequate." Despite its resemblance with rationality, they argued that the normal, nonaddictive behavior of people is not the result of utility maximization. Rather, it is the result "of a good match between the behavioral rules and particular circumstances."[327] When, like with addictive goods, "this match is not good [...] then the same behavioral rules produce poor results" (Herrnstein and Prelec 1992: p. 334). In this sense Herrnstein and Prelec describe addiction quite literally as a case of maladaptation to new, but different circumstances.[328]

Herrnstein and Prelec (1992) see their primrose path view of addiction generally similar to what they call the divided self vision of addiction. But in detail they argue both approaches are distinct by their core assumptions and by their methodological proceeding. According to Herrnstein and Prelec the divided self view "starts with the observation that the same person has different preferences at different times." They argue that the "common element in formalized divided self models is that the individual is viewed as a collection of rational subagents, jockeying for control of behavior." While each of the individual subagents can be seen as a utility maximizer, this does not need to carry over to the

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of microeconomics. He has argued that the limitation on behavior that it imposes should not be confound with the errors of decision making that are due to cognitive biases that were often stressed by cognitive psychologists like Kahneman and Tversky or behavioral economists like Thaler (Vallois 2012: chapter 2).

[327] Herrnstein and Prelec's interpretation of addiction in 1992 is a good example of how the meaning of the Matching Law has gotten broadened semantically while it was applied to real-world addiction. The initial Matching Law stated that the relative ratio of behavior responses should match the relative ratio of reinforcers. Now it is argued that in equilibrium the behavioral rules will simply match particular circumstances.

[328] An intellectually-imperial similarity between Herrnstein and Prelec's melioration theory of addiction and Becker and Murphy's rational theory of addiction is that both assume one general view of behavior that more or less fits all activities. Just as Becker did just one basic form of behavior for all different types of activities, Herrnstein and Prelec write that people are "following the same fundamental rules when [they] develop an appetite for golf as when the developing appetite is for heroin" (Herrnstein and Prelec 1992: p. 334).

individual who is seen as a collective. Thus, "the behavior of the collective can be severely suboptimal[.]" (Herrnstein and Prelec 1992: p. 334f.).[329]

As they used different underlying behavioral principles, the melioration vision of addiction differed from the vision of rational addiction. While melioration assumed only a comparison of local reinforcement rates. Maximization assumed an intertemporal optimization.[330] As a consequence, with melioration becoming addicted was more seen as "a process of invidious slippage than a cool decision adventitiously supported by a high discount rate." They argued that "[a] person does not normally make a once-and-for-all decision to become an exercise junkie, a miser, a glutton, a profligate, or a gambler[.]" Rather, they argue that a person "slips into the pattern through a myriad of innocent, or almost innocent choices, each of which carries a little weight" (Herrnstein and Prelec 1991: p. 153).

In part people would slip into addiction, because of the negative side-effects of addictive consumption that are not correctly taken in account by individuals. Herrnstein

[329] The divided self view has been pushed extensively by researchers like George Ainslie, Jon Elster, or Richard Thaler and Hersh Shefrin who were also participating with different chapters in the collective volume *Choice Over Time* (Loewenstein and Elster 1992) in which also Herrnstein and Prelec published the chapter on addiction. We will describe some of the work of Thaler and Ainslie in chapter 7 when we discuss how the rational addiction model has been perceived during the construction of behavioral economics as a field and as a community. George Ainslie is a psychiatrist who has used animal experiments to demonstrate the effects of delayed reward. He has been introduced to the experimental techniques of operant conditioning by Rachlin and could also fit into this chapter describing the rational addiction model as a methodological benchmark. We have decided to put Ainslie rather in chapter 7 focusing on the perception of the rational addiction model among behavioral economists as his critique of the rational addiction model is similar to that of Thaler and others taking a divided self view on addiction.

[330] Herrnstein and Prelec placed their own distributed choice approach rather closer to the literature on naïve habit models that "assumes that the taste-change process (also called 'habit-formation') is essentially opaque to the consumer." They argued that naïve habit formation models draw "a sharp separation between a type of taste-change to which the person adjusts optimally, namely the taste-change that is encompassed within the one-period preference structure, and a second type of taste-change, across periods, which the consumer ignores completely" (Herrnstein, Prelec 1991: p. 149). It is not clear at all that authors such as Pollak would in return place themselves closer to Herrnstein and Prelec than to Becker. As we have seen in chapter 3, Pollak has explained that the earlier naïve habit models were limited in part through the static modeling approach taken from traditional demand theory. But in part, Pollak also acknowledged the importance of effects of current behavior on future consumption possibilities. And although Herrnstein and Prelec do not hesitate to draw welfare implications from demand situations, Pollak stressed repeatedly the crucial difference between interpreting utility functions for estimating demand and between interpreting utility functions for welfare analysis.

and Prelec (1992) argued that "[a]ddictive behavior has significant negative interpersonal side effects – costs that are caused by addiction but that appear in the context of other, ostensibly unrelated activities." Although "from the outside, it is usually clear that addictive behavior is having profound effects on the rest of the addict's life[,]" addicts might perceive their situations differently for a long time. For a long time, they might link the psychic benefits to consuming the addictive good, while the psychic costs (i.e. unrealized opportunities, a worsening career, or deteriorating relationships) are not connected to the addiction problem (see Herrnstein and Prelec 1992: p. 337).

Despite all their distancing from the rational addiction model, both descriptions of addiction resemble each other in several aspects. As Becker and Murphy, Herrnstein and Prelec (1991) saw addiction as a molar equilibrium that arises with repeated consumption over time due to either beneficial or harmful addiction. For example, they argue that molar equilibria of distributed choice tend to be suboptimal because either people do not realize the positive effects of a certain behavior on the future. That would be the case of "an activity whose value intrinsically depends on its own rate of choice, and the value is increasing with rate." Herrnstein and Prelec argue that "[t]his type of value function would be characteristic of skilled activities (like music or sports) which provide greater satisfaction if maintained at higher rates." As meliorating individuals do not take in account the dependency of future value on the current rate of consumption, these activities would be "underconsumed" (see Herrnstein and Prelec 1991: p. 150f.). Or otherwise, distributed choice equilibria a suboptimal, because people do not recognize the negative effects of a behavior chosen in the present on reinforcement (or utility) in the future like in the case of addiction. In such a case, they argue the engagement in one behavior "destroys the satisfaction produced by engaging in alternatives complementary to it." They remark that "this seems to correspond to the common understanding of harmful addiction, as a process in which consumption of the addictive substance casts a shadow over other pleasures" (Herrnstein and Prelec 1991: p. 150).

As a dynamic phenomenon of maladaptation, the melioration vision and the rational addiction vision were strikingly similar. As Becker and Murphy, Herrnstein and Prelec (1992) argued that "addiction is a habit[,]" it is "normally not produced by a single action, but is rather the result of a long stream of choices."[331] To the extent that "[a]ddictions, [...] are ordinarily built up from many smaller decisions[,]" Herrnstein and Prelec argue that "they are closely related to what we recognize as defects in character or personality." (Herrnstein and Prelec 1992: p. 336).[332] Becker and Murphy have argued somewhat similarly by comparing the claims by addict not being able to stop to claims by disorganized people wanting to be better organized (see Becker and Murphy 1988: p. 693).

Herrnstein, Prelec (1992) "agree with Becker and Murphy that addictions include many activities beyond substance abuse[.]"[333] As a consequence, they argue the physiological everyday characterization of addiction of the disease view "no longer makes sense." (Herrnstein and Prelec 1992: p. 336). As in the Becker-Murphy model, addiction means for Herrnstein and Prelec that "[t]he benefits of each instance of an addictive behavior are generally more immediate than the costs" (Herrnstein and Prelec 1992: p. 338). This is also assumed in the rational addiction model. In fact, this is exactly the reason why Becker and Murphy argue that people with a high time preference for present consumption are prone to be become addicted. Becker and Murphy assume that people

[331] Although this point is not explicit in Becker and Murphy's article from 1988, Becker described addictions explicitly as habits in an essay published in 1992. In that essay Becker wrote that "[a]n addiction is defined simply as a strong habit" (Becker 1992: p. 329).

[332] As an example, Herrnstein and Prelec argue that "[a] lazy person, for example, is not one who once chose to rest rather than work, but one who is consistently predisposed to choose rest over work. We could say that he is addicted to loafing. Likewise, a hygienic person is not someone who once chose to bathe or to wear clean clothes, but someone who is predisposed to doing so repeatedly and consistently" (Herrnstein and Prelec 1992: p. 337). This is largely complementary to Becker and Murphy arguing that disorganized people can state and wish to be better organized. The disorganized person is not organized yet, because he or she needs to implement short-term adjustment costs that are sufficiently high to outweigh potential long-term benefits (see Becker and Murphy 1988: p. 693).

[333] Herrnstein and Prelec describe following activities as potentially addictive: "gambling, spending beyond one's means, compulsive buying of particular items, such as, for example, cosmetics, some deviant sexual acts like exhibitionism, probably also the 'type A' (hypercompetitive) personal style, excessive temper, a tendency to form self-destructive love relationships, and many others" (Herrnstein and Prelec 1992: p. 336).

differ in their subjective discount rate which makes them more or less susceptible to addiction. Herrnstein and Prelec argue quite similarly that "[i]ndividuals vary in their susceptibility for falling into self-destructively high or low rates of indulgence, which is to say they vary in their propensity toward a stable matching point at which the aggregate returns are significantly suboptimal" (Herrnstein and Prelec 1992: p. 343).

Finally, the melioration model and the rational addiction model are very similar in describing dynamic difficulties leading to addiction. Becker and Murphy have stressed the importance of multiple steady states and the danger of unstable steady states in setting individuals on a higher consumption path. Herrnstein and Prelec argue that addiction is often marked by what they call "knife edges." They argue that in many addictions "[l]ow levels of indulgence can go on indefinitely, but, at some threshold, the pattern tips over, and consumption seems to break free of control." The consumption might be low but stable at a low matching equilibrium. But "should something change, either in the environment or in the person's drives," an individual might trespass an unstable matching equilibrium and might be drawn towards a higher consumption level (see Herrnstein and Prelec 1992: p. 344f.).[334]

During the 1990s, behavioral psychologists become even more determined in applying reinforcement theories to addiction. The psychiatrist George Ainslie publishes a widely-praised book called *Picoeconomics* in 1992 in which he explains how aspects of addiction are linked to hyperbolical discounting (Ainslie 1992). In 1996, Gene Heyman, a former student of Herrnstein, publishes a widely read article called *Resolving the contradictions of addiction* (Heyman 1996). And in 1997, Rachlin published also a short

[334] The formal similarity in describing addiction as a process with unstable steady-states or critical thresholds has also been remarked by the editors of the collective volume in which Herrnstein and Prelec published their chapter. The volume contained as well a reprint of a short paper co-written by Becker, Michael Grossman, and Kevin Murphy (1991) titled *Rational Addiction and the Effect of Prices on Consumption*. In the general introduction to the collective volume Loewenstein and Elster compare the chapters by Herrnstein and Becker, Grossman, and Murphy. They have written that "[g]iven the major difference in starting assumptions between the two chapters, their theoretical frameworks are remarkably similar. This affinity is most strikingly evident in the resemblance between Becker et al.'s Figure 1, and Herrnstein and Prelec's Fiigure 2, each of which contains two stable and one unstable equilibrium point located at approximately equivalent positions" (Loewenstein and Elster 1992: p. xxii).

article about addiction called *Four teleological theories of addiction* addiction (Rachlin 1997).[335] In 2000 published a book called The Science of Self Control in which he described in greater detail his own vision of addiction (Rachlin 2000).

The multiplication of "behavioral" addiction research over the 1990s was also reflected in some collective volumes. In 1996, Leonard Green and John Kagel published the third volume of their collective series *Advances in Behavioral Economics* that was subtitled *Substance Use and Abuse* (Green and Kagel 1996). The volume contained chapters by behavioral psychologists, by economists, but now also by behavioral pharmacologists.[336] In 1999 applied health economists from the NBER published a collective volume titled The Economic Analysis of Substance Use and Abuse: An Integration of Econometric and Behavioral Economic Research (Chaloupka et al. 1999). The volume contained analyses by applied health economists like Michael Grossman or Frank Chaloupka and by behavioral pharmacologists like Warren Bickel who had developed their own kind of behavioral economics of drug consumption.[337] In 2003 the psychologists Rudy Vuchinich and Nick Heather, published a collective volume titled *Choice, Behavioural Economics and Addiction* (Vuchinich and Heather 2003).[338] The

[335] In this article Rachlin compared Ainslie's hyperbolical discounting view, Herrnstein and Prelec's melioration view, the earlier Stigler-Becker model, and the later Becker-Murphy model. Rachlin argued as well that except for some points the Becker-Murphy model and the Herrnstein-Prelec model are remarkably similar. Building on Stigler and Becker's distinction of beneficial and harmful addiction, he also proposed his own view of addiction that he called relative addiction (see Rachlin 1997).

[336] Behavioral pharmacologists like Warren Bickel and Richard DeGrandpre continued the "behavioral economics" approach of Steven Hursh (1980, 1984). For a detailed historical description of the contributions to addiction research by behavioral pharmacologists see Campbell (2007, especially chapter 7).

[337] The collective volume was the outcome of a conference that was organized by the NBER in Camebridge, U.S., in 1997 and whose organizers obtained funding from the *Robert Wood Johnson Foundation*, and from several federal agencies, the *National Institute on Drug Abuse*, the *National Institute on Alcohol Abuse and Alcoholism*, the *National Cancer Institute*, and the Centers for Disease Control and Prevention (see Chaloupka et al. 1999: p. xi). For more on the economic analyses of drug consumption by applied health economists see Chapter 6 of this PhD thesis. For the behavioral economics of behavioral pharmacologists see the preceding footnote.

[338] The book was based on a conference that took place in 2002 at the University of Birmingham in Alabama. In preparing the conference the organizers planned to have as speakers proponents of the "four major theories of addiction that have been developed in the area of economic science/behavioural economics" (Vuchinich, Heather 2003: p. xiii).

book contained chapters representing the main behavioral theories of addiction. It contained a chapter by Gene Heyman representing the melioration vision of addiction, a chapter by Frank Chaloupka representing the rational addiction vision,[339] a chapter by George Ainslie representing the hyperbolical discounting or divided self vision of addiction[340], and a chapter by Howard Rachlin representing the relative addiction vision.

5.5 Concluding remarks

By the early 2000s a differentiated landscape of "behavioral economic" approaches to addiction existed. In this chapter we were mainly interested in how the rational addiction model has been perceived by behavioral psychologists. We have focused on one type of "behavioral economics" that has been proposed by a collaboration of behavioral psychologists and microeconomists in the early 1980s. We have argued that this collaboration has probably accelerated the dissemination of the rational addiction model among quantitatively-oriented behavioral psychologists. The collaboration has nurtured debates among behavioral psychologists about the proper role of maximization techniques and economic concepts in behavioral psychology. While some psychologists like Howard Rachlin were more receptive to the integration of maximization and economic concepts like substitutability, other psychologists like Richard Herrnstein were more critical. In any case, both Rachlin and Herrnstein saw general similarities between behavioral psychology and microeconomics with regards to how both disciplines were interested in modeling individual behavior over time and in subjective valuations of intertemporal consumption processes.

When Becker and Murphy published their model in 1988 it provided an occasion for psychologists to provide their own interpretations of addiction. In this chapter we have

[339] Frank Chaloupka is an applied health economist and a former PhD student of Michael Grossman. In 1988 he published his PhD thesis titled An economic analysis of addictive behavior: The case of cigarette smoking in which he developed a model of cigarette demand very close to Becker and Murphy's rational addiction model. For more on the role of Grossman and Chaloupka in the dissemination of the rational addiction model in applied health economics, see chapter 6.

[340] For more Ainslie and the so-called divided self vision of addiction, see chapter 7.

mainly traced how Herrnstein and Prelec have proposed an alternative model providing an alternative vision of addiction in terms of melioration and matching. As the Becker-Murphy model became seen as an instance of reinforcement maximization in the psychologists' debate; as it became a public reference for these methodological connotations, we speak of the rational addiction model as a methodologic benchmark.

The similarities between the rational addiction model and the melioration model of addiction illustrate the general methodologic similarities in the analytic approaches of microeconomists like Becker and behavioral psychologists like Herrnstein. Both approaches describe addiction quite similarly as a dynamic maladaptation that happens as people consume addictive goods repeatedly. Although both approaches were quite similar, they differed in important aspects. They assumed different molecular decision processes representing different degrees of foresight and control. Therefore, they differed with regards to the amount of personal responsibility that could be demanded from individuals. Both visions of addiction also came with different implications for individual welfare (see also chapter 7).

By stressing the similarities between the microeconomics of the rational addiction model and operant conditioning analyses of behavioral psychologists we do not want to suggest that utility is the same as reinforcement, or that microeconomists like Becker were actually Skinnerian behaviorists. We rather adhere the weaker view that both, microeconomists like Becker and behavioral psychologists like Rachlin or Herrnstein, appealed to similar experimental principles and partly to similar ideals of positivism in the social sciences. Next to these differences both disciplines differ with regards to their methodologies and with regards to the place of principles like rationality or personal responsibility.

6. Becoming a theoretic benchmark: Rational addiction as seen by applied health economists

6.1 Introduction

The rational addiction model became a widely used model over the 1990s. The model was discussed and used mostly in the field of applied health economics. Initially, health economists used the model to describe the demand for cigarettes, but rather quickly they extended the logic of the model also to other consumption goods like alcohol or illicit drugs, to other supposedly addictive activities like gambling, or to other forms of consumption that could be seen as bad health habits, such as a sedentary lifestyle and later obesity. In this chapter we describe how the model has been seen and used by applied health economists interested in the analysis of unhealthy behavior.

Having described the rational addiction model as a methodological benchmark among behavioral psychologists in Chapter 5, we present it in this chapter as a theoretical benchmark among applied health economists. Health economists were familiar with the methods and practices contained in the model. By the late 1980s, Becker was considered part of the economic establishment. Health economics had become one of several applied fields of economic analysis that had recently undergone redefinition. Prominent researchers in the field, such as Michael Grossman, were very receptive to the model and became leading disseminators of it. Having been part of the CEAHBSI community in the 1970s, Grossman was already familiar with the household production framework from his Ph.D. thesis. The rational addiction model fit well with Grossman's research on the determinants of healthy and unhealthy behavior.

Health economists, such as Grossman, were primarily interested in the model as a theoretical guidepost that made consumption activities accessible to economic analysis. The model could serve this purpose because it expressed dependence in intertemporal consumption behavior in microeconomic terms. It provided theoretical orientation by

opening a potentially vast realm of habitual behavior to economic analysis. The model offered analytical concepts, such as consumption capital, and gave meaning to empirical parameters, such as the time discount rate. It enabled health economists to view consumption activities as either harmful or beneficial in an economic sense. Although Becker and Murphy were not the only economists interested in unhealthy consumption patterns, their framework accounted for a specific type of unhealthy behavior. This was useful to other applied health economists modeling health habits in the 1990s.

The rational addiction model provided orientation because it described health habits in microeconomic terms that could inform public policy. The model normalized viewing drugs as conventional consumption goods. Despite the fact that certain habitual and addictive activities created large dependencies, the model essentially framed these goods as consumption goods that obeyed the same economic principles as other goods exchanged on markets. Framed as a consumption good, addictive goods would need additional attention from consumers as their habit formation process distinguished them from other goods.[341] But once habit formation was taken in account, the choice to consume or not could be delegated to the consumers themselves.

Compared to chapter 5 some researchers in this chapter are socially closely connected to Becker and Murphy. In fact, Grossman became a coauthor of them and they published three articles on addiction-related topics together. Therefore, it is to some extent an artificial cut that we make between Becker and Murphy as authors of the rational addiction model and Grossman as a disseminator in the field of health economics. Even more, we describe how Becker himself used of the rational addiction model to provide a more general account of endogenous preferences. Again, this might fall more under the term of dissemination than reception. Nonetheless, it makes sense to have these dissemination efforts in our case study as they provide an interesting contrast to the rather critical reception by behavioral economists.

[341] As we have seen in the chapters 4, the rational addiction model demanded much more fore-sight and self-control from consumers.

The rational addiction model was also a political fiction. Addiction and the consumption of addictive goods posed difficult questions for political economists. Behind addiction were the problems of past dependency and endogenous preferences, thorny issues that put into question basic principles of economic liberalism. Traditionally, libertarians appeal to personal responsibility to justify consumers' freedom of choice.[342] Against common views from the medical community, the model stressed the element of individual choice involved in addictions. As long as addictive goods only harm those who consume them, consumers should be able to decide for themselves whether to consume them. Although many addictions were usually seen as involving harm for society, the harm caused by the restrictive drug policies of the US federal government outweighed these costs for Becker. Consequently, he promoted the idea of drug legalization in his public opinion publications. But in order to sell drugs as legal consumer goods, consumers must be sovereign and responsible enough to handle drug consumption.

This chapter is structured as follows. In section 2 we use the career of Michael Grossman as a way to describe how health economists in the late 20th century became interested in unhealthy behavior. In section 3 we describe how the rational addiction model has been received by applied health economists in the 1990s. We describe how the model has been applied empirically first to the analysis of cigarettes, but later to an increasing array of habits perceived as unhealthy. In section 4 we describe how Becker used the rational addiction model strategically to push the development of his framework of extended utility. In section 5 we draw brief conclusions.

[342] Since consumers are most impacted by their consumption choices, they should be the most informed about their choices. Therefore, they should be free to choose what to consume, but they must also bear the consequences of their decisions. In this sense, libertarians and classically liberal economists hold consumers personally responsible for their choices.

6.2 Research on unhealthy behavior viewed through the career of Michael Grossman

> "From a positive standpoint, those who focus on economic approaches to the determinants of health outcomes need to understand the behavioral underpinnings of consumer choices pertaining to the consumption of unhealthy goods."
>
> Michael Grossman in *Determinants of Health: An Economic Perspective* (2017: p.15)

6.2.1 Michael Grossman and the determinants of healthy and unhealthy behavior

In the 1980s and 1990s, applying economics to the analysis of unhealthy behavior became a growing field within health economics. Grossman's career path exemplifies the growing interest in unhealthy behavior. After becoming a prominent figure in the CEAHBSI community in the 1970s, he continued to play an important role in the NBER program of health economics. During the 1970s, he worked on the positive correlation between health and schooling, as well as the demand for children's health. From the 1980s onward, he focused increasingly on unhealthy behavior. In the 1990s, he co-authored two papers with Becker and Murphy. One paper extended the implications of the rational addiction model; the other applied the model to cigarette demand data. By the mid-1990s, many applied economists were analyzing the demand for cigarettes, alcohol, and exercise. By the early 2000s, obesity was considered another form of unhealthy behavior that health economists approached similarly.

When Grossman became familiarized in the economic analysis of health in the late 1960s and 1970s, health economics was refashioned as an applied field of economics. While working on his Ph.D. thesis, Grossman was a research assistant for Victor Fuchs, a

central figure in the transformation of health economics.[343] Fuchs established the health economics program at the NBER in the late 1960s. He was the vice director of the NBER during the 1970s and the director of the CEAHBSI (see Chapter 1). By the end of the 20th century, he had become one of the most prominent figures in health economics in both economics and medical circles.[344]

According to Fuchs (1989) health economics "divides naturally into two distinct, albeit related subjects: the economics of health per se, and the economics of medical care" Fuchs found it useful to think about the economics of health first, "because the demand for medical care is, in part, derived from the demand for health, and because many of the theoretical and empirical problems in the economics of medical care arise because of difficulties in measuring, valuing, and analyzing health" (Fuchs 1989: p. 119). With regards to study of health, Fuchs wrote in an article 1972 that "it is becoming increasingly evident that many health problems are related to individual behavior. In the absence of dramatic breakthroughs in medical science the greatest potential for improving health is through changes in what people do and do not do to and for themselves. Household decisions concerning diet, exercise, smoking, drinking, work and recreation are of critical importance" (Fuchs 1972: p. 229).

Grossman's model of health capital provided a theoretic rationale to address these questions. In chapter 2 we have seen how Grossman modeled the demand for health as a combination of medical inputs and other health-improving and health-damaging factors.

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[343] For more on the history of health economics as an applied field, see Forget (2004), Banzhaf (2014), or Panhans (2018), Grignon et al. (2018), Coast (2018). See also more partial retrospectives on the field of health economics, for example Grossman (1982, 2004, 2022), Fuchs (2000), and Leibowitz (2004). Like Grossman, Arleen Leibowitz has been part of the CEAHBSI community in the early 1970s.

[344] Over his life Fuchs has been an ardent communicator of economics among US health scientists. Over his career Fuchs has often held double appointments as a professor in economics departments and in medical schools. As a result, Fuchs needed to translate his view of applied economics in language that was easily understandable for physicians and other people in the health sector. Fuchs promoted his economic analysis of health and health service provision also in books addressed to general audiences. In 1974 Fuchs published the book *Who Shall Live? Health, Economics, and Social Choice* (Fuchs 1974) and in 1983 he published the book *How We Live: An Economic Perspective on Americans from Birth to Death* (Fuchs 1983). The economic analysis he applied in the two books fits neatly in the household production framework that we have presented in chapter 2.

For Grossman the decision to smoke comes with a "full price" that needs to be considered by the consumer. As smoking contributes to lowering the stock of health capital, the decision to smoke should be based not only on the monetary price of cigarettes, but also on the monetary value of the negative health effects of deciding to smoke. The price of health-improving and health-damaging consumption goods were for Grossman potentially important parameters to propose public policies.

Given his experience at the CEAHBSI in organizing research projects, Grossman and research colleagues of him were ready in the late 1970s to quickly respond with research proposals when external funding agencies were interested in analyses of cigarette and alcohol consumption. In 2017 Grossman recounted how he became engaged in analyzing unhealthy behavior in his monography *Determinants of Health* (Grossman 2017).[345] "I made an initial attempt to deal with the demand for unhealthy goods in the last chapter of my NBER monograph in the context of a model of joint production in the household (Grossman 1972). […] I did not return to this area until 1978, when I noticed a request for applications (RFA) dealing with teenage smoking from the *National Institute of Child Health and Human Development*. My then colleagues at the NBER and former students, Eugene M. Lewit and Douglas Coate, also saw the RFA, and we discussed applying for funding" (Grossman 2017: p. 480). Grossman (2017) recounted that major campaigns against smoking and excessive drinking were underway at the time. For example, the 1964 *Surgeon General's Report* on the negative health consequences of smoking motivated an anti-smoking campaign. Grossman remembered a campaign consisting of efforts to disseminate knowledge of these detrimental health effects on radio and television. Another campaign against alcohol consumption resulted from an increased number of motor vehicle accidents. Grossman explained that, after many states lowered the legal driving age, more young people were involved in motor vehicle accidents. Many of these

[345] Throughout this chapter, we use Grossman's research monograph (Grossman 2017) as a source for his ex post view of events earlier in his career. The monograph consists mainly of reprints of Grossman's most important papers throughout his career, grouped into topical sections. Each section begins with an introductory text written by Grossman, in which he reflects on the context and content of the sections.

accidents involved drunk drivers, hence the campaign to raise awareness about the effects of alcohol consumption (see Grossman 2017: 490).

At the time, Grossman, Lewis, and Coate were surprised by the economic inconsistencies of domestic policies in the United States. Grossman (2017) recounted how he and his research colleagues were struck by the lack of discussion among policymakers regarding tax increases on alcoholic beverages and cigarettes. While excise taxes on cigarettes remained fixed at a level set in 1951, the overall price of cigarettes had continuously decreased in recent years. He recalled that "Lewit, Coate, and I were struck by the inconsistency between the policy goal of reducing smoking and the reduction in the real price of cigarettes." Grossman argued that it seemed to them that "the relevant decision makers were ignoring the law of the downward sloping demand function." Grossman argued that he and his colleagues "thought it was particularly relevant to focus on the demand for cigarettes by teenagers and their responsiveness to price because the behavior at issue is one that begins early in life." They believed that raising taxes on cigarettes would be the most effective way to increase their price and, consequently, reduce smoking among all demographic groups (see Grossman 2017: p. 481).

Although their initial research grant proposal was rejected, Grossman (2017) explained that Lewit, Coate and him continued writing research grant proposals. Soon after, they obtained grants from the *National Science Foundation* and the *National Institute on Alcohol Abuse and Alcoholism*. They benefitted from their research experience in previous projects at the NBER and their knowledge of existing datasets when preparing the proposals. Grossman wrote that "by chance, I had been working with an individual-level dataset on teenagers that contained smoking measures and state of residence. That made it easy to append cigarette prices to it and estimate cigarette demand functions." In addition to that, Grossman recounted that also "by chance, Coate, had been working with a dataset that contained alcohol consumption measures for teenagers and young adults as well as state of residence. So we would be able to append alcoholic beverage prices and legal drinking ages to it, estimate demand functions for alcohol, and compare

the effectiveness of a policy to raise the drinking age to twenty-one in all states to ones that raised excise tax rates by specified amounts" (Grossman 2017: p. 481).

Several of Grossman's papers resulted directly from these research projects. In one paper, Lewit, Coate, and Grossman analyze the effects of regulatory policies aimed at controlling tobacco use and teenage cigarette consumption (Lewit et al. 1981).[346] Using data from the third cycle of the *U.S. Health Examination Survey*, they were able to compare the effects of being exposed to pro- and antismoking messages on television and radio. They compared the effects of two advertising regimes to the effects of a hypothetical increase in the excise tax for cigarettes that they estimate. For example, they found that "a 10 percent increase in the price of a pack of cigarettes causes the number of teenagers who smoke to fall by 12 percent and reduces the quantity smoked by those who participate in this behavior to decline by 2 percent" (Grossman 2017: p. 483).

In Lewit et al. (1981) Grossman and his former students estimated the price elasticity of cigarette demand for teenagers and compared it to that of adults. They found that the price elasticity of cigarette demand among teenagers was much higher and they offered three explanations for this finding. First, they argued that teenagers have less disposable income than adults. Since the percentage of their income spent on cigarettes is higher for teenagers, they are likely to react more strongly to price changes in that spending category. Second, they assumed stronger indirect peer effects for teenagers. They argued that teenagers were more likely to smoke if their family and friends smoked as well. They assumed that the indirect effect via the presence of smoking peers contributed to higher price elasticity for teenagers. Third, they argued that "given the habitual nature of smoking, adult users, who almost always will have been users for longer periods of time than youths,

[346] They presented a version of their paper (Lewit et al. 1981) on a conference with the subject *Consumer Protection Regulation*. The conference was sponsored by the *Center for the Study of the Economy and the State* at the *University of Chicago* and articles from that conference were published as a special issue of the *Journal for Law and Economics*. The conference and the special issue contained as well one of the first published articles of Kevin Murphy, coauthored with Lynne Schneider and Benjamin Klein (Schneider et al. 1981). Their article was titled called *Governmental Regulation of Cigarette Health Information*. Compared to Lewit et al. (1981), Murphy and his coauthors focused more on the role of advertising in communicating relatively less-harmful cigarettes.

might be less sensitive to price than youths[,]" as they had become more dependent on smoking (Grossman 2017: p. 483).

Two other papers resulted from these early research grants on unhealthy behavior. In one of the papers, Coate and Grossman analyzed the excessive alcohol consumption of older teenagers and young adults (Coate and Grossman, 1988). In the other, Grossman and Henry Saffer examined the motor vehicle accident mortality rates of older teenagers and young adults (Saffer and Grossman, 1987).[347] Both papers focused on changes in the price of beer and changes in the legal drinking age. The studies found that increasing the legal driving age or the cost of alcohol decreases the motor vehicle accident mortality rate of teenagers and young men, as well as their excessive alcohol consumption.

Grossman had the opportunity to work on research projects at the NBER while he was a PhD student. When he was in a position to supervise PhD theses, he continued this practice with his students in his NBER research projects.

6.2.2 Individual health explained: Human capital investment vs time preference

Grossman was not the only one from the former CEAHBSI community who ventured into the analysis of unhealthy behavior during the 1980s. Victor Fuchs became interested in the analysis of cigarette demand in the early 1980s as well. Fuchs moved from New York to Palo Alto in the early 1970s and became professor at the *University of Stanford*. During the six years of existence, Fuchs directed the CEAHBSI program on health economics together with Grossman. Under Fuchs' leadership Grossman learned to conduct research projects. In general, Fuchs was very much associated with the CEAHBSI describing behavior in terms of household production and human capital.

In the early 1980s, Fuchs questioned whether human capital alone could explain health outcomes (see Fuchs, 1982; Farrell and Fuchs, 1982). The issue was the positive correlation between health status and an individual's level of schooling. In the 1970s,

[347] Like Lewit and Coate, Saffer was a former PhD student of Grossman.

Grossman empirically analyzed this positive correlation (see Grossman, 1976). As in other studies of human capital, establishing causal relationships through econometric estimations was difficult because it was challenging to distinguish the causal effects of education from other background variables, such as ability or family background.

In the case of health, it was also difficult to demonstrate which variable caused the positive correlation between education and health. According to Grossman (1976), education likely enhanced households' productive efficiency in producing health. Thus, he believed that education likely caused increases in individuals' health status. Fuchs turned to analyzing cigarette consumption to reevaluate the relationship between education and health (see Farrell and Fuchs, 1982). Rather than focusing solely on the productivity-enhancing effects of human capital, Fuchs argued that researchers should also consider the potential effects of third variables that might determine the levels of schooling and health, such as time preference.

Fuchs acknowledged the importance of life styles for health outcomes. Commenting on Grossman's (1976) study Fuchs (1982) argued that "while the relationship between schooling and health seems well established, the mechanisms through which schooling affects health are less clear." According to Grossman had argued that "additional years of schooling make the individual a more efficient producer of health [through] wiser use of medical care or, what is more likely, through differences in cigarette smoking, diet, and other elements of 'life style'" (see Fuchs 1982: p. 94). Although Fuchs agreed with Grossmanon the relevance of the research, He was not fully convinced. He observed that "from an economic point of view many of these behaviors have a common characteristic - they involve trade-offs between current costs and future benefits." These current costs might be various according to Fuchs: "The costs may be purely psychic, such as the loss of pleasure from passing up a rich dessert or a cigarette. They may involve time, such as jogging, or they may involve other costs including financial and nonfinancial resources." The benefits are also various, but expected to arise some time from now in the

future. They might take "the form of reductions in the probability of morbidity and mortality from one or more diseases sometime in the future" (Fuchs 1982: p. 94f.).

Overall, Fuchs (1982) acknowledged Grossman's theory of health capital, but he stressed the importance of time preferences as a potentially confounding third variable. Fuchs argued that "the acceptance of a current cost for a future benefit constitutes an investment." He argued that "Becker's development of the theory of investment in human capital (Becker 1964) and Grossman's application of this theory specifically to health (Grossman 1972) provide a convenient framework for thinking about these health behaviors." But he also argued that "individuals differ in their willingness or ability to undertake investments, [...] they have different time preferences." These different time preferences, argued Fuchs, "might help to explain variations in cigarette smoking, diet, and the like" (Fuchs 1982: p. 95). Different time preferences were usually captured in the form of different time discount rates.

Fuchs (1982) saw mainly in two explanations for the correlation between schooling and health. In the first explanation, "differences in time preference are established early in life, are relatively stable, and do affect subsequent behavior. These differences might be due to differences in the education or income of parents, the stability of the family, the values associated with different religions, or to other background characteristics." He argued that "given variation in time preference, it would not be surprising to observe that individuals with low rates of time discount would invest in many years of schooling and would also invest in health-enhancing activities." According to this first way, he argued that "schooling has no direct effect on health; the observed correlation is due to both schooling and health as depending upon time preference." He proposes also a second explanantion, potentially co-existing, in which individual variation in time preference could explain the correlation between schooling and health. According to the second explanation it could also be that "those with more schooling are more willing to invest at a lower rate of return" meaning that "more schooling could result in better health by increasing

investments in health" (Fuchs 1982: p. 95f.). This would come closer to Grossman's interpretation.

In his analysis of time preference, Fuchs (1982) acknowledged being loosely inspired by research from cognitive psychologists that was increasingly discussed by economists. He cited Daniel Kahneman and Amos Tversky's *Econometrica* paper on prospect theory as evidence of the importance of time preferences. (Kahneman, Tversky 1979). Fuchs provided evidence suggesting that time preference is a crucial third variable by analyzing survey questions designed to elicit and measure time preferences. He also cited an unpublished paper by Richard Thaler [1981], who conducted a similar survey with students (see Fuchs, 1982, p. 98). In an acknowledgement footnote, Fuchs (1982) thanked Thaler for their discussions. According to Thaler's autobiography (Thaler 2015), Thaler stayed at Stanford University for several months to meet Kahneman and Tversky, who were visiting professors. Thaler recounted that this stay was made possible by funding money from Fuchs (see Thaler 2015: p. 35). Thaler also played a role in the reception of the rational addiction model in behavioral economics literature (see Chapter 7).

In the 1980s and 1990s other former peers of Grossman from the CEAHBSI community engaged at times in research questions linked to unhealthy and risky behavior over time as well. This holds especially for Sherwin Rosen and Isaac Ehrlich. Rosen wrote articles about related to the valuation of health risks (Rosen 1981) and changes in life expectancy (Rosen 1988), and also on the relationship of marriage status and health status (Taubman and Rosen 1982). Ehrlich wrote papers on the demand for longevity and the value of life extensions (Ehrlich, Chuma 1990) and on uncertain lifetime and life protection (Ehrlich 2000). Many of these papers cite Grossman's health capital model from 1972. Although these authors were interested in different questions than Grossman, these papers indicate that the broader concept of health capital was easily taken up by fellow researchers who were socialized in the CEAHBSI community.

Both Grossman and Fuchs agreed on the importance of healthy and unhealthy personal behaviors to explain individual health levels. Grossman (1976) had proposed that

education might make individuals more efficient producers of their own health by combing given resources more effectively. Accordingly, better educated individuals should be able to manage their own health more effectively. Fuchs (1982) had argued that high education levels and good health levels are both caused by individual time preference that is probably formed in childhood. Having a lower time discount rate should make individuals attribute more importance in their decisions to costs and benefits of current decisions that are likely to arise only in the future. Although Grossman and Fuchs differed in their explanations of what is the most likely cause for the positive correlation between observed health status and educational level, both agreed that health levels are explained to a large degree through the personal behavior of individuals. While exercising, jogging and keeping a healthy diet should increase one's health capital, smoking or excessive drinking should decrease one's stock of health capital.

6.3 The rational addiction model in the field of applied health economics

Becker and Murphy's rational addiction model became an important reference among applied health economists because it offered a theoretical explanation for a specific intertemporal consumption pattern. Specifically, the model assigned a theoretical role to time preference and legitimized the principles of intertemporal utility optimization as implemented in the literature on rational habit formation. Although Becker and Murphy discussed addiction extensively in their 1988 article, they also included beneficial habits under the term addiction. Consequently, the model was very general. As mentioned briefly in Chapter 4, Lawrence Iannaccone used a rational addiction model to analyze religion and participation in religious activities.

The model was proposed at a time when more and more applied health economists were interested in unhealthy behavior. Grossman played a pivotal role in establishing the model within the field. First, he disseminated the model directly by co-authoring papers with Becker and Murphy that dealt with rational addiction, as well as by using similar

models in his own publications. Second, he disseminated the model indirectly by supervising the PhD dissertations of many young health economists related to the analysis of unhealthy behavior. Throughout the 1990s, other renowned health economists also used the model to analyze a broader range of unhealthy habits and lifestyles.

6.3.1 Early adoption by intellectually-close health economists

The rational addiction model helped to make unhealthy behavior involving dependence to become a more acceptable research objects for economists. Grossman (2017) claimed that his first research proposal on cigarette and alcohol demand written together with Lewit, Coate was rejected in part due to "the view even among economists that the behaviors at issue were addictive and therefore highly unlikely to be sensitive to price" (Grossman 2017: p. 481). While Grossman was working on empirical studies on cigarette and alcohol consumption, "Gary S. Becker and Kevin M. Murphy were developing a theoretical model in which addiction is a perfectly rational behavior [.]" He remembered that "by 1986 or 1987, Becker and Murphy had made a substantial progress on their paper and were anxious to test its implications." Grossman wrote that "[g]iven the work that I had been doing on the demand for cigarettes and alcohol and my knowledge of potential data, they invited me to join them in that effort" (Grossman 2017: p. 485). As a result, in the early 1990s Becker, Murphy and Grossman published two papers together that dealt with rational addiction (Becker et al. 1991; Becker et al. 1994).[348]

In 1991 Grossman, Becker and Murphy published a short paper in which they derive additional implications of rational addiction (Becker et al. 1991). In particular, they described how different people are likely to react to the price changes of addictive goods that are implied by public policies. This short paper effectively illustrates how the rational addiction model contributed to the proper role of time preference in the analysis of

[348] In 2006 they published a third paper together called *The Market for Illegal Goods: The Case of Drugs* on the political economy of aspects of drug legalization.

unhealthy behavior.[349] Becker, Grossman, and Murphy demonstrate that individuals' reactions to changing prices of addictive goods should differ systematically depending on their age, income, and education. This is because the total cost of consuming an addictive substance includes the price of the substance itself plus "the money value of the future adverse effects, such as the negative effects on earnings and health." Although the price is the same for everyone, they argued that the monetary value of future adverse effects depends on the discount factor and people's income-earning capacities. They argue that "future costs tend to be less important for poorer, less educated, and younger consumers because they generally place a smaller monetary value on health and other harmful future effects than richer, more educated, and older consumers who have higher wage rates." This is the case, because "the poor, youths, and the less educated are likely to have lower time discount factors (higher rates of time preference for the present) than the rich, adults, and the more educated." Therefore, the same public policy may affect different people differently depending on their socioeconomic characteristics. Grossman explained that "the poor, youths, and the less educated are more sensitive to changes in money prices of addictive goods, whereas the middle- or upper-income classes, adults and the more educated respond more to changes in the perceived or actual harmful consequences that take place in the future" (Grossman 2017: p. 488).

In 1991 a reprint of Becker et al. (1991) was contained as a chapter in a collective volume on drug policy was edited by the economists Melvyn Krauss and Edward Lazear and published by *the Hoover Institution Press* (Krauss and Lazear 1991). [350] The chapter by Becker, Grossman, and Murphy was followed by a short comment by Fuchs (Fuchs 1991). Fuchs generally praised the rational addiction model in his comment. Fuchs

[349] This paper was also reprinted in Loewenstein and Elster's collective volume *Choice over Time* (Loewenstein and Elster 1992) that was funded by the behavioral economics program of the *Russell Sage Foundation* (see chapter 7).

[350] The collective volume was titled Searching for Alternatives: Drug-Control Policy in the United States . Both, Krauss and Lazear, were senior fellows at the Hoover institution, as was Becker. Lazear was part of the CEAHBSI community in the 1970s and became the editor of the *Journal of Labor Economics* that was founded in 1983 and published by the *University of Chicago*. The Hoover Institution is a conservative US think tank based at Stanford University. The volume contained chapters by outspoken proponents of drug legalization like Milton Friedman, but also chapters by critics of legalization.

summarized the chapter in five stylized facts or findings that he saw as the main contributions of the authors. The finding that Fuchs saw as the most important was that Becker, Grossman, and Murphy "report that past and future prices of addictive commodities affect current consumption the same way that present prices do." In other words, Fuchs argued that this meant that "past and future consumption are complements of present consumption" (Fuchs 1991: p. 88). Fuchs recommended to test the empirical robustness of the econometric specification.

Fuchs also wondered how widely the rational addiction model would apply and what the definition of economic addiction actually meant. He wondered "what would happen if the same econometric methods used to produce this result were applied to so-called normal commodities" (Fuchs 1991: p. 88f.). He provided some thoughts on potential empirical results on this. He argued that "[i]f these other commodities did not show this relationship, this might prove to be a powerful way to identify an addictive commodity." But he argued that such economic addiction might be found empirically for much more goods or services than those goods who were commonly seen as physiologically addictive substances.[351]

In another paper co-written with Becker and Murphy (Becker et al., 1994), Grossman sought to empirically test the implications of the rational addiction model. To test the model empirically, Grossman (2017) argued that they needed to strip "the model to its barest essentials[.]" He wrote that "[t]he two really important ingredients are the definition of an addictive good and the assumption that consumers take account of the future consequences of their current actions." Together, Grossman argued, these two "assumptions generate the key prediction of the model: that of intertemporal complementarity" (Grossman 2017: p. 486).

[351] In Fuchs' words, "[n]otice, however, that this 'addictive' property might be present in commodities far different from alcohol, cigarettes, or heroin. For instance, the certain knowledge that future gasoline prices would be much higher (or lower) than they are this year would probably affect the quantity demanded this year through changes in types of cars purchased and similar decisions" (Fuchs 1991: p. 89).

In their empirical paper Becker, Grossman and Murphy (1994) show that "the Becker-Murphy model generates a demand function for consumption of an addictive good in period $t(C_t)$ of the following form.

(equation I) $C_t = \alpha C_{t-1} + \alpha\beta C_{t+1} + \theta P_t$

In equation I P_t represents the price of cigarettes in year t, C_t represents current year cigarette consumption, C_{t-1} represents the cigarette consumption level of the preceding year, and C_{t+1} represents the same level in the following year, α, β, and θ are estimated coefficients. Grossman (2017) explained that the coefficient α measures at the time "the effect of an increase in past consumption on the marginal benefit of current consumption," and it also measures "the effect of an increase of future consumption on the marginal benefit of current consumption." This coefficient is assumed to be positive for addictive goods with the value of α representing the degree of reinforcement of addiction. He argued that in the rational addiction model intertemporal complementarity arises "because increases in past or future consumption (caused by reductions in past or future prices) cause current consumption to rise" (Grossman 2017: p.487).

In Becker et al. (1994) Becker, Grossman, and Murphy also estimated short-run and long-run price elasticities and interpreted their differences. The short-run price elasticity of cigarette demand "holds past consumption constant," while the long-run price elasticity "allows past consumption to vary." For addictive goods the short-run price elasticity must be smaller than its long-run price elasticity. This is because "past consumption reinforces current consumption so the price response grows over time in the case of an addictive good." The greater the long run price response, "the higher the degree of addiction or reinforcement." Thus, for goods considered addictive or dependence-creating their short-run price elasticities may be misleading when compared to usual price elasticities of non-addictive goods (see Grossman 2017: p. 487).

The other important parameter estimated by Becker, Grossman, and Murphy (1994) was the rate of time preference. The coefficient β in the upper equation measures

the time discount factor. Typically, Grossman (2017) argued "economists and psychologists assume that this discount factor is smaller than one because people are impatient." Becker, Grossman and Murphy assumed a discount factor, β, equal to the expression $\frac{1}{(1+r)}$, where r is the rate of time preference for the presence. Grossman explains that the smaller the time discount factor β "the greater the rate of time preference for the present" and "the smaller is the effect of future consumption or future price on current consumption" (Grossman 2017: p. 487).[352]

Becker, Grossman, and Murphy (1994) present their empirical paper as a test of the rational addiction model against the alternative assumption of perfectly myopic behavior.[353] Grossman (2017) explained that "in the case of perfectly myopic behavior in which consumers pay no attention to the future consequences of their current actions, β equals zero (r equals infinity), and future variables have no impact on current decisions" (Grossman 2017: p. 487).[354] Like many other applied economists, Grossman applied the Becker-Murphy model to an array of unhealthy behaviors that lead to dependence. In subsequent years, Grossman and his co-authors tested the theory with other addictive substances, such as alcohol and cocaine (see Grossman et al. 1998; Grossman and Chaloupka 1998).

Grossman also indirectly contributed to establishing the rational addiction model in the economics literature on unhealthy behavior. In the late 1980s, he supervised young researchers who were just starting to work on related issues. Some of these researchers

[352] As we have explained in chapter 4 the Becker-Murphy model uses exponential discounting as a valuation function for utility coming from future periods. Importantly, exponential discounting implies that individuals make time-consistent plans. In chapter 7 we will see how behavioral economists deviated from this assumption.

[353] The melioration model of addiction proposed by the behavioral psychologists Richard Herrnstein and Drazen Prelec can be interpreted as a model of myopic habit formation (see chapter 5).

[354] To the degree that perfect myopia can be represented in the empirical application of the rational addiction model, Grossman argued that in this sense "a myopic model of addiction is nested within a rational model of this behavior." (Grossman 2017: p. 487). This strategy of nesting one type of model functionally through parametrization in a more general model has been a popular modeling strategy also among behavioral economists in proposing quasi hyperbolical time discounting as an alternative to exponential discounting (see chapter 7).

became strongly invested in analyzing unhealthy behavior. As mentioned earlier, these researchers included Eugene Lewit, Douglas Coate and Henry Saffer. Another example is the case of Frank Chaloupka who completed a Ph.D. thesis titled *An Economic Analysis of Addictive Behavior: The Case of Cigarette Smoking* in 1988 at the *City University of New York*. Grossman was his Ph.D. committee chairman and supervisor. In 1991 Chaloupka published an article in the *JPE* called *Rational Addictive Behavior and Cigarette Smoking* (Chaloupka 1991). In that article Chaloupka applied the Becker-Murphy model to data from the second *National Health and Nutrition Examination Survey* and estimated short-run and long-run demand functions for the demand of cigarettes. Chaloupka's conclusions were similar to Grossman's. Chaloupka concluded that his "estimates imply that smoking is addictive, individuals are not myopic, and price increases would reduce demand[.]" Further Chaloupka noted that "less educated (younger) individuals are found to behave more myopically than more educated (older) individuals, whereas more addicted (myopic) individuals are found to respond more to price, in the long run, than less addicted (myopic) individuals" (Chaloupka 1991: p. 722).

Rooted in the applied field of unhealthy behavior analysis, the rational addiction model defined a particular economic meaning of rationality. Chaloupka (1991) mentioned the methodologic prescriptions of the Becker-Murphy model. He wrote that "rationality in this context [the consumption of cigarettes] implies that the future consequences of current and past behavior are considered in the lifetime utility maximization process [. . .]" and that "preferences are stable over time" (Chaloupka 1991: p. 723). He acknowledged that this economic definition of rationality differs greatly from the more common definition of rationality used by laypeople. He wrote that "some noneconomists and economists alike will be uncomfortable with the use of the term 'rational' to describe potentially self-destructive activities (as an anonymous referee notes, to many, the term 'rational addiction' sounds like an oxymoron)." However, citing Stigler and Becker's *De Gustibus* article, Chaloupka argued also that "traditional economic analysis should not be abandoned when dealing with complicated behaviors (such as addictions) in the hope that

'further explanation will perhaps someday be produced by one of our sister behavioral sciences'" (Chaloupka 1991: p. 723).

Over the following years, Chaloupka became a frequent coauthor of Grossman, focusing on the applied field of unhealthy consumption. Chaloupka is only one example. Grossman, who remained at the City University of New York and the NBER until the end of his career, was the primary supervisor of over 100 Ph.D. theses and partially supervised many more. From 1987 to 1999, eight of Grossman's PhD students defended theses related to unhealthy behavior; Chaloupka was one of them. Not all of them tested the rational addiction model like Chaloupka did, and not all of Grossman's students worked on unhealthy behavior.[355] However, different aspects of unhealthy consumption patterns, as defined by Grossman, can be inferred from the titles of their PhD theses.[356] However, different aspects of unhealthy consumption patterns, as defined by Grossman, can be inferred from the titles of their theses. This illustrates that when Grossman became heavily involved in analyzing unhealthy and addictive consumption, he had young researchers around him who developed his ideas further and applied them in new ways. This situation is similar to that at the end of the 1970s, when Becker and Mincer advanced the analysis of human capital and nonmarket behavior, and Grossman built on their work (see Chapter 1 of this thesis).

6.3.2 The Rational Addiction Model as a theoretical guide for analyzing unhealthy behaviors

While Grossman established unhealthy consumption as a core area of his scholarly work in the late 1980s, an increasing number of other economists also became interested in the

[355] In the same time period, he had a total of 43 Ph.D. students who defended their theses.

[356] The other PhD students of Grossman, next to Chaloupka, were Gregory Arluck with his thesis called *Economic Factors in Youth Alcohol Use* in 1987; Pamela Mobilia with *Rational Addiction and Gambling* and Zeev Meiseles with *The Impact of the 1985 Increase in the Federal Tax on Distilled Spirits on the Consumption of Beer, Wine, and Distilled Spirits in the U.S.* in 1990; Ismail Sirtalan with *The Demand for Alcohol in a Panel of Young Adults* in 1996; Sara Markowitz with *Alcohol Regulation and Gender-Specific Violence Towards Children* in 1998; Kyumin Shim with *Rational Addiction and Cirrhosis Mortality* and Shin-Ta Tung with *Price Sensitivity of Alcoholic Beverages: The Differential Response to Price among Different Racial/Ethnic Populations* in 1999.

applied field of analyzing unhealthy behavior. This interest was partly nurtured by the creation of new data on unhealthy consumption. It may also have been linked to the steady stream of economics Ph.D. candidates seeking policy-related research questions in health economics.

An important source of data on various health behaviors during the 1970s and 1980s was the *RAND Health Insurance Experiment*, one of the largest social experiments in the United States during the second half of the 20th century. The experiment examined healthcare provision, quality, and costs, as well as different cost-sharing regimes. More than 7,700 individuals were randomly assigned to different cost-sharing regimes within a health management organization, and their healthcare consumption patterns were observed for several years. In 1987, for example, Willard Manning, Joseph Newhouse, Naihua Duan, Emmett Keeler, Arleen Leibowitz, and Susan Marquis published a paper in the American Economic Review (AER) called *Health Insurance and the Demand for Medical Care": Evidence from a Randomized Experiment*, in which they sought to reduce uncertainty about price elasticities in the demand for medical services estimated from nonexperimental data (Manning et al. 1987, p. 252). The data generated by the experiment were used in over 300 publications, many of which were widely cited papers in health economics (see Brook et al. 2006).

Several of the economists involved in the *RAND Health Insurance Experiment* in the 1980s were also interested in the analysis of unhealthy behaviors. In 1989 two papers appeared that used data from the RAND experiment to look at harmful consumption behaviors (Manning et al. 1989 and Keeler et al. 1989).[357] The first paper was coauthored by Manning, Keeler, Newhouse, Elizabeth Sloss and Jeffrey Wassermann. It was titled *The Taxes of Sin: Do Smokers and Drinkers Pay Their Way?* and it appeared in the *Journal of the American Medical Association* (Manning et al. 1989). The authors argued that "poor health habits, such as smoking and heavy drinking, carry costs not only for smokers

[357] These two papers were published together in 1991 in an extended version in book form carrying the title *The Costs of Poor Health Habits* (Manning et al. 1991).

and heavy drinkers [internal costs], but for everyone else as well [external costs]." To quantify these external costs the authors "estimate the lifetime, discounted costs that smokers and drinkers impose on others through collectively financed health insurance, pensions, disability insurance, group life insurance, fires, motor-vehicle accidents; and the criminal justice system" (Manning et al. 1989: p. 1).[358]

The second study was published in 1989 by the same team of authors and was called *The External Costs of a Sedentary Life-style* (Keeler et al. 1989). In that article the authors claimed that "those with sedentary life-styles incur higher medical costs, but their life expectancy at age 20 is 10 months less so they collect less public and private pensions." They argued that "the external costs of smoking and drinking can in principle be converted to internal costs by appropriate excise taxes, but it is difficult to imagine how to tax a sedentary life-style." They estimate these external costs nonetheless to check whether public "subsidies to facilities and programs that promote exercise" are warranted. They argued that if high external costs "associated with reduced physical activity" would exist, such subsidies "could well save money in the long run" (Keeler et al. 1989: p. 975).

Over the 1990s the rational addiction model became mentioned in a host of studies of unhealthy behavior by applied health economists. In 1991 Wasserman, Manning, Newhouse, and Winkler simulate the effect of excise taxes on cigarette consumption and mention the rational addiction framework in their literature review (Wasserman et al. 1991). In 1995 Teresa Waters and Frank Sloan publish an article titled *Why do people drink? Tests of the rational addiction model* (Waters and Sloan 1995). They find evidence for the predictions of the model of strong intertemporal complementarities. In 2002 Frank Sloan, Kerry Smith, and Donald Taylor use the rational addiction framework to describe the effects of government interventionson cigarette demand (Sloan et al. 2002). In 2000 the *Handbook of Health Economics* was edited by Anthony Culyer and Joseph Newhouse

[358] Accumulating internal costs did not justify any government intervention. Self harm was seen as falling in the domain of consumer sovereignty, the authors suggested that accumulating external costs was more like a classic externality. It might justify additional regulation so that the burden of the cost is carried by those who caused the cost and not by the rest of the society.

(Culyer, Newhouse 2000). Volume B of the handbook had a part dedicated to health habits with a chapter titled *The economics of smoking* that was written by Frank Chaloupka and Kenneth Warner (Chaloupka, Warner 2000).

The rational addiction model was also modified and adapted in the following. The economist André Hofmeyr has provided an excellent account of the different type of models that emerged from the discussions of rational addiction and alternative models in terms of myopic behavior or multiple selves (Hofmeyr 2015 chapter 2).[359] He argued that the rational addiction model as a controversial modeling propositions that drew attention to the economic analysis of addiction and opened the topic up for discussion among economists.[360] Some economists praised the model and modified it. For example, Hofmeyr described how Athanasios Orphanides and David Zervos adapted the model in 1995 by modeling individual regret including subjective beliefs of addiction potential and Bayesian learning (Orphanides and Zervos 1995). Others who were more critical to the assumptions of the model, proposed alternative models of addiction that broke with the assumption of a unitary self and modeled addiction as the result of dual selves or dual decision systems within economic agents (see Hofmeyr 2015: p.51ff.).[361] We come back to the development of dual self models when we look at the reception of the rational addiction model among behavioral economists in chapter 7.

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[359] Hofmeyr's survey of the literature is very interesting as he also described how two widely used psychiatric diagnostic classification systems for substance use disorders have been modified over the second half of the 20th century. He described changes in the *Diagnostic and Statistical Manual of Mental Disorders* that is published by the *American Psychiatric Association*, and the *International Classification of Diseases* that is published by the World Health Organization (Hofmeyr 2015: p. 18ff.).

[360] Hofmeyr (2015) provided a remarkable citation by the philosopher Jon Elster who reviewed Becker's 1996 book Accounting for Tastes and the rational addiction model contained in that book in 1997 (Hofmeyr 2015: p. 50). In that review Elster wrote that although he disagrees "sharply with much of it, it has raised the level of discussion enormously. Before Becker, most explanations of addiction did not involve choice at all, much less rational choice. By arguing that addiction is a form of rational behavior, Becker offers other scholars the choice between agreeing with him or trying to identify exactly where he goes wrong. Whatever option we take (I'm going to take the second), our understanding of addiction will be sharpened and focused" (Elster 1997, p. 758)."

[361] In his review Hofmeyr classified alternative addiction models into diachronic dual self models, synchronic dual self models, and exogenous addiction models.

6.3.3 Towards analyzing obesity as a rational health habit

Over the 1990s and early 2000s, the range of harmful consumption patterns analyzed by economists would expand.[362] In the 1990s, they mainly considered cigarettes and alcohol to be sources of negative health effects. In the early 2000s, obesity gained increasing attention as a public health problem in U.S. society. While previous empirical analyses examined sedentary lifestyles and lack of exercise, obesity was viewed by some economists as another example of unhealthy behavior supposedly resulting from poor health habits, such as lack of exercise and an imbalanced diet. The rise of obesity in literature on unhealthy behavior is reflected in Grossman's career. He began researching obesity in the 2000s. In 2004, he co-authored a paper with Shin-Yi Chou and Saffer that focused on potential determinants of obesity, such as the number of fast food restaurants per capita, the price of fast food meals, and the price of cooking at home (Chou et al. 2004). In 2008, Grossman co-authored another paper with Chou and Inas Rashad, analyzing the effects of fast food advertising on children (Chou, et al. 2008). Grossman also had three Ph.D. students who defended theses on obesity in the early 2000s.[363]

Grossman (2017) resumed the surging interest of obesity in the early 2000s as follows. "Obesity rates in the United States and the rest of the developed world remained steady from approximately 1960 until about 1980. Since then, they have increased dramatically" Grossman argued that "obesity is a complex public health problem that is related both to individual characteristics that are genetic or acquired and to the individual's economic environment." He argued that "the stability of obesity until about 1980 and the continuous and dramatic increase since that year suggest that genetics may not play a very important role in the upswing, as genetic change typically does not take place quickly"

[362] In 2011 two economists from the NBER program on the economics of health, John Cawley and Christopher Ruhm, have resumed the applied research on unhealthy behavior, see Cawley and Ruhm (2011). The rational addiction model figures centrally in their survey of the literature (Cawley and Ruhm 2011: p. 19).

[363] The three PhD students who finished their PhD on an obesity related topic were Inas Rashad Kelly with a dissertation titled *Essays in the Economics of Obesity*; Changik Jo with *Marital Status and Obesity: Cause and Effect*; and In Kyu Kim with *Essays in the Determinants of Body Weight Outcomes*. All obtained their PhD in 2004.

(Grossman 2017: p. 488). Instead many economists in the early 2000s were focusing on individual consumption patterns related to obesity.

The surging interest of applied health economists in obesity is also illustrated by a workshop that took place in 2003 at the *U.S. Department of Agriculture* (*USDA*).[364] According to a summary report, the purpose of the workshop was "to provide an overview of leading health economics research on the causes and consequences of rising obesity in the United States." The authors of the summary report claim that "although high health, social, and economic costs are known to be associated with obesity, the underlying causes of weight gain are less understood." At a basic level, they argued, "weight gain and obesity are the result of individual choices. Consequently, economics, as a discipline that studies how individuals use limited resources to attain alternative ends, can provide unique insight into the actions and forces that cause individuals to gain excessive weight" (Philipson et al. 2004: p. 1).

Some of the participants of that workshop became spokespersons of the subfield of the applied economics of obesity. Grossman presented his paper co-written with Chou and Saffer at the workshop (Chou et al. 2004). Another participant, Tomas Philipson, professor at the economics department of the *University of Chicago* and co-organizor of the workshop, presented a cowritten paper on the growth of obesity and technological change (most likely a version leading up to Lakdawalla and Philipson 2009).[365] Other participants, like Darius Lakdawalla and John Cawley, had done their PhD at the University of Chicago, both of them had Becker in their PhD committee.[366] Another PhD

[364] The workshop was organized by the Economic Research Service of the USDA in cooperation with the Irving B. Harris Graduate School of Public Policy Studies and the George J. Stigler Center for the Study of the Economy and the State of the University of Chicago.

[365] Some years earlier, Philipson had coauthored also a controversial book on public policies addressing AIDS together with the legal scholar Richard Posner from the University of Chicago Law School (Philipson, Posner 1993). In 2003 he published another paper with Posner explaining the rise of obesity as a result of changes in individual body weight production technology that implied changed consumption patterns on the individual level (Philipson, Posner 2003).

[366] Lakdawalla finished his PhD thesis dealing with the quality of teachers in 2000, but became engaged quite much in the economic analysis of obesity in the following years. At the USDA workshop he coauthored a paper with Philipson on the technological effects and obesity. John Cawley finished his PhD titled Rational Addiction, the Consumption of Calories, and Body Weight in 1999. As Lakdawalla,

student who was supervised by Becker, but did not participate in the workshop was Fernando Wilson. His thesis was titled *Explaining the Growth of Child Obesity in the US*.[367]

In this section we have seen that from the 1980s to the 2000s, the analysis of unhealthy and risky behavior gained momentum among applied economists in the US. We gave a rough sketch of this development mainly by focusing on the career of Michael Grossman. Although this is evidently a partial and incomplete account of what happened, it illustrates well how the Becker-Murphy model of Rational Addiction was integrated in the analysis of unhealthy behavior. The model of rational addiction became a theoretic contribution that helped to explain consumption patterns that depended on past consumption and involved elements of dependence. Economists like Grossman applied the model to the demand of cigarettes, alcohol, and other illicit drugs. More generally the model provided a rationale for the analysis of intertemporal consumption processes based on the assumption of forward-looking and internally consistent individuals and consumption processes that contain complementarities in consumption of time.

In the 1990s the study of unhealthy habits became a busy branch of applied health economics. Becker and Murphy's rational addiction model quickly gained popularity among such studies. This was in part because it was adopted and acknowledged early on by important figures in the field such as Grossman and other renown health economists.

6.4 Becker's framework of extended utility as a theoretical guide

The empirical extension of the rational addiction model's logic from addictive consumption to other unhealthy habits was paralleled by its theoretical extension to habits

Cawley became very much involved in the subfield of the economics of obesity in the following years publishing many articles. In 2011 Cawley edited the Oxford Handbook of the Social Science of Obesity, a multidisciplinary book putting together insights on obesity coming from medicine, psychology, demography, many other disciplines, and economics.

[367] Occasionally, Becker cited the work of his PhD students also when commenting on obesity related public opinion posts on his blog that he started and maintained with Posner in the 2000s (see for example Becker 2005).

in general. In 1996, Becker published a book titled *Accounting for Taste*. In that book, he built on the rational addiction model and other papers he had written, integrating them into a broader vision of endogenous preferences. In the book's introductory chapter, Becker explains his general approach to endogenous preferences and how it can inform welfare evaluations. In this subsection, we discuss how Becker used the rational addiction model to illustrate the significance of preferences determined by past consumption.[368]

6.4.1 The endogenous preferences of the rational addiction model

In 1991, Becker had the honor of delivering the annual Nancy Schwartz Lecture at Northwestern University. The following year, he published an article based on the lecture in the journal Kyklos (Becker, 1992). In the article Becker explained some implications of making preferences endogenous. He argued that "the past carries a long shadow on the present through its influence on the formation of preferences and choices." He aimed to explore how these influences might be included into economic analysis and he predicted "profound implications for the analysis of many kinds of economic and social phenomena" like for example addiction, work habits, preference formation, the evolution and stability of institutions, or the problem of committing choices for the future (see Becker 1992: p. 340).

Becker's 1992 article was titled Habits, Addictions, and Traditions indicating three ways through which present behavior is influenced through past experiences. In the article he used the theoretic implications of the rational addiction model to describe habits in rational terms, in terms of "forward-looking utility-maximizing behavior" (see Becker

[368] The edited volume consists of eleven chapters preceded by an introductory chapter. We confine ourselves here to the first part of the volume which is dedicated to endogenization of preferences through past experiences. The second part deals with endogenizations of preferences through interactions of individuals with their social environment. Except from the introductory chapter and two essays from the second part, all other chapters are reprints of already published papers. Part I begins with the introductory chapter which is followed by Stigler and Becker's *De Gustibus* paper (Stigler, Becker 1977), the by Becker and Murphy's rational addiction paper (Becker, Murphy 1988), then an extension of the rational addiction model by Becker, Murphy, and Grossman (Becker, Grossman, Murphy 1991), an empirical application of the rational addiction model (Becker, Murphy, Grossman 1994), and finally an essay of Becker in which he reflects more generally on the role of addiction, habits, and traditions (Becker 1992).

1992: p. 330). He described habits in the very same way as he described addictions in the Becker-Murphy model, as intertemporal complementarities between past and present consumption. He defined "habitual behavior as displaying a positive relation between past and current consumption[,]" meaning that greater consumption in the past stimulates greater consumption in the present(see Becker 1992: p. 328).

In the 1992 article Becker stressed that what the Becker-Murphy model described as addictions, were actually simply habits. As Becker and Murphy (1988) described how the degree of addiction varies among people and goods, Becker (1992) described how activities and people vary in their degree of habituation. As Becker and Murphy described addictions as harmful or beneficial, Becker (1992) described habits as harmful and beneficial. After Becker (1992) had defined habitual behavior, he could define an addiction "simply as a strong habit" that is "sufficiently strong to be destabilizing" for the person (see Becker 1992: p. 329). What might be a harmful habit at one moment in time might turn into a harmful addiction over time. Having previously used economic principles to explain addiction, Becker shifted his focus in 1992, arguing that what holds for addiction should also hold for habits in general. This shift in focus reflects the rhetoric nuances of economic modeling and the skill of economists like Becker in handling these nuances.

Since both habitual and addictive behaviors were the result of behavior over time, Becker's analysis of them enabled him to categorize people based on their intertemporal behavior and generalize about people based on these categories. As it defines whether a person is rather myopic or rather rational, Becker (1992) stressed that the individual discount rate is among the most important parameter to describe persons in their consumption over time. He labeled persons "who do not consider the future consequences of their actions" as "myopic persons." As the rational addiction model predicts, myopic persons do not take in account that "greater past consumption of a good [...] increases the marginal utility of present [and future] consumption" (Becker 1992: p. 329). By contrast, rational people consider how present consumption affects future utility.

The degree to which a person considers the future when evaluating the effects of present consumption on the future is measured by the individual discount rate. Becker (1992) argued that the larger the discount rate "at which either the future or the past is discounted, [...] the stronger is the habit[,]" and "the smaller are the effects on future utility of greater present consumption" of a habitual good (Becker 1992: p. 329). Therefore, he argued that "people who heavily discount the future and past [...] are less likely to be deterred from 'harmful' activities that reduce future utility," and "they would be less attracted by 'beneficial' activities that raise utility in the future" (Becker 1992: p.330). Extending rational addiction from addictions to habits made it possible to speak of harmful and beneficial activities, or of good and bad health habits, or of healthy or unhealthy lifestyles.[369]

When the past casts a long shadow on the present, our present choices and preferences are (at least partially) predetermined by the past. This means that the preferences of economic agents have been formed somehow. Becker (1992) wrote that "[e]ach person is born perhaps not as a tabula rasa – an empty slate – but with limited experiences that get filled in by childhood and later experiences" (Becker 1992: p. 335). He argued that "[c]hildhood experiences can greatly influence behavior over a person's entire life because it may not pay to try to greatly change habits when the environment changes." Even when the environment of people changes radically, Becker argued that "habits acquired as a child or young adult generally continue to influence behavior" (Becker 1992: p. 335).

Parents have therefore an immense responsibility according to Becker to raise and educate their children. Becker (1992) discussed altruistic and selfish parental behavior. But independent of children have altruistic or selfish parents, Becker argued that "[c]hildren carry along into adulthood the baggage of experiences they had only a limited role in shaping. Therefore, a rational person can meaningfully state that she does not 'like' her

[369] Even though the term addiction was used, the rational addiction model was conceived very generally since its inception. However, beneficial addictions clearly described beneficial habits.

preferences in the sense that she doesn't like the inherited baggage: the guilt, the sexual fears, the propensity to smoke or drink heavily, and so forth." In principle a rational person can change her stock of experiences over time if she does not like the inherited preferences. But, Becker stressed that "how much a rational person wants to change depends on how long she expects to live, the strength of the influence of the past on present choices, and other factors." That is why he wrote that "[w]e all are to some extent prisoners of experiences we wish we never had" (Becker 1992: p. 337).[370]

Some years later Becker refined his approach to endogenous preferences in the introductory chapter of his book Accounting for Taste (Becker 1996). In 1996 he distinguished between two types of utility functions that express two types of preferences. One type is called a subutility function. Subutility functions are defined at a single point in time. They specify how economic agents derive utility from market goods at that moment. Thus, subutility functions define the preferences of individuals at a given moment. Together with the constraints effective at that moment, the subutility function determines the optimal choice at that moment. The other type of utility function is called the extended utility function, as defined by Becker. Extended utility functions contain market goods from subutility functions of one time period plus two stocks of human capital: personal and social capital.

The stock of personal capital represents experiences from the past that constrain behavior through habits or addictions.[371] The stock of social capital represents interactions with the social environment that constrain choices externally through norms, peer pressure, or advertising.[372] In the extended utility function, individuals derive utility not only from

[370] With regards to parental responsibility one could add that with such a Beckerian vision of preference formation our prisons have in part been constructed by our parents and the rest of the society in which they or others raised us when we were young.

[371] Personal capital includes "the relevant past consumption and other personal experiences that affect current and future utilities" (Becker 1996: p. 4).

[372] Social capital contains "the influences of past actions by peers and others in an individual's social network and control system" (Becker 1996: p. 4). By analogy, one might argue that personal capital might be seen as the internal control system in individuals that is according to Becker's framework primarily structured by past experience.

the goods consumed at a given moment but also from the two types of capital stocks interacting with the subutility function. These capital stocks can be viewed as providing individuals with production technology, enabling them to derive more or less utility from the same quantity of goods than in the subutility function. Thus, the extended utility function defines preferences over goods while accounting for internal, past-related constraints and external, social constraints on present choices (see Becker 1996: p. 4 ff.). He described this approach explicitly as compatible with the household production framework.[373]

The extended utility function provided Becker the stability of preferences that he and Stigler prescribed in 1977. In 1996 Becker wrote that "George Stigler and I in 'De Gustibus Non Est Disputandum' [...] explicitly considered extended utility functions, not subutility functions, for the utility functions that remained the 'same' over time and are the 'same' for different individuals included addictive, social, and advertising capital as arguments. Our assumption that extended preferences are stable was intended not as a philosophical or methodological 'law,' but as a productive way to analyze and explain behavior" (Becker 1996: p. 6).[374] Two decades later stable preferences have taken the shape of psychological stocks that constrain personal production technology. In 1996 Becker argued that "the past, the present, and future are [...] linked through the capital stocks that determine the productivity of commodity production." While people cannot change past consumption, Becker assumed that people were eager to change their future consumption in desirable ways. As present choices affect personal and social capital, "current choices depend not only on how they affect current utility, but also on how they

[373] Becker's extended utility approach is compatible with the household production framework. Instead of relating only to market goods, Becker argues, "[i]n a more fundamental approach, utility does not depend directly on goods and consumer capital stocks, but only on household-produced 'commodities,' such as health, social standing and reputation, and pleasures of the senses" (Becker 1996: p. 5).

[374] In his 1992 article Becker argued already very similarly. He wrote that the message of his paper was that "common rules determine the way different variables and experiences enter the meta preferences that motivate most people at most times." Further, he argued in 1992 that "forward-looking rational actors maximize the utility from their meta preferences, not from the current preferences" (Becker 1992: p. 340).

affect future utilities" (Becker 1996: p. 7). Becker acknowledged that his extended utility framework blurred the strict separation of preferences and production constraints.[375]

What Becker called personal capital can be seen as an internal control system that limits the production choices of persons through the personal consumption history. When personal capital raises, it stimulates demand for "goods and experiences which increase future personal capital," but it also affects "the dynamic demand for activities that contribute to these investments," for goods, activities, or experiences that have a complementary productivity effect on personal capital. Through rational addiction, Becker translated concepts such as reinforcement in economic vocabulary. He wrote that "[i]n the technical language of consumption theory, 'reinforcement' means that past and present consumption are complements, which is the same thing as stating that addictive capital and consumption of addictive goods are complements" (Becker 1996: p. 7f.).[376]

As in Becker's 1992 article the concept of personal capital is much broader than just addiction. The stock of personal capital generally includes all kinds of habits that have been built up in the past, while addiction is rather an extreme case of very harmful habits. He wrote that "[t]he examples in 'De Gustibus' were chosen because they seemed to pose special challenges to the theory of choice. However, I now believe that personal and social capital are crucial not only for understanding addictions and the other behavior discussed there, but also for most other behavior in the modern world, and probably in the distant past as well" (Becker 1996: p. 6).[377]

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[375] He argued that "preferences and constraints no longer have independent influences on behavior since personal and social capital are constraints that operate through preferences" (Becker 1996: p. 22).

[376] Although psychologists like Rachlin and Herrnstein were willing to interpret utility in terms of reinforcement (see Chapter 5), and economists like Becker were willing to interpret reinforcement in terms of utility, this does not mean that the two concepts become identical or that such translation works in both directions without friction. While comparison is possible, psychologists and economists tend to maintain their disciplinary perspectives, which encompass not only reinforcement or utility but also a host of additional terms and practices.

[377] For Becker addiction as a research object has been mainly attractive for extending the theoretic boundaries of rational choice models. Calling addiction rational has been controversial. In the eyes of other scholars closer to disciplines of public health describing addiction as rationally determined by choice is precisely on the edge of ridiculing a serious human health problem (see for example Rogeberg 2004).

Becker (1996) saw human beings as maximizers that move toward long-term equilibria by maximizing their utility while adapting to new situations. Therefore, habits were not only an internal control mechanism for present choices, but also a means of adaptation. Becker argued that "human beings are creatures of habit[,]" and he believed that "the main reason habitual behavior permeates most aspects of life is that habits have an advantage in the biological evolution of human traits[.]" (Becker 1996: p. 8f.). Whether habits are ingrained into human beings biologically, socially, physiologically, or psychologically – what counts for Becker is that this happens through repetition over the past. Although Becker did not want to be associated with behavioral psychologists like Burrhus Skinner, his view of habits and adaptation resembles strongly the view of behavioral psychologists like Herrnstein and Rachlin who were students of Skinner (see chapter 5).[378]

We have visualized Becker's view of personal and social capital is represented in figure 1. Figure 1 shows how Becker imagines extended preferences constrain individuals' temporary consumption choices. The figure can be interpreted as follows: In the middle, one can see the momentary consumption choices assumed to be made by individuals. Becker represents these choices using subutility functions. A dotted arrow pointing to the right shows that these choices will lead to choice results. The momentary preferences are constrained by extended preferences through two mechanisms: the effects of personal and social capital stocks.

Becker proposes this interpretation of addiction seeing himself as an applied price theorist extending a decidedly economic view of human activity in terms of general productivity.

[378] Compared rather to more sociological views of habituation, Becker's emphasis on habits may resemble to concepts like the habitus that have been developed by sociologists like Pierre Bourdieu. But any closer look reveals fundamental differences in the descriptive techniques Becker and Bourdieu use and in the economic anthropology that is implicit in their works (see for example Bourdieu 2005). Although a comparison of Bourdieu and Becker with respect to habits could be interesting, we cannot pursue that comparison here.

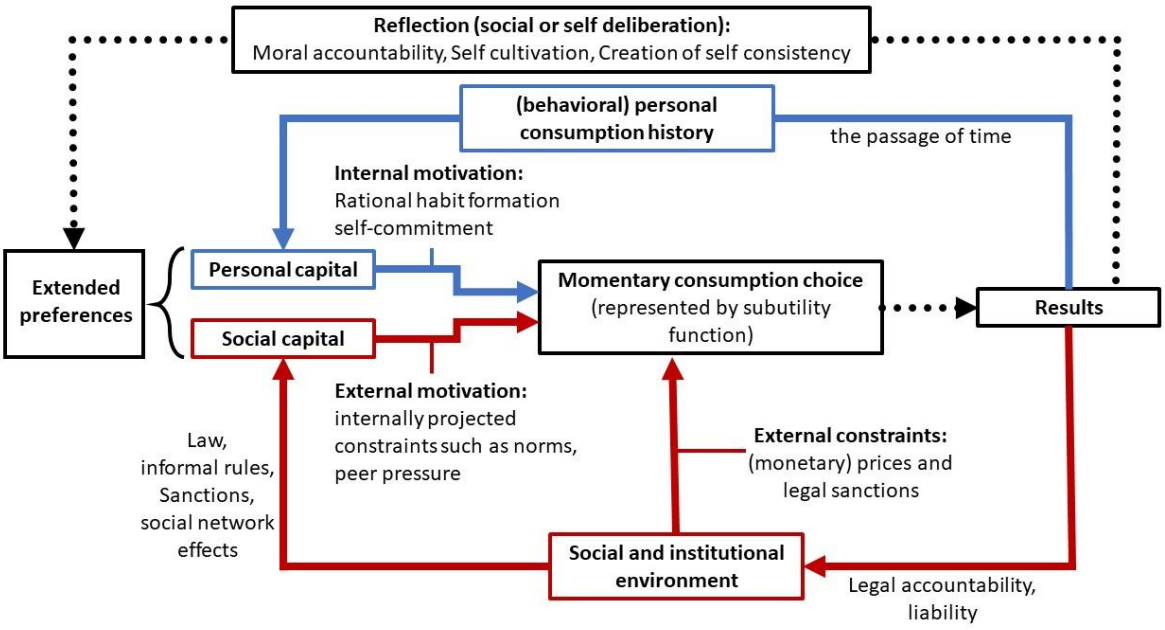

Figure 14 A procedural view of how personal and social capital (internally) constrain individual choices according to Becker (1996). (Source: own elaboration)

Figure 14 shows the constraining effects associated with personal capital in blue. As individuals exist over time, the result of a momentary consumption choice becomes part of their personal consumption history. Depending on how dependent one becomes on a good or service, the results of momentary consumption accumulate as stocks of personal capital. These stocks constrain present and future consumption choices. Personal capital provides internal motivation for consumption choices. Rational habit formation is an example of the internal motivation induced by personal capital.

Figure 14 shows the constraining effects associated with social capital in red. Becker uses social capital stocks to represent all kinds of social influences on the individual. He imagines these influences as psychological stocks that constrain individual choices similarly to personal capital stocks. The social environment—the social reality in which individuals make decisions—constrains their consumption choices in two ways. First, the social environment provides fixed constraints in the form of monetary prices and legally defined sanctions, which are clearly external to the individual. These external constraints exist objectively in the social and institutional environment. Second, the social environment

shapes what Becker describes as social capital: the influences of the social environment that individuals perceive and project on themselves when making decisions. Social capital provides external motivation for individuals that is mediated by their own projection of the social world around them. Thus, social capital can be viewed as internalized constraints that align individual choices with social influences, such as norms or peer pressure.

To resume, two decades after the *De Gustibus* article, Becker acknowledges that individual preferences are likely to change and that that changing preferences should have an impact on consumption choices. But instead of letting preferences vary freely, Becker chose to use the technical apparatus already employed in the household production framework to mirror changes in preferences in changes in production technology. In 1996 Becker did not insist on the assumption of stable preferences anymore. Rather, he insisted on new types of capital stocks that represent the personal consumption histories and social environments of individuals. Thus, Becker recognized psychological and physiological effects of past consumption constrain consumption choices in a dynamic temporal context in which choices are repeated. But, he argued that next to that, consumption choices were also shaped by social influences. Next to the internal motivations built up through past experiences, social motivations also provide important constraints that affect the choices of individuals. In the last years of his career, Becker focused his research considerably on what he called social economics (see for example Becker and Murphy 2000).

6.4.2 The role of consumer sovereignty in Becker's extended utility framework

How did the concept of endogenous preferences change the way welfare is conceived by economists? Economists like Becker did not differentiate between different motivations, such as needs versus other desires, when evaluating welfare. They compared welfare independently of motivation, in terms of final utility. Instead of assessing subjective states of agents (like motivation or intention), Becker delegated the differentiation of needs and other desires to consumers by appealing to the principle of consumer sovereignty in welfare evaluations. Endogenous preferences did not change his view on welfare evaluations. In

fact, he emphasized the importance of personal responsibility as the flip side of consumer sovereignty.

Although endogenous preferences presented challenges for welfare economics, Becker (1996) argued that his extended utility framework could be used to improve welfare evaluations without introducing new concepts of welfare. He argued that "[e]xtended utility functions can also form a stable foundation for welfare analysis that uses Pareto-optimality and other criteria." He argued that "[s]ubutility functions of goods do not provide a stable foundation because these functions 'shift' over time" (Becker 1996: p. 6f). To give an accurate description of the utility of economic agents with endogenous preferences, economists would need to take in account the temporal and social complementarities in terms of production technology when comparing individual welfare. In other words, Becker argued that economists should use the extended utility functions that contain stocks of personal and social capital for welfare evaluations.

As extended utility functions contain stocks that have accumulated in the past, they imply an intertemporal view of utility. When welfare is compared in terms of extended utility, welfare is compared in terms of discounted utility. When utility stretches out over time, a practical problem for the economist is how and when to measure economic outcomes so that they reflect accurately the effects of economic development of utility. Becker argued that "[w]hether particular public policies and other action raise or lower utilities may crucially depend on how the changes in utility are evaluated[,]" and from which moment in time utility is evaluated (Becker 1996: p. 6f). He illustrated the problem with an example of civil rights legislation in the US comparing the utility of Black and White Americans before and after anti-segregation policies.[379]

[379] The crucial issue was for Becker (1996) how to measure and compare the utility of economic agents over time when the utility that each agent derives at each moment depends on changes that are implemented along the way. When subutility functions change, "initial preferences should have no priority over final preferences." He argues that "[i]f the relevant utility function for welfare analysis includes personal and social capital, the effect on utility of advertising and public policies can be evaluated without ambiguity […]." This is the case, Becker has argued, because "the effects on discounted utility incorporate initial attitudes, final attitudes, and transitional attitudes into a single consistent welfare criterion" (Becker 1996: p.20f.).

Taking temporal complementarities in account when comparing welfare, complicates welfare assessment considerably. Whether household production functions are assumed or not, the fact that a stock of personal capital is added in the utility function makes the welfare assessment an intertemporal optimization process. In the extended utility framework welfare is measured in terms of intertemporal utility, and not in terms of the momentary utility of a subutility function. To measure the welfare of an economic agent in the extended utility framework, economists need to be able to compare his or her utility at the present moment and the utility that he or she projects on the future. Thus, in comparing welfare in terms of extended utility, a welfare economist claims to interpret the welfare of an agent more broadly with regards to the past and the future.[380] Welfare is not defined simply as an assessment of resources in control of the agent at one moment. Rather, such momentary welfare is reinterpreted with the help of two auxiliary behavioral statistics, personal and social capital, that approximate utility production capacities of agents.

When comparing the welfare of agents in terms of discounted utilities, the discount rate is a crucial parameter that economists need to define. Becker (1996) argued to make this crucial parameter more personal. Economists usually use discount rates to make utility from different periods comparable. In practice, the discount rate is either assumed or derived from consumption observations as it was done by Becker, Grossman, and Murphy (1994). With endogenous preferences the discount rate becomes a crucial descriptive parameter to describe economic agents in terms of their intertemporal character. Often economists assume the same fixed discounting rates with which one person devalues future utility. Becker (1996) argued that more differentiation is needed: "This assumption is a good initial simplification, but it cannot explain why discount rates differ by age, income, education, and other personal characteristics, or why they change over time for the same individual, as when a person matures from being a child to being an adult" (Becker 1996: p. 10). As they were viewed in in principle over a whole life of a person, individual time

[380] One precondition is that current behavior will be sufficiently consistent with past behavior and future behavior imagined in the present. As we will demonstrate in Chapter 7, behavioral economists have challenged the idea that this precondition is generally met.

discount rates should be rather called personal discount rates. Becker argued that personal discount rates are not necessarily fixed, but might change over time and they may differ between different people.

How personal discount rates change depends on a somewhat malleable ability of individuals to imagine the future. Becker (1996) argued that people can invest in "'imagination' capital that helps them better appreciate future utilities," for example in education. Such imagination capital would be part of the personal capital that people accumulate over their lives. He argued that "[t]he weight a person places on future utilities in determining present decisions is affected by how well she can imagine what future utilities will be like." Although Becker believed that the capacity to imagine the future was somehow biologically constrained, he also argued that people can "change the weight they attach to future utilities by spending more time, effort, and goods in creating personal capital that helps them to better imagine the future." People could "train themselves to reduce and sometimes more than fully overcome any tendency toward undervaluation" of the future (see Becker 1996: p. 10f.). In 1997 he published a paper cowritten with his Chicago colleague Casey Mulligan dealing more extensively with making the personal discount rate an endogenous variable (Becker and Mulligan 1997).

The extended utility framework enables economists to characterize economic agents in terms of time preferences. Becker (1996) wrote that "[i]magination capital not only affects the discount on future utility, but it also alters preferences over goods by affecting present and future choices." For example, he "[s]omeone who places greater weight on the future consequences of current choices is more likely to engage in activities that raise future utilities, perhaps partly at the expense of current utility." As a consequence, Becker wrote that future-oriented persons "less likely to become addicted to harmful substances like drugs, alcohol, and cigarettes, and [are] more likely to develop a belief in the afterlife, and to acquire beneficial habits like exercise and coming to work on time." So, when people are oriented towards the future, they "develop habitual and other preferences that have more beneficial future consequences" (Becker 1996: p. 11). The

more people plan for the future, the more they should develop habits supporting them to do so.

Because Becker believed that people could change their ability to plan for the future, he thought they were responsible for using this ability to their advantage. In this context, Becker (1996) appeals to the principle of consumer sovereignty. In political economy, this principle asserts that consumers are the best judges of their own choices. Consequently, libertarians argue that consumers should have the freedom to choose without state intervention. However, Becker's framework of endogenous preferences suggests that consumer sovereignty also has a flip side, which could be called consumer responsibility. Given that Becker spoke of personal capital and personal time discount rates, we might call it personal responsibility.

Becker's framework of endogenous preferences contains a very neoliberal view of self-management following loosely the premise become who you want to be. According to Becker (1996), individuals play a crucial role in managing their intertemporal selves. This implies managing their own preferences; this includes caring about one's habits and addictions; and this means also becoming a person who is capable of taking responsibility. Becker wrote that "[i]ndividuals help guide their destinies by exercising control over future stocks of personal capital that determine future utilities and preferences. Therefore, individuals, in effect, help to choose their own preferences" (Becker 1996: p. 9). More precisely, people choose their preferences for their subutility functions, not their extended utility functions. Extended utility functions are assumed to be given at the beginning of life and to be more or less equal for everyone.

Becker (1996) saw individuals as being equipped with the crucial capacity, or agency, to evaluate their own consumption behavior. Since consumption behavior develops over time, individuals are expected to assess their consumption patterns and optimize their lifetime utility. This capacity is reflected in the representation of individuals as

intertemporal utility maximizers.[381] Becker acknowledged that the ability of agents to evaluate themselves is imperfect. He recognized that "individuals are not omnipotent, and they sometimes make mistakes while trying to influence their future preferences." He qualified that "[t]he assumption of forward-looking behavior does not imply perfect foresight, or even accurate calculation of the probabilities of future events." Becker argued that it rather implied that "individuals try as best as they can to anticipate the future consequences of their present choices." Therefore, individuals are likely to make mistakes and they may be unhappy [...] because of the effect of their own mistakes on their present 'tastes'." (Becker 1996: p. 9.)

Becker's framework of extended utility can be seen a defense of the traditional liberal ideal of personal responsibility. The endogenization of preferences posed a threat for individualism and liberalism. When present choices of individuals are predetermined through others using pressure on them or through their own consumption history, how could choices still be seen as free? If the choices of individuals were not free but predetermined in the past or through others, how could the individual still be held personally responsible for their choices? And if individuals are not responsible for their choices, how can they be held accountable for what they do?

Becker responded to such criticism, but also to criticism that was coming from other liberally-minded scholars accusing Becker of social engineering. In 1979 James Buchanan had criticized the *De Gustibus* treatment of stable preferences as too behavioristic (see Buchanan 1979). Buchanan had criticized Stigler and Becker's reduction of preferences to something objectively quantifiable that could be expressed with the logics of cause and effect by external constraints and the consumption history of consumers. He criticized that the *De Gustibus* approach denies the important human capacity to imagine and re-imagine oneself, to aspire aims for oneself, and to form one's identity according to these aims (see Buchanan 1979). See also a similar critique by Richard McKenzie (1979).

[381] To see how individuals are represented when habit formation is assumed in intertemporal consumption models, see our description of the rational habit formation literature in chapter 3.

Buchanan and McKenzie have claimed that the modern economics view of behavior implied in the Stigler-Becker model becomes too close of a behavioristic view in terms of reinforcement and conditioning by the environment that leaves no room for human liberty.

By extending utility, Becker (1996) offered more than just a descriptive framework of preferences and choice. In fact, he tried to reconcile the positivist ideals of an objective science with the safeguarding of crucial subjective aspects of volitional choice. He argued that individuals can "only partly control their own destinies." While it is difficult but possible to change one's personal capital stock, he argued that it is often much more difficult to change one's social capital, the social environment with which one interacts, or the norms and culture in which one lives. By proposing stocks of personal and social capital Becker described limits within which individuals might re-imagine themselves à la Buchanan.

By describing individuals as deriving ultimate utility from achieving production objectives, Becker provided a view of individuals as production-goal-oriented beings. To the degree that individual are the best judges of their own production objectives, Becker advocated consumer sovereignty as a principle for welfare economists. Becker sticked closely to consumer sovereignty even in more difficult cases. He acknowledged that "one might be skeptical about basing welfare analysis […] on discounted utilities when preferences are heavily dependent on childhood upbringing, peer pressure and other social interactions, and lucky or unlucky experiences." He asked "[s]hould preferences be 'sovereign' when individuals take drugs, drink heavily, or abuse others because their parents were on crack, were drunkards, and abused their children and each other?" (Becker 1996: p. 21). But in the end, Becker argued for consumer sovereignty even in those cases.

Maybe the biggest simplification that Becker makes in extending utility is to abstract from any detailed description of cognitive mechanisms through which past experiences affect present choices. Instead of describing the exact molecular process, Becker imposed the condition of consistent planning on the molar process of planning. He assumed that "individuals choose their discount rates within a framework in which

preferences are consistent over time." That meant for him that "the choices an individual would like to make in the future, if he knew now what would happen in the interim, are exactly the same as the choices he will actually make then." In other words, Becker assumed that initial consumption plans can be maintained and fulfilled in the course of the intertemporal consumption processes ahead. This implied that individuals stick to initial promises to behave in future periods as they have been stated in the period when they had initially planned their future consumption. In chapter 7, we describe the efforts of behavioral economists who stressed that conventional economists like Becker neglect inconsistent planning. Becker hedged against potential criticism by arguing that the exact molecular process might not matter so much.[382]

Becker acknowledged that there might be subjectively desired preferences or aspirations as it has been remarked by contemporary commenters of the *De Gustibus* article (see Buchanan 1979, see also Hirschman 1985). But Becker did not "distinguish between actual and desired preferences[.]" Becker argued that "individuals would be unhappy with their [extended] preferences if they do not like the personal and social capital they 'inherited' from the past. In effect, they wish their actual preferences over goods and other activities were different." But such subjective aspirations were not counting much for Becker. What really counted for him was what individuals do. And he subsumed that individuals "do not act on this wish [of having different extended preferences] because actual capital stocks constrain their utility-maximizing choices, no matter how much they may regret the amount and kind of capital they inherited from the past." This meant that in many situations the desired preferences were not strong enough to make a difference. The utility of individuals "would be lower, perhaps much lower, if their 'desired' preferences alone guided choices. Even though a person may greatly regret he acquired a taste for crack because both of his parents took crack, he might be miserable if he ignored his background and abstained from taking the drug. (Becker 1996: p. 21f).

[382] Becker (1996) wrote that "[t]he assumption of consistent preferences is clearly not a literal description of much actual behavior, and is not necessary to develop an analysis of endogenous preferences, but it is an extremely useful simplification of behavior" (Becker 1996: p. 11).

Becker (1996) made discounted utility the cornerstone of welfare economics when preferences are temporally determined by the past. But for discounted utility providing consistent welfare measures, he needed to assume exponential discounting. With exponential discounting individuals plan consistently for the future and act accordingly as stated in their initial consumption plan. And as exponential discounting was generally assumed, inconsistent planning did not play a role in Becker's description of intertemporal consumption behavior and in his evaluation of intertemporal welfare.

He argued that "conflicts between actual and desired stocks of personal and social capital would have a large influence over choices if individuals try to depreciate inherited capital that lowers their utility and invest in capital that raises their utility." But nonetheless, he argued, "a person can regret that he inherited certain types of personal and social capital, and yet he may invest in that capital because he is addicted to particular types of behavior, or because of other reasons also consistent with utility-maximizing behavior." (Becker 1996: p. 22). Becker believed that "even extreme forms of addictive behavior, such as heavy smoking or drinking, involve forward-looking, consistent utility maximization […]" (Becker 1996: p. 11).

In 1996 Becker seems to have been well aware of criticism of microeconomic methods coming from different directions, among others from behavioral economists. Although Becker did not address some of those critics explicitly, he justified his own approach in the light of such criticism. Instead of giving room to intrapersonal conflicts and cognitive inconsistencies, Becker (1996) underlined his assumption that "individuals maximize utility in a consistent way, and they consider the effects of their actions on future as well as present utilities[.]"He agreed that "individuals may occasionally do otherwise: they may have imperfect memories, they may discount the future 'excessively,' they may make erroneous calculations and be influenced by how questions are framed, and their perceptions may be distorted by drugs, anesthesia, or Ulysses' sirens." He argued that "[p]sychologists and others in recent years have placed great emphasis on these cognitive

limits on individual 'rationality'," even if for him the importance of these cognitive deviations from the norm was exaggerated (Becker 1996: p. 22).

For Becker (1996) many of the psychological explanations would move economics as a discipline in the wrong direction. "Such cognitive imperfections are sometimes important, but in recent years they may have received excessive attention at the expense of more significant weaknesses in standard models of rational choice for explaining behavior in real, as opposed to experimental, situations." The more significant weaknesses were according to Becker that economic models "typically assume that preferences do not directly depend on either past experiences or social interactions. But childhood and other experiences, and the attitudes and behavior of others, frequently place more far-reaching constraints on choices than do mistakes and distortions in cognitive perceptions" (Becker 1996: p. 22). He wrote that "some philosophers and economists assume that addictive behavior is inconsistent, the result of the existence of conflicting selves within the same person [.]" However, Becker argued, "behavior over time may appear to be inconsistent only because changes in the stock of personal capital have been neglected." "The assumption of consistency focuses the analysis of conflict not on multiple selves within the same individual, but on the far more important conflict between different individuals and organizations" (Becker 1996: p. 11f.).

Human choices involved in addiction provided a challenging puzzle for Becker in pushing his agenda of rational choice. Through the phenomenon of addiction Becker extended economic analysis to habits as kind of past-dependent, internal constraint on current behavior. While Becker extended utility and welfare evaluations to intertemporal complementarities, he simplified the internal control mechanism to a great extent by assuming consistent planning and consistent preferences. Becker assumed that in fact individuals may have desired preferences that deviate from the preferences as manifested in their consumption choices. But as long as individuals do not succeed to implement their aspirations in their actual consumption behavior, economists will not be able to take it in

account. Because what counts for economists is behavior observable from the third person, and not subjective states of mind or personal intentions.

In this sense, the rational addiction model should be seen not only as a descriptive concept permitting to describe human consumption in a new way. The rational addiction model should also be seen as a political fiction, rendering addictive consumption accessible for liberal policy interventions. Becker delegated it to the individuals to render themselves consistent, by investing in stocks of personal capital and by putting effort in forming their habits rationally. This personal responsibility can be seen as the flipside of consumer sovereignty, as an obligation of individuals to render themselves accountable to the rest of society.

6.4.3 Becker's public opinion on cigarette regulation in the late 1980s

In order to understand the innovative role of the rational addiction model as a political fiction, it is helpful to view the model within the context of U.S. domestic drug policy in the 1970s and 1980s. In this period US federal administrations lanced themselves in the so-called *War on Drugs*. The term was coined in the early 1970s by US President Richard Nixon who declared drugs as the public problem number one and who put into place rigid legal punishments on the selling, possession, and consumption of drugs in his federal administration. Many following Presidents and federal administrations continued this policy objective.

Becker is known as a staunch defender of neoliberal and libertarian ideas. In 1986 Becker started to write columns for the magazine *Business Week* on policy related aspects. continued to write them until 2004.[383] In many of these columns Becker has argued for deregulation of industries and for the social and economic benefits of competition.[384] At

[383] For a concise overview of Becker's activities as a public intellectual see Fleury and Marciano (2013). As one of four rotating commenters for the column for *Business Week* magazine, Becker was pitted as the central-right commenter next to a central-left economist (Alan Blinder), a more radical left commenter and a more radical right commenter.

[384] In his very last column for *Business Week* magazine in 2004, Becker looks back on 19 years of writing columns. He describes his political positions in that column as follows "Along with many others of my

the time Ronald Reagan was president (from 1981 to 1989). For many, Reagan is like no other associated with the rise of neoliberalism in the US. This is in part due to the efforts of his administration to deregulate many US industries. But with regards to illicit drugs, Reagan did not liberalize. Instead of drug liberalization, Reagan still intensified efforts to fight drugs through increased law enforcements and tougher legal punishments. Although both, Becker and Reagan, are often put next to each other in the neoliberal camp, they had quite different views on the regulation of illicit drugs.

In 1987 Becker published his first column on the regulation of drugs. The column was titled *Should drugs be legalized?* (see Becker, Nashat Becker 1997: p. 150).[385] In the column Becker advocates for a "radical solution" to the problems linked to the consumption of drugs like marijuana, cocaine, or heroin. The radical solution he proposed consisted of legalizing these drugs for adults, installing sufficiently high excise taxes on them, and restricting the access to them for children. Becker wrote that "my proposal to legalize some drugs does not indicate that I approve of addiction and drug use. Rather, it is a way to combat the many severe problems created by the ban on these drugs" (see Becker, Nashat Becker 1997: p. 150f). He argued that drug prices could be lowered considerably when drug production and distribution are delegated to competitive companies. He believed that addicts would benefit greatly from lower prices since they already spend a large portion of their budget on drugs. They would no longer need to turn to illegal activities to finance their costly habit. Drug users should only be punished when they harm others through their consumption.

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generation, I was a socialist when I started my university studies. But my first few economics courses taught me the power of competition, markets, and incentives, and I quickly became a classical liberal. That means someone who believes in the power of individual responsibility, a market economy, and a crucial but limited role of government. I have not hesitated to express these beliefs in evaluating policies of both Democratic and Republican Administrations. I understand that politics often trumps economics, but it is a mistake to excuse misguided policies because one generally sympathizes with a particular party or person" (Becker 2004).

[385] This is roughly the same time when Becker and Murphy finished their rational addiction model. A year earlier they had already presented a version of the model at the seminar of the *Center for the Study of the Economy of the State* at the *University of Chicago*. The paper presented by Becker and Murphy was number 58 in the Working Paper series of the Center.

In that same column from 1987 Becker also tried to break with the common assumption that incentives would not work on addicted people, since their price elasticity is supposedly too inelastic. He argued that "[i]t is widely but wrongly believed that addicts and other regular users of drugs do not respond to changes in price. Although direct evidence is fragmentary, what is known about other highly addictive substances clearly suggests that the demand for drugs expands when their prices fall" (see Becker, Nashat Becker 1997: p. 151). In general, "[t]his price sensitivity raises the main argument against legalizing drugs: that making them substantially cheaper would expand their use. [...] But the very sensitivity to price that stimulates greater use also suggests a partial solution to such problems," in particular the implementation of excise taxes on drug use.

A year later in 1988, Becker published a second column on the legalization of drugs titled *More people are saying 'yes' to legalizing drugs* (Becker, Nashat Becker 1997: p. 148). In that column he renewed his proposal of drug legalization and provided some additional arguments. He wrote that "[c]ocaine and other drugs remain popular despite prisons crowded with drug dealers and military attacks on foreign sources of supply." He claimed that "[n]either Reagan administration's high-profile war against drugs, nor campaigns in schools and the media, nor street prices that are many times the cost of drug production have succeeded in breaking America's costly habit." And he wrote that "[m]ore and more people recognize that the war on drugs has failed [...]" (Becker, Nashat Becker 1997: p. 148f.). He argued also that "[c]alls for harsh punishment for pushers are popular with politicians, who are increasingly pressuring state legislatures to take action."[386] And also, "[p]oliticians are so intent on showing their opposition to drugs that they are even reluctant to sponsor measures that would provide drug users with sterilized needles to help check the spread of AIDS, one of the most serious health problems in the world" (Becker, Nashat Becker 1997: p. 149).

[386] For example, in his 1988 column Becker wrote that "A bill pending in New York would make possession of even a small amount of crack subject to a stiff jail sentence. But severe penalties encourage dealers to step up violent attacks on drug agents or anyone else seen as a threat to their freedom" (Becker, Nashat Becker 1997: p. 150).

Although Becker also saw negative effects of legalization in his 1988 column, he argued that the positive effects outweighed the negative effects. "No doubt drug use would expand if drugs became legal and street prices dropped. Drinking increased greatly after Prohibition ended in 1933, mainly because liquor and other alcoholic beverages became much cheaper. However, the today's high drug prices force many heavy users to finance their expensive habits by theft, robbery, or dealing in drugs themselves. The association between crime and drug use would become much weaker than it is now if drugs were legal and cheap" (Becker, Nashat Becker 1997: p. 149). Becker also instigated that addiction is less dangerous as it often presented (see Becker, Nashat Becker 1997: p. 150).[387]

In 1989 Becker had a further column on the regressive character of excise taxes on cigarettes and gambling, and in 1993 he had a further column on gambling. In 2001 Becker had another column called *It's time to give up the war on drugs* in which he argues similarly for the legalization of drugs as in the columns from 1987 and 1988.

Some years later, Becker still held on to similar policy recommendations. In an interview with the economist Simon Bowmaker Becker explained in some more detail how he imagined some of the consequences of legalization of drugs (see Bowmaker 2005). In 2004 Becker still believed that drugs should be legalized. In the interview he argued that the War on Drugs "has been a very costly programme and it has had a very low benefit/cost ratio" (Becker cited in Bowmaker 2005: p. xxvii). As in 1987, Becker argued that legalization should be complemented with an access restriction for minors and with an excise taxes to regulate the prices of drugs or if drugs are believed to constitute significant externalities.[388]

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[387] He wrote that "[t]he harmful effects of greater drug use are mitigated by the fact that most drugs are much less addictive than is generally believed. For example, the *National Institute on Drug Abuse* says 95% of all the 30 million Americans who have tried cocaine either stopped prior to becoming addicted or managed eventually to break their addiction. And legalization would not necessarily lead to more addiction, which is often caused by peer pressure, unhappiness, and stress. Many people suffering from those ills simply resort to heavy drinking or other destructive behavior" (Becker, Nashat Becker 1997: p. 150).

[388] Becker argued that "[y]ou may want to tax it if you believe it has certain externalities on other people. People who become addicted may drive or come to work and harm others. A better way to treat that is

Becker described legalization as the fairer and less discriminatory system of drug regulation. "The ones who suffer the most under the present system[,] were according to him minority groups and the poor. They suffered from the present prohibitive system in several ways, according to Becker. First, Becker argued that among the "people who are sent to prison for drug convictions, a huge disproportion are blacks or other minorities in the United States." Second, he argued that "drug markets are usually centred in poor parts of the city," bringing drug transactions and crime to poor neighborhoods. And third, he argued that due to the drug market concentration in poorer neighborhoods "access to drugs for poor, inner-city kids is easier than it is for rich kids" (Becker cited in Bowmaker 2005: p. xxvii f.).

In fact, the drug regulation approach reflected for Becker a political conflict between the middle classes and the poor. In the interview with Bowmaker Becker said that "I think it's really the middle-classes [...] battling against the poor and putting more of the burden on the part of the poor." He argued that the current regulative approach reflected in the War on Drugs "is discriminatory, maybe not intentionally, but that's the way it works out, against the poor and against the blacks, Hispanics and other minorities." Becker argued that "[a] legalized system, with taxes, would raise the price of drugs and the poor would be more responsive to a higher monetary price." (Becker cited in Bowmaker 2005: p. xxviii). While he saw the poor as more responsive to monetary prices, he saw the middle classes more responsive to non-monetary prices.[389]

Recap: We already said that the rational addiction model provided a justification that for the view that addicts actually do respond to incentives, even if their price-sensitivity is bigger in the long-run than in the short-run. This was basically an argument for normalizing drugs as consumption activities that are addictive and often expensive over time in terms of foregone spending bound up by the dependence drugs have created.

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to punish more severely those who are driving while under the influence of drugs or who are at work under the influence" (Becker cited in Bowmaker 2005: p. xxvii).

[389] As an example of a nonmonetary price Becker understood that "you can't get good jobs if it was known you took drugs" (Becker cited in Bowmaker 2005: p. xxviii).

Although even rational, forward-looking utility maximizing consumers might become addicted, Becker described drugs as normal consumption activities to the extent that spending and consumption are over the long-run sensitive to variations in income and prices.

Becker's neoliberal view of addiction was less informed by a desire to mitigate a public health problem. Rather it was informed by considerations to minimize the social costs of the enforcement of drug regulations. Individual drug addiction was seen as a private problem, but the incentives provided by drug policies were a public problem, as they shaped the economic realities of individuals.

6.4.4 Becker on personal responsibility

Two concepts figure centrally in Becker's regulative approach of drugs – first, the legal principle of personal responsibility, and second, the related political-economic principle of consumer sovereignty. Personal responsibility plays a central role in neoliberal accounts of consumer regulation. In 2008 at the height of the financial crisis, Becker and Posner have discussed the role of personal responsibility on their weblog.[390] Becker (2008) justified the broader political-economic usefulness of personal responsibility with two arguments, (1) a moral hazard argument and (2) an argument in terms of the perishability of decision-making abilities. In his comment Posner (2008) described the role of free will with regards to personal responsibility.

First, Becker (2008) argued that without personal responsibility society has a moral hazard problem. He wrote that "[s]uccessful attempts to shift the responsibility for bad decisions towards others and to society more generally create a 'moral hazard' in behavior." If individuals were not held accountable for decisions and actions that harm themselves

[390] Citing Becker and Posner's opinions on personal responsibility roughly a decade after the other events in this historic account of the rational addiction model risks to be anachronistic. But the fact that they express themselves politically in a rather straight-forward manner on their private blog helps us to describe their regulative approach. The fact that they speak of the decline of the principle personal responsibility in 2008 indicates that they assumed an important role of personal responsibility also in the earlier decades.

and others, he argued that "they have less incentive to act responsibly in the first place since they will escape some or all of the bad consequences of their actions" (Becker 2008). As we saw earlier, present choices are partly determined by the past with endogenous preferences. A couple of years after his initial presentation of the endogenous preferences approach, such arguments did not matter much when assessing the aspect of moral hazard prevention of personal responsibility. In 2008 facing the financial crisis, Becker argued that a person's upbringing must not be an excuse for the person's behavior. A bad childhood may impact the present choices of a person. He claimed that the majority of those with a bad childhood did not let these bad experiences define their present choices.391

The second argument that Becker made in 2008 in favor of personal responsibility is related to his view of how the decision-making capacities of persons perish with time. Becker (2008) wrote that "[a]n important foundation of the philosophy behind the arguments for private enterprise, free economics, and free societies more generally, is that these societies rely on and require individual decision-making and responsibility" (Becker 2008). He wrote that this philosophy requires what he calls the "'use it or lose it principle,' a colloquial expression indicating that various mental and physical capacities wear down and erode if they are not used on a regular basis" (Becker 2008). The principle implies, he argued "that people who are accustomed to having other persons or governments make their decisions for them lose the ability to make good decisions themselves" (Becker 2008).392

Becker's "use-it-or-lose-it" argument regarding individual skills carries over into his general view of what constitutes a good society. Becker (2008) argued that "[f]ree societies lead to better decision-making partly because men and women accumulate more experience

391 "Many criminals who confess to or are convicted of serious crimes try to have the courts excuse or mitigate their behavior. They allege that they had uncaring or abusive parents, or that fathers, relatives, stepfathers or other adults have molested them as children. Abusive treatment is awful, but still the vast majority of abused children do become law-abiding and responsible adults. That is a major fact that courts should pay attention to." (Becker 2008).

392 On similar grounds Becker also argues that welfare programs destroy good work habits. In 1992 he wrote that (see Becker 1992: p. 334).

at making decisions that affect their well-being and that of others." Even though individuals may differ in their abilities to make decisions,[393] he argued that "greater practice in making decisions, and greater responsibility for the consequences of one's decisions, usually significantly improves decision-making by the vast majority of adults, regardless of limitations in their education or cognition." (Becker 2008).

The co-host of Becker's weblog, legal scholar Richard Posner, complemented Becker's arguments for the social value of personal responsibility with some reflections on the type of free will he saw employed in market societies like the US. Posner (2008) argued that he believed that it is a natural tendency of people trying to "blame others when things go wrong." He noted that the erosion of personal responsibility claimed by Becker could be linked to an "erosion of the free will" (Posner 2008).394 Posner argued that the moral notion of free will had been most developed in Christian theology that assumed free will in "uncoerced decisions[,]" in which individuals were "deemed to be uncaused." When decisions are uncoerced, he argued that they can be seen as free choices meaning that if the choice turns out wrong people have no one else to blame but themselves.

Posner (2008) interpreted free will in market economies differently, not in moral terms, but rather in behavioral terms. He wrote that he "find[s] it hard – maybe for the lack of imagination – to believe that decisions have no cause." He assumed instead that decisions were "determined by the balance of advantages and disadvantages as it appears to the decider, though he may not be fully conscious (or conscious at all) of the considerations that are moving him." He argued that those considerations were "influenced

393 "I recognize that not all individuals are equally capable of making decisions in their own interests". He argues that mentally disabled people have difficulties understanding complex problems. At other places in the blog Becker has also argued as well that children are not capable to make responsible decisions with regards to the consequences of the consumption of drugs (see Becker 2012). He argues as well that [c]ollege-educated persons generally manage their financial assets better, and respond more successfully to many types of economic, health, and other stresses, than persons with less schooling" (Becker 2008).
394 We should keep in mind the moment when Becker and Posner comment of personal responsibility, the height of the financial crisis in the United States. In part Becker and Posner comment on the decline of the role of personal responsibility while commenting the borrowing behavior of people in the subprime mortgage crisis. Many people with modest financial resources who have been buying homes before the subprime crisis have lost their home in the financial crisis.

by background, intelligence, experiences, and other factors most of which are not, in any meaningful sense, within a person's 'control.'" Calling someone "'responsible' for a decision[,]" he wrote "is just to say that his process of weighing the pros and cons of the decision was not overborne by force or fraud or thwarted by a mental deficiency" (Posner 2008). If one adopts a negative view of freedom as being free from external coercion, Posner argued that freedom "expands the opportunities open to people[.]" How exactly people would "exploit their opportunities is the product of the interaction of their genetic and financial endowments, their upbringing and other environmental factors, and their good and bad luck[,]" argued Posner. That is why, he saw "[m]oral hazard [...] not [as] a defect of the will, but [as] a rational response to one's opportunity set" (Posner 2008).

If we take Becker's and Posner's arguments on the role and importance of personal responsibility in society, and if we apply it to Becker's framework of extended preferences in which habit stocks constrain the choices open to consumers in the present moment, a view emerges in which we might interpret Becker's extended utility framework as an attempt to re-legitimize an important role for consumer sovereignty when present choices are dependent on past consumption, as in the case of addiction. In fact, we argue that it is plausible to interpret the rational addiction model in political terms as a formal means of expression that helped to render past-dependent choices (and socially determined choices) compatible with the governance principle of consumer sovereignty.

Becker and Murphy (1988) argued that the demand of addictive goods reacts in principle in the same way to incentives as the demand of normal goods. Their rational addiction model provided a psychologically simplified view of a unitary self and relatively unambiguous choice outcomes. At many occasions Becker has argued that in reality individuals may be subjectively irrational or make mistakes in their attempts to maximize their personal interest. But for Becker this did not invalidate economic theory, because economic theory was for him mainly about aggregate and not individual behavior (see Chapter 2).

It seems to us then that Becker seemed to see it as an obligation for consumers to grapple with the difficulties of intertemporal consumptions on their own. If we imagine personal responsibility with regards to the intertemporal consumption problems considered here we might argue that Becker saw people as responsible to moderate inner conflicts, to eschew inconsistencies in their choices, and to render themselves together to one person that can become reliable to the rest of society. Becker seemed to see it as a task for the personal responsibility of consumers to keep themselves together, to make unambiguous choices, and to make one's desired preferences one's actual preferences revealed in choice. In this way, we interpret the concept of rational addiction at the same time as a descriptive concept and as a political fiction that might be used by policymakers to legitimize a neoliberal regulative approach toward addiction.

6.5 Conclusion

Becker and Murphy's model of rational addiction (1988) became quickly part of the common references on the applied field of unhealthy behavior. In this chapter we have traced roughly how this field became populated in the late decades of the 20th century. We did so by following the later career of Michael Grossman, a prominent contributor on the field. We have shown that Michael Grossman played a considerable role in preparing the practical ground for the theoretic model, directly by putting the model into econometric practice, and indirectly by forming young researchers to whom such a model might be of service. With the bias of looking at the analysis of unhealthy behavior through Grossman's career, we illustrated what in the theoretic model of addiction was useful to Grossman the applied economist. First, the model shaped the role of time preference in intertemporal consumption processes. Second, the model provided guidance to set up a rationale combing the harmful effects of dependence with models assuming rational and farsighted individuals.

Furthermore, we have looked at an audience of applied economists that was fairly sympathetic to the rational addiction approach. In part that can be explained by the fact

that many members of this audience were formed by Becker and others in the CEAHBSI community. Thus, they shared a set of theoretic considerations that were common with the model of Becker and Murphy. This is most striking for very close fellow-travelers of Becker like Grossman, but it holds also more generally for applied health economists in the 1990s when the assumptions and practices of the household production approach were more widely recognized as an approach to model all different kinds of consumption decisions in microeconomics.

While applied health economists began to use the rational addiction model to look at an array of activities that were considered unhealthy habits or antihealth behavior, Becker reframed his analysis in the following. While he and Murphy were speaking mostly of addiction in 1988, in the early 1990s Becker used the rational addiction model as a general illustration of how habits constrain individual decision making. By proposing his framework of extended utility functions and meta preferences, he extended the logic of the rational addiction model to the much wider case of habitual behavior.

7. Becoming a normative benchmark: The rational addiction model in behavioral economics

7.1 Introduction

Since the 1980s, behavioral economists have criticized the mainstream economics of intertemporal consumption. A key critique has been that mainstream models of intertemporal consumption descriptively oversimplify decision-making. As we will see in this section, behavioral economists saw the rational addiction model as a descriptive model that represented the phenomenon of addiction only partially. They claimed it misrepresented addiction by leaving out of the model problems of self-control and inconsistent planning. Behavioral economists criticized the rational addiction model in part for these misrepresentations that came out in the study of addiction, but that represented actually more general problems in the intertemporal decision-making process assumed by conventional microeconomics. They also proposed own theoretic innovations to represent intertemporal decision-making more realistically.

Our historiographic strategy is to see the development and reception of the rational addiction model and the rise of behavioral economics as parallel developments. We propose to look at the rational addiction model and some theoretical innovations of behavioral economists as dealing with similar issues of intertemporal consumption. The aim is to look in how far behavioral economics took the conception of intertemporal utility contained in the rational addiction model as a normative benchmark for welfare evaluations.[395] Behavioral economists are often described as accepting neoclassical economics as a normative guideline, but not as a positive description of actual economic activity (see Sent 2004, Heukelom 2014). But as the historian Rüdiger Graf has argued

[395] A second question that immediately follows is in how far were the theoretic propositions of behavioral economists informed by alternative normative views. Although we only scratch the results with regards to this second question, we first try to describe in this chapter in how far behavioral economists associated normative implications to the rational addiction model.

during the second half of the 20th century behavioral social scientists have often criticized prevailing norms by supposedly factual or value-neutral descriptions of behavior (Graf 2024: p. 71).[396] The main issue turns around the question to what extent economists should regard intertemporal consumption as consistently planned and free from internal conflict. Important consequences follow for the evaluation of welfare of intertemporal consumption activities. As we have seen in the preceding chapter, Becker proposed a reformulation of welfare that was cognitively very simple and built on the assumption of internal consistency. In the eyes of some behavioral economists, this internal consistency has been seen as (at least) one theoretic simplification too much.

As historians of economics have shown, intertemporal choice has been a major topic of published research associated with behavioral economics. Since the 1980s, intertemporal choice has been a major topic associated with behavioral economics, as historian of economics Alexandre Truc has shown in bibliometric analyses (Truc 2022a,b). In this section we argue that it makes sense to look at the rational choice model as a normative reference point in the creation of behavioral economics. We do not claim that a historic account of the intertemporal choice community within behavioral economics would not be possible without the model. In fact, the rational choice model is not indispensable for behavioral economics. But, we argue, that taking the rational addiction model as a mainstream reference that was seen as misrepresentative, against which behavioral economists raised their own theoretic innovations, helps to better understand the rise and dissolution of behavioral economics into mainstream microeconomics.

[396] Graf (2024) argues that by making behavior the central observational concept of their studies, behavioral scientists or behaviorally-inspired researchers have often criticized accepted normative theories through the backdoor by coming up with new factual descriptions that should inform about what is actually going on independent of the prevailing normative aims and arrangements. But once the reality is described in scientific terms, new behavioral norms can be derived from the observed situation. Observed behavioral norms might or might not be in conflict with prevailing norms of behavior (see Graf 2024: p.71).

7.2 Misrepresentations in rational addiction model

In the early 1980s, Becker's economic approach and the CEAHBSI household production framework have become part of mainstream economics. In the beginning of his career, Becker was supported mostly from within the *University of Chicago* where he did his PhD in 1955.[397] Outside of Chicago, he was strongly criticized by established economists for his economic analyses of discrimination or fertility.[398] Over the 1960s and 1970s he became a more widely established micro economist. When Stigler and Becker dragged addiction into the spotlight of the economics discipline in 1977, they were associated with modern neoclassical microeconomics.[399] When economists like Richard Thaler and George Loewenstein have been initiated to microeconomics in the 1970s and 1980s, the household production framework was already on the way to become part of modern microeconomics being put into practice on several refashioned applied fields.

In this section we briefly describe two early critiques of the addiction model contained in Stigler and Becker's *De Gustibus* article. Both critiques were made by young applied economists, by Richard Thaler and his coauthor Hersh Shefrin and by Gordon Winston, who criticized the model for misrepresenting the phenomenon of addiction by leaving important aspects out of the model. They criticized the Stigler-Becker model, while proposing their own models of intertemporal consumption and addiction.[400] They illustrate how economists who were farther removed from the household production

[397] In a recent paper Jonny Bunning interprets Becker's early work as supported by those who were engaged in collective intellectual efforts to which Becker contributed with his very early work. Bunning's article reviews as well Becker's trajectory as a undergraduate and graduate student, see Bunning (2025).

[398] The historians of economics Pedro Teixeira and Jean-Baptiste Fleury have described Becker's early contributions (Teixeira 2014, Fleury 2015). Teixeira describes how Becker's early contributions were strongly criticized by many established economists at the time.

[399] He obtained the *John Bates Clark Medal* in 1967. He became member of the Board of Editors of the prestigious journal *American Economic Review* from 1968 to 1971. In 1974, Becker was elected Vice-President of the *American Economics Association* (AEA). In 1987 Becker would be elected President of the AEA. Stigler obtained the Nobel Prize in economics in 1982 for his contributions to the field of industrial organization. Becker obtained the Nobel Prize five years later in 1992 for having extended economic analysis fruitfully to many non-market activities.

[400] While Winston (1980) set out to model addiction, Thaler and Shefrin (1977, 1981) were more generally modelling intertemporal consumption activities that were potentially suboptimal.

framework and the former CEAHBSI community attempted to incorporate addiction into an economic model. Therefore, they provide useful contrast to the vision of addiction of Stigler and Becker.

While economists like Thaler or Winston stressed certain differences to the Stigler-Becker approach, they also shared basic commonalities, like familiarity with constrained maximization, the neoclassical grammar of utility functions, and a disciplinary training in basic microeconomics. This marks an important difference to behavioral psychologists like Rachlin or Herrnstein whose reception of the rational addiction model we have traced in chapter 5.

7.2.1 Missing (I): Self-control

One of the early critics of Stigler and Becker's addiction model was Richard Thaler. Thaler would become one of its most visible figureheads of the behavioral economics movement.[401] He started his career as an economist with a PhD thesis at the *University of Rochester*, supervised by Sherwin Rosen who was part of the CEAHBSI community in the late 1960s.[402] Fascinated by the risk evaluations implicit in labor market choices and equipped with actuarial data obtained from his father, Thaler chose "the up-and-coming labor economist […] Sherwin Rosen" as a supervisor, because his "thesis topic was related to some theoretical work he was doing" (Thaler 2015).[403]

Thaler came into contact with the CEAHBSI community after his thesis. Together with Rosen, Thaler wrote a chapter called *The Value of Saving a Life: Evidence from the*

[401] In 2017 he obtained the Nobel Prize for his contributions to behavioral economics.
[402] Rosen came to the NBER New York office in the late 1960s as a visiting scholar and created since then strong ties with other scholars from the CEAHBSI community. He became professor of economics at the University of Rochester where he accepted Thaler as one of his PhD students. In 1977 Rosen went to the *University of Chicago* where he became the chair of the economics department from 1988 to 1994.
[403] In 1974 Thaler finished his thesis with the title *The Value of Saving A Life: A Market Estimate*. It dealt with the exposition of risks related to different occupations and valuation in terms of wage on the labor market.

Labor Market in a collective volume published in 1976 by the NBER.[404] Many of the other contributors of the volume were young researchers from the CEAHBSI community, among others Robert Michael, Robert Willis, James Heckman, or Michael Grossman (see also chapter 2).[405] Thaler got even closer to the CEAHBSI community. In 2015 Thaler remembered that after he had finished his thesis he wanted to get into contact with the cognitive psychologists Daniel Kahneman and Amos Tversky who were visiting Stanford University for a year. Having searched desperately for any funding, Thaler recounted that it was Victor Fuchs who offered him some funding for staying a year at the NBER-West office in Palo Alto (Thaler 2015: p. 35).[406]

While Becker and others from the CEAHBSI community tried to reform consumer theory with the household production framework, Thaler also proposed to reform microeconomics – although not with household production functions. While at the NBER Thaler presented some research of his own. Number 208 of the *NBER Working Paper* series is cowritten by Thaler and Hersh Shefrin and branded as a CEAHBSI paper. It is titled *An Economic Theory of Self-Control* (Thaler, Sheffrin 1977). The paper criticizes that although "[a] significant portion of consumer behavior is characterized by the presence of self-control problems," current economic theories do not represent these problems adequately." In particular, self-control issues might be most relevant in saving decisions, but more generally, Thaler and Shefrin argued that "problems of self-control

[404] The volume was titled *Household Production and Consumption* and was edited by Nestor Terleckyj. The different chapters of the volume were based on presentations of a conference with the same title (see chapter 2)

[405] "In the introductory chapter Terleckyj presents the volume as follows "The present wave of research on the household sector has been given direction by the deepening and extensions of the theory of consumption and has built on the empirical foundation provided by the hedonic price analysis. Also, various social changes, including the recent growth of the consumer movement, have placed the consumer sector closer to the center of public and professional attention. The insights afforded by the research discussed here suggest that the goods and services which consumers purchase or use can be seen as tractable inputs devoted to the achievement of personal and household. objectives. Consumer behavior can be better understood in terms of specific functional relationships and objectives which goods and services and their combinations can serve by virtue of their particular properties, given the limits of consumer income, time, and other resources. The papers in this volume convey, I believe, a clear sense that the various consumer units tend to behave as competent producers in a large variety of situations often thought to be governed by irrationality or impulse responses." (Terleckyj 1976: p. 1f.).

[406] In 1977 Fuchs was the Director of the CEAHBSI and Vice President of the NBER.

will be present to some degree in all consumer decisions that involve intertemporal tradeoffs" (Thaler, Shefrin 1977: p. 1).

Thaler and Shefrin deviated quite much from the type of decision-making unit usually imagined in the CEAHBSI community. Household production models assumed harmonious decision-making that followed one common interest from either one or several persons in a household.[407] Thaler and Shefrin's self-control model assumed conflicted decision-making that was the result of different interests that cohabited together in the same person.[408] They argued that self-control problems arise due to conflicting interests or conflicting drives within individuals. Formally, they represented these conflicting interests as different preferences. They proposed a dual-self model in which individuals are represented as an organization of two agents that need to cooperate and coordinate their potentially conflicting interests over different moments in time.[409] What was seen as consistent preferences in consumer theory consisted for Thaler and Shefrin actually of at least two different set of preferences. One part of a person might be described as a reflective, anticipating planner, who has more long-term preferences. Another part of a person might be seen as a spontaneous, unreflected doer having only instantaneous preferences for the present. Often these two personalities might be in conflict when making actual decisions (see Thaler and Shefrin 1977).[410]

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[407] Although feminist economists have often criticized that intra household decision making would be much more complicated due to conflicting interests, Becker and his followers have assumed that households would make decisions as if they were a single, united decision unit (see Becker 1981). For example, Becker argued with his rotten kid theorem that under certain conditions of temporal order and income dependency even the most self-interested children would align their choices with the altruistic family interests of a household head. For a more detailed of Becker's view of the family as an economic system see Bankowsky (2025).

[408] I am not aware of any applications of Thaler and Shefrin's model to intra-household decision making.

[409] In the classification provided by André Hofmeyr (2015) Thaler and Shefrin's model is a diachronical dual self model in which different agents compete for personal agency at different moments in time.

[410] In Thaler and Shefrin's words, "[o]ur proposed theory is simple, uses standard economic tools, and yet describes actual behavior. Our basic advance is simply the recognition of self-control as a problem. Our model explicitly deals with consumer choice as a control problem. As the quotation above suggests, self-control seems to necessarily imply the existence of a controller and a controllee. Individuals are thus assumed to behave as if they possessed two separate sets of preferences. These two aspects of their personality are referred to as the planner and the doer" (Thaler, Shefrin 1977: p. 1f.).

In 1981, Thaler and Shefrin published a version of that paper in the *Journal of Political Economy*. They proclaimed a paper by the economist Robert Strotz (1955-56) as a predecessor in problematizing issues of intertemporal planning and they mentioned the endogenous taste literature. They argued that "[i]n Strotz's formulation a conflict occurs between today's preferences and tomorrow's preferences if the discount function used today is not exponential with a constant exponent. Our framework differs from the changing-tastes literature in that we model man as having two sets of preferences that are in conflict at a single point in time" (Thaler, Shefrin 1981: p. 394).

Strotz is an important intellectual predecessor of models of habit formation as well as of economic models of self-control problems. [411] Strotz argued in 1956 that intertemporal planning poses considerable problems as regarding whether initially planned choices about what to do in the future will actually executed when the time passes and the future comes closer. When an intertemporal consumption plan is laid out, it contains many desired choices, planned choices that will be done in the future. But as the future approaches, period by period, other options for choices may become more interesting. As other options become actually available in the now, they might be preferred by economic agents although the desired choice from the initial plan was to ignore these options (see Strotz 1955-56; see also Vallois 2012 and Grüne-Yanoff 2015).

Strotz' early article illustrates well the role of discounting in intertemporal choice. In 1938 Samuelson has used the technique of exponential discounting to compare utility over time. In the following decades this technique became a shared standard widely used by different economists. Exponential discounting implies that the modeled economic agents choose consistently over time, that they will actually choose the desired choices they

[411] Robert Strotz' paper from 1956 is an early reference that serves somewhat as an intellectual anchor in the behavioral economics literature of intertemporal choice. As Nicolas Vallois (2012) and Till Grüne-Yanoff (2015) have shown convincingly, early on Strotz has been pointing the finger on the problems of intertemporal planning when many economists were not yet seeing the relevancy of inconsistent planning. This changed some decades later, when Strotz' paper became a widely cited reference. Strotz' early paper served as inspiration also for Robert Pollak and others in the endogenous preference literature of the 1970s (see for example Pollak 1968). The psychiatrist George Ainslie is another scholar who cites Strotz as inspiration in his essay on delay gratification (Ainslie 1975).

initially formulated in their consumption plan in the past (see Grüne Yanoff 2015). Strotz argued clearly that such consistent decisionmaking should be seen a rational social norm, rather then a description holding for actual behavior (see Strotz 1955-56: 177). He noticed that many actual consumers fall prey to their temptations to spend their resources in the present, rather than saving them for future purposes. Although some people may come very close to the ideal of consistent planning, Strotz argued that this is due to education and training that has shaped the decisionmaking skills of such rational planners (Strotz 1955-56: p. 178). Nicolas Vallois (2012) and Till Grüne-Yanoff (2015) have described how Strotz's early paper became a major inspiration for many other economists who approached the issues of self-control.

While proposing his and Shefrin's self-control model, Thaler criticized the Stigler-Becker model of addiction did not represent self-control issues in any meaningful sense. When Howard Rachlin, Raymond Battalio, John Kagel, and Leonard Green published an article in the journal *The Behavioral and Brain Sciences* (see chapter 5), Thaler was among those peers of economists and psychologists who commented on the article (Thaler 1981).[412] Although generally sympathetic with the approach of Rachlin and his coauthors, Thaler criticized how the authors used maximization theory. In his comment Thaler resumed the authors as demonstrating "that each subject's behavior [in operant conditioning experiments] can be reasonably well described by a single f(x)[,]" in words, by a single utility function. Thaler explained that utility functions are assumed to be stable in economics, "that is, the same function must be used to make all decisions, "[i]f f(x) is allowed to change from one situation to the next, the theory becomes empty." He argued that "maximization theory itself can never be tested. If a decision is observed that does not maximize the hypothesized f(x) then a new f(x) must be found. But there will always be

[412] As we have seen in chapter 5, Rachlin and his coauthors proposed to use the techniques of constrained optimization of utility to interpret results from animal experiments. Although behavioral psychologists in the 1970s were usually thinking in terms of reinforcement, Rachlin and his coauthors proposed to use indifference functions as a measurement tool for psychology. To enhance their argument, they argued that some economists like Stigler and Becker were already discussing psychological problems like addiction in terms of consumption effects that enhance or lower the costs of consuming certain items (Rachlin et al. 1981: p. 384).

some f(x) that can explain any set of choices, no matter how bizarre." He then criticized Rachlin and his coauthors for taking economists' maximization theory as a means "to model more complicated decisions, such as those in situations involving self-control." He wrote that "[t]his, I believe, is not accurate" (Thaler 1981: p. 403).

In his comment on Rachlin et al. (1981), Thaler went on and stressed the importance of precommitment strategies, as him and Shefrin have done before (1977). He argued that the choice of a precommitment strategy "is induced by a conflict between initial preference and the preference once the eating has begun. This conflict defines a self-control problem. All dieting, exercise, and saving problems can be characterized in this way." He argued that "[s]uch problems cannot be modeled using maximization theory because it is impossible to characterize the individual's preferences with a single function. The individual acts as if he prefers both (a) to (b) and (b) to (a)." Thaler proposed to use the tools of maximization instead to model individuals as an organization of several individuals. He argued that the result would be "a hybrid of economics and psychology. The individual is assumed to act as if he had two psyches, which we call a planner and a doer. The planner's preferences are made over the long-run, while the doer is myopic" (Thaler 1981: p. 403).

With regards to the Stigler-Becker model of addiction that Rachlin et al. (1981) mentioned, Thaler (1981) made it clear that he saw the problem of self-control misrepresented by Stigler and Becker. In the Stigler-Becker model, he wrote, "addicts feel no internal conflict about their addiction – they face no self-control problem. Their[Stigler and Becker's] addicts would never utilize the services of Alcoholics Anonymous or Smokenders, [they] would never buy their cigarettes by the pack instead of the carton in an attempt to cut down; in fact they would never try to quit! In short, their model fails to describe observed behavior" (Thaler 1981: p. 404).

While Stigler and Becker's "consumption capital" might be a welcomed instrument for Thaler's "planner," it looks as if Thaler missed more instruments for the "doer". And even more so Thaler seems to miss any traces of conflict within the decisionmaking process

contained in in the Stigler-Becker model. One reason Thaler could not find any cognitive representations is that the Stigler-Becker model of decision making is cognitively relatively void, as has been remarked also by Rosenberg (1985). Instead of focusing on detailed cognitive descriptions of mental processes, the decision-making unit can be treated as a black box, what counts is observable interaction of the individual with its environment over time.[413]

In the early 1980s the term behavioral economics was still used by different researchers. When in 1980 the first issue of the *Journal of Economic Behavior and Organization* (JEBO) was published, Thaler had an article in the issue titled *Toward a positive theory of consumer choice*. In that article Thaler criticized many consumer choice models as providing inaccurate descriptions of actual economic agents. Although they may serve as normative guideposts for decisions, he argued that "exclusive reliance on the normative theory leads economists to make systematic, predictable errors in describing or forecasting consumer choices."[414] In the paper he presents "a group of economic mental illusions" that for him are "classes of problems where consumers are particularly likely to deviate from the predictions of the normative model."[415] The changes in theory that he

[413] As we have argued in chapter 5 the Stigler-Becker vision of the decision-making process is much more similar to the decision-making process assumed by behavioral psychologists.

414 Thaler writes that "Economists rarely draw the distinction between normative models of consumer choice and descriptive or positive models. Although the theory is normatively based (it describes what rational consumers should do) economists argue that it also serves well as a descriptive theory (it predicts what consumers in fact do)." (Thaler 1980: p. 39).

415 Although Thaler saw different ways to be rational, he argued that many economic models assumed a kind of expert rationality. He wrote "[c]learly, descriptive models for the novice or intermediate [billard players] will have to be quite different than the model for the expert. If one wanted to model the behavior of the average billiard player, the model selected would be for some kind of intermediate player, and would probably resemble the model of the novice more than the model of the expert. [...] It is important to stress that both the novice and intermediate players described above behave rationally. They choose different shots than the expert does because they have different technologies." What he criticized was that many economic models provided rational norms for decisionmaking that were formulated in terms of the expert decisionmaker. "Nonetheless, the expert model has a distinct normative flavor. The model chooses from all the shots available the best shot. Thus the novice and intermediate players choose rationally and yet violate a normative model. The reason, of course, is that the model is not an acceptable normative (or positive) model for them." Different to the cognitively void models of household production, for Thaler models could contain more cognitive representations of decisionmaking. He guessed that in models for the novice "[r]ules-of-thumb and heuristics would have important roles" (Thaler 1980: p. 58).

proposes are provided by "a new descriptive model of choice under uncertainty[,]" by Kahneman and Tversky's prospect theory (see Thaler 1980: p. 39). It was only in the following years that Thaler and others began to appropriate the term behavioral economics for their research.

7.2.2 Missing (II): Internal conflict

Same year, different issue, the *Journal of Economic Behavior and Organization* contained an article that criticized the Stigler-Becker model of addiction in much more detail. That article was written by Gordon Winston, an economist who graduated in 1964 from Stanford University (Winston 1980). In the article titled *Addiction and backsliding: A theory of compulsive consumption*, Winston reviewed the Stigler-Becker model, criticized it as leaving important aspects of addiction out of the model, and proposed an own model aiming to better represent these aspects. Winston accepted the household production framework as a basic modeling framework, but he criticized the Stigler-Becker model for explaining away conflict and compulsive consumption within the household production framework (see Winston 1980: p. 295). Winston's partial embracement of the Stigler-Becker model (in terms of modeling technique) and partial rejection (in terms of representation of the reality of addiction) illustrates the implicit role of consumer sovereignty associated with the model. It also illustrates how the Stigler-Becker model simplifies past-dependent control mechanisms internal to economic agents.

Addiction was for Winston something related to one's future path through life. For Winston addiction had two defining characteristics. The first was for Winston that "a consumer's future choices are affected by current consumption of an addictive commodity (for worse or for better)" (Winston 1980: p. 297). Expressing the utility of consumption through a household production model, Winston was able to describe important intertemporal consumption effects similarly as Stigler and Becker have done, in terms of shadow prices. With regards to their shadow prices, addictive goods are different from

normal ones. Winston argued that the shadow price of an addictive good "is complicated by the fact that along with current production costs, it also includes an investment return component since [the addictive good] alters future productivity" (Winston 1980: p. 301).[416] One strength of the household production model was for Winston "its ability to recognize that different individuals have different knowledge of the production relationships and this, rather than inherently different tastes, may often explain different consumption patterns for time and goods" (Winston 1980: p. 313).

On a very basic level the household production framework enables to express intertemporal effects. What counts, argued Winston, is "[t]he general idea that one's consumption can irretrievably alter future consumption patterns[,]" and the consequence that humans have the capacity to alter their future consumption patterns, be it in a positive or negative way. On a very basic level, he argued, it does not matter whether this was explained as in the literature on habits and endogenous preferences by the hypothesis that "future preferences [are] altered by current consumption; or whether this fact is explained as in "Becker's new theory of consumer behavior" by the hypothesis that "future household production possibilities [are] altered by current consumption because it changes the human capital stock" (Winston 1980: p. 297). Winston seemed inclined to agree with Robert Pollak's critique of the Stigler-Becker model that the model is only a change in semantics.[417]

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[416] This is very similar to the Stigler-Becker model description of beneficial and harmful addictions.

417 Robert Pollak had criticized Carl Christian von Weizsäcker (1971) for being too quick when deriving welfare consequences from demand models when preferences are past-dependent, when individuals are assumed to form habits only with regards to past-consumption (see chapter 2). In 1978 Pollak criticized Stigler and Becker as well for the way they derived welfare implications in terms of utility from demand data that usually do not contain the kind of choice data necessary for welfare comparisons (see Pollak 1978: p. 377). Like the philosopher Alexander Rosenberg (1979, 1985), Pollak rejected Stigler and Becker's claim that household production functions provide increased formal explanatory power. He wrote that "[w]hether one accounts for the observation that […] exposure to good music increases the subsequent demand for good music […]in terms of taste change (as I would) or in terms of the accumulation of music capital (as Stigler and Becker do) is a matter of semantics, not substance. There is no more explanatory power in a household production model which postulates the accumulation of a specific but unobservable 'consumption capital' […] than in a habit formation model of the type proposed by Richard Stone […], Hendrick Houthakker and Lester Taylor, the author […] or Louis Phlips […]" (Pollak 1978: p. 375).

But in the end, Winston chose to formulate his own theory of addiction in terms of household productivity as well.

Winston described how the assumption of consumer sovereignty is implicitly ingrained in the Stigler model. He argued that the Stigler-Becker model describes economic agents as perfectly coherent between what they desire and how they put their desires into practice. Winston argued that the Stigler-Becker model "creates a happy addict, doing what he wants to do so long as he can buy the stuff and stopping effortlessly whenever he thinks he should." Winston argued that paradoxically, the addict described by the Stigler-Becker model is "a paragon [an ideal instance] of self-discipline, doing always and only what he deems best for himself" (Winston 1980: p. 298f.). Winston argued that "[t]he [Stigler-Becker] addict looks strange because he sits down at period [zero], surveys future income, production technologies, investment/ addiction functions and consumption preferences over his lifetime [...], maximizes the discounted value of his expected utility[,] and decides to be an alcoholic. That's the way he will get the greatest satisfaction out of life." In logic consequence, this would mean that "[a]lcoholics are alcoholics because they want to be alcoholics, ex ante, with full knowledge of its consequences" (Winston 1980: p. 302). Winston disagreed. Therefore, he criticized the Stigler-Becker model for providing a formal description of addiction that does not describe real addicts accurately. Describing economic agents in this way, Winston read Stigler and Becker as implicitly saying that "[s]ociety should certainly not worry about addiction so long as those people keep to themselves[.]" In fact, he argued, "any interference with such internalized, rational addiction – certainly any 'help' – will always reduce the addict's welfare and therefore that of society" (Winston 1980: p. 302).

Paraphrasing Winston, we can say that the Stigler-Becker model ascribed rationally justified production objectives to addicted economic agents. This ascription pushed addiction as such out of the scope of economically, legitimized public policies. As long as addictions do not hurt others, they do not consist of market failures, because addictive consumption patterns are explained as the result of subjective production objectives.

Consumer sovereignty assumes that it is the consumers themselves who know best what is the best for themselves. Pushed to its extreme, addiction might be seen only as a result partially dependent on the past and not on the social environment or on other factors. To the extend that an economic agent is rational on its own, by isolated reflection, consumer sovereignty assumes that it is the individual with his knowledge accumulated in the past who is the in the best position to decide which consumption choices will be best for him- or herself in the present, more alcohol or less alcohol.

According to Winston the Stigler-Becker model failed to represent the basic nature of addictive consumption. He argued that "[t]he model simply avoids most of the economic implications of addiction." So, "[i]n the Stigler-Becker addict, it is hard to recognize a serious social problem; he will never rationally pay hard earned cash for help in changing his behavior [...]; and nowhere is there the compulsive behavior that underlies addiction and is relevant to other economic choices and institutions." That is maybe why Winston wrote that "[a]s a demonstration of the power of the new consumer analysis to describe what appear to be taste changes without allowing tastes to change, the [Stigler-Becker] addiction model is impressive. But as a model of actual addiction [...] it is much less so" (Winston 1980: p. 302).[418]

The reason for this misrepresentation was linked for Winston to what he saw as the second defining characteristic of addictive consumption, the description of withdrawal behavior. That is that "controlling one's own consumption of an addictive commodity – regulating or stopping it – is typically difficult, involving personal conflict and inconsistent behavior." He argued that "[i]t is usually hard to quit smoking [...] [or] difficult not to drink, however much it may be desired[,]" and that there is periodic conflict "between what we want to do and what we feel we should do" (Winston 1980: p. 297f.). In

418 Winston appreciated how the household production framework tried "to cut down the area of ambiguity and arbitrariness surrounding 'tastes'" and how it tried "to urge against the temptation to let 'a change in tastes' be a deus ex machina[god from the machine] to be invoked whenever the analysis has got bogged down." But, he also wrote that the Becker-Stigler model "seems to confront error with error to counter that potential foolishness with the absolute rigidity of constant tastes." According to Winston economists should be able to do better, "it should be possible to warn against capricious introduction of taste changes without substituting an iron dogma of their fixity" (Winston 1980: p. 304).

addiction, but also in many other consumption choices, "[a]n individual wrestles with contradictory preferences – to follow an immediately satisfying course of action or to reject that in favor of actions that will lead to greater ultimate satisfaction." That is why Winston argued that there are "[s]imultaneously two sets of preferences [that] order an individual's choices and they don't agree." Citing Thomas Schelling (1978), Winston argued that "[e]verybody behaves like two people" that "are in continual contest of control" (Winston 1980: p. 303).[419]

On a more profound level, Winston did not see conventional consumer theory as capable of accommodating conflict-laden behavior like addictive consumption. The reason was that conventional assumptions about the preference structure of consumers are too simplifying. Winston wrote that "[t]he single, consistent and rigid set of egoistic preferences normally attributed to the consumer can't generate conflict or the need for its resolution" (Winston 1980: p. 298). He argued that "for there to be conflict, there must be more than one preference set; there has to be a platform, social or temporal, from which an individual can judge his current preferences and against which he can find conflict" (Winston 1980: p. 298). He argued that "[i]n orthodox consumer theory, where preferences are seen, simply, as an ordered set of consumption alternatives, a single, egoistic preference set is all that matters." But in fact, he argued, "people care about what they care about: we typically have both egoistic preferences and metapreferences over those preferences." Therefore, Winston argued that individuals have what Sen (1977) called meta-preferences, "preferences about one's preferences" (Winston 1980: p. 298).

[419] Thomas Schelling is widely regarded as a scholar centrally involved in integrating the issues of strategic self-control into economics, especially through strategic bargaining theory and game theory. Behavioral economists like Thaler (2015), but also psychologists like George Ainslie (1992) associate their own work with Schelling's ideas. In 1983 Schelling gave the so-called *Richard. T Ely Lecture* at the annual meeting of the *American Economics Association*. In his public lecture he focused on strategic self-control problems (Schelling 1984). He argued that the Stigler-Becker model (1977) is maybe "[t]he best known effort to fit self-control within the economics tradition[.]" But, according to Schelling, the formulation of self-control inherent in the Stigler-Becker model is such that it denies the economic existence of self-control phenomena (see Schelling 1984: p. 6, footnote 2).

Winston perceived a symmetry in the way how choices are embedded within the larger social context and within a temporal context. Both of these levels would create personal conflict for the individual. In the temporal context, Winston argued that conflicts exist "between myopic and long-run preferences under inconsistent discounting rules or habituation – the consumption plan that looks best when viewed at the outset of a planning period may not look best when living through it. Experiences don't agree with plans." As a consequence, temporal meta-preferences arise "from one's simultaneous awareness of [one's] own current [tastes] and evolving tastes over time[,]" as has been argued by von Weizsäcker (1971). In the social context, conflicts would arise from the fact that individuals live "in a society of other individuals." Referring to Sen (1977), Winston argued that social preferences arise "from one's simultaneous awareness of self and society" (Winston 1980: p. 298). For example, he argued, an individual "may be a content user of heroin as is the Stigler-Becker addict, yet still be in conflict with society's judgments and subjected therefore to its controls – 'addiction' often refers to this social judgment about the behavior of apparently quite satisfied consumers" (Winston 1980: p. 298).

In his article Winston focused on the temporal platform of judgment within the individual. To express temporal conflict Winston introduced different utility functions of the present moment in a household production model. In his model the economic agent has a set of two myopic short-run preferences that may switch from one instant to the next.[420] One prefers an addictive good more, the other less. From his varying short-run preferences the individual projects long-run preferences on a larger period stretched out on the future. The long-run preferences define an expected value of utility over time that contains utility from both types of short-run utility. From one observation moment to the next the short-run preferences remain the same. In this sense, Winston hopes to retain "much of the analytical virtue of treating tastes as constant" (Winston 1980: p. 304). But, Winston argued, this apparent constancy would result from the choice of the observational unit over which the short-run preferences are defined (one year, one day, or one hour). So,

[420] As the model of Thaler and Shefrin (1981), Hofmeyr (2015) classified Winston's model as a diachronic dual self model.

according to Winston's model "[a]t every moment, there are two criteria for optimal behavior which may be 'in internal contest of control'" (Winston 1980: p. 308).[421] From this preference structure Winston claimed to be able to represent personal conflicts of withdrawal behavior more accurately in the model.

Like Thaler (1981), Winston (1980) perceived the Stigler-Becker model of addiction as part of the orthodox mainstream. Although Winston saw value in the potential of household production models to describe various types of consumption patterns, he disagreed with the Stigler-Becker model. Like Thaler he saw addicted agents basically misrepresented by the model. For Winston, the Stigler-Becker model failed in taking in account consumption behavior resulting from individual control problems. Individual control problems result from the fact that individuals have present preferences that are likely to be different of more long-term preferences that project consumption on the future. Winston disagreed with Stigler and Becker to accept the liberal principle of consumer sovereignty to evaluate consumer welfare when individuals have temporally conflicted preferences. When short-run preferences are conflicted, it is much less clear that the choice outcome will reflect what is best for the economic agent.

The specific reactions of Thaler and Winston to the Stigler-Becker model of addiction illustrate the impression of some economists that household production functions à la Stigler and Becker represented addiction only partially – important aspects like personal conflict and individual self-control problems were neither part of the model, nor was it reflected in the results derived with the model. In the following years Chicago-based economists like Iannaccone, Becker and Murphy adjusted the Stigler-Becker Murphy by making it more compatible with dynamic models of rational habit formation (see chapter 4). Behavioral economists remained interested in intertemporal consumption over the following decades as well. But unlike the neoclassical microeconomists from Chicago, they remained skeptical of rational choice explanations that assumed a unified, consistent,

[421] Winston worked with two optimality criteria, because he worked with two short-run preference functions.

and unconflicted decisionmaker and that embraced the principle of consumer sovereignty too warmheartedly.

7.3 From descriptive misrepresentations to partial policy recommendations

As behavioral economists became more organized as an academic community in the 1980s, they continued to criticize what they perceived as the mainstream economics. At the same time, they became more active in promoting theoretical innovations that they saw more compatible with their own vision of descriptive economics. In this subsection we describe how the rational addiction model has been perceived among behavioral economists in the early 1990s. We focus on two key publications of those behavioral economists that were interested in intertemporal decision-making, and we explain how these publications fit into the larger context of the emergence of behavioral economics. Our aim in this subsection is not to survey the vast literature of intertemporal behavioral economics in the 1990s.[422] Rather we look on some important publications in the behavioral economics literature on intertemporal choice and we describe how the authors of those publications cited and perceived the rational addiction model.[423]

The early 1990s have been a very vibrant period for behavioral economics. Floris Heukelom has described how the meaning of behavioral economics consolidated in the late 1980s when the *Russell Sage Foundation* and the *Alfred P. Sloan Foundation* supported a group of economists, psychologists and other social scientists that were up to change the status quo in economics (see Heukelom 2012). In the early 1990s, Thaler had become a central figure in the emerging behavioral economics community. From 1986 onwards, he coordinated the research activities funded by the *Russell Sage Foundation* (see Heukelom 2012). In 1987 he started his popular anomalies series in the *Journal of*

[422] A bibliographic network analysis of the behavioral economics literature and the sub-literature in it focusing on intertemporal choice has been provided by Alexandre Truc (2022a,b).
[423] We have no means to access how the authors back in the day actually perceived the model. We will only interpret what they have written in their published texts.

Economic Literature. In that series of articles, he and changing coauthors presented research puzzles as anomalies from the perspective of neoclassical mainstream economics. Thaler's anomalies series continued for several years.

The early 1990s were also a very vibrant period for the reception of the rational addiction model. Becker and Murphy published the rational addiction model in 1988. As we have seen in chapter 5 behavioral psychologists around Richard Herrnstein were quick in developing their own interpretations of addiction, not in terms of utility maximization, but in terms of melioration. And as we have seen in chapter 6, applied health economists like Michael Grossman helped in putting the model into econometric practice and in disseminating it in the field of applied health economics. Behavioral economists like Thaler, George Loewenstein, David Laibson, or Matthew Rabin and Ted O'Donoghue took were somewhat in the middle. Like the behavioral psychologists, they were skeptical of the explanation of addiction in terms of rational, intertemporal utility optimization. Like the applied health economists, they were trained in microeconomic methods and the use of constrained optimization, and they were part of a discipline in which these techniques were used very basically, but very widely. Breaking fully with them would thus be very hard.

In the early 1990s, behavioral economists were not only better organized as a group when criticizing the Becker-Murphy model. They also increasingly proposed new theoretical innovations, such as hyperbolic discounting or melioration, to interpret intertemporal choice differently from the rational addiction model. To the extent that the rational addiction model provided only a partial account of addiction, behavioral economists proposed new terms like internalities that reflect their ambition to reconsider how individual welfare is evaluated by economists in intertemporal consumption processes (see Herrnstein et al. 1993). In this way, we see the rational addiction model as a normative benchmark from which behavioral economists proposed to deviate.

To strengthen our interpretation, we take a closer look on two books from the early 1990s that document how behavioral economists saw the rational addiction model as a

normative benchmark. Both were published in 1992. The first book is a collective volume called *Choice over Time* that has been edited by the economist George Loewenstein and the philosopher Jon Elster (Loewenstein, Elster 1992). The volume can be seen as a snapshot of the research activity on intertemporal choice in the emerging behavioral economics community in the early 1990s. The rational addiction model is confronted in the book by the melioration view of addiction. To the extent that both views come with quite different policy and welfare implications, it illustrates the way in which the rational addiction model was seen as a normative benchmark. The second book is a monography titled *Picoeconomics* by the psychiatrist George Ainslie who was also one of the contributors of the Loewenstein-Elster volume. In the book he extended economic reasoning to the sub-individual or intra-individual level looking at individual behavior as the outcome of repeated bargaining processes of different interests within the individual. As Thaler and Winston, Ainslie criticized the Becker model for representing addiction only partially. But Ainslie also proposed a much more sophisticated psychological theory to explain addiction and motivational conflict. Both books illustrate how the Becker-Murphy model was received by behavioral economists. Both books also show how the authors fixed the model as a normative benchmark from which behavioral economists should deviate.

7.3.1 The rational addiction model in *Choice over Time*

Choice over Time was one of the main publication outcomes of the early funding efforts of the *Russell Sage Foundation* in behavioral economics (see Heukelom 2012).[424] In 1986 Eric Wanner became its president and set up new funding initiatives for the social sciences. Floris Heukelom has described Wanner's training as a social psychologist, his interest in

[424] The front pages of the book provide some information on the Russell Sage Foundation. "The Russell Sage Foundation, one of the oldest of America's general purpose foundations was established in 1907 by Mrs. Margaret Sage for 'the improvement of social and living conditions in the United States.' The Foundation seeks to fulfill this mandate by fostering the development and dissemination of knowledge about the political, social, and economic problems of America." (Loewenstein, Elster 1992: p. iv) See also Heukelom (2012) for more information on the Russell Sage Foundation in the development of behavioral economics.

cognitive psychology, and his efforts in creating new possibilities for interdisciplinary research through the *Russell Sage Foundation* (see Heukelom 2012: p. 270f.). Wanner supported economists like Thaler who were open to explore potential links between economics and psychology. Since the group of involved scholars was quite eclectic in the beginning, they quickly formed different working groups that met annually to discuss different research areas. One of these working groups focused on intertemporal choice and was coordinated by the economist George Loewenstein[425] and the political philosopher Jon Elster.[426]

Choice over Time was a major publication outcome of the meetings of the working group on intertemporal choice. The book united contributions of economists and psychologists. Among the contributors were psychiatrists like George Ainslie, and psychologists like Howard Rachlin, Walter Mischel and Richard Herrnstein, and economists like Loewenstein, Drazen Prelec, Thomas Schelling and Robert Frank.[427] The unauthored preface describes the book as "[…] the product of a group that met annually for four years to discuss intertemporal choice." To the authors intertemporal choice was a

[425] Loewenstein was a young scholar who had finished his PhD in economics at Yale University in 1985 on the role of expectations in intertemporal decision-making. In 1989, he joined Thaler in writing a text for the JEL anomalies series on intertemporal choice. In Choice over Time Loewenstein teamed up with Drazen Prelec to describe further anomalies of intertemporal choice. Prelec is an experimental psychologist from Harvard who obtained his PhD in 1983, supervised by Richard Herrnstein.

[426] Elster was much more experienced, especially as an organizer of workshops and editor of monographies and edited volumes. Before becoming professor of political science and philosophy at the University of Chicago in 1984, Elster held different appointments as visiting and associate professor, among others at the University of Oslo, and at the Ecole des Hautes Etudes en Sciences Sociales (EHESS) in Paris. At the EHESS Elster coordinated already different working groups, one on rationality and one on Marxism. By 1986, Elster had published already seven books. In 1986 four edited volumes were published in which he served as an editor. Together with Michael McPherson, Elster was also the editor of a series of books titled Studies in Rationality and Social Change for Cambridge University Press. Elster also discussed related questions about public policy and paternalism (see Elster 1977). Elster's research interest stretched out over different fields ranging from history, over political philosophy, to the role of rational choice theory in the social sciences. Elster's wide research interest is exemplified in the book Ulysses and the Sirens: Studies in Rationality and Irrationality, published in 1979 by Cambridge University Press. The book contains four essays on the role of rationality in the social sciences. In the second chapter, Elster reflects on the problem that inconsistency poses for rationality. In this context he also discusses the habit formation literature among economists in the 1970s and their discussions of habit formation and endogenous preferences. As such Elster discussed the intellectual quarrel between Pollak and von Weizsäcker on how to properly mobilize endogenous preferences for welfare recommendations.

[427] Jon Elster as a political philosopher is a bit of an exception in terms of disciplinary background.

very relevant topic for public policy, because they saw many economic and other societal activities permeated intertemporal choice problems.[428] It seemed clear to them that "[…] many Americans exhibit behavior that reflects a heavy weighting of the present relative to the future" (Loewenstein, Elster 1992: p. xxiii).

For the authors of *Choice over Time* the notion "behavioral economics" contained a critical stance towards mainstream economics. The book has been the outcome of a professional editing process on the side of the *Russell Sage Foundation* and the scholars who were involved. Usually, such editing processes adjust initial propositions to render them conform to the expectations of the aimed audiences.[429] As a result, more extreme or charged positions may by toned down during the editing process. Despite presumed editing process, the authors wrote in the preface of the book that their discussions "revolved around the axis of behavioral economics," and that "much of the book that emerged from them is devoted to a critique of the current economic approach to modeling intertemporal choice." In particular, they wrote that "[t]he dominant model of intertemporal choice employed by economists – the discounted utility model (DU) – provides an implicit (and sometimes explicit) benchmark against which many of the authors contrast their contributions" (Loewenstein, Elster 1992: p. ix). The critical stance

[428] The authors claimed that intertemporal choice problems are reflected in economic key economic variables, such as in "a low saving rate, low rates of corporate investment, and ballooning private and public debt." But more than that, they saw intertemporal choice problems also reflected in "social ills such as abysmal educational attainments, AIDS, environmental degradation, high rates of infant mortality, crime, and teenage pregnancy." (Loewenstein, Elster 1992: p. xxiii)

[429] Academic or semi-academic publications like edited volumes and articles in peer-reviewed journal usually undergo an editing process before publication that implies checks on the general appearance of the content. The editing process often includes checks on formal correctness, political affinities, ort factual accuracy. The front pages of the book provide some information on the editing process of publication issued by the Russell Sage Foundation. "The President bears final responsibility for the decision to publish a manuscript as a Russell Sage Foundation book. In reaching a judgment on the competence, accuracy, and objectivity of each study, the President is advised by the staff and selected expert readers" (Loewenstein, Elster 1992: p. iv). At the time of publication of Choice over Time Eric Wanner was the president of the Russell Sage Foundation.

towards mainstream economics is also perceivable in the general structure of the book,[430] and in the first historical essay in the beginning of the book.[431]

One application case in which the discounted utility model provided a very explicit benchmark against which the authors contrasted their own contributions was the case of addiction. The rational addiction model lifted addiction into the realm of constrained optimization using exponential discounting and provided an important role for personal time preference, as we have seen in chapters 4 and 6. And as we have seen in chapter 5, behavioral psychologists like Herrnstein and Prelec had their own explanation of addiction in terms of local melioration and not in terms of global utility maximization. Despite their differences in baseline assumptions, both theories are quite similar in the way how choice evolves dynamically depending on the environment of individuals and their history of past choices. In this regard, the rational addiction model allowed behavioral psychologists and microeconomists to compare their different descriptive explanations of addiction.

But when descriptive theories are used to evaluate actual situations, descriptive theory tends to become prescriptive.[432] The behavioral economists from the *Russell Sage*

[430] The book is divided into five parts. The book starts with a part containing two historical chapters on intertemporal choice, and a part containing general theoretic perspectives on the topic. Next, two topical book parts follow. Part 3 of the book focuses on self-control and part four on internalities. While the parts two and three on general theoretic perspectives and self-control illustrate alternative descriptions of intertemporal choice for economics, part four on internalities clearly engages with the more normative issues of evaluating and comparing individual welfare. A final part provides applications of theoretic insights.

[431] In the first chapter of the book Loewenstein describes how psychological factors linked to intertemporal decisionmaking have been treated by past economists (Loewenstein 1992). We will not further discuss whether Loewenstein's account of the history of intertemporal choice overlaps with accounts of historians of economic thought. Another historical chapter is written by Elster who describes how considerations of intertemporal choice interfere with constitutional questions in political thought (Elster 1992).

[432] In 1985 the philosopher of economics Alexander Rosenberg had already stressed problematic aspects of the household production framework as a descriptive representation to inform welfare economics and to derive public policies from it. Rosenberg (1985) argued that in welfare economics "the chief questions concern the effects of social policies on the utilities of actual individuals, rather than abstractions convenient for the economical expression of regularities about markets and industries. There would be no point to various compensation criteria for changing distributions of commodities, nor any sense in debates about the losses or gains involved in the existence and distribution of a consumer's surplus, unless there were real agents to be advantaged or disadvantaged by these distributions. The very possibility of

working group on intertemporal choice were aware of the technical similarities between the explanation of individual behavior in behavioral psychology and microeconomics. Behavioral psychologists like Herrnstein, Rachlin, and Ainslie were part of the working group and had (co-written) chapters in the *Choice Over Time* volume. To the extent that these scholars also used their theories to derive normative implications, we speak of the rational addiction model as an evaluative or normative benchmark. Using descriptive theory to evaluate individual welfare, behavioral economists derived implications for public policy different to those derived by the proponents of the rational addiction model.

One objective of the Russel Sage working group is stated in the preface of *Choice Over Time*. The authors write that they would like to provide a more nuanced understanding for policy-making complaining that the usual, dominant economic approach to intertemporal choice would not provide much help with many of the societal problems related to intertemporal choice. According to them, the dominant approach "[…] assumes that each individual has a rate of time discounting that he or she applies to all domains of behavior, economic or otherwise. But the research reviewed in this book suggests a much more complicated picture."[433] They claim that "[s]implistic solutions that ignore psychology will inevitably founder." Instead, they argue that "[s]uccessful policy must be based on a more nuanced understanding of the psychological mechanisms underlying time preference" (see Loewenstein, Elster 1992: p. xxiii). They promoted their collective volume as a step in this direction.

But instead of tackling policy making upfront, most of the book's chapters are more theoretical in nature. Only the last part in the book was more policy-oriented. It provided "a small sampling of how theoretical insights into intertemporal choice illuminate real world phenomena." This final part contained two "radically different approaches to the

normative applications of microeconomic theory turns on its actual applicability to real economic agents" (Rosenberg 1985: p. 54).

[433] The authors write that "[w]hile individual discount rates, to the extent that they exist, may be high, humans possess remarkable capabilities to overcome these rates. Social and political organizations, elaborate strategies and tactics of self-control, social norms, and emotions arising from memory and anticipation all mitigate the otherwise pernicious effects of hyperbolical discounting" (Loewenstein, Elster 1992: p. xxiii).

problem of addiction" (Loewenstein, Elster 1992: p. xxi f.). One is the rational addiction view, a reprint of the 1991 article written by Becker, Grossman, and Murphy (Becker, Grossman, Murphy 1991). The other is the melioration view of addiction, a chapter written by Herrnstein and Prelec that we have already described in chapter 5 (Herrnstein, Prelec 1992a). Herrnstein and Prelec have also a more general chapter on melioration theory (Herrnstein, Prelec 1992b). Both of their chapters illustrate how they saw the rational addiction model as an evaluative or prescriptive benchmark, a model closely-associated to regulatory consequences for public policies.

Both the rational addiction model and the melioration model of addiction can be used for welfare evaluations. The crucial difference in informing one's welfare evaluation with these two theories concerns the nature of the decision-making individual. The rational addiction model assumes an intertemporal utility maximization process of an intertemporally constituted person. The implied decision-making agency is interested and motivated by the whole person's time horizon. Conversely, this person is assumed to be able to keep his or her interest and motivation unified as the person advances in time. Herrnstein and Prelec's intertemporal utility maximization process assumes much less of such personal unity or identity.[434] Herrnstein and Prelec argued that "[o]ne could say that the difference between maximization and melioration is that melioration contains a weaker concept of personal identity than maximization. Within the melioration framework, the alternative behaviors are in competition with each other, vying for the organism's investment of time, effort, etc." They argued that "[b]eyond the dynamics of this competition itself, no one is in charge." To the contrary, they argued that "[w]ithin the maximization framework, the alternatives are, in principle, so perfectly articulated with each other that they lose their individuality. Only the utility of the whole choice bundle

[434] Herrnstein's view of the intertemporal identity differed strongly from Becker's view of personal identity (see chapter 6).For a useful description of Herrnstein's view of the identity of intertemporal agents, see Herrnstein's book review of the book *The Multiple Self* that was edited by Jon Elster (1986) and that contained also chapters by Ainslie, and Schelling (see Herrnstein 1988).

matters, rather than the utility attached to its constituents, as in the melioration framework" (Herrnstein, Prelec 1992b: p. 259).

For Herrnstein and Prelec individuals were inconsistent primarily because they were temporally constituted creatures, and not because they are inhabited by competing interests as in divided self models.[435] The main reason why individuals were not the same as the time progresses was for them that individuals are confronted with new situations and for many new situations their adjustment processes may not be sufficiently well adjusted. Therefore, individuals were not really capable to stick to their personal plans. Instead individuals would turn out inconsistent over time. This could be caused by changes within the individuals themselves, within their historically-informed adjustment processes. But this could be caused also by changed environments in which individuals make their choices. As has been stressed by Nicolas Vallois (2012), for Herrnstein and Prelec this is a very fundamental limit of evolutionary adaptation linked to the nature of distributed choice situations (see chapter 5).[436]

From this conception of the nature of individual decision-makers Herrnstein and Prelec draw crucial implications for welfare evaluations. In situations of distributed choice they assume decision-makers generally as time-inconsistent, missing the capacity to take in account the indirect effects of their choices on future consumption possibilities, and by consequence, ignoring the consequences of their current choices on their future welfare. As a consequence, Herrnstein and Prelec claimed that in situations of distributed choice,

[435] Nonetheless, Herrnstein and Prelec have stated to be sympathetic towards the divided self models from the self-control literature citing Winston 1980, Thaler and Shefrin 1981, Schelling 1980, and Ainslie 1975).

[436] As we described in chapter 5, in distributed choice situations, Herrnstein and Prelec saw decision-makers much less united or consistent than they were assumed to be in the rational addiction model. This is, they argued, due to the fact that in situations of distributed choice individuals have more problems in imagining the consequences of their choices, in taking track of them, and in accounting them correctly in comparison to alternative choices. They assumed that individuals gain ultimate knowledge of their real consumption utility by experience, that individuals learn about new situations, new reinforcement contingencies by trial and error. As we described in chapter 5, Herrnstein and Prelec argued that individuals in distributed choice situations tend to meliorate on local reinforcement, and not to optimize the global intertemporal utility. Instead of diverging to optimal dynamic equilibria, individuals in distributed choice situations tend to stick to a suboptimal matching equilibrium (see chapter 5).

consumers are vulnerable to choose suboptimal levels of consumption and end up in dynamic equilibria that might be hedonistic short-term matches on the individual level, but mismatches on the social level.

For Herrnstein and Prelec these social mismatches were only very hardly resolvable on the individual level. Not only because it is hard for individuals to change their consumption patterns, but also because it is harder to detect hedonistic mismatches on the individual level. As meliorating individuals are assumed not to perceive the taste-changing effects of addictive consumption, Herrnstein and Prelec argued that meliorating individuals might associate the intrapersonal negative consequences of consuming addictive goods rather with other contexts or unrelated activities. Therefore, consuming individuals are likely to perceive the consequences of consuming addictive goods differently than others whose preferences were not impacted by past or present consumption.[437]

The evolutionary nature of many consumption problems still increased the vulnerability of people on the purely individual level according to Herrnstein and Prelec. They argued that "interactions between tastes and allocation are not, as a general rule, known innately, so they must be discovered by experimentation across ranges of allocations." But as they saw individuals more generally as meliorators and not as maximizers they argued that individuals "often seem to lack a natural way of keeping record of our observations." As they saw meliorating individuals as unable to memorize correctly, unable to account correctly for behavioral evolution, and unable to calculate correctly optimal consumption levels, Herrstein and Prelec saw meliorating individuals "likely to ramble down the primrose path to various suboptimal equilibria," many of them far worse than overindulgence in caviar" (Herrnstein, Prelec 1992a: p. 351). As it has been stressed by Vallois (2012) this was a very strong critique of the positive connotations of equilibria in microeconomics à la Becker.

[437] They argued that "[f]rom the outside, it is usually clear that addictive behavior is having profound effects on the rest of the addict's life. But, for the addict the pattern is for the psychic benefits to be directly associated with consumption of the addictive good, while psychic costs are to be spread all around[,]" being maybe not linked to the addictive good at all (Herrnstein, Prelec 1992a: p. 337).

Using the terms of Winston (1980), we might say that cases of addiction might be better identified from a platform external to concerned individuals, from the social platform.

Herrnstein and Prelec saw the solution to the problems of such hedonistic fallibility in culture and in social norms and rules that function as social reinforcers. They argued that when meliorators exist not only individually, "[b]ut in a community of meliorators, knowledge about at least some of those primrose paths would accumulate." Therefore, they argued "it matters whether we are observing other people's behavior or just our own. Observing just our own, we are in the clutches of our own current value functions and our impoverished memories of past ones. Observing others, it would soon be noted, as pleasing as wine may be, it can become 'too much of a good thing.' We would soon be saying 'enough is enough,' 'all things in moderation,' or, simply, 'know thyself.'" That is why they argue that individuals would not only have their own consumption experience at disposition to judge potential addiction dangers, but also "the accumulated wisdom of a culture [that] is full of warnings about the pitfalls of distributed choice" which is "built into many of a culture's institutions" (Herrnstein, Prelec 1992a: p. 351f.). As an example, they cite social encouragements and incentives to work hard,[438] or mundane rules that define socially acceptable consumption amounts or frequencies for addictive goods.[439]

Out of their conception of distributed choice situations leading to social mismatches, Herrnstein and Prelec derived a legitimization for government intervention. They argued that an individual in a distributed choice situation is "[…] victim to an externality, but one that is internal to his or her own choices […]" (Herrnstein, Prelec 1992b: p. 248). One could describe this also as an externality of second degree or an

[438] Herrnstein and Prelec wrote that "[w]ithout the social supplements, many of us might work less and eat more cake than is optimal for us individually, let alone optimal for society as a whole" (Herrnstein, Prelec 1992a: p. 352)

[439] Herrnstein and Prelec wrote that "[b]ecause distributed choices often go haywire by stabilizing at the wrong rate, society invents many rate-setting customs. […] A daily cocktail or two before dinner, beer in twelve ounce bottles, a few holidays enlivened by drink, occasional religious observances with a taste of wine, are examples of rate-setting customs that detour the primrose path away from danger." (Herrnstein, Prelec 1992a: p. 355)

indirect externality: Through their consumption individuals impose an internal externality on themselves by not taking in account the effects of their present choices on their future selves; this constitutes what they call an internal externality; since individuals exist in society and interact with the rest of society, their individual hedonistic mismatches might impose costs on the rest of society like in the classic case of a negative externality. In this way, they imply that meliorating choices are directly like an internal externality upon the meliorating person's future selves, and like an indirect actual externality towards the rest of society.

They argue that regulators should not only care about external effects of decisions of the agent that impact other agents. Additional to that, regulators should also care about "negative intrapersonal side effects," about the effects of present choices of a decisionmaker on the welfare of their future selves that are not taken in account in the moment when the choices are made. Therefore, distributed choice situations are for Herrnstein and Prelec important situations of decision-making failure in which regulators might provide help to increase the wellbeing of economic agents and the overall social welfare.

It did not take long, and what was called a "negative intrapersonal side effect" would soon simply be called an "internality." In 1993, Herrnstein published an article in the *Journal of Behavioral Decision Making* together with Loewenstein, Prelec and William Vaughan (Herrnstein et al. 1993). The article was titled *Utility Maximization and Melioration: Internalities in Individual Choice*. In the article the authors recognized that people are likely to behave as utility maximizers in some situations and as reinforcement meliorators in other situations. The term internality is later taken up by other behavioral economists to justify government interventions.[440]

[440] In 1999 Ted O'Donoghue and Matthew Rabin take up the term when discussing addiction (O'Donoghue and Rabin 1999, see also O'Donoghue and Rabin 2000). Jonathan Gruber is another behavioral economist who takes up the term in the early 2000s (see Gruber and Köszegi 2001, Gruber 2001, 2002).Later the rhetorical power of the term internality was also recognized by libertarian critics of behavioral economists like Glen Whitman writing for the free market think tank *Cato Institute* (see Whitman 2006).

The normative differences between the melioration model of addiction and the rational addiction model stood out strongly as well when Herrnstein and Prelec (1992a) compared how their melioration view of addiction differed from the other main explanations of addiction in maximizing individual and social welfare (see Herrnstein, Prelec 1992a: p. 332-335; see chapter 5). In chapter 5 we described how Herrnstein and Prelec framed their melioration view or primrose path view of addiction as the middle way between the disease or no-choice view of addiction and the rational addiction view or rational self-medication view of addiction. Their exposition makes clear that depending on which explanation for addiction is chosen, the public policies to address the problems of addiction should be designed quite differently.

In case of the disease view of addiction public policy should be designed to eradicate, cure, or alter the causes that made individuals become sick of the addiction disease in the first place. Herrnstein and Prelec argued that "this approach would focus on the 'root causes' of the troublesome behavior and attempt to alter them[,]" like a "search for interventions to cure the 'disease' presumably underlying the unwanted behavior." Incentives would be only secondary as people are imagined as deprived of any volitional agency. Making individuals personally responsible for their behavior should therefore be avoided. Herrnstein and Prelec wrote that "[t]he person should in any case not be hold accountable for the behavior of afflicted with a sense of guilt for engaging in it" (Herrnstein, Prelec 1992a: p. 356).[441]

In the case of the rational addiction view, the matters were for Herrnstein and Prelec quite the opposite to the disease view of addiction. They wrote that "[t]he rationality approach implies that some people are addicts because of their endowment (where endowment includes material, constitutional, and psychological aspects)." As a consequence, they argued, "the most efficient way to increase their welfare is to give them

[441] Unfortunately, Herrnstein and Prelec (1992a) did not detail any further their arguments for why individuals should not be charged with guilt or false personal responsibility claims. But it is imaginable that overcharging persons with personal responsibility would make their existence unnecessarily harder than it is already, or otherwise it might simply be useless and the resources used to do so could be spend more effectively otherwise.

more money. The public policy goal for drug abusers, for example, would be to make it possible for addicts to self-medicate more easily." Referring to Milton Friedman and Becker and Murphy (1988) as examples, Herrnstein and Prelec argued that of the rational addiction approach aims to totally decriminalize addiction, making it legally a perfectly tolerable consumption good like any other good. They wrote that "[d]isregarding the possible offsetting social welfare penalties for allowing addicts freer rein to pursue their habits, the logic of this approach argues against criminalization of addictive substances, or any other form of government action that raises prices or otherwise impedes their use" (Herrnstein, Prelec 1992a: p. 356).For Herrnstein and Prelec this seemed a bit too radical a solution. Herrnstein and Prelec claimed that the rational choice approach should in its logical consequences also argue "against attempts to change demand by education, restrictions on the advertising of addictive substances, and the like." Instead, Herrnstein and Prelec argued the rational addiction view would legitimize fully legal institutional arrangements do deal with addiction. They argued that "[t]here should be a market for addiction insurance, that is, for insuring against the high costs of drugs, should stressful events lead to a need for drug medication" (Herrnstein, Prelec 1992a: p. 356).

Herrnstein and Prelec (1992a) presented the primrose path as a middle way between the disease view and the rational choice view, as a compromise between no-choice and full choice in the face of addictive consumption. They argue that the primrose path view "accepts the reality and significance of incentives in relation to addiction, but it does not assume that the individual can perform a rational calculation in weighing those incentives" (Herrnstein and Prelec 1992a: p. 357). They argued that "[t]he primrose path approach suggests that society should at least provide people with more information, on the grounds that they are less likely to go down the path if they know where it is headed." Such information could alter the imagination of the long-term consequences that meliorators were assumed not to perceive. For example, they proposed to provide consumers with "biofeedback that makes the buildup of tolerance or the imminence of physical dependence more visible[,]" or to provide consumers with "actuarial information (vividly presented) about one's career, health, family, prospects, as a function of current

behavior." They argued that public policy could also "attempt to influence the value functions themselves, perhaps by applying social reinforcers to make the addictive activity less attractive in relation to its alternatives" (Herrnstein and Prelec 1992a: p. 357). Legal criminalization was for Herrnstein and Prelec one form of such social reinforcement.[442]

The fourth major scientific explanation of addiction that Herrnstein and Prelec recognized was the divided self view of addiction promoted by Schelling, Ainslie, and others like Winston or Thaler and Shefrin. They argued that "the divided self approach extends the analysis of the primrose path" by acknowledging that "individuals can sometimes rearrange the value functions controlling their own behavior." With the divided self-view of addiction public policy should according to Herrnstein and Prelec be designed "to make self-control mechanisms more accessible and more available than they are evidently are now for those who succumb." They argued that "[a]ddiction, in other words, is like market failure, in that the market does not supply convenient self-control devices (and the legal system prohibits some of them)" (Herrnstein and Prelec 1992a: p. 357f.). Faced with such market failures, "[p]ublic policies could be devised to make the teaching and dissemination of self-control more effective" (Herrnstein and Prelec 1992a: p. 358).

Herrnstein and Prelec's legitimization for government intervention in distributed choice situation went exactly against Becker's legitimization based on consumer sovereignty for the government not to intervene. Herrnstein and Prelec saw consumers generally not sovereign, because they were in many cases not capable to resolve their socially suboptimal hedonistic mismatches. Becker saw the similar dangers of addiction on the individual level, but he did not derive a legitimization of government intervention out of that situation. Rather he delegated the responsibility to the individual agents themselves – stressing the volitional element in addictive consumption. Herrnstein and Prelec had less trust in the capacities of individuals to learn and discipline themselves over time. They saw social

[442] Herrnstein and Prelec argued that the desease view "rejects criminalization because it is irrelevant," and that the rational addiction rejects criminalization "because it is against the addict's self-interest[.]" They argued that "the primrose path approach may favor it for providing incentives where they could be truly helpful" (Herrnstein and Prelec 1992a: p. 357).

reinforcers as the better mean to become a more efficient society. While Becker publicly advocated for the liberalization and decriminalization of drugs, Herrnstein and Prelec saw liberalization and decriminalization of drugs as the wrong societal incentive towards many of its citizens that they saw rather as myopic meliorators.

7.3.2 The rational addiction model in *Picoeconomics*

A second book from 1992 that stood out amongst other contributions of behavioral economists was George Ainslie's monography *Picoeconomics* (Ainslie 1992). Ainslie was a psychiatrist at the *Veterans Administration Medical Center* in Coatesville, Pennsylvania.[443] He was part of the Russell Sage working group on intertemporal choice and had cowritten chapters in *Choice over Time*.[444] In the 1980s Ainslie had been part already in a working group coordinated by Elster that lead to the publication of the collective volume *The Multiple Self* that was published in 1986 (Elster 1986).[445] Ainslie's 1992 book *Picoeconomics* was part of a publication series titled *Studies in Rationality and Social Sciences* with of *Cambridge University Press* that was also edited by Elster and Michael McPherson.

We are interested in Ainslie's *Picoeconomics* mainly to document the (public) reception of the rational addiction model by a psychologist and psychiatrist who is often named as a source of inspiration among behavioral psychologists like Thaler or Laibson.[446]

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[443] Ainslie had been introduced to psychologic learning theories during his undergraduate studies at Yale University through the psychologist Frank Logan who is often described as a neo-behaviorist in the tradition of Clark Hull (see Ellis 2005). Ainslie learned operant conditioning techniques of behavioral psychology Herrnstein and Rachlin in the 1970s and based his theory of conflicting motivational states strongly on the matching law that had been popularized by Herrnstein (see chapter 5).

[444] Ainslie had two chapters in *Choice over Time* that were cowritten with Nick Haslam a graduate student in psychology at the *University of Pennsylvania* at the time. Their chapters were titled *Hyperbolical Discounting* (Ainslie and Haslam 1992a) and *Self-Control* (Ainslie and Haslam 1992b).

[445] Ainslie's chapter in *The Multiple Self* was titled *Beyond microeconomics. Conflict among interests in a multiple self as a determinant of value* (Ainslie 1986).

[446] *Picoeconomics* is a dense book stretching out over 400 pages. It synthesizes Ainslie's view of motivational conflict that is based on a wide psychological literature. Ainslie's theory makes a grand tour from Sigmund Freud over operant conditioning to modern microeconomics. We will focus here mainly on the way how Ainslie described the rational addiction model in his work. For historical accounts relating Ainslie's work to behavioral economics more generally, see Vallois (2012) and Grüne-Yanoff (2015).

But *Picoeconomics* is also an interesting case in itself as its main arguments are similar to the divided self models of Winston (1980) and Thaler and Shefrin (1981).[447] Although Ainslie's explanation of addiction is much more profound and detailed, it criticized the rational addiction model basically for the same reasons for which Winston or Thaler and Shefrin have also criticized the model: As a descriptive theory, the rational addiction model would misrepresent core aspects of addiction. As a consequence, policy implications derived solely on the base of the rational addiction model would be biased or only partially-informed. Therefore, public policies based on rational addiction miss key aspects in providing their attempts to provide solutions to the problems of addiction.

Picoeconomics meant for Ainslie (1992) something like "micr-micro-economics[,]" applying the principles of economics on the intrapersonal level to explain often ambivalent human behavior in terms of a dynamic view of motivational states. Ainslie wrote that "[j]ust as classical economics describes negotiation for limited resources among institutions, and microeconomics describes such negotiation among individuals, so picoeconomics describes interactions that resemble negotiation among parts that can be defined within the individual for control of that individual's finite behavioral capacity" (Ainslie 1992: p. xiii).

For Ainslie individuals had limited behavioral capacity at disposition when making choices. Some individuals would manage to use their behavioral capacity in a goal-directed manner in accordance to well-articulated interests and motivational states. But often, Ainslie argued that the resulting observable behavior would be subject to considerable ambivalence. He argued that "[w]hen a choice-maker fails to reach a stable decision between two familiar alternatives, he is called ambivalent" (Ainslie 1992: p. 14). Ainslie explained the existence of ambivalent behavior and the existence of engagement in self-

[447] In the early 1980s Winston, Thaler, and Shefrin have been economists who presented economic models that were inspired and supported by loose references to the psychology literature. Roughly ten years later Ainslie, a practicing psychiatrist, presented an economic explanation of addiction in a similar vein that was supported by a full-fledged and well-articulated psychological theory of motivational conflict. A main difference between Winston, Thaler, and Shefrin and Ainslie was that Ainslie was actually

defeating or self-destructive forms of behavior with the hypothesis that the individual decisionmaking of a person was internally determined by multiple centers of choice[448] and by separate principles of decision making[449] that fought within the person to shape the agency of a person at one moment in time.[450] He argued that within each person there must be something like a "marketplace where the person's preference is decided[,]" and that it is a "failure of this marketplace to produce a stable decision that we describe as ambivalence" (Ainslie 1992: p. 32).[451]

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[448] Ainslie drew on a wide array of psychological literature to describe the idea of different centers of choice existing within the same individual. For example, he discussed theories of physiologically "distinct motivational centers in the brain" or separate personalities as examples of multiple decision centers within individuals. He discussed Thaler and Shefrin's 1981 article as an "abstract version of the multiple-center theory" describing "the competition of two apparently independent consumption patterns[,]" echoing a "Freudian topography that permits simultaneous id pleasure and ego unpleasure" (Ainslie 1992: p. 28f.). Next to multiple centers of decisionmaking, Ainslie also discussed multiple principles of decisionmaking (see Ainslie 1992: p. 32 – 48).

[449] Ainslie argued that lower and higher decision making processes must also compete within an individual for access to the agency of making choices. He argued that most modern theories of ambivalence would assume a lower principle of decision making that "is insensitive to reward or responds to reward in a different way than the other[,]" and a higher principle of decision making that is "rational and maximizes expected reward" (Ainslie 1992: p. 32f.). Ainslie argued against an explanation of self-defeating behavior purely in terms of lower decision making principles like conditioned reflexes that left no room for volitional agency. Instead, he argued that "a viable theory of ambivalence must stay within the rules of operant reward" (Ainslie 1992: p. 48).

Roughly a decade later the cognitive psychologist Daniel Kahneman argued similarly when explaining why people make statistical errors and fall prey to cognitive biases (see Kahneman 2003). Kahneman obtained the Nobel Prize in economics in 2002, together with the experimental economist Vernon Smith. In his Nobel lecture Kahneman argued that the existence of two basic modes of decision making potentially explains why people fall prey to cognitive biases and make errors in statistical thinking (Kahneman 2003). Kahneman described a mode of decisionmaking based on intuition as system 1 that would function automatically for a wide range of situations demanding only a low amount of cognitive resources, and a second mode of decision making based on reason that he called system 2 that was able to solve much harder and more complicated problems, but that used much more cognitive resources at the same time and was therefore limited in its availability (see Kahneman 2003: p. 450f.).

[450] In chapter 6 we saw how Becker (1996) saw interpersonal conflict as a much more relevant problem in explaining choices than intrapersonal conflict. Ainslie discussed such interpersonal conflict as a potential source of observable ambivalence in choice (see Ainslie 1992: p. 25-27), but he saw such explanations ultimately as not fully persuasive. He wrote that "[t]here is something intuitively appealing about the analogy between interpersonal conflict and ambivalence, but the analogy alone is not an adequate hypothesis. Likewise, interpersonal conflict is a common finding in situations in which a person is ambivalent, but it does not explain his ambivalence" (Ainslie 1992: p. 27).

[451] The marketplace metaphor seemed to appeal to Ainslie due to its implication of value commensurability. He wrote that "there may be different motives or even anatomically separate motivational centers in the brain, but such motives or centers must compete and be chosen on the basis of a common dimension." Further, he argued that "[t]he competition of all behaviors for a limited channel

Although Ainslie had a mitigated view of the vision of motivation implicit in economic theories, he explicitly endorsed economic principles due to the focus on goal orientation in explaining behavior. In the preface of *Picoeconomics* he wrote that he has "chosen an economic title in light of convincing evidence that even seemingly irrational and 'unwanted' behaviors are goal-directed." As economics was for him "the original theory of goal-directed choice[,]" he argued that "self-defeating behavior is best understood in terms of an economic marketplace within the individual" (Ainslie 1992: p. xii).[452]

In the introductory chapter of *Picoeconomics*, Ainslie explained why addiction was a pressing social problem and why economic accounts of addiction were inadequate. Ainslie argued that he saw the problem of addiction and compulsive behavior especially prevalent in modern societies. He wrote that "[m]odern industrial societies are rich by any historical standard, but we do not enjoy our riches well." He claimed that, as people's standards of living increased, the attainment of biological and basic needs necessary for survival became less relevant. Consequently, people could structure their lives in many ways, largely choosing their own goals and incentives, which sometimes led to self-defeating behavior and compulsive consumption. This type of consumption would not provide people with satisfaction, yet people were strongly motivated to engage in it despite its potentially destructive effects. He argued that such activities "usually are called addictions and are characterized by the sufferer's ambivalence about them." Ainslie argued that the sufferers often felt imprisoned by their addictions. They would want to be rid of their addictions, but they kept "choosing them freely when given the chance" (Ainslie 1992: p. 3).

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of expression requires that reward in one center have equivalents in the others; they must be like dollars and pounds, fully exchangeable and therefore fully commensurable" (Ainslie 1992: p. 32).

[452] Regarding the aspect of being goal-directed, Ainslie argued that Freudian drive theory as well as behaviorist reinforcement theory would be basically economic in nature. He noted that "the recent burgeoning of 'behavioral economics' has shown how nearly congruent reinforcement theory is with economics" (Ainslie 1992pico: p. xii)

Although Ainslie argues that in human history "there have always been concrete examples of urgent pleasures with destructive effects[,]" he maintained that "in recent years the number of activities recognized to have this puzzling, unwanted seductive quality has mushroomed" (Ainslie 1992: p. 3).[453] According to Ainslie this growth in the suggested cases of addiction was in part due to "increased recognition of an addictive pattern in behaviors that have long been common," and in part it was due to "a shift of public attention as the purely technical problems that have affected human welfare have been solved" (Ainslie 1992: p. 4).[454] The increasing set of alleged addiction contributed pressing question to behavioral scientists in trying to explain addiction in terms of motivation and in providing insight for public policies on how to intervene constructively in the case of addiction. Assuming addictions to consist of goal-directed behavior, Ainslie argued that addictions "should respond to the many techniques that modern society uses to marshal motivation" (Ainslie 1992: p. 4f.). But in fact, he observed that this was not the case – at least if motivation was assumed as it was reflected in modern utility theory in microeconomics. What was needed according to Ainslie was a "radical reexamination of our beliefs about motivation" (Ainslie 1992: p. 5).

Modern utility theory was for Ainslie (1992) one of the most prominent theories that implicitly assumed an account of motivation to explain the choice behavior of people. Describing modern utility theory as the successor of ancient Epicurean thought and 18th

[453] Basing himself on psychiatric studies, Ainslie identified the following cases of potential addictions in 1992. He wrote that "[t]o the traditional list of alcoholism, drug addiction, gambling, and overeating […] have been added addictions to a variety of 'normal' drugs, including prescription tranquilizers […], nicotine, caffeine […], and even sugar[…], chocolate […], and water […]. In addition, there can be addictions to romantic relationships […], and emotional dependence[…], as well as promiscuous sexual encounters […], masturbation[…], and a number of deviant sexual practices […]. The list continues: addictions to television and video games […], to haste […], work […] and exercise[…], to shoplifting and other kinds of thrill-seeking, to some kinds of self-inducible epileptic seizures […], to physical self-mutilation […] and aggression toward others […], to spending money […], to religiosity and fasting, to many maladaptive personality traits such as overcompetitiveness […], procrastination […], and obsessional jealousy […], and even to some symptoms that usually have not been counted as behaviors, such as anxiety, depression, and 'obsessional compulsions'" (Ainslie 1992: p. 3f.).

[454] Ainslie added that "addictions often are described as the 'greatest preventable cause' of one or another kind of morbidity, as if they were somehow more easily preventable than other causes" (Ainslie 1992: p. 4).

century Utilitarian thought, Ainslie argued that utility theory supposed a hedonic calculus by which people could "appraise the value of goods by simple experience," meaning that "incentive derives from the limited availability of […] goods, and that motivational conflict results merely from failure to think choices through." He argued that this line of thinking "essentially takes the desires that motivate climbing, cleaning, and loving as givens, assigns them values on the basis of their relative unavailability, and likens the task of choosing among them to shopping on a budget" (Ainslie 1992: p. 7). Utility theory as it was practiced in modern microeconomics was to Ainslie one version of this line of thinking.[455]

Although being widely known, the description of human motivation in modern utility theory was to Ainslie insufficient. He argued that "[e]conomists have almost unanimously avoided the problems of subtle reward and of self-defeating behavior" by basing the analysis mainly on "those relatively concrete goods that can be easily priced." Ainslie argued that "[c]onventional utility theory arose from the study of tangible commodities in limited supply – goods that, though they were not always necessities, could nevertheless motivate people powerfully if those goods were in short supply." Yet, he argued, in most cases of subtle forms of behavior people are not directly motivated by accessing the goods itself. For example, he argued that "[u]nder conditions of leisure, most of the value that commodities have for people is bestowed by the people themselves, depending on arbitrary processes that occur in their own heads, rather than on the properties of the commodities" (Ainslie 1992: p. 8f.). Instead, Ainslie argued that "most

[455] Ainslie (1992) associated modern utility theory with the assumption of consistent preferences and a focus on the free comparison of alternative choices. Providing some key moments of modern microeconomics, he argued that first, Samuelson (1937) "had solidified economists' tentative assumptions that people and corporations, when allowed to choose freely, behave so as to optimize their objective prospects." Later, he argued, "Becker (1976) postulated a virtual price for each activity, in effect updating the hedonic calculus to modern economic standards" (Ainslie 1992: p. 8). For a historical comparison of the economic analysis of Becker with that of Bentham, see Hurtado (2008).

choices have to do with how much of an unpleasant emotion one is willing to risk enduring in the hope of reaching pleasant emotions [...]" (Ainslie 1992: p. 9).[456]

Ainslie (1992) recognized the household production framework developed by Becker and others as a step in the right direction to account for human motivation. But it was by large not sufficient for Ainslie as it evacuated ambivalence and motivational conflict out of the explaining theory. Ainslie wrote that "[i]t has been argued that the limitation of economic theory for addressing the choices closest to the human heart may be simply that quantitative data on choice-making are not available for these areas of behavior. In the spirit of solving this problem, Gary Becker and a few other economists have recently expanded the economic data base by describing regularities in nonmonetary transactions like marriage (Becker, 1976), extramarital affairs [...], and criminal deterrence (Becker, 1976), as well as addiction itself (Becker and Murphy, 1988)." However, Ainslie contented that "the problem is more serious than simply a lack of data" (Ainslie 1992: p. 9f.).[457]

Ainslie acknowledged that some aspects of addiction might be usefully explained with the means of utility theory, but other, crucial aspects of addiction would remain unexplained, and therefore, misrepresented. While he noted the theoretical interest of some economists in the large "domain of nonmonetary addictions," Ainslie (1992) claimed that they have seen "unable to handle the 'two minds' problem that is at the heart of the addict's paradox." He argued that some of the addict's behavior "can be described in conventional economic terms, for instance, as the combination of an inelastic demand curve for the

[456] This view of behavior is in principle quite similar to Becker's view of behavior describing decisions not only in terms of monetary costs as reflected in market prices and money income, but also in subjectively defined psychic costs and advantages. In his 1976 book *The Economic Approach to Human Behavior*, Becker wrote in the introductory chapter that "[w]hen an apparently profitable opportunity to a firm, worker, or household is not exploited, the economic approach does not take refuge in assertions about irrationality, contentment with wealth already acquired, or convenient ad hoc shifts in values (i.e., preferences). Rather it postulates the existence of costs, monetary or psychic, of taking advantage of these opportunities that eliminate their profitability – costs that may not be easily 'seen' by outside observers" (Becker 1976: p. 7).

[457] In his chapter in Elster's 1986 book on the multiple self, Ainslie made already a similar comment citing Becker's work in extending economic analysis. He cited the Stigler-Becker model, but not the Becker-Murphy model that was not yet published (Ainslie 1986: p. 134).

addictive good with an increasing price for that good (Stigler and Becker, 1977), or as a high time constant for discounting future goods (Becker and Murphy, 1988), his fear of his own behavior and his consequent attempts to limit his own freedom cannot" (Ainslie 1992: p. 13).[458]

Such motivational conflict was to Ainslie not only absent to the conventional utilitarian psychology assumed by Becker and Murphy (1988). Motivational conflict and its resulting ambivalent choice outcomes were at the same time key aspects of addiction to Ainslie (1992). Granted that conventional utilitarian logic "is internally consistent, that it fully describes many people's norms for their motivation, and that it roughly describes much of their actual motivation, [...] its picture of motivation differs in detail from what is observed, even when the incentives people face are concrete and quantifiable." He argued that "[p]eople often fail to maximize any conceivable shopping list of goods, but rather behave in ways that look internally contradictory" (Ainslie 1992: p. 13f.).[459]

On a more technical level Ainslie rejected the accuracy of the Becker-Murphy model as relied centrally on the valuation technique of exponential discounting. Ainslie argued that "[f]or some theorists the simple discounting of delayed events explains all behaviors that are apparently imprudent or irrational" (Ainslie 1992: p.60). He called such explanations "time window explanations." As an example, he provided an article by the psychologist Alexandra Logue (1988) suggesting that "organisms change their preferences over time because of a 'time window,' that is, a limited awareness of the future" (Ainslie 1992: p. 60). He argued that the Becker-Murphy model is "[i]n effect, [...] another time-window hypothesis" as Becker and Murphy (1988) asserted "that all addiction is rational

[458] Different to Becker and Murphy (1988), Ainslie (1992) did not define those activities as addictions that Becker and Murphy described as beneficial addictions. Ainslie wrote that he excluded "the activities that have been called 'positive addictions,' such as an attachment to classical music with practice (Becker & Murphy, 1988); these do not entail the experience of disowning one's own wishes, and hence they pose no problem for conventional motivational theory" (Ainslie 1992: p. 4, footnote 4).

[459] Furthermore, Ainslie argued that "even where people do seek goods in consistent fashion, utilitarian psychology does not specify the factors that make nonconcrete goods scarce and/or necessary for the chosen reward process" (Ainslie 1992: p. 14).

in that it must maximize a person's expected utility whenever he chooses it" (Ainslie 1992: p. 61).[460]

By technical definition, exponential discounting was inconsistent with the temporal preference reversals caused by motivational conflicts that Ainslie (1992) considered central to addiction. He argued that "[t]he trouble with such hypotheses is [...] that these theories cannot deal with the common case in which an organism knows he will change his choice in the future and is still at pains to prevent this" (Ainslie 1992: p.61). Ainslie agreed that "[t]he hypothesis that the 'true' or innate discount rate for future events is extremely steep accounts for disregard of the future[.]" But he disagreed that by itself exponential discounting "does not explain ambivalence between 'higher' and 'lower' behaviors" (Ainslie 1992: p. 62).[461] Instead Ainslie argued that temporal preference reversals were consistent with Herrnstein's Matching Law that implied a hyperbolic (and not an exponential) discount function that was sufficiently steep to make some lower consumption options become more attractive as they come closer in time compared to alternative consumption options that are objectively preferable, but that occur farer in the future.[462]

Ainslie saw the Becker-Murphy model as an important contribution of microeconomists trying to modeling activities that create dependence and addiction. Although he acknowledged Stigler and Becker's and Becker and Murphy's partial translations of aspects of addiction into the language of modern utility theory, he was not

[460] Ainslie (1992) argued that Becker and Murphy (1988) "express current utility of an alternative as the integral, from the present moment through the person's expectable life span, of $e^{\sigma d}$ times the momentary utility of that alternative each delay, where σ is a 'constant rate of time preference,' and d is delay [...]." He argued that although Becker and Murphy's used complex equations to compute momentary utilities, "the term that permits a highly destructive addiction is σ, which determines the steepness of the person's rate of exponentially discounting delayed events" (Ainslie 1992: p. 61).

[461] Ainslie (1992) argued that "[f]or a discount function to produce motivational conflict between alternatives, it must generate curves that lie so close together as to prevent one from dominating the other, or else the curves must cross one another as time elapses." He argued that the situation that discount curves cross each other only as a result from the passage of time would in not arise from exponential discounting as it was conventionally assumed in economics since at least Samuelson's days (see Ainslie 1992: p. 61f.)

[462] For a useful and concise illustration see the Figures 3.1 and 3.2 from Ainslie (1992). See also the very comprehensive and concise description of the difference between exponential and hyperbolical discounting provided in Grüne-Yanoff (2015).

persuaded that their models provided adequate motivational explanations of addiction. Like Winston (1980) and Thaler and Shefrin (1981) before him, Ainslie argued that the Becker-Murphy model is basically biased as it neglected intrapersonal motivational conflict as a source of ambivalence in personal choice behavior. As a result, the model assumed choice behavior as too clear and too optimistic.

7.4 Conclusions

In the following years a new generation of behavioral economists would take up the lines of criticism provided by Thaler and Shefrin, Winston, Herrnstein and Prelec, and Ainslie when criticizing mainstream microeconomics from the perspective of behavioral economics. In part behavioral economists like David Laibson,[463] Matthew Rabin, and Ted O'Donogue[464] came up with mathematically formalized behavioral economics propositions

[463]David Laibson is an economist who obtained a PhD from the Massachusetts Institute of Technology (MIT) in 1994 under the supervision of Olivier Blanchard and Roland Bénabou. His PhD thesis was *titled Hyperbolic Discounting and Consumption*. In it Laibson modeled intertemporal consumption with game theory as the result of intrapersonal bargaining. Ainslie (1992) is cited in each chapter as a source of main inspiration. He published parts of his thesis in a NBER working paper (Laibson 1996) and in an article in the *Quarterly Journal of Economics* (Laibson 1997). In the article Laibson introduced a new discounting technique called quasi-hyperbolical discounting. By introducing an extra parameter, quasi-hyperbolical discounting approximates the hyperbolic value curves promoted by Ainslie in a mathematically tractable and parametrizable model. At the same time the model permitted also to use exponential discounting with the right parameter values. Laibson's model leans on a formulation first used in an intergenerational savings model that was published by Edmund Phelps and Robert Pollak in 1968 (Phelps and Pollak 1968). One can say that Laibson's model provided a translation of Ainslie's ideas by an economist into modeling language that was easy to use by other economists without breaking with the standard technique of exponential discounting altogether. For more details of Laibson's approximation of Ainslie's ideas, see Grüne-Yanoff (2015). In 2001 Laibson also formulated a cue-theory of addiction in which environmental cues (specific aspects or impressions of an environment) change the marginal utility of an addictive good. Laibson based his model in part on the rational addiction model and compared how the implications of his cue-based model differed from the implications of the rational addiction model. One main difference that Laibson noted related to the differing implications regarding public effects and public policy (Laibson 2001: p. 108). Different than the rational addiction model, Laibson argued that his cue-based model "implies that cues can be a negative externality" that can be seen as contributing negative effects on other people, and therefore, providing potential legitimations for the restriction and government intervention (Laibson 2001: p. 108f.). See also the excellent review of theoretic addiction models by André Hofmeyr (2015) in which Laibson's cue model is classified as an exogenous addiction model in which addictive temptations are exogenous to the agent (Hofmeyr 2015: p. 67).

[464] Matthew Rabin obtained a PhD in 1989 from MIT. From 1996 to 1999 he was Associate Professor and from 1999 to 2014 Full Professor of Economics at the University of California Berkely. Since 2014

that were much more fine-tuned to the usual modeling practices prevalent in economics. In part applied behavioral economists like Jonathan Gruber, Botond Köszegi, and Sendhil Mullanaithan[465] provided empirical analyses of US cigarette demand that put into question the empirical validity of the implications from the rational addiction model. In the early

Rabin is Professor at Harvard University. Rabin was Mac Arthur Foundation Fellow from 2001 to 2005 and obtained the John Bates Clark Medal in 2001. Ted O'Donoghue obtained his PhD in 1996 from the University of California Berkeley. He became Assistant Professor at Cornell University in 1997, Associate Professor in 2003 and Full Professor in 2008 also at Cornell University. Together Rabin and O'Donoghue published several papers containing formal economic models of intertemporal consumption. In 1999 they contributed a chapter to a collective volume edited volume published by the *Russell Sage Foundation* and edited by Jon Elster that was titled *Addiction: Entries and Exits*. In their chapter O'Donoghue and Rabin describe that they postulate a model of addiction that differs in its details from the rational addiction model of Becker and Murphy (O'Donoghue and Rabin 1999a). They write that "our model assumes that the choice to consume an addictive product is 'volitional' in the sense that a person balances her current desire for the addictive product against her perceptions of the future consequences of current consumption. Our model is quite different, and less extreme, than rational-choice models, however, because it assumes that a person may be over-attentive to her immediate gratification (i.e., that she may have self-control problems) and may have incorrect beliefs about her future behavior (i.e., that she may not anticipate future self-control problems)" (O'Donoghue and Rabin 1999a). O'Donoghue and Rabin focused in their research on present-bias in time preferences and promoted a distinction between naïve and sophisticated agents (O'Donoghue and Rabin 1999b, 2000, 2001). Citing the Becker-Murphy model, they saw the modeling of habitual consumption and addiction as relevant application areas for their models (see O'Donoghue and Rabin 2000: p. 240). At other times, they acknowledged the importance of the Becker-Murphy model, but criticized it for neglecting important issues related to time-inconsistency and self-control when modeling addiction (1999b: p. 118). Ainslie (1992) is a recurring reference in the articles of O'Donoghue and Rabin.

[465] Jonathan Gruber is an economist who obtained a PhD in 1992 from Harvard University. Gruber has been first Assistant and then Associate Professor at MIT, before he became a Full Professor there in 1997. Botond Köszegi is a former PhD student of Gruber who obtained his PhD in 2000 from the MIT. In 2001 Gruber and Köszegi published an article in the *Quarterly Journal of Economics* titled *Is Addiction "Rational"? Theory and Evidence* (Gruber and Köszegi 2001) that they disseminated earlier already as an NBER working paper. In the article they test the rational addiction model on US cigarette demand data. While finding general support of the main implications of the model, but they present evidence that preferences for smoking cigarettes are in fact time -inconsistent in contrast to the Becker-Murphy model that assumes consistent preferences. Gruber and Köszegi published a second, more theoretical paper on the tax incidence of an excise tax on cigarettes assuming time-inconsistent preferences (Gruber, Köszegi 2004). Mullanaithan is a US-Indian economist who obtained his PhD in 1998 from Harvard University having written a dissertation supervised by Drew Fudenberg, Lawrence Katz, and Andrei Shleifer. In 2005 Gruber and Mullanaithan published a paper titled *Do Cigarette Taxes Make Smokers Happier* in the journal *Advances in Economic Analysis & Policy* (Gruber and Mullanaithan 2005). They compared levels of happiness of people with a high propensity to smoke under different settings of excise taxes on cigarettes and provided results that "suggest that the welfare effects of cigarette taxation are far more complex than simple rational economic models might predict" (Gruber and Mullanaithan 2005). In 2000 Mullanaithan published a NBER working paper together with Thaler titled *Behavioral Economics* that they prepared as an entry for the *International Encyclopedia of the Social and Behavioral Sciences* (Mullanaithan, Thaler 2000).

2000s, behavioral economists entering the field of law and economics pushed harder as ever before to not only doubt the validity of neoclassical microeconomics as a descriptive theory of actual behavior, but also to doubt its validity as a normative theory of behavior providing a useful normative benchmark.[466] Not only was the role of rational behavior heavily reexamined by law and economics scholars, many behavioral economists argued also for new forms of government intervention legitimized by soft forms of paternalisms defined in research articles.[467]

In this chapter we have argued that next to the perception of the rational addiction model as a methodologic and as a theoretic benchmark, the model was also seen by behavioral economists as a normative or prescriptive benchmark. While these views built in part on the views of rational addiction as a methodological benchmark, we have argued that it makes sense to trace them separately in order to stress the role of the rational addiction model as a political fiction. The rational addiction model did not only innovate the economic description of addiction. Behavioral economists claimed that it did so in particular way, misrepresenting core aspects of actual addiction, such as self-control issues, motivational conflict, and inconsistent planning of consumption. By representing addiction only partially, behavioral economists associated the rational addiction model also with normative implications.

The resulting misrepresentations were according to behavioral economists highly relevant for policy prescriptions as they defined the extent of human agency in

[466] In 1998 Thaler published an article together with the legal scholars Christine Jolls and Cass Sunstein titled A Behavioral Approach to Law and Economics (Jolls et al. 1998). In the article they set out to describe how behavioral economics is relevant for the economic analysis of law. Among others they describe that compared to the conventional economic analysis of law that they associate with Becker and legal scholar Richard Posner, the agents in their analysis are assumed to be boundedly rational, boundedly self-interested, and have only bounded self-control. For more on behavioral law and economics, see also Sunstein (2000).

[467] Many of the behavioral economists interested in intertemporal consumption, self-control problems, and inconsistent planning were also involved in propositions of new types of government interventions justified by behavioral economic analysis. Thaler and Sunstein proposed libertarian paternalism (Sunstein, Thaler 2003), O'Donoghue and Rabin studied optimal paternalism (O'Donoghue and Rabin 2003), George Loewenstein together with Matthew Rabin and Ted O'Donoghue, Colin Camerer and Samuel Issarachoff promoted an asymmetric paternalism (Camerer et al. 2003), and Laibson together with Daniel Benjamin proposed benign paternalism in a conference paper (Benjamin, Laibson 2003).

intertemporal consumption decisions and the role of related governing principles like consumer sovereignty. While Becker (1996) used the rational addiction model to make a case for organizing the access to addictive consumption goods on legal markets following the principle of consumer sovereignty and personal responsibility, behavioral economists perceived this vision as biased and searched for theoretic contributions that could help to justify government interventions differently than it was associated with the rational addiction model.

Part III: Conclusion

The three chapters in this part tracked how the rational addiction model has been perceived in three different scientific communities. Each of these communities was a bit different from the others and had its particular view on the model. But the rational addiction model and what was represented in it forms a central link between these communities and their respective academic fields. By comparing the reception in the different communities, we have not only compared the different communities. We have also worked out different aspects of the rational addiction model that would otherwise be less visible.

The communities as such differed already in some aspects and resembled each other in other aspects. While applied health economics and behavioral economics were academic communities internal to the wider economics discipline, behavioral psychology was a community external to the economics discipline. While applied health economists accepted exponential discounting as a conventional valuation technique and a useful approximation of individual decision making, behavioral psychologists and behavioral economists criticized exponential discounting as a descriptive technique and the accompanying assumption of consistent preferences. While applied health economics and behavioral psychology were already established academic fields in the early 1990s, behavioral economics was much less established and was more like an academic movement in the early 1990s.[468]

But as different as the communities were, researchers from these communities saw the rational addiction model as a representation of intertemporal decision making, of a valuation process that was linked to an adaptation process, tools that were useful to model intertemporal consumption processes, with health impacting consumption processes being

[468] But one should not forget that applied health economics and behavioral psychology were also pushed by academic movements before they had become established fields. See Chapter I for some elements of the establishing of applied health economics as an academic field.

especially policy relevant. But apart from that the reception in each community revealed further aspects of the model.

To behavioral psychologists the rational addiction model became a methodologic benchmark. Conventionally, they were trained in different disciplinary practices than those taught among economists. They saw the model as an instance of a dynamic adaptation process as the result of global utility maximization. While they described strong similarities between the utility and reinforcement as units for hedonic calculi and means to do behavioral accounting, some behavioral psychologists saw the adaptation process implied by the model as too optimistic and sophisticated to be a good description of actual behavior.

To applied health economists the model became a theoretic benchmark laying out how conventional techniques from microeconomics could be fruitfully be applied to phenomena like addiction or health habits. Although they had a similar vision like behavioral psychologists of addiction as behavioral maladaptation, they did not associate strong methodological aspects with the model as the model fitted neatly into the practices with which they were trained themselves.

Our comparative study revealed also different types of how researchers may engage with a piece of economics work like the rational addiction model. There are close followers like Michael Grossman. Being a former student of Becker, Grossman was very receptive of the model and contributed importantly to its dissemination among other health economists. There are also more distant followers, the behavioral psychologist Howard Rachlin might be an example, or the economists John Kagel and Raymond Battalio. As a behavioral psychologist Rachlin took the economic approach that he associated with Becker as a form of inspiration for his own work in psychology and at the same time he contributed to disseminate the work of Becker among psychologists. There are also agents of dissemination that could be called antagonists who take the rational addiction model as an example of how things should not be done. The behavioral psychologist Richard Herrnstein would be the clearest example in the case of the rational addiction model. Jon

Elster might be another case that could be interesting to look in. Beyond these three types roughly described here, there are also those who perceive a contribution, but decide to ignore it, forget to cite it, or judge it as irrelevant. These are still harder to capture for historiography.[469]

To behavioral economists the model became a prescriptive benchmark that was associated with certain implications for public policies. As they saw addiction misrepresented, they saw also the policy implications based on such misrepresentations as misguided. Although the different researchers set out to describe the economic phenomena in neutral terms, they end up hashing on version of descriptive theory against another version of descriptive theory creating conflict about which version of descriptive theory is the true descriptive one. What we showed in this Part 3 is that in fact neither version is only descriptive. Rather there are a set of other values and virtues that become tangled up with the descriptive theories.

[469] One example that we have seen in our reception history is related to Herrnstein and not to Becker. The behavioral economist David Laibson was together with Howard Rachlin the co-editor on a posthumously published book on Herrnstein's contributions (Herrnstein et al. 1997). He also cited Herrnstein's work occasionally in his thesis. But except from these citations Laibson has not cited Herrnstein any further in other published work. This could be related also to Herrnstein's general audience books like the Bell Curve that are judged – correctly so – racist.

8. General Conclusions

In this PhD thesis we have described the creation of the rational addiction model. We have described the concept of rational addiction that is contained in the model as an innovative descriptive concept and as an innovative political fiction. We have focused on the economist Gary Becker as the central innovative force behind the model, but we have embedded his efforts in social and institutional relations. As a consequence, we describe the creation of rational addiction as the result of collective effort that involved many more researchers than just Becker. This work of embedding the model historically has involved many historiographic choices that have shaped the outcomes of this PhD thesis that we will quickly resume in this conclusion. The PhD thesis is structured in three parts. Each part focusses on different historiographic aspects. Combing all these aspects into one holistic view on the creation of rational addiction has been the central objective of this thesis.

In Part I we have focused on the role of thought collectives in shaping the use of practices and the social organization of research. We have provided a detailed picture of the thought collective organized at the NBER during the 1960s and 1970s within which Becker became the intellectual leader that he was when he became interested in addiction in the mid-1970s. We have also described the household production framework that has been developed and used by Becker and others in the NBER thought collective. We argue that it can be interpreted similarly as a thought style, as a particular way of looking at individual behavior that resulted from the intellectual research activity within the thought collective.

Becker's years at the NBER were a crucial phase in Becker's intellectual career. We argue that these years are crucial to explain the force of the economic approach of human behavior of which was Becker maybe the biggest promoter. Becker's career path within the NBER from his arrival in 1957 to his departure in 1980 illustrates the role that Becker took as an intellectual leader more generally. It also illustrates the symbiosis between his

contributions and those of the followers around him. Describing Becker as a central node in a network of other researchers around him discourages us from seeing his models as the ingenious ideas of an individual vanguard. Instead we argue that it is more useful to see Becker's models as part of a theoretic framework that paved the way for many other contributions. While Becker was the one who blazed the trail, his models would not have been successful as they were if there would not have been enough followers to enlarge the trails to generally accepted pathways.

In Part 2 we have focused on the practices that make up microeconomics and economic modeling in the late 20th century. We have resumed how different researchers in the post-WWII decades have integrated habit formation in formal demand models and we have described the different practices that have been involved in these models. We have described how the practices involved in modeling habituation have changed over the years leading up to e retrospectively famous distinction into naïve and rational habit formation. We have also described the practices that were involved in the models that lead to Becker and Murphy's rational addiction model (1988). By comparing the practices of the rational addiction model with the practices of the other models of habit formation we have clarified the ways in which the rational addiction model has been a case of practice innovation.

We have described the switch from static models of present utility to dynamic models of intertemporal utility as the most profound change of practices in the habit formation literature. Considering intertemporal utility optimization brought with it a complexification of the optimization process demanding more from agents than models of simple, present utility optimization. The type of model has important implications on the role that habits play for consumers and their agency in regulating intertemporal consumption activities.

In Part 3 we have focused on the immediate reception of the rational addiction model and transmission into different fields of research. We have compared how the rational addiction model has been received by behavioral psychologists, by applied health economists, and by behavioral economists. We have focused on these three communities

because the rational addiction model has been perceived slightly different by the researchers of these communities. We have described how the model has been seen as a methodological benchmark by behavioral psychologists. It has been seen as a theoretical benchmark by applied health economists, and it has been seen as a prescriptive benchmark by behavioral economists.

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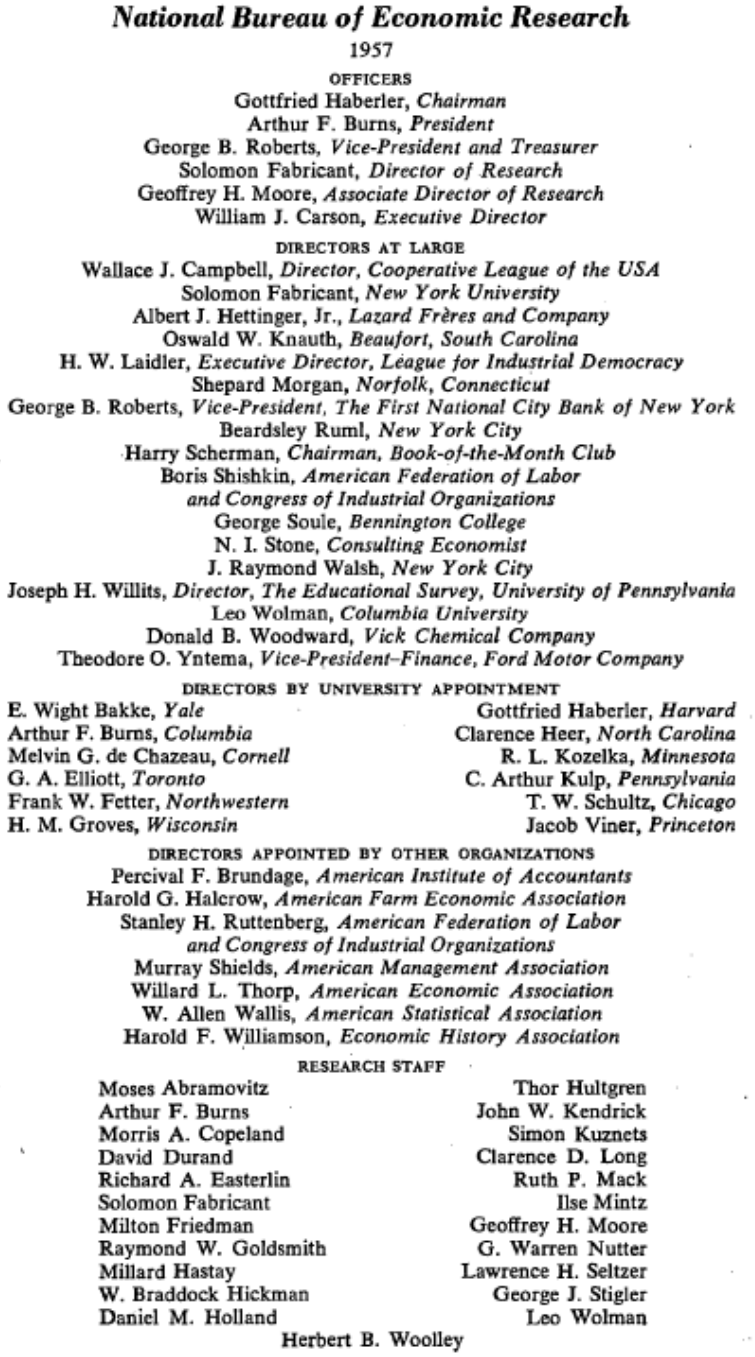
10. Annex

10.1 NBER organizational roster, examples



National Bureau of Economic Research

1957

OFFICERS

Gottfried Haberler, *Chairman*
Arthur F. Burns, *President*
George B. Roberts, *Vice-President and Treasurer*
Solomon Fabricant, *Director of Research*
Geoffrey H. Moore, *Associate Director of Research*
William J. Carson, *Executive Director*

DIRECTORS AT LARGE

Wallace J. Campbell, *Director, Cooperative League of the USA*
Solomon Fabricant, *New York University*
Albert J. Hettinger, Jr., *Lazard Frères and Company*
Oswald W. Knauth, *Beaufort, South Carolina*
H. W. Laidler, *Executive Director, League for Industrial Democracy*
Shepard Morgan, *Norfolk, Connecticut*
George B. Roberts, *Vice-President, The First National City Bank of New York*
Beardsley Ruml, *New York City*
Harry Scherman, *Chairman, Book-of-the-Month Club*
Boris Shishkin, *American Federation of Labor and Congress of Industrial Organizations*
George Soule, *Bennington College*
N. I. Stone, *Consulting Economist*
J. Raymond Walsh, *New York City*
Joseph H. Willits, *Director, The Educational Survey, University of Pennsylvania*
Leo Wolman, *Columbia University*
Donald B. Woodward, *Vick Chemical Company*
Theodore O. Yntema, *Vice-President–Finance, Ford Motor Company*

DIRECTORS BY UNIVERSITY APPOINTMENT

E. Wight Bakke, *Yale*
Arthur F. Burns, *Columbia*
Melvin G. de Chazeau, *Cornell*
G. A. Elliott, *Toronto*
Frank W. Fetter, *Northwestern*
H. M. Groves, *Wisconsin*
Gottfried Haberler, *Harvard*
Clarence Heer, *North Carolina*
R. L. Kozelka, *Minnesota*
C. Arthur Kulp, *Pennsylvania*
T. W. Schultz, *Chicago*
Jacob Viner, *Princeton*

DIRECTORS APPOINTED BY OTHER ORGANIZATIONS

Percival F. Brundage, *American Institute of Accountants*
Harold G. Halcrow, *American Farm Economic Association*
Stanley H. Ruttenberg, *American Federation of Labor and Congress of Industrial Organizations*
Murray Shields, *American Management Association*
Willard L. Thorp, *American Economic Association*
W. Allen Wallis, *American Statistical Association*
Harold F. Williamson, *Economic History Association*

RESEARCH STAFF

Moses Abramovitz
Arthur F. Burns
Morris A. Copeland
David Durand
Richard A. Easterlin
Solomon Fabricant
Milton Friedman
Raymond W. Goldsmith
Millard Hastay
W. Braddock Hickman
Daniel M. Holland
Thor Hultgren
John W. Kendrick
Simon Kuznets
Clarence D. Long
Ruth P. Mack
Ilse Mintz
Geoffrey H. Moore
G. Warren Nutter
Lawrence H. Seltzer
George J. Stigler
Leo Wolman
Herbert B. Woolley

Figure 15: NBER organizational roster from the NBER Annual Report 1957

NATIONAL BUREAU OF ECONOMIC RESEARCH

Arthur F. Burns, *Honorary Chairman*
James J. O'Leary, *Chairman*
Moses Abramovitz, *Vice Chairman*
Martin S. Feldstein, *President*
Victor R. Fuchs, *Vice President, Director, Palo Alto Office*
Thomas D. Flynn, *Treasurer*

Charles E. McLure, Jr., *Executive Director for Research*
Douglas H. Eldridge, *Executive Secretary*
Sam Parker, *Director of Finance and Administration*
Edwin Kuh, *Director, Cambridge Computer Research Center*
Robert E. Lipsey, *Director, New York Office*
Joel Popkin, *Director, Washington Office*

DIRECTORS AT LARGE

Atherton Bean, *International Multifoods Corporation*
Andrew F. Brimmer, *Brimmer & Company, Inc.*
Otis F. Brubaker, *United Steelworkers of America*
Arthur F. Burns, *Board of Governors of the Federal Reserve System*
Wallace J. Campbell, *Foundation for Cooperative Housing*
Emilio G. Collado, *Adela Investment Company, S.A.*
Solomon Fabricant, *New York University*
Martin S. Feldstein, *Harvard University*
Eugene P. Foley, *Pan American Building, New York*
Edward L. Ginzton, *Varian Associates*
David L. Grove, *International Business Machines Corporation*
Walter W. Heller, *University of Minnesota*
Walter E. Hoadley, *Bank of America*
Roy E. Moor, *Becker Securities Corporation*
Geoffrey H. Moore, *National Bureau of Economic Research*
J. Wilson Newman, *Dun & Bradstreet, Inc.*
James J. O'Leary, *United States Trust Company of New York*
Rudolph A. Oswald, *American Federation of Labor and Congress of Industrial Organizations*
Peter G. Peterson, *Lehman Brothers*
Robert V. Roosa, *Brown Brothers Harriman & Co.*
Eli Shapiro, *The Travelers Corporation*
Arnold M. Soloway, *Jamaicaway Tower, Boston, Massachusetts*
Lazare Teper, *International Ladies' Garment Workers' Union*

DIRECTORS BY UNIVERSITY APPOINTMENT

Moses Abramovitz, *Stanford*
Gardner Ackley, *Michigan*
Charles H. Berry, *Princeton*
Otto Eckstein, *Harvard*
Walter D. Fisher, *Northwestern*
John H. Kareken, *Minnesota*
J. C. LaForce, *California, Los Angeles*
Robert J. Lampman, *Wisconsin*
Maurice W. Lee, *North Carolina*
Daniel L. McFadden, *California, Berkeley*
Almarin Phillips, *Pennsylvania*
Lloyd G. Reynolds, *Yale*
Robert M. Solow, *Massachusetts Institute of Technology*
Henri Theil, *Chicago*
William S. Vickrey, *Columbia*

DIRECTORS BY APPOINTMENT OF OTHER ORGANIZATIONS

Richard M. Bird, *Canadian Economics Association*
Eugene A. Birnbaum, *American Management Associations*
Carl F. Christ, *American Economic Association*
Robert G. Dederick, *National Association of Business Economists*
Thomas D. Flynn, *American Institute of Certified Public Accountants*
Franklin A. Lindsay, *Committee for Economic Development*
Paul W. McCracken, *American Statistical Association*
Douglass C. North, *Economic History Association*
G. Edward Schuh, *American Agricultural Economics Association*
James C. Van Horne, *American Finance Association*

DIRECTORS EMERITI

Percival F. Brundage
Frank W. Fetter
Gottfried Haberler
Albert J. Hettinger Jr.
George B. Roberts
Murray Shields
Boris Shishkin
Willard L. Thorp
Joseph H. Willits
Theodore O. Yntema

SENIOR RESEARCH STAFF

Gary S. Becker
Charlotte Boschan
Phillip Cagan
Solomon Fabricant
Martin S. Feldstein
Milton Friedman
Victor R. Fuchs
J. Royce Ginn
Raymond W. Goldsmith
Michael Gort
Michael Grossman
James J. Heckman
John F. Kain
John W. Kendrick
Irving B. Kravis
Anne O. Krueger
David T. Kresge
Edwin Kuh
William M. Landes
Robert E. Lipsey
Sherman J. Maisel
John R. Meyer
Robert T. Michael
Jacob Mincer
Geoffrey H. Moore
M. Ishaq Nadiri
Joel Popkin
Richard Posner
Richard Ruggles
Anna J. Schwartz
Robert J. Willis
Victor Zarnowitz

Figure 16: NBER organizational roster from the NBER Annual Report 1977

10.2 The evolution of names of program areas within the Human Resources and CEAHBSI related research areas at the NBER

NBER annual report	Sub-sections of the staff Reports leading up to the Center of Economic Analysis for Human Behavior and Social Institutions				
1968	Human Resources				
1969	Human Resources and Social Institutions			Studies in Industrial Organization	
	Human Capital and the Personal Distribution of Income	Human Capital and Consumption	Law and Economics		
1970	Human Resources and Social Institutions			Studies in Industrial Organization	
	Education Studies		Economics of the Legal System		
1971	Human Resources and Social Institutions			Studies in Industrial Organization	
	Education and other Studies on Human Capital	Law and Economics	Population Studies		
1972	Human Resources and Social Institutions			Economics of Health and Population	
	Education and Other Studies on Human Capital	Law and Economics	Labor Market Studies	Economics of Health	Economics of Population
1973	Human Behavior and Social Institutions				
	Education and Information and the Distribution of Income	Law and Economics	Economics of Health	Population and Family Economics	
1974	Human Behavior and Social Institutions				
	Income Distribution and Education and Information	Law and Economics	Economics of Health	Population and Family Economics	
1975	Human Behavior and Social Institutions				
	Income Distribution and Education	Law and Economics	Economics of Health	Population and Family Economics	
1976	Human Behavior and Social Institutions				
	Law and Economics	Income Distribution	Economics of Health	Population and Family Economics	
1977	Human Behavior and Social Institutions				

Table 1: Sub-sections of the Staff Reports Section from the NBER Annual Reports (1968-77) leading up to the creation of the Center for Economic Analysis of Human Behavior and Social Institutions (CEAHBSI). The Annual Reports inform on the ongoing activities that happened mostly in the precedent year, for example the annual Report from 1968 reports on events of 1967.

10.3 Most frequent authors from the CEAHBSI-branded working papers

Authors of papers of the NBER Working Paper series associated with the CEAHBSI, 1973-1978[470]	total number of authorship participations in papers	Number of authors having the respective amount of authorship participations
Edward P. Lazear, Lee A. Lillard	8	2
William Landes, Robert Michael, Richard Posner	7	3
Michael Grossman, James J. Heckman, Yoram Weiss	6	3
Victor R. Fuchs, Robert J. Willis	5	2
Ann P. Bartel, Gary Becker, Michael Boskin, Jacob Mincer	4	4
George J. Borjas, Douglas Coate, Arleen Leibowitz, Eytan Sheshinski	3	4
Barry R. Chiswick, Linda Edwards Isaac Ehrlich, Jerry Green, Reuben Gronau, Edward Hughes, Elisabeth Landes, Eugene Lewit, Huston McCulloch, Peter Pashigian, Sam Peltzman, Sherwin Rosen, Warren Sanderson, Lewis Solmon, Richard Watkins	2	15
Orley Ashenfelter, Uri Ben-Zion, Alan Blinder, Richard Butler, Dov Chernichovsky, Ann Colle, J. S. Flemming, Sue Goetz Ross, Fred Goldman, David Graham, Richard Handschin, John Hause, John Hurd, Anna Ozorio de Alneida, Donald Parsons, Mark Pauly, Melvin Reder, Hersh Shefrin, John Shoven, James Smith, Paul Taubman, Richard Thaler, Nigel Tomes, Paul Wachtel, Kenneth Warner, Finis Welch, Kenneth Wolpin	1	27

Table 2: Authors of CEAHBSI-branded papers in the NBER Working Paper series ranked by number of authorship

[470] Authors are included in the table a) if their working paper is printed referring to the CEAHBSI in the title section, or b) in cases where the original paper was not available at the NBER website authors are included if they have formerly been associated with the CEAHBSI

10.4 CEAHBSI researchers by year and staff report, 1958 – 1977

(see next page)

Table 3: CEAHBSI researchers by year and staff report, 1958 – 1977, (source: own data collection); the number in each cell designate the number of staff reports that a researcher was authoring or co-authoring in a given year in the staff report section of the NBER Annual Reports; the columns SR58-62, SR63-67, SR68-72, SR73-77, SR58-77 represent accumulated staff reports over the respective period

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	SR58-62	SR63-67	SR68-72	SR73-77	SR58-77
Gary S. Becker	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	2	2	2	2	0	5	5	7	8	25
F. Thomas Juster	1	1	1	2	2	2	2	2	2	1	1	2	5	4	3	4	1	0	0	0	7	9	15	5	36
Victor R. Fuchs	0	0	0	0	0	1	1	1	1	2	2	3	2	3	1	1	2	3	3	4	0	6	11	13	30
Harry Gilman	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Albert Fishlow	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
David Schwartzman	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
Ernest Kurnow	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
Jean Wilburn	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Jacob Mincer	0	0	0	0	0	0	0	0	1	2	1	2	1	2	1	1	1	1	1	1	0	3	7	5	15
Dave O'Neill	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	2
Irving Leveson	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Richard Auster	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Deborah Sarachek	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Morris Silver	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	3	0	3
Kong Kyun Ro	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	3	0	3
Michael Grossman	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	3	4	3	0	0	5	14	19
Sherwin Rosen	0	0	0	0	0	0	0	0	0	0	1	2	2	2	1	0	0	0	0	0	0	0	8	0	8

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	SR58-62	SR63-67	SR68-72	SR73-77	SR58-77
Joseph Persky	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2	0	2
Barry Chiswick	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	3	2	2	0	0	0	0	4	7	11
Gilbert R. Ghez	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	3	1	4
Robert T. Michael	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	4	4	4	3	1	0	0	5	16	21
Paul Taubman	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	4	2	6
Terence Wales	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	3	0	3
Isaac Ehrlich	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	3	2	2	0	0	0	4	9	13
William M. Landes	0	0	0	0	0	0	0	0	0	0	0	2	2	3	4	2	3	3	3	4	0	0	11	15	26
Masanori Hashimoto	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3	0	3
Michael Tannen	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	0	2
Lewis Solmon	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	4	1	5
Finis Welch	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	3	1	1	0	0	0	0	6	5	11
John C. Hause	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	1	1	0	1	0	0	0	6	3	9
Roger Alcaly	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1
V.K. Chetty	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1
Marcia J. Kramer	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0	0	4	3	7

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	SR58-62	SR63-67	SR68-72	SR73-77	SR58-77
Michael Landsberger	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	2
Richard A. Posner	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	3	2	4	4	3	0	0	4	16	20
Robert Willis	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	4	2	3	2	0	0	2	14	16
Warren Sanderson	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	2	3	5
Sue Goetz Ross	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	2	2	4
Edward F. X. Hughes	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	2	3	5
Eugene Lewit	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	2	0	0	0	0	1	4	5
Paul Wachtel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	0	0	0	0	2	4	6
Ann P. Bartel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	1	5	6
James J. Heckman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	4	1	0	0	1	10	11
Arleen Leibowitz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	3	4
Melvin Reder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	0	0	0	0	1	5	6
John Robinson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	2
Reuben Gronau	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	4	4
Milton Moss	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	0	0	0	6	6
Robert Evenson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	2
Lee A. Lillard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	2	3	4	0	0	0	15	15

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	SR58-62	SR63-67	SR68-72	SR73-77	SR58-77
James P. Smith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	1	0	0	0	0	0	7	7
George Stigler	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2	2	0	0	0	0	7	7
Elizabeth Landes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	0	0	0	0	5	5
Jane Duberg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	2
Linda Leighton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1
John Owen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1
George Borjas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2	2
Kenneth Wolpin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	5	5
Kathleen McNally	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	3	3
Yoram Weiss	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	4	4
Michael Boskin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	4	4
Edward Wolff	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3	3
Peter K. Clark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	2
Edward Lazear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3	3
Peter Pashigian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	5	5
Sam Peltzman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2	0	0	0	5	5

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	SR58-62	SR63-67	SR68-72	SR73-77	SR58-77
Mark Pauly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2	2
Claire Bombardier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	5	5
Douglas Coate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3	3
Dov Chernichovsky	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3	3
Oey Astra Meesook	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
Donald O. Parsons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
Ann D. Colle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2
Linda N. Edwards	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2
Fred Goldman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2
Kenneth Warner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3
J. Huston McCulloch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Jacob Gesthalter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Daniel Graham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1

10.5 Overview of coauthored staff reports

	SRcoAuth 73-77	SRcoAuth 68-72	SRcoAuth [illegible]	SRcoAuth [illegible]
Gary S. Becker	Stigler; Stigler; Stigler; E.Landes; E.Landes; E.Landes; Michael; Michael	Juster; Juster; W.Landes	0	0
1958	0			
1959	0			
1960	0			
1961	0			
1962	0			
1963	0			
1964	0			
1965	0			
1966	0			
1967	0			
1968	0			
1969	Thomas Juster			
1970	Thomas Juster			
1971	0			
1972	William Landes			
1973	George Stigler			
1974	E.Landes			
1975	George Stigler; Elisabeth Landes; Robert Michael			
1976	George Stigler; Elisabeth Landes; Robert Michael			
1977	0			

Paul Wachtel; John Robinson; John Robinson	Robert Michael; Robert Michael; Robert Michael; Michael Grossman; Robert Michael; Michael Grossman; Michael Grossman; Bombardier; Lillard; Warner
Gary Becker; Gary Becker; Paul Wachtel	Marcia Kramer; Hughes
0	0
0	0
0	Michael Grossman; Bombardier; Lillard; Warner
0	Robert Michael; Michael Grossman
0	Robert Michael; Michael Grossman
John Robinson	Robert Michael
Paul Wachtel; John Robinson	Robert Michael
Paul Wachtel	0
0	Marcia Kramer; Hughes
Gary Becker	0
Gary Becker	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
F. Thomas Juster	Victor R. Fuchs

0	0	0	0	0	Ann Bartel, George Borjas
0	0	0	0	0	Masanori Hashimoto
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	Ann Bartel, George Borjas
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	Masanori Hashimoto
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
Harry Gilman	Albert Fishlow	David Schwartzman	Ernest Kurnow	Jean Wilburn	Jacob Mincer

Dave O'Neill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Irving Leveson	0	0	0	0	0	0	0	0	0	0	Richard Auster; Deborah Sarachek	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Richard Auster	0	0	0	0	0	0	0	0	0	0	Irving Leveson; Deborah Sarachek	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Deborah Sarachek	0	0	0	0	0	0	0	0	0	0	Irving Leveson; Richard Auster	0	0	0	0	0	0	0	0	0	0	0	Irving Leveson; Richard Auster	0
Morris Silver	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kong Kyun Ro	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Victor Fuchs; Victor Fuchs; Linda Edwards; Fred Goldman; Victor Fuchs; Linda Edwards; Ann Colle	0	0
0	M.I.Nadiri; M.I.Nadiri; M.I.Nadiri	0
0	0	0
0	0	0
Victor Fuchs; Linda Edwards; Ann Colle	0	0
Victor Fuchs; Linda Edwards; Fred Goldman	0	0
Victor Fuchs	0	0
0	0	0
0	0	0
0	0	0
0	M.I.Nadiri	0
0	M.I.Nadiri	0
0	M.I.Nadiri	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Michael Grossman	Sherwin Rosen	Joseph Persky

0	0	Victor Fuchs; Robert Willis; Victor Fuchs; Lee Lillard; Robert Willis; Fuchs; Lillard; Becker; E.Landes; Fuchs; Becker; E.Landes
0	0	0
0	0	0
0	0	0
0	0	0
0	0	Fuchs; Becker; E.Landes
0	0	Fuchs; Lillard; Becker; E.Landes
0	0	Victor Fuchs; Lee Lillard; Robert Willis
0	0	Victor Fuchs; Robert Willis
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Barry Chiswick	Gilbert R. Ghez	Robert T. Michael

0	0	Posner	Posner; Posner;Posner; Posner; Posner;	0
Terence Wales; Terence Wales; Terence Wales	Taubman; Taubman;	0	Becker; Posner; Bartel; Solmon	Mincer
0	0	0	0	0
0	0	0	0	0
0	0	0	Posner; Posner	0
0	0	0	Posner; Posner	0
0	0	0	Posner; Posner	0
0	0	Posner	0	0
0	0	0	0	0
0	0	0	Becker; Posner; Bartel; Solmon	0
Terence Wales	Taubman	0	0	Mincer
Terence Wales	Taubman	0	0	0
Terence Wales	Taubman	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Paul Taubman	Terence Wales	Isaac Ehrlich	William M. Landes	Masanori Hashimoto

0	0	Evenson; J.P.Smith; J.P.Smith	0	0	0	0
0	Wachtel; W.Landes	Evenson	0	V.K.CHETTY	Alcaly	Fuchs; Fuchs
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	J.P.Smith	0	0	0	0
0	0	J.P.Smith	0	0	0	0
0	0	Evenson	0	0	0	0
0	Wachtel; W.Landes	Evenson	0	0	0	0
0	0	0	0	0	0	Fuchs
0	0	0	0	V.K.CHETTY	Alcaly	Fuchs
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
Michael Tannen	Lewis Solmon	Finis Welch	John C. Hause	Roger Alcaly	V.K. Chetty	Marcia J. Kramer

0	Ehrlich;W.Landes; W.Landes; W.Landes; W.Landes; W.Landes; W.Landes	Michael; Michael; Heckman; Smith; Heckman;Lillard; Heckman; Lillard	0
0	W.Landes	0	0
0	0	0	0
0	0	0	0
0	W.Landes; W.Landes	Lillard	0
0	W.Landes; W.Landes	Lillard; Heckman	0
0	W.Landes; W.Landes	Heckman	0
0	Ehrlich	Michael; Heckman; Smith	0
0	0	Michael	0
0	W.Landes	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
Michael Landsberger	Richard A. Posner	Robert Willis	Warren Sanderson

0	Lewit	Hughes	Juster	Borjas; Mincer	Lillard; Smith; Lillard; Smith; Willis; Willis; Wolpin
0	Fuchs	0	Juster; Solmon	W.Landes	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	Borjas;	0
0	0	0	0	0	Willis; Wolpin
0	Lewit	Hughes	0	0	Willis
0	0	0	0	0	Lillard; Smith; Willis
0	0	0	Juster	0	Lillard; Smith
0	0	0	Juster;	W.Landes	0
0	Fuchs	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
Sue Goetz Ross	Edward F. X. Hughes	Eugene Lewit	Paul Wachtel	Ann P. Bartel	James J. Heckman

Arleen Leibowitz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melvin Reder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
John Robinson (to check)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Juster	Juster	0	0	0	0	0	0	Juster; Juster;
Reuben Gronau	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Milton Moss (to check)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Duberg	Duberg	Duberg	0	0	0	Duberg; Duberg; Duberg
Robert Evenson (to check)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Welch	Welch	0	0	0	0	0	Welch	Welch

Lee A. Lillard	James P. Smith	George Stigler
Heckman; Smith; Michael; Heckman; Smith; Michael; Y.Weiss; Willis; Bombardier; Warner; Willis; Bombardier; Fuchs; Warner; Bombardier	Heckman; Lillard; Heckman, Lillard; Willis; Welch; Welch	Becker; Becker; Becker
0	0	0
0	0	0
0	0	0
Willis; Bombardier; Fuchs; Warner; Bombardier	0	0
Y.Weiss; Willis; Bombardier; Warner	0	Becker
Michael	Welch	Becker
Michael; Heckman; Smith	Heckman, Lillard; Willis; Welch	0
Heckman; Smith	Heckman; Lillard	Becker
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

Becker; Becker; Michael; Becker; Michael	Moss; Moss; Moss	Owen	Leighton	Bartel; Mincer	Heckman
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	Bartel; Mincer	0
Becker; Michael	Moss	0	0	0	Heckman
Becker; Michael	Moss	0	0	0	0
Becker	Moss	Owen	Leighton	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
Elizabeth Landes	Jane Duberg	Linda Leighton	John Owen	George Borjas	Kenneth Wolpin

Kathleen McNally	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yoram Weiss	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Lillard	0	0	0	0	Lillard
Michael Boskin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edward Wolff	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peter K. Clark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edward Lazear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peter Pashigian	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Sam Peltzman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mark Pauly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Claire Bombardier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Douglas Coate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dov Chernichovsky	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oey Astra Meesook	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0	0	Lillard; Warner;Fuchs; Lillard; Warner	Chernichovsky; Chernichovsky	Coate; Coate	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Donald O. Parsons	Ann D. Colle	Linda N. Edwards	Fred Goldman	Kenneth Warner	J. Huston McCulloch
0	Grossman	Grossman; Grossman	Grossman; Gestalther	Bombardier; Lillard; Bombardier; Lillard; Fuchs	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	Grossman	Grossman	Gestalther	Bombardier; Lillard; Fuchs	0
0	0	Grossman	Grossman	Bombardier; Lillard	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0

Jacob Gesthalter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Goldman	0	0	0	Goldman
Daniel Graham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4: The table shows for all authors considered with whom they coauthored a staff report in a given year, the four last columns aggregate over the respective periods

10.6 Overview of outgoing mentions of other researchers from staff reports (1958-1967)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Gary S. Becker	Stigler	Friedman	0	0	Mincer; Stigler	Mincer; Phelps; Fishlow	Fishlow	Chiswick; Linda Kee	Mincer; Chiswick	Chiswick; Fuchs; Fishlow; D.O'Neill
F. Thomas	1	Friedman	Albert G. Hart	Goldsmith	Robert P. Shay	Robert P. Shay	0	0	0	0

Victor R. Fuchs	0	0	0	0	0	0	Harry Gilman, Ernest Kurnow, David Schwartzman, Jean Wilburn	Harry Gilman	Jean Wilburn, Solomon Fabricant, Harriet S. Rubin, Deborah W. Sarachek, Ernest Kurnow, Irving Leveson, Richard Auster, Reuben Gronau, David Schwartzman	Jean Wilburn, Irving Leveson 2, Richard Auster, Reuben Gronau, David Schwartzman, Henrietta Lichtenbaum, Kay Wilson, Lorraine Wolch, Lorraine Lusardi; George James, Gary S. Becker, James Brindle, Norton Brown, Eveline Burns, Marion B. Folsom, Eli Ginzberg, William Gorham, David Lyall, Melvin Reder, Peter Rogartz, James Strickler, Gus Tyler, Morris Silver, Kong Kyun Ro, Michael Grossman, Irving Leveson, Richard Auster, Deborah Sarachek, Ira Silver, Susan Crayne;

Harry Gilman	0	0	0	0	0	0	John W. Kendrick, Victor Fuchs, Gary S. Becker, Jacob Mincer, H. Gregg Lewis	0	0	0
Albert Fishlow	0	0	0	0	0	0	Becker	0	0	H. Rosovsky, Denison
David Schwartz	0	0	0	0	0	0	Victor Fuchs	Armen Alchian , Gary Becker	0	0
Ernest Kurnow	0	0	0	0	0	0	0	0	0	0
Jean Wilburn	0	0	0	0	0	0	0	0	0	0
Jacob Mincer	0	0	0	0	0	0	0	0	Victor Zarnovitz	Victor Zarnowitz, Friedman

Dave O'Neill	0	0	0	0	0	0	0	0	0	0
Irving Leveson	0	0	0	0	0	0	0	0	0	0
Richard Auster	0	0	0	0	0	0	0	0	0	0
Deborah Sarachek	0	0	0	0	0	0	0	0	0	0
Morris Silver	0	0	0	0	0	0	0	0	0	0
Kong Kyun Ro	0	0	0	0	0	0	0	0	0	0
Michael Grossman	0	0	0	0	0	0	0	0	0	0

Sherwin Rosen	0	0	0	0	0	0	0	0	0	0
Joseph Persky	0	0	0	0	0	0	0	0	0	0
Barry Chiswick	0	0	0	0	0	0	0	0	0	0
Gilbert R. Ghez	0	0	0	0	0	0	0	0	0	0
Robert T. Michael	0	0	0	0	0	0	0	0	0	0
Paul Taubman	0	0	0	0	0	0	0	0	0	0
Terence Wales	0	0	0	0	0	0	0	0	0	0

Isaac Ehrlich	0	0	0	0	0	0	0	0	0	0
William M.	0	0	0	0	0	0	0	0	0	0
Masanori Hashimot	0	0	0	0	0	0	0	0	0	0
Michael Tannen	0	0	0	0	0	0	0	0	0	0
Lewis Solmon	0	0	0	0	0	0	0	0	0	0
Finis Welch	0	0	0	0	0	0	0	0	0	0
John C. Hause	0	0	0	0	0	0	0	0	0	0

Roger Alcaly	0	0	0	0	0	0	0	0	0	0
V.K. Chetty	0	0	0	0	0	0	0	0	0	0
Marcia J. Kramer	0	0	0	0	0	0	0	0	0	0
Michael Landsber	0	0	0	0	0	0	0	0	0	0
Richard A. Posner	0	0	0	0	0	0	0	0	0	0
Robert Willis	0	0	0	0	0	0	0	0	0	0
Warren Sanderso	0	0	0	0	0	0	0	0	0	0

Sue Goetz Ross	0	0	0	0	0	0	0	0	0	0
Edward F. X. Hughes	0	0	0	0	0	0	0	0	0	0
Eugene Lewit	0	0	0	0	0	0	0	0	0	0
Paul Wachtel	0	0	0	0	0	0	0	0	0	0
Ann P. Bartel	0	0	0	0	0	0	0	0	0	0
James J. Heckman	0	0	0	0	0	0	0	0	0	0
Arleen Leibowitz	0	0	0	0	0	0	0	0	0	0

Melvin Reder	0	0	0	0	0	0	0	0	0	0
John Robinson	0	0	0	0	0	0	0	0	0	0
Reuben Gronau	0	0	0	0	0	0	0	0	0	0
Milton Moss (to	0	0	0	0	0	0	0	0	0	0
Robert Evenson	0	0	0	0	0	0	0	0	0	0
Lee A. Lillard	0	0	0	0	0	0	0	0	0	0
James P. Smith	0	0	0	0	0	0	0	0	0	0

George Stigler	Wooden&Wasson	0	Yehuda Grunfeld; Dorothy Brady; Edward Denison; Irving Kravis; Philip McCarthy; Albert Rees; Richard Ruggles; Boris Swerling; Harry McAllister; Peter O. Steiner; Eleanor Snyder; Victor Zarnowitz; Walter Oi; Meyer L. Burstein; Geoffrey Shepherd	Raymond T. Bowman; Dorothy Brady; Edward Denison; Irving Kravis; Philip McCarthy; Albert Rees; Richard Ruggles; Boris Swerling; Harry McAllister; Walter Oi; David E. Lund; Paul P. Bestock; Zvi Griliches; Victor Zarnowitz; Peter O. Steiner;Eleanor M. Snyder; John Flueck; Geoffrey Shepherd; Earl R. Swanson; Reuben A. Kessel	0	0	0	0	0	0
Elizabeth Landes	0	0	0	0	0	0	0	0	0	0
Jane Duberg	0	0	0	0	0	0	0	0	0	0

Linda Leighton	0	0	0	0	0	0	0	0	0	0
John Owen	0	0	0	0	0	0	0	0	0	0
George Borias	0	0	0	0	0	0	0	0	0	0
Kenneth Wolpin	0	0	0	0	0	0	0	0	0	0
Kathleen McNally	0	0	0	0	0	0	0	0	0	0
Yoram Weiss	0	0	0	0	0	0	0	0	0	0
Michael Boskin	0	0	0	0	0	0	0	0	0	0

Edward Wolff	0	0	0	0	0	0	0	0	0	0
Peter K. Clark	0	0	0	0	0	0	0	0	0	0
Edward Lazear	0	0	0	0	0	0	0	0	0	0
Peter Pashigian	0	0	0	0	0	0	0	0	0	0
Sam Peltzman	0	0	0	0	0	0	0	0	0	0
Mark Pauly	0	0	0	0	0	0	0	0	0	0
Claire Bombardi	0	0	0	0	0	0	0	0	0	0

Douglas Coate	0	0	0	0	0	0	0	0	0	0
Dov Chernich	0	0	0	0	0	0	0	0	0	0
Oey Astra Meesook	0	0	0	0	0	0	0	0	0	0
Donald O. Parsons	0	0	0	0	0	0	0	0	0	0
Ann D. Colle	0	0	0	0	0	0	0	0	0	0
Linda N. Edwards	0	0	0	0	0	0	0	0	0	0
Fred Goldman	0	0	0	0	0	0	0	0	0	0

Kenneth Warner	0	0	0	0	0	0	0	0	0	0
J. Huston McCulloc	0	0	0	0	0	0	0	0	0	0
Jacob Gesthalte	0	0	0	0	0	0	0	0	0	0
Daniel Graham	0	0	0	0	0	0	0	0	0	0

Table 5: Overview of outgoing mentions of other researchers from staff reports (1958-1967)

10.7 Overview of outgoing mentions of other researchers from staff reports (1958-1967)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Gary S. Becker	Stigler	Friedman	0	0	Mincer; Stigler	Mincer; Phelps; Fishlow	Fishlow	Chiswick; Linda Kee	Mincer; Chiswick	Chiswick; Fuchs; Fishlow; D.O'Neill
F. Thomas Juster	1	Friedman	Albert G. Hart	Goldsmith	Robert P. Shay	Robert P. Shay	0	0	0	0

Victor R. Fuchs	0	0	0	0	0	0	Harry Gilman, Ernest Kurnow, David Schwartzman, Jean Wilburn	Harry Gilman	Jean Wilburn, Solomon Fabricant, Harriet S. Rubin, Deborah W. Sarachek, Ernest Kurnow, Irving Leveson, Richard Auster, Reuben Gronau, David Schwartzman	Jean Wilburn, Irving Leveson 2, Richard Auster, Reuben Gronau, David Schwartzman, Henrietta Lichtenbaum, Kay Wilson, Lorraine Wolch, Lorraine Lusardi; George James, Gary S. Becker, James Brindle, Norton Brown, Eveline Burns, Marion B. Folsom, Eli Ginzberg, William Gorham, David Lyall, Melvin Reder, Peter Rogartz, James Strickler, Gus Tyler, Morris Silver, Kong Kyun Ro, Michael Grossman, Irving Leveson, Richard Auster, Deborah Sarachek, Ira Silver, Susan Crayne;

Harry Gilman	0	0	0	0	0	0	John W. Kendrick, Victor Fuchs, Gary S. Becker, Jacob Mincer, H. Gregg Lewis	0	0	0
Albert Fishlow	0	0	0	0	0	0	Becker	0	0	H. Rosovsky, Denison
David Schwartzman	0	0	0	0	0	0	Victor Fuchs	Armen Alchian, Gary Becker	0	0
Ernest Kurnow	0	0	0	0	0	0	0	0	0	0
Jean Wilburn	0	0	0	0	0	0	0	0	0	0
Jacob Mincer	0	0	0	0	0	0	0	0	Victor Zarnovitz	Victor Zarnowitz, Friedman
Dave O'Neill	0	0	0	0	0	0	0	0	0	0

Irving Leveson	0	0	0	0	0	0	0	0	0	0
Richard Auster	0	0	0	0	0	0	0	0	0	0
Deborah Sarachek	0	0	0	0	0	0	0	0	0	0
Morris Silver	0	0	0	0	0	0	0	0	0	0
Kong Kyun Ro	0	0	0	0	0	0	0	0	0	0
Michael Grossman	0	0	0	0	0	0	0	0	0	0
Sherwin Rosen	0	0	0	0	0	0	0	0	0	0

Joseph Persky	0	0	0	0	0	0	0	0	0	0
Barry Chiswick	0	0	0	0	0	0	0	0	0	0
Gilbert R. Ghez	0	0	0	0	0	0	0	0	0	0
Robert T. Michael	0	0	0	0	0	0	0	0	0	0
Paul Taubman	0	0	0	0	0	0	0	0	0	0
Terence Wales	0	0	0	0	0	0	0	0	0	0
Isaac Ehrlich	0	0	0	0	0	0	0	0	0	0

William M. Landes	0	0	0	0	0	0	0	0	0	0
Masanori Hashimoto	0	0	0	0	0	0	0	0	0	0
Michael Tannen	0	0	0	0	0	0	0	0	0	0
Lewis Solmon	0	0	0	0	0	0	0	0	0	0
Finis Welch	0	0	0	0	0	0	0	0	0	0
John C. Hause	0	0	0	0	0	0	0	0	0	0
Roger Alcaly	0	0	0	0	0	0	0	0	0	0

V.K. Chetty	0	0	0	0	0	0	0	0	0	0
Marcia J. Kramer	0	0	0	0	0	0	0	0	0	0
Michael Landsberger	0	0	0	0	0	0	0	0	0	0
Richard A. Posner	0	0	0	0	0	0	0	0	0	0
Robert Willis	0	0	0	0	0	0	0	0	0	0
Warren Sanderson	0	0	0	0	0	0	0	0	0	0
Sue Goetz Ross	0	0	0	0	0	0	0	0	0	0

Edward F. X. Hughes	0	0	0	0	0	0	0	0	0	0
Eugene Lewit	0	0	0	0	0	0	0	0	0	0
Paul Wachtel	0	0	0	0	0	0	0	0	0	0
Ann P. Bartel	0	0	0	0	0	0	0	0	0	0
James J. Heckman	0	0	0	0	0	0	0	0	0	0
Arleen Leibowitz	0	0	0	0	0	0	0	0	0	0
Melvin Reder	0	0	0	0	0	0	0	0	0	0

John Robinson (to check)	0	0	0	0	0	0	0	0	0	0
Reuben Gronau	0	0	0	0	0	0	0	0	0	0
Milton Moss (to check)	0	0	0	0	0	0	0	0	0	0
Robert Evenson (to check)	0	0	0	0	0	0	0	0	0	0
Lee A. Lillard	0	0	0	0	0	0	0	0	0	0
James P. Smith	0	0	0	0	0	0	0	0	0	0

George Stigler	Wooden &Wasson	0	Yehuda Grunfeld; Dorothy Brady; Edward Denison; Irving Kravis; Philip McCarthy; Albert Rees; Richard Ruggles; Boris Swerling; Harry McAllister; Peter O. Steiner; Eleanor Snyder; Victor Zarnowitz; Walter Oi; Meyer L. Burstein; Geoffrey Shepherd	Raymond T. Bowman; Dorothy Brady; Edward Denison; Irving Kravis; Philip McCarthy; Albert Rees; Richard Ruggles; Boris Swerling; Harry McAllister; Walter Oi; David E. Lund; Paul P. Bestock; Zvi Griliches; Victor Zarnowitz; Peter O. Steiner;Eleanor M. Snyder; John Flueck; Geoffrey Shepherd; Earl R. Swanson; Reuben A. Kessel	0	0	0	0	0	0
Elizabeth Landes	0	0	0	0	0	0	0	0	0	0
Jane Duberg	0	0	0	0	0	0	0	0	0	0

Linda Leighton	0	0	0	0	0	0	0	0	0	0
John Owen	0	0	0	0	0	0	0	0	0	0
George Borjas	0	0	0	0	0	0	0	0	0	0
Kenneth Wolpin	0	0	0	0	0	0	0	0	0	0
Kathleen McNally	0	0	0	0	0	0	0	0	0	0
Yoram Weiss	0	0	0	0	0	0	0	0	0	0
Michael Boskin	0	0	0	0	0	0	0	0	0	0

Edward Wolff	0	0	0	0	0	0	0	0	0	0
Peter K. Clark	0	0	0	0	0	0	0	0	0	0
Edward Lazear	0	0	0	0	0	0	0	0	0	0
Peter Pashigian	0	0	0	0	0	0	0	0	0	0
Sam Peltzman	0	0	0	0	0	0	0	0	0	0
Mark Pauly	0	0	0	0	0	0	0	0	0	0
Claire Bombardier	0	0	0	0	0	0	0	0	0	0

Douglas Coate	0	0	0	0	0	0	0	0	0	0
Dov Chernichovsky	0	0	0	0	0	0	0	0	0	0
Oey Astra Meesook	0	0	0	0	0	0	0	0	0	0
Donald O. Parsons	0	0	0	0	0	0	0	0	0	0
Ann D. Colle	0	0	0	0	0	0	0	0	0	0
Linda N. Edwards	0	0	0	0	0	0	0	0	0	0
Fred Goldman	0	0	0	0	0	0	0	0	0	0

Kenneth Warner	0	0	0	0	0	0	0	0	0	0
J. Huston McCulloch	0	0	0	0	0	0	0	0	0	0
Jacob Gesthalter	0	0	0	0	0	0	0	0	0	0
Daniel Graham	0	0	0	0	0	0	0	0	0	0

Table 6: Overview of outgoing mentions of other researchers from staff reports (1958-1967), each cell represents other researchers who are mentioned in a staff report

11.1 Overview of outgoing mentions of other researchers from staff reports (1968-1972)

	1968	1969	1970	1971	1972
Gary S. Becker	Barry Chiswick, Jacob Mincer, Kelvin Lancaster, Robert T. Michael, Michael Grossman	Robert Michael, Gilbert Ghez, Haim Ofek; Mincer,Chiswick, Ghez, Michael, Ehrlich, Landes, Taubman, Wales, Rosen, Chetty, Welch, Solmon, Hause	Ghez; Barry Chiswick, Jacob Mincer, Gilbert Ghez, Robert Michael, Paul Taubman, Terence Wales, Sherwin Rosen, Lewis Solmon, Robert Michael, Finis Welch, John Hause, V.K. Chetty, Roger Alcaly, William Landes, Isaac Ehrlich	Isaac Ehrlich, William Landes, Richard Posner	Ehrlich; Solmon; Posner; Bartel; Reder
F. Thomas Juster	Goldsmith, John McNeill, Thomas Stoterau, Robert Ferber, James Byrnes, John Frechtling, Gary Fromm, Raymond Goldsmith, George Jaszi, George	Avrohn Eisenstein, Paul Wachtel, John McNeil, Thomas Stoterau; Mincer,Chiswick, Ghez, Michael, Ehrlich, Landes, Taubman, Wales, Rosen, Chetty, Welch, Solmon, Hause	Richard and Nancy Ruggles, John Kendrick, Robert Eisner; Paul Wachtel, Michael Landsberger, Avrohn Eisenstein, Teresita Rodriguez; Barry Chiswick, Jacob Mincer,	John Kendrick, Richard and Nancy Ruggles,Jennifer Rowley, Elizabeth Wehle, Harold Wolozin, Robert Eisner, Michael McElroy, Paul Wachtel, Michael Landsberger,	Gronau;Nancy Ruggles; Richard Ruggles; Gilbert Ghez; John Kendrick; John Meyer; Robert Willis; Robert Eisner; George Katona; Taubman,

	Katona, Helen H. Lamale, E. Scott Maynes, Milton Moss, Frederick N. Sass, Tynan Smith, Harold W. Watts, Avrohn Eisenstein, Paul Wachtel		Gilbert Ghez, Robert Michael, Paul Taubman, Terence Wales, Sherwin Rosen, Lewis Solmon, Robert Michael, Finis Welch, John Hause, V.K. Chetty, Roger Alcaly, William Landes, Isaac Ehrlich; Robert Thorndike; Ilse Mintz, Milton Friedman, Anna Schwartz, Haitovsky, Evans, Treyz, Zarnowitz, Boschan, Moore, Gregory C. Chow, Arthur Burns, Philip Klein, Robert Eisner, Benoit Mandelbrot)	Landsberger; Paul Taubman, Terence Wales, Robert Michael, Jacob Mincer,Isaac Ehrlich, John Hause, Gilbert Ghez, Lewis Solmon, Sherwin Rosen, Albert Beaton, Gary Becker; Ilse Mintz, Solomon Fabricant, Victor Zarnowitz, Yoel Haitovsky, Neil Wallace, Charlotte Boschan, Milton Friedman, Anna Schwartz, Gregory Chow, An-loh Lin, Geoffrey Moore	Wales; Solmon; Rosen; Mincer; Becker; Chiswick; Ghez; Welch; Evenson; Heckman; Leibowitz; Wachtel
Victor R. Fuchs	David Schwartzman, Reuben Gronau,, Irving	Elizabeth Rand, Bonnie Garrett; Reuben Gronau, David Schwartzman;	Richard Auster, Irving Leveson, Deborah Sarachek, Elizabeth Rand,	Michael Grossman, Morris Silver, Elizabeth Rand, Bonnie Garrett,	Reder; Chiswick; Michael; Kramer; T.Schultz;

	Leveson; Irving Levenson, George James, Gary S. Becker, James Brindle, Norton Brown, Eveline Burns, Philip E. Enterline, Marion B. Folsom, Eli Gintzberg, William Gorham, David Lyall, Melvin Reder, Peter Rogartz, Gus Tyler, elizabeth Rand;	George James, Gary Becker, James Brindle, Norton Brown, Eveline Burns, Philip E. Enterline, Marion B. Folsom, Eli Gintzberg, William Gorham, David Lyall, Melvin Reder, Peter Rogartz, Gus Tyler, Richard Auster, Irving Leveson, Deborah Sarachek	Bonnie Garrett, Kong Kyun Ro, George James, Gary Becker, James Brindle, Norton Brown, Eveline Burns, Philip E. Enterline, Marion B. Folsom, Eli Ginzberg, William Gorham, David Lyall, Melvin Reder, Peter Rogatz	Herbert Klarman, Marcia Kramer, Kurt Deuschle, Morton D. Bogdonoff, James Brindle, Norton Brown, Eveline Burns, Philip Enterline, Marion Folsom, Eli Ginzberg, George James, Richard Kessler, David Lyall, Jacob Mincer, Melvin Reder, Peter Rogatz	Grossman; Hughes; J. Jacoby; E. Lewit; Lazear; Heckman; Leibowitz; Posner
Harry Gilman	0	0	0	0	0
Albert Fishlow	0	0	0	0	0

David Schwartzman	0	0	0	0	0
Ernest Kurnow	0	0	0	0	0
Jean Wilburn	0	0	0	0	0
Jacob Mincer	Becker, Victor Zarnovitz, Rosanne Cole, Stanley Diller, F. Thomas Juster	0	0	Barry Chiswick, Carl Rahm, Michael Tannen, Masanori Hashimoto	Becker; Chiswick
Dave O'Neill	0	0	0	0	0
Irving Leveson	0	0	0	0	0
Richard Auster	0	0	0	0	0

Deborah Sarachek	0	0	0	0	0
Morris Silver	Helen C. Chase, Geraldine A. Gleeson, Elijah L. White	0	0	0	0
Kong Kyun Ro	Susan Crayne	Richard Auster	0	0	0
Michael Grossman	Becker	Becker	0	Auster, Levenson, Sarachek	Robert L. Thorndike
Sherwin Rosen	0	0	0	Becker, Alfred Marshall	0
Joseph Persky	0	John Kain	John Kain	0	0
Barry Chiswick	0	0	0	0	0

Gilbert R. Ghez	0	Irving Fisher, Becker	Irving Fisher, Modigliani, Brumberg	Becker	0
Robert T. Michael	0	Becker	0	0	Lazear
Paul Taubman	0	Terman, Lewellen	D.Wolfe, J.Smith, W.G.Lewellen	0	Mincer, Komogorov, Smirnov
Terence Wales	0	Terman, Lewellen	D.Wolfe, J.Smith, W.G.Lewellen	0	0
Isaac Ehrlich	0	Becker	0	0	0
William M. Landes	0	0	0	0	Ehrlich; Posner; Solmon; Bartel; Reder
Masanori Hashimoto	0	0	0	0	0
Michael Tannen	0	0	Jacob Mincer, Gary Becker, Barry Chiswick	Barry Chiswick, Aigner&Heins, Al-Samarrie&Miller, Griliches	0

Lewis Solmon	0	0	Mincer	0	Mincer
Finis Welch	0	0	0	Robert Evenson	Heckman; Leibowitz; Mincer
John C. Hause	0	0	T.Husén	D. C. Rogers; Torsten Husén; Jules Dupuit	0
Roger Alcaly	0	0	Samuel Bowles, W. Lee Hansen	0	0
V.K. Chetty	0	0	Samuel Bowles, W. Lee Hansen	0	0
Marcia J. Kramer	0	0	0	0	0
Michael Landsberger	0	0	0	Becker, Mincer	0
Richard A. Posner	0	0	0	W.Landes	W.Landes
Robert Willis	0	0	0	Warren Sanderson; Larry Bumpass and Charles Westoff	Sanderson; Richard Ruggles;

					Charles Westoff
Warren Sanderson	0	0	0	Willis	Willis
Sue Goetz Ross	0	0	0	Willis; Sanderson	0
Edward F. X. Hughes	0	0	0	0	Frederick V. Lorenzo; Richard J. Radna; Eugene Lewit; D. fisher; C. Breckner; P. Goldberg; E. Rand; M. Perides
Eugene Lewit	0	0	0	Fuchs	0
Paul Wachtel	0	0	0	0	Katona
Ann P. Bartel	0	0	0	0	0

James J. Heckman	0	0	0	0	Mincer
Arleen Leibowitz	0	0	0	0	Susan Crayne
Melvin Reder	0	0	0	0	0
John Robinson	0	0	0	0	0
Reuben Gronau	0	0	0	0	0
Milton Moss	0	0	0	0	0
Robert Evenson	0	0	0	0	0
Lee A. Lillard	0	0	0	0	0

James P. Smith	0	0	0	0	0
George Stigler	0	0	0	0	0
Elizabeth Landes	0	0	0	0	0
Jane Duberg	0	0	0	0	0
Linda Leighton	0	0	0	0	0
John Owen	0	0	0	0	0
George Borjas	0	0	0	0	0
Kenneth Wolpin	0	0	0	0	0

Kathleen McNally	0	0	0	0	0
Yoram Weiss	0	0	0	0	0
Michael Boskin	0	0	0	0	0
Edward Wolff	0	0	0	0	0
Peter K. Clark	0	0	0	0	0
Edward Lazear	0	0	0	0	0
Peter Pashigian	0	0	0	0	0
Sam Peltzman	0	0	0	0	0

Mark Pauly	0	0	0	0	0
Claire Bombardier	0	0	0	0	0
Douglas Coate	0	0	0	0	0
Dov Chernichovsky	0	0	0	0	0
Oey Astra Meesook	0	0	0	0	0
Donald O. Parsons	0	0	0	0	0
Ann D. Colle	0	0	0	0	0

Linda N. Edwards	0	0	0	0	0
Fred Goldman	0	0	0	0	0
Kenneth Warner	0	0	0	0	0
J. Huston McCulloch	0	0	0	0	0
Jacob Gesthalter	0	0	0	0	0
Daniel Graham	0	0	0	0	0

Table 7: Overview of outgoing mentions of other researchers from staff reports (1968-1972), each cell represents other researchers who are mentioned in a staff report

11.2 Overview of outgoing mentions of other researchers from staff reports (1973-1977)

	1973	1974	1975	1976	1977
Gary S. Becker	0	T.Schultz; E.Landes	0	Terman	0
F. Thomas Juster	John Kendrick; Robert Eisner; Henry Peskin; Stanley Diller; Avrohn Eisenstein; Linda FrayMoo Kai-Bai; Harold Horowitz; George Katona	Nancy&Richard Ruggles	0	0	0
Victor R. Fuchs	Wesley Mitchell; Becker; Mincer; Welch; T.Schultz; Taubman&Wales; Chiswick; Ghez; Juster; W.Landes; Grossman; Kramer; Willis; Reder; Hughes; Posner	W.Landes; Willis; Grossman; Lillard; Becker; Mincer; T.Schultz; Chiswick; Ghez; Evenson,Welch;Heckman,Lillard&Smith	Becker; Pauly; Bombardier; Coate; Hughes; Lewit; Chiswick; Reder; Warner; Kramer; McNally; Marilyn McDonald; Donald Wright; Claire Gilchrist; Catherine Grant; Terleckyj; Harvey Brenner; Frederick V. Lorenzo; Richard N. Watkins; Richard Handschin;	Terleckyj; Becker; T.Schultz; Linda Nasif Edwards; Dov Chernichovsky; Douglas Coate; Fred Goldman; Marcia Kramer; Lewit; Jacob Gestalther; Ann Colle; Kenneth Warner; Theodore Bergstrom; Edward Hughes; Mark Pauly; Claire Bombardier; Lee Lillard; Chiswick; Bismarck; Woodcock; Seymour E. Harris; Richard N. Watkins; Bismarck; Woodcock	Boskin; Michael; Becker; Juster; Bartel; Borjas; Mincer; Gronau; Lazear; Lillard; Y.Weiss; Willis; Daniel Graham; Jerry Green; Dov Chernichovsky; Coate; Colle; Edwards; Gestalther; Goldman;

					Bombardier; Lillard; Warner; J. Fries;
Harry Gilman	0	0	0	0	0
Albert Fishlow	0	0	0	0	0
David Schwar	0	0	0	0	0
Ernest Kurnow	0	0	0	0	0
Jean Wilburn	0	0	0	0	0
Jacob Mince	Coleman-Rossi; Eckland; Polachek; Hashimoto	S.Polachek; T.Schultz; G.Borjas; Coleman, Rossi; Owen; Leighton; Hashimoto	Borjas; Bartel; Coleman-Rossi; Polachek; Leighton	Coleman-Rossi; Ann Bartel; Thorndike-Hagen; George Borjas; Linda Leighton	Coleman-Rossi;
Dave O'Neill	0	0	0	0	0
Irving Leveson	0	0	0	0	0

Richard Auster	0	0	0	0	0
Deborah Sarachek	0	0	0	0	0
Morris Silver	0	0	0	0	0
Kong Kyun	0	0	0	0	0
Michael Grossman	Fuchs; Janice Platt; John Wolfe; Christine wilson; Emerson Ward; Kramer; Lee Benham; Edward Hughes; John Jacoby; Eugene Lewit; Barry chiswick; Martin Feldstein; Elizabeth Rand; Richard J. Radna; Lee Benham; Becker	Fuchs; Mark Pauly;Chiswick; Lewit; Hughes; Kramer; Reder; Feldstein; Bernard Friedman; E.Rand; Richard N. Watkins; Nestor E. Terleckyj; Robert Thorndike; Elizabeth Hagen;	Pauly; Bombardier; Coate; Hughes; Lewit; Chiswick; Reder; Warner; Kramer; McNally; Marilyn McDonald; Donald Wright; Claire Gilchrist; Catherine Grant; Terleckyj; Harvey Brenner; Frederick V. Lorenzo; Richard N. Watkins; Richard Handschin; Engel; Michael	Linda Nasif Edwards; Dov Chernichovsky; Douglas Coate; Fred Goldman; Marcia Kramer; Lewit; Jacob Gestalther; Ann Colle; Kenneth Warner; Theodore Bergstrom; Edward Hughes; Mark Pauly; Claire Bombardier; Lee Lillard; Chiswick; Bismarck; Woodcock; Seymour E. Harris; Richard N. Watkins; Mindlin-Densen	Daniel Graham; Jerry Green; Dov Chernichovsky; Coate; Colle; Edwards; Gestalther; Goldman; Bombardier; Lillard; Warner; J. Fries; Jacob K. Javits; James H. Scheuer; Edwards
Sherwin Rosen	0	0	0	0	0

Joseph Persky	0	0	0	0	0
Barry Chiswick	Mincer	G.von Furstenberg	0	0	0
Gilbert R.	0	0	0	0	0
Robert T. Michael	Wesley Mitchell; Becker; Mincer; Welch; T.Schultz; Taubman&Wales; Chiswick; Ghez; Juster; W.Landes; Grossman; Kramer; Willis; Reder; Hughes; Posner; Becker; Willis; Terman; David Lindauer, Kathleen McNally	W.Landes; Willis; Grossman; Lillard; Becker; Mincer; T.Schultz; Chiswick; Ghez; Evenson,Welch; Heckman,Lillard&Smith; Coleman, Rossi; Terman; Mincer; Borjas; Leighton; Owen; Y.Weiss; Taubman; Hause; Fuchs; Michael Boskin, E.Landes; Leibowitz; J.P.Smith; Wolpin; McNally; Ehrlich; Chiswick; Becker; Ghez; Heckman; Evenson; Welch; Juster; Taubman&Wales; Solmon; Wachtel; Terman; Becker; E.Landes; Coleman'Rossi; Markov	Becker; Coleman-Rossi; Mincer; Bartel; Weiss; Heckman; Smith; Welch; Fuchs; Ehrlich; Wolpin; Lazear; McNally; Boskin; Chiswick; Taubman; Wales; Juster; Ghez; Becker; Solmon; Wachtel; Hause;	Terleckyj; Becker; T.Schultz; Coleman-Rossi; Gronau; Oey Astra Meesook; Donald O. Parsons; Harry Scherman; Bartel; Lazear; Lillard; Y.Weiss; Wolpin; Fuchs; Ehrlich; Heckman; Mincer; A.Blinder; Terman	Becker; Fuchs; Gronau;Lazear; Larry Kenny; E.Landes; Terman
Paul Taubman	Wales; Thorndike, Hagen; Mincer	Mincer	0	0	0
Terence Wales	0	0	0	0	0

Isaac Ehrlich	Becker; Stigler; T.Sellin	Uri Ben-Zion; Keynes; Dorothy Projector; Gertrude Weiss; Thornten Sellin	Uri Ben-Zion;Alfred Marshall	Uri Ben-Zion; Alfred Marshall	0
William M. Landes	Ehrlich; Posner; Becker; Stigler; Reder; Bartel	Becker; Stigler; Ehrlich; Posner; Reder; Bartel	Ehrlich; Posner; Pashigian; Peltzman; Reder; Stigler; Bartel; Becker; Stigler	Ehrlich; Posner; Peltzman; Stigler; Becker; Pashigian; Wolpin; Heckman	Ehrlich; Wolpin; Posner; Pashigian; Peltzman
Masanori Hashimoto	0	0	0	0	0
Michael Tannen	0	0	0	0	0
Lewis Solmon	0	0	0	0	0
Finis Welch	Robert Evenson; Michael; solmon; Wachtel; Chiswick; Hause; Heckman; Leibowitz; Lillard; Mincer; Taubman; J.P.Smith	0	Juster	0	0
John C. Hause	D.C.Rogers	D.C.Rogers	0	0	0

Roger Alcaly	0	0	0	0	0
V.K. Chetty	0	0	0	0	0
Marcia J.	0	0	Willis	0	0
Michael Landsberger	0	0	0	0	0
Richard A. Posner	W.Landes; Cournot	0	Becker; Stigler; Becker; Tullock	0	0
Robert Willis	T.Schultz; Becker; H. Gregg Lewis; Gronau; Michael; Mincer; Polachek; Leibowitz; Heckman; Sanderson; E.Landes; J.P.Smith; Ross; Sanderson, Richard Easterlin	Michael; Heckman; Kramer; Ross; Sanderson; Becker; E.Landes; Leibowitz; Smith; Boskin; T.Schultz; Terleckyj; Markov; Terleckyj; Dirichlet)	Sanderson; Becker; E.Landes; Michael; Heckman; Leibowitz; Dov Chernichovsky; Daniel McFadden; Dirichlet	Becker; E.Landes; Michael; Nigel Tomes; Heckman	Markov; Mahmood Mamdani; Anna Luiza Ozorio de Almeida; Gronau
Warren Sanderson	Becker; Willis;P.David; M.Reder	Willis	Easterlin; Paul David	0	0

Sue Goetz	0	Parnes	0	0	0
Edward F. X. Hughes	Fuchs; J.E.Jacoby; E.M.Lewit; Richard H.Watkins; Frederick V.Lorenzo; Elizabeth H.Rand	Richard Watkins; John Palumbo; Eugene Lewit; John Wolfe	R.N. Watkins; R. Handschin; Fuchs; J.E.Jacoby; F.V.Lorenzo; Donald Wright	0	0
Eugene Lewit	0	0	R.N. Watkins; R. Handschin; Fuchs; J.E.Jacoby; F.V.Lorenzo; Donald Wright	0	0
Paul Wach	Katona; Solmon;Juster; Hause; Taubman&Wales	Solmon; Juster	Solmon; Edwards	0	0
Ann P. Bartel	S.Kakalik&S.Wildhorn	0	Coleman-Rossi	Coleman-Rossi	Coleman-Rossi
James J. Heckman	Ghez; Becker; Oniki; Rosen; Sheshinski; Stafford; Pareto; Polachek; Becker; Chiswick; Mincer; Orley Ashenfelter; Stigler	Terleckyj; Dirichlet	Daniel McFadden; Dirichlet	Landes; Richard Quandt; Linda Edwards; Modigliani-Brumberg; Cobb-Douglas; Friedman; Landsberger; Ben-Porath	Willis
Arleen Leibowitz	Susan Crayne	Terman	Bernard Friedman	0	0
Melvin Reder	Landes; Posner	0	0	0	0

John Robinson	0	0	0	0	0
Reuben Gronau	0	0	0	Becker; Lancaster; Muth	0
Milton Moss	Herman Miller	Gini; Lorentz	Richard&Nancy Ruggles	0	0
Robert Evenson	0	0	0	0	0
Lee A. Lillard	Ghez; Becker; Oniki; Rosen; Sheshinski; Stafford	Coleman, Rossi; Terman; Mincer; Borjas; Leighton; Owen; Y.Weiss; Taubman; Hause; Fuchs; Michael Boskin, E.Landes; Leibowitz; J.P.Smith; Wolpin; McNally; Ehrlich; Chiswick; Becker; Ghez; Heckman; Evenson; Welch; Juster; Taubman&Wales; Solmon; Wachtel;	Coleman-Rossi; Mincer; Bartel; Weiss; Heckman; Smith; Welch; Fuchs; Ehrlich; Wolpin; Lazear; McNally; Boskin; Chiswick; Taubman; Wales; Juster; Ghez; Becker; Solmon; Wachtel; Hause; Ben Porath; Juster	Markov; McCall 1973	Markov
James P. Smith	Ghez; Becker; Oniki; Rosen; Sheshinski; Stafford; Mincer	Becker	Juster	0	0
George Stigler	W.Landes	0	0	Tiebout	0

Elizabeth Landes	0	0	0	Mincer; Polachek	0
Jane Duberg	0	Gini; Lorentz	0	0	0
Linda Leighton	0	0	0	0	0
John Owen	0	0	0	0	0
George Borjas	0	0	0	0	Coleman-Rossi
Kenneth Wolpin	0	0	0	0	0
Kathleen McNally	0	0	0	0	0
Yoram Weiss	0	0	0	0	0
Mic hae	0	0	Markov	Martin Feldstein; Joseph Stiglitz; Eytan Sheshinski	Joseph Stiglitz; Eytan

					Sheshinski; Michael Hurd; Martin Feldstein; Sherwin Rosen; Lee Lillard; Jerry Green; John Shoven
Edward Wolff	0	Richard&Nancy Ruggles	Goldsmith	0	Chow-test
Peter K. Clark	0	Tinsley	Lucas; Prescott	0	0
Edward Lazear	0	0	0	0	0
Peter Pashigian	0	0	0	0	0
Sam Peltzman	0	0	0	0	0
Mark Pauly	0	0	Gobb-Douglas; Michael Redisch	0	0

Claire Bombardier	0	0	0	0	0
Douglas Coate	0	0	0	0	0
Dov Chernichovsky	0	0	0	0	0
Oey Astra Meesook	0	0	0	0	0
Donald O. Parsons	0	0	0	Rosen	0
Ann D. Colle	0	0	0	0	Jacob K. Javits; James H. Scheuer; Edwards
Linda N. Edwards	0	0	0	0	0

Fred Goldman	0	0	0	Mindlin-Densen	0
Kenneth Warner	0	0	0	Lillard; Bombardier; Peltzman	0
J. Huston McCulloch	0	0	0	0	Gini index
Jacob Gesthalter	0	0	0	0	0
Daniel Graham	0	0	0	0	Hicks; Kaldor; Scitovsky

Table 8: Overview of outgoing mentions of other researchers from staff reports (1973-1977), each cell represents other researchers who are mentioned in a staff report

12. Extensive Summary in French

Dans cette thèse de doctorat, nous décrivons la création du modèle d'addiction rationnelle et le concept d'addiction rationnelle qui y est contenu. Nous décrivons l'addiction rationnelle comme un concept descriptif novateur et comme une fiction politique innovante. Nous nous concentrons sur l'économiste Gary Becker en tant que force innovante centrale derrière le modèle, mais nous intégrons et contextualisons ses efforts dans les relations sociales et institutionnelles. En conséquence, nous décrivons la création de la dépendance rationnelle comme le résultat d'un effort collectif qui a impliqué beaucoup plus de chercheurs que Becker seul. La thèse de doctorat est structurée en trois parties. Chaque partie se concentre sur différents aspects historiographiques. L'objectif central de cette thèse a été de combiner tous ces aspects en une vision holistique de la création de la dépendance rationnelle.

Dans la première partie, nous nous concentrons sur le rôle des collectifs de réflexion dans l'élaboration des pratiques et l'organisation sociale de la recherche. Nous dressons un portrait détaillé d'un collectif de réflexion organisé au NBER dans les années 1960 et 1970, au sein duquel Becker est devenu le leader intellectuel qu'il était lorsqu'il s'est intéressé à la toxicomanie au milieu des années 1970. Nous décrivons le cadre de production des ménages qui a été développé et utilisé par Becker et d'autres membres du collectif de réflexion du NBER. Nous soutenons qu'il peut être interprété de la même manière qu'un style de pensée, comme une façon particulière d'envisager le comportement individuel qui résulte de l'activité de recherche intellectuelle au sein du collectif de réflexion.

Les années passées par Becker au NBER ont constitué une phase critique dans sa carrière intellectuelle. Nous soutenons que ces années sont cruciales pour expliquer la force de l'approche économique du comportement humain, dont Becker est considéré comme l'un des plus grands promoteurs. Le parcours professionnel de Becker au sein du NBER, de son arrivée en 1957 à son départ en 1980, illustre le rôle qu'il a joué en tant que leader

intellectuel de manière plus générale. Il illustre également la symbiose entre ses contributions et celles de ses disciples. Décrire Becker comme un nœud central dans un réseau d'autres chercheurs autour de lui nous empêche de considérer ses modèles comme les idées ingénieuses d'un individu avant-gardiste. Nous pensons qu'il est plus utile de considérer les modèles de Becker comme faisant partie d'un cadre théorique qui a ouvert la voie à de nombreuses autres contributions. Si Becker a été le pionnier, ses modèles n'auraient pas connu le succès qu'ils ont connu s'il n'y avait pas eu suffisamment de disciples pour élargir les pistes et en faire des voies généralement acceptées.

L'approche économique du comportement humain est souvent associée à Gary Becker, car il en était l'un des plus éminents défenseurs. Il a proposé ce terme, écrit un livre qui en porte le titre et reçu le prix Nobel pour cela. Dans ce chapitre, cependant, nous tentons de réduire l'association réductionniste entre l'approche économique du comportement humain et le chercheur Gary Becker. Si l'approche économique est fortement associée à Becker, elle ne peut s'expliquer par une seule personne. Nous avons plutôt examiné Becker et son environnement social pendant son séjour au NBER, en soulignant son rôle de leader intellectuel et de figure centrale dans la communauté où l'approche économique a vu le jour.

Sans cette communauté, l'approche globale aurait été moins efficace. Par exemple, Becker aurait eu moins d'occasions d'interagir avec des personnes telles que Grossman, qui menait des recherches connexes dans différents domaines appliqués, et de recevoir leurs commentaires. Il aurait donc été impossible pour Becker de s'aventurer dans différents domaines appliqués en si peu de temps. Nous avons donc mis l'accent sur l'importante fonction de soutien que le réseau a fournie. Les doctorants comme Grossman ont bénéficié du fait de placer leurs recherches dans un cadre innovant et d'interagir avec des chercheurs partageant les mêmes idées qui exprimaient leurs questions de recherche en utilisant un langage similaire. Dans le même temps, ils ont consolidé le langage théorique commun développé par Becker et Mincer.

De manière plus générale, il est utile de replacer la communauté de recherche représentée par le CEAHBSI dans le contexte politique plus large du début des années 1970. L'historique du financement des personnes impliquées dans le CEAHBSI montre que leurs programmes ont grandement bénéficié de la demande accrue des agences fédérales. Ils ont également bénéficié dans une large mesure des fonds privés provenant de fondations. Cependant, l'approche économique a été présentée comme une caractéristique distinctive clé de la recherche menée au CEAHBSI. À ce titre, l'approche économique s'inscrivait bien dans les tendances de recherche de l'époque. Bien que l'ère de la Grande Société de Johnson ait pris fin, une mentalité économique s'était implantée dans divers domaines politiques, notamment les agences fédérales, le Bureau du budget du Congrès et les nouveaux programmes de politique publique. L'approche économique du comportement humain développée au CEAHBSI était tout à fait compatible avec cette façon de penser économique plus large.

Dans la deuxième partie, nous nous concentrons sur les pratiques microéconomiques mises en œuvre dans les modèles de formation des habitudes dans les années 1960, 1970 et 1980. Nous résumons la manière dont différents chercheurs ont intégré la formation des habitudes dans les modèles formels de la demande au cours des décennies qui ont suivi la Seconde Guerre mondiale et nous décrivons les différentes pratiques qui ont été utilisées dans ces modèles. Nous décrivons comment les pratiques utilisées dans la modélisation de la formation des habitudes ont évolué au fil des ans, jusqu'à aboutir à la distinction rétrospectivement célèbre entre formation naïve et formation rationnelle des habitudes. Nous décrivons également comment les pratiques du modèle d'addiction rationnelle de Becker et Murphy (1988) s'inscrivent dans ces pratiques de modélisation. En comparant les pratiques du modèle d'addiction rationnelle avec celles des autres modèles de formation des habitudes, nous clarifions les façons dont le modèle d'addiction rationnelle a constitué un cas d'innovation pratique.

Nous décrivons le passage des modèles statiques d'utilité présente aux modèles dynamiques d'utilité intertemporelle comme le changement le plus profond des pratiques

dans la littérature sur la formation des habitudes. La prise en compte de l'optimisation de l'utilité intertemporelle a entraîné une complexification du processus d'optimisation, exigeant davantage des agents que les modèles d'optimisation simple de l'utilité présente. Le type de modèle a des implications importantes sur le rôle que jouent les habitudes pour les consommateurs et leur capacité à réguler leurs activités de consommation intertemporelle.

Au chapitre 3, nous décrivons comment différents économistes, des années 1950 aux années 1980, ont introduit les habitudes dans les modèles formels de demande. Nous notons deux changements majeurs au cours de ces années. Premièrement, nous montrons comment les habitudes étaient considérées comme un moyen de rendre les estimations empiriques de la demande plus dynamiques dans les années 1950 et 1960. Deuxièmement, dans les années 1970 et 1980, les économistes à l'esprit théorique se sont intéressés aux effets de la formation des habitudes pour décrire comment les préférences peuvent être en partie rendues endogènes par rapport au passé. Au chapitre 4, nous nous intéressons en particulier au développement du modèle d'addiction rationnelle entre le milieu des années 1970 et la fin des années 1980. Nous montrons comment les modèles d'utilité intertemporelle ont pris de l'importance parmi les économistes dans les années 1970 et 1980. Si l'optimisation de l'utilité intertemporelle a permis de modéliser des consommateurs plus sophistiqués dans leur prise en compte de l'avenir, elle a également rendu la recherche de solutions optimales beaucoup plus compliquée.

L'introduction de l'utilité intertemporelle dans les modèles de formation des habitudes a eu des conséquences profondes sur les hypothèses implicites de ces modèles. Elle a conduit au développement de modèles dits de formation rationnelle des habitudes, qui différaient des modèles antérieurs, souvent qualifiés de modèles de formation myope ou naïve des habitudes. Nous avons identifié trois différences principales. Premièrement, les consommateurs sont supposés s'engager à tout moment dans l'allocation de ressources en vue de l'avenir. Cela signifie que leurs opportunités à long terme sont limitées par une contrainte budgétaire intertemporelle et que cette contrainte budgétaire peut être utilisée

pour rendre accessible un avenir généralement imprévisible. Deuxièmement, les habitudes ne sont pas seulement considérées comme des stocks psychologiques, mais comme des ressources qui peuvent et doivent être utilisées pour maximiser l'utilité au fil du temps. Troisièmement, les consommateurs sont supposés beaucoup plus sophistiqués dans leur capacité à évaluer les effets futurs de leurs actions actuelles et des habitudes qu'ils acquièrent avec leur consommation. Si l'estimation de la demande avec la formation d'habitudes est une chose, l'analyse du bien-être avec la formation d'habitudes en est une autre. Nous montrons comment l'introduction des habitudes a posé des questions épineuses pour l'analyse du bien-être et comment les modèles de formation d'habitudes naïves et rationnelles limitent tous deux la représentation des habitudes dans le modèle de différentes manières.

Nous décrivons comment le modèle d'addiction rationnelle a d'abord été présenté comme une extension du modèle de production des ménages, comment il a été intégré à la littérature sur les modèles d'habitudes rationnelles, puis comment il a été reformulé comme un modèle de choix rationnel. Il a apporté une innovation conceptuelle à la microéconomie en décrivant des concepts tels que le renforcement, la tolérance et le sevrage en termes microéconomiques. Si les auteurs du modèle de dépendance rationnelle ont positionné leur modèle à proximité des modèles de formation d'habitudes rationnelles, ils ont suivi une convention politique consistant à décrire l'accoutumance en termes de contraintes de production et non en termes de préférences.

Dans la troisième partie, nous nous concentrons sur l'accueil immédiat réservé au modèle de dépendance rationnelle et sa transmission à différents domaines de recherche. Nous comparons la manière dont le modèle de dépendance rationnelle a été accueilli par les psychologues comportementaux, les économistes de la santé appliquée et les économistes comportementaux. Nous nous concentrons sur ces trois communautés car le modèle de dépendance rationnelle a été perçu de manière légèrement différente par les chercheurs de chacune d'entre elles. Nous décrivons comment le modèle a été considéré comme une référence méthodologique par les psychologues comportementaux, comme une

référence théorique par les économistes de la santé appliquée et comme une référence normative par les économistes comportementaux. Nous soutenons que le modèle de dépendance rationnelle et ce qu'il représente constituent un lien central entre ces communautés et leurs domaines académiques respectifs. En comparant la réception dans les différentes communautés, nous ne nous contentons pas de comparer les différentes communautés. Nous mettons également en évidence des aspects différenciés du modèle de dépendance rationnelle qui seraient autrement moins visibles.

Les communautés en tant que telles diffèrent sur certains aspects et se ressemblent sur d'autres. Alors que l'économie de la santé appliquée et l'économie comportementale sont des communautés universitaires internes à la discipline économique au sens large, la psychologie comportementale est une communauté externe à la discipline économique. Alors que les économistes de la santé appliquée ont accepté l'actualisation exponentielle comme une technique d'évaluation conventionnelle et une approximation utile de la prise de décision individuelle, les psychologues comportementaux et les économistes comportementaux ont critiqué l'actualisation exponentielle en tant que technique descriptive et l'hypothèse d'une préférence constante qui l'accompagne. Alors que l'économie de la santé appliquée et la psychologie comportementale étaient déjà des domaines universitaires établis au début des années 1990, l'économie comportementale était beaucoup moins établie et ressemblait davantage à un mouvement universitaire au début des années 1990.

Mais malgré ces différences, la quasi-totalité des chercheurs des différentes communautés considéraient le modèle d'addiction rationnelle comme une représentation de la prise de décision intertemporelle, d'un processus d'évaluation lié à un processus d'adaptation, d'outils pouvant être utilisés pour modéliser les processus de consommation intertemporelle, les processus de consommation ayant un impact sur la santé étant particulièrement pertinents sur le plan politique. Mais au-delà de cela, l'accueil réservé au modèle dans chaque communauté a révélé d'autres aspects, comme nous le montrons dans les chapitres 5 à 7.

Pour les psychologues comportementalistes, le modèle rationnel de la dépendance est devenu une référence méthodologique. Traditionnellement, leur formation différait de celle des économistes. Ils considéraient ce modèle comme un exemple de processus d'adaptation dynamique résultant de la maximisation globale de l'utilité. Bien qu'ils aient décrit de fortes similitudes entre l'utilité et le renforcement en tant qu'unités de calcul hédonique et moyens de comptabiliser les comportements, certains psychologues comportementaux ont considéré que le processus d'adaptation impliqué par le modèle était trop optimiste et sophistiqué pour décrire correctement les comportements réels.

Pour les économistes de la santé appliquée, le modèle est devenu une référence théorique expliquant comment les techniques conventionnelles de la microéconomie pouvaient être appliquées de manière fructueuse à des phénomènes tels que la dépendance ou les habitudes de santé. Bien qu'ils aient eu une vision similaire à celle des psychologues comportementaux de la dépendance comme une inadaptation comportementale, ils n'ont pas associé de forts aspects méthodologiques au modèle, car celui-ci s'inscrivait parfaitement dans les pratiques auxquelles ils avaient eux-mêmes été formés.

Pour les économistes comportementaux, le modèle est devenu une référence normative associée à certaines implications pour les politiques publiques. Comme ils considéraient que la dépendance était mal représentée, ils considéraient également que les implications politiques fondées sur ces représentations erronées étaient erronées. Bien que les différents chercheurs aient cherché à décrire les phénomènes économiques en termes neutres, ils ont fini par opposer une version de la théorie descriptive à une autre version de la théorie descriptive, créant ainsi un conflit quant à savoir quelle version de la théorie descriptive était la véritable théorie descriptive. Ce que nous avons montré dans cette troisième partie, c'est qu'en fait, aucune des deux versions n'est uniquement descriptive. Il existe plutôt un ensemble d'autres valeurs et vertus qui s'entremêlent avec les théories descriptives.