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Sous la direction de Monsieur **Vincent FROMENTIN, Professeur des Universités**

Banking Strategy under Uncertainty: The Linkages Between Liquidity Creation, Profitability, and Stability

Le 24 octobre 2025

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To my family and friends,

to George Xavier

to Gadièle

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Introduction

The year 2019 marked the beginning of an ongoing period of global uncertainties and instabilities starting with the COVID-19 pandemic and continuing with the wars in Ukraine and the Middle East. These rising economic and geopolitical tensions renewed interest in the stability of financial systems and reawakened predominant concerns among researchers, policymakers, and banks' stakeholders (Fromentin & Lelievre, 2024; Liu, Wang, Wen, & Wu, 2024). The need to understand how mounting uncertainty affects banks' outcomes and behavior in addition to how prudential policies can curb its detrimental effects is now pressing more than ever.

A full understanding of how banks can contribute as stabilizers or fragility amplifiers of financial systems became particularly important in the wake of the global financial crisis of 2007-2008 and the European sovereign debt problem of 2010 (Alexandre, Bouaiss, & Refait-Alexandre, 2014; Atman & Lamarque, 2025; Capelle-blancard & Tadjeddine, 2010; Barabra Casu, Girardone, & Molyneux, 2015; Desban & Jarjir, 2019; Guery, Stevenot, Wood, & Brewster, 2017; Gupta & Kashiramka, 2020b; Ory & Lemzeri, 2012; Ureche-rangau & Burietz, 2013; Fabian Valencia, 2016; Vogel & Winkler, 2010).

More recently, the 2019 financial collapse in Lebanon and its aftermath (The World Bank, 2021b), emphasized the need to understand these relationships to prevent future crises with devastating economic and social repercussions.

A clear comprehension of how uncertainty propagates through banks and financial systems requires analyzing three transmission channels.

First, on the assets side, rising uncertainty tightens screening and lending standards and pushes banks' management toward safer investments, fewer loans, and more liquidity hoarding. This conservative behavior from the banks' side naturally reduces liquidity creation and may lower their profit margins.

Second, on the liabilities side, uncertainty can trigger precautionary deposits inflows as a flight-to-safety may occur among individual and institutional depositors. Or else, in stressed or less regulated systems, uncertainty may lead to deposits' flight. These unpredictable opposing behaviors by depositors affect deeply banks' liquidity buffers, funding costs, and profitability.

Third, through off-balance sheet activities, banks adjust commitments and guarantees as a response to mounting uncertainty by transferring contingent liquidity risk sources back to customers or by absorbing it to protect relationships.

Collectively, these bank-level responses pile up into system-level outcomes resulting

in dampening uncertainty shocks or amplifying them depending on banks' strategies and risk appetite, financial system regulation and development levels, and other sectorial, institutional, and macroeconomic factors.

The three chapters of our thesis explore these channels to provide a theoretical and empirical analysis of the complex relationships between banks' liquidity creation, profitability, and financial stability in uncertain environments. **Chapter 1** provides a macro level analysis of the bidirectional causalities between liquidity creation, uncertainty, and financial stability. It presumably shows that in economies with less developed financial systems, liquidity creation can itself raise uncertainty. **Chapter 2** offers bank-level exploratory analysis to confirm that, under uncertainty, banks can successfully manage their liquidity and overall performance taking into consideration regional, institutional, and bank's specific characteristics. **Chapter 3** provides and in-depth country-level investigation of the Lebanese banking system. The vast multidimensional collapse of 2019 makes Lebanon and its financial system a perfect experimental ground to test the strategies and relationships developed in the previous chapters. We show that liquidity creation, including off-balance sheet activity, increased systemic fragility even where banks' profitability looked robust.

This structure maintains our focus on banks' risk management and operational efficiency, prudential control of liquidity creation, and institutional governance, as the three levers that connect banks' strategic behavior to systemic stability under uncertainty.

The main role of banks, as financial intermediaries, includes an asset transformation function bridging the gap between the different needs of borrowers and lenders. Specifically, transforming short-term, liquid, and relatively safe deposits into long-term, illiquid, and risky loans is the essence of financial intermediation (Diamond & Dybvig, 1983). Casu et al. (2015) indicate that banks offer liquidity-smoothing and risk-sharing solutions with lower transactions costs. This asset transformation function solves the problems of maturity and preferences mismatch between savers, preferring short term liquid deposits, and borrowers favoring long-term loans (Alaeddini, Madiès, Reaidy, & Dugdale, 2023). The output of this asset transformation function is the creation of liquidity. Nevertheless, this function inherently exposes the banks to liquidity and solvency risks. In fact, by creating liquidity, banks themselves become less liquid as they hold less cash and liquid assets. Precisely, Allen & Carletti (2012) highlight the crucial role of banks' outcomes in economic growth, but they equally underline their

negative impact on the stability of the financial systems.

To measure the liquidity creation output, Deep & Schaefer (2004) use the liquidity transformation gap while Berger & Bouwman (2009) present a more comprehensive three-step approach.

In our thesis, liquidity creation denotes the transformation of banks' liquid liabilities into illiquid assets. In article 1, at the aggregate and macro level, we draw on a novel method to measure liquidity creation from aggregate country-level available banking data, allowing cross-country analysis where bank-level statements are not available or incomplete (D'Avino, Girardin, & Shabani, 2022). In article 3, liquidity creation output is measured using the widely adopted Berger & Bouwman's (2009) three-step procedure using category classification with and without off-balance-sheet items (cat.fat and cat.nonfat).

Turning to banks profitability, it usually measures the ability of the bank to efficiently allocate and use its assets to maximize its return. Common profitability measures include the return on assets (ROA) and the return on equity (ROE) where ROA measures the efficient use of assets while roe indicates the return to shareholders (Caby, Ziane, & Lamarque, 2022; Pessarossi, Thevenon, & Weill, 2020; Shabir, Jiang, Bakhsh, & Zhao, 2021).

In addition to ROA and ROE, bank profitability is also affected by the mix of interest and non-interest income. Particularly, the net interest margin (NIM) captures the difference between the bank's pricing power on the assets side and the funding costs on the liabilities side and it is directly affected by the banks' strategic choices concerning non-interest revenues.

In our thesis, we use ROA and ROE as primary profitability indicators, and we complement them with NIM where applicable. In Article 2, profitability is examined directly through ROA and ROE and indirectly via a PCA-based composite performance index that jointly reflects liquidity and profitability. In Article 3, we employ the return on average assets (ROAA) and the return on average equity (ROAE) measures as the primary profitability metrics to better reflect within-year balance-sheet variations while the NIM is used as a robustness check.

Liquidity creation and profitability are intrinsically connected. By holding large amounts of liquid assets, banks generate less revenue and consequently become less profitable unless compensated by other sources of non-interest income (Albert & Alexandre, 2018). Equally, high levels of liquidity creation can strengthen profitability

in the short run by expanding interest-earning assets and fee-generating off-balance sheet commitments. However, in the longer term, if excessive liquidity creation coincides with weak regulatory and governance frameworks, uncontrolled risk appetite, or macro level uncertainties, it can degrade stability and banks' profits will appear strong until losses abruptly materialize.

Financial stability refers to the smooth functioning of the financial system in facilitating the efficient allocation of financial resources between lenders, borrowers, and investors and to simplifying payments and similar operations (Schinasi, 2004; The World Bank, 2021a). This definition emphasizes the role of banks as financial intermediaries and payment systems enablers in promoting financial stability. Prior research link high levels of liquidity creation to lower financial stability (Acharya & Naqvi, 2012; Acharya & Thakor, 2016; Berger & Sedunov, 2017; Louhichi, Saghi, Srour, & Viviani, 2022; Xingmin Zhang, Fu, Lu, Wang, & Zhang, 2021). As banks create more liquidity, they become increasingly vulnerable due to lower liquidity margins and higher credit risk exposure. On the contrary, banks profitability seems to have a positive impact on financial stability as more profitable banks are essentially more solvent and less prone to failure (Arena, 2008; Cole & White, 2012; Gupta & Kashiramka, 2020b; Lin & Yang, 2016; Wheelock & Wilson, 2000). The mutual dependency between bank-level and system-level stability is documented by Diamond & Rajan, 2005 (2011), showing that vulnerabilities at the bank level can rapidly turn into systemic weakness through spillovers.

Throughout our thesis, we use the Z-score at the bank and the aggregate country level as our primary financial stability proxy. High levels of Z-score indicate lower insolvency risk and consequently more financial stability. For consistency, we refer to financial instability as the opposite of stability specifically in articles 1 and 3.

With regard to Uncertainty, it refers to a situation where actions or events are unknown or uncertain. Bloom (2014) refers to uncertainty as a nebulous concept describing the inability of economic agents to predict the future of micro and macro-economic variables. Uncertainty can be defined as the agents' incapacity to predict the possibility of events occurring (Knight, 1921, as cited in Bloom, 2014, p. 154). In addition, Jurado, Ludvigson, & Ng (2015) offer a broad definition of uncertainty as an unpredictable economic shock conditioned by past events but still invisible to decision makers. More broadly, Rowe (1994) defines uncertainty as the "absence of information". In our research we ponder that ambiguities and instabilities characterizing financial and

economic policies, as well geopolitical and social disruption increase the level of uncertainty among economic agents. Several indices are used a proxies to capture the macro level uncertainty. Caldara & Iacoviello (2022) constructed a geopolitical risk index (GPR) while Baker, Bloom, & Davis (2016) propose a widely used Economic Policy Uncertainty (EPU) index to capture policy related economic uncertainty. Also, Davis, Bloom, & Baker (2021) present the Economic Uncertainty Related Queries index (EURQ) using the agents' internet searches related to topics associated with uncertainty.

In our thesis, we capture uncertainty using the World Uncertainty Index (WUI) developed by Ahir, Bloom, & Furceri (2022). The World Uncertainty Index is a text-based country-level indicator that covers developed and emerging economies and captures economic, political, and social uncertainty signals. Unlike the EPU index, which uses incongruent media sources with limited availability for less developed economies, the WUI is produced from the Economic Intelligence Unit reports as a single and consistent source. This improves comparability across countries, which is a critical factor for our multi-country analyses in Articles 1 and 2.

As previously mentioned, uncertainty disrupts people's expectations and may trigger overly conservative or irrationally aggressive behaviors among banks, organizations, and individuals. The negative impact of different types of uncertainty on banks' behavior and outcomes as well as on financial stability is heavily documented in banking literature banks (Hsieh, Lee, & Lin, 2022; Otero González, Ashour, Redondo-López, & Rodríguez Gil, 2018;T. C. Nguyen, 2021; Phan *et al.*, 2021a; Qi *et al.*,2022; Shabir *et al.*, 2021; Desalegn *et al.*, 2023; Al-Shboul *et al.*, 2020; Karanasos & Yfanti, 2020). Previous research link excessive liquidity creation to greater systemic risk and crisis incidence (Acharya & Naqvi, 2012; Acharya & Thakor, 2016; Berger, Boubakri, Guedhami, & Li, 2019; Berger & Bouwman, 2017; Berger & Sedunov, 2017; Fungacova, Turk, & Weill, 2021). Yet, the role of uncertainty in shaping banking behavior and strategic decisions related to liquidity creation and risk tolerance as well as the impact of financial stability is less established. Our thesis closes that gap in the literature by jointly modeling banking strategies, uncertainty, and financial stability at macro, sectoral, and country levels.

Concerning the Lebanese case, the ongoing crisis which started in 2019, offers a perfect example where chronic uncertainty and questionable banking behavior coupled with shady regulations and supervisory actions culminated in a huge financial collapse.

Markedly, a 2021 world bank report classed the crisis amongst the three greatest economic collapses globally since the mid-nineteenth century (The World Bank, 2021b). Prior to 2019, Lebanese banks were prominent for their stability despite frequent political and economic disturbances and Lebanon served as the main financial hub of the Middle East and Gulf region for more than three decades (Banque du Liban, 2016; Desquilbet, 2012; Naimy & Karayan, 2015). For instance, in terms of reliability, the Lebanese banking system was ranked 29th in the world in 2014 (World Economic Forum, 2013-2014) and Lebanese banks were relatively unaffected by the 2008 global financial crises. Furthermore, the size of the Lebanese banks measured their total assets totaled 433% of the Lebanese GDP in 2017 (McKensie, 2018). In the last chapter of our thesis, we intend to uncover the origins of the current Lebanese crisis by examining the nexus between banks' behavior and outcomes and systemic financial instability. We conduct our study over a period of 23 years starting in 1997, the beginning of the post-war financial stabilization, and ending in 2019, the start of the current crisis. To our present knowledge, no similar prior analysis has been conducted in the Lebanese context.

The Lebanese financial and economic collapse underscores how a long period of apparent robustness and soundness can conceal growing endogenous vulnerabilities when liquidity creation is uncontrolled, governance is weak, and institutional transparency is limited. Chapter 3 shows that liquidity creation nurtured systemic instability while profitability dampened it, offering a cautioning insight that profitability alone is a poor guide in fragile financial systems.

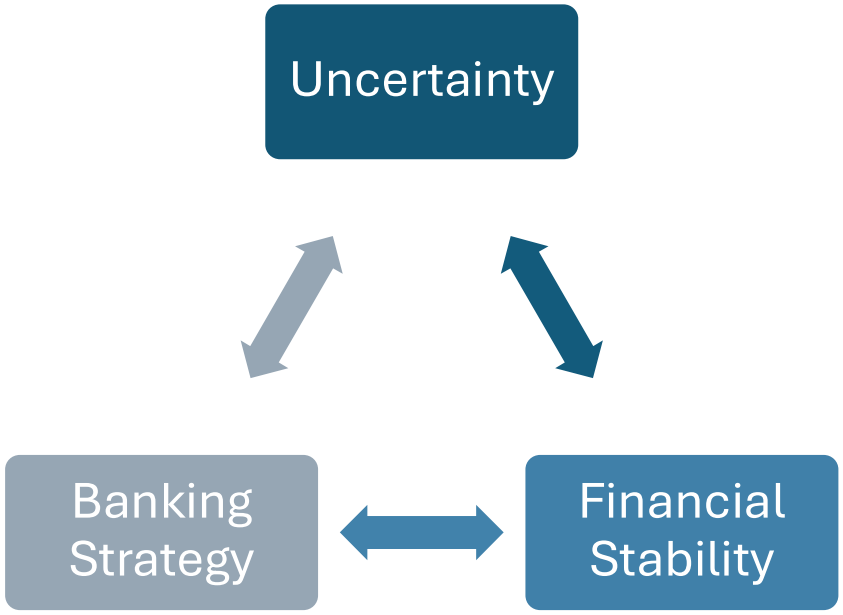
This brief introduction highlighted the complexity of the relationship between our variables of interest showing high levels of interdependence and unpredictability. In our present thesis, we aim to broaden our understanding of the complex interdependent linkages between banks' strategies proxied by liquidity creation, banks' outcomes measured by their liquidity and profitability levels, financial stability, and uncertainty. We also propose practical advisory recommendations to bank's management stressing the importance of prudential policies concerning liquidity creation and operational effectiveness in optimizing bank performance under uncertainty and preventing large scale instability. Furthermore, we offer practical policy and regulatory recommendations in support of early intervention targeting banks policy and liquidity creation measures to curtail the negative effects of uncertainty and prevent financial instability.

1. Research problem

The complex relationships between bank's behavior, their outcomes and financial stability represent an ongoing concern for bankers, researchers, and policy makers (Diamond & Rajan, 2005; Kim, 2018; Rajan, 2006; Soedarmono, Machrouh, & Tarazi, 2011; Vogel & Winkler, 2010). Rising levels of uncertainty, whether policy related or due to external shocks, intensify the complexity of these nexuses.

A comprehensive way to study these connections is through a triangular intersection with responses:

Figure 1: Triangular Intersection: uncertainty-banking strategy-financial stability



Uncertainty ↔ Banking strategy ↔ Financial stability

Shocks to any component, whether it is policies or geopolitical uncertainties, banks' strategic choices, or shifts in systemic stability, provoke reactions from the other two.

First, we notice that uncertainty acts as a financial system destabilizer by negatively impacting the behavior of banks and their soundness. Banks react to uncertainty by tightening their credit policy leading to lower liquidity creation and profitability. Moreover, uncertainty may trigger deposits withdrawal and loans losses resulting in lower levels of banks' assets and adding volatility to their earnings consequently culminating in weaker solvency and stability.

The transmission mechanisms run through both assets side and liabilities side adjustments and through off-balance-sheet commitments. On the assets side, uncertainty shocks make banks more conservative with stricter credit policies and thus they create less liquidity and possibly suffering lower profitability. On the liabilities side, trustworthy banks may experience anticipatory deposit inflows while banks with dubious status suffer from deposit flight, unequally affecting funding costs and liquidity buffer needs. Banks may also withdraw or limit commitments and guarantees limiting their off-balance sheet liquidity creation. These bank-level changes may have systemic financial stability consequences and, depending on context, could magnify or hinder the initial uncertainty shock.

Second, we note that banks' strategic behavior related to liquidity creation decisions has a direct impact on financial stability. Higher levels of liquidity creation have a destabilizing effect on systemic stability. However, liquidity creation has a positive effect on profitability which, in turn, positively impacts financial stability. This perplexing interconnection suggests that higher liquidity creation may negatively affect financial stability despite rising profitability.

This apparent contradiction is resolved once we recognize that liquidity creation affects stability and return on different time frames. In the short run, excessive liquidity creation can generate more interest income and increase profitability. However, in the long term, extended maturities and rising funding costs may erode liquidity buffers and profitability alike, particularly where governance and regulations are questionable. Conversely, controlled liquidity creation can reconcile with financial stability when it reflects prudent lending with reasonable maturities and is supported by careful credit risk management, operational efficiency, and adequate policy and regulatory frameworks.

Third, we observe that banks' behavior substantially impacts their outcomes quantified using liquidity margins and profitability ratios. These outcomes, equally important to the bank's performance and financial stability, react differently to the increasing levels of liquidity creation. For instance, liquidity creation leads to more profits but less liquid assets, creating another confusing relationship.

To understand these trade-offs, we tackle liquidity together with profitability and we combine them with a composite performance index. This index captures how banks mutually manage liquidity buffers and profits under uncertainty rather than evaluating performance based on a single outcome. For instance, banks can show lower

profitability alongside stronger overall performance if they act strategically rather than reactively.

Specifically, the persisting Lebanese economic and financial crisis with dire economic, and social consequences have raised logical questions about the role of the Lebanese banks in promoting financial instability. Prior research analyzed the determinants of Lebanese banks liquidity (El Khoury, 2015), performance (Peters, Raad, & Sinkey, 2004), and fragility (Awdeh, 2016) while others examined the impact of the global financial crisis on Lebanese banks (Naimy & Karayan, 2015). However, no formal study systematically investigates the relationship between Lebanese banks behavior and country wide financial instability.

In Lebanon, these relationships are further complicated by opacity, banks' concentration, and weak institutional credibility. Large banks could internalize deposit inflows during uncertainty, expand liquidity creation aggressively, and make profits while jeopardizing bank-level and systemic financial stability. Limited transparency kept rising vulnerabilities hidden but when confidence overturned, the same structure that encouraged profits accelerated instability. The Lebanese case exemplifies how instability can slowly develop during long periods of apparent robustness.

The main goal of our thesis is to offer a comprehensive framework where these linkages are tested concurrently under different regional, economic, and institutional conditions as well as form different macro-level, sectorial, and country-specific perspectives.

2. Objectives and research questions

The central objective of our thesis is to comprehend the intricate nexuses between banks' strategic choices proxied by liquidity creation, banks' outcomes measured by liquidity and profitability, systemic financial stability, and uncertainty across heterogeneous contexts. Conceptually, these variables are inherently interrelated in a sense where shocks to uncertainty alter banks' liquidity creation choices, changes in liquidity creation influence financial stability, and financial stability itself shapes both bank behavior and perceived uncertainty. Our goal is to identify, measure, and explain the multifaceted interactions between banks' strategic choices, banks' outcomes, financial stability, and uncertainty across different institutional and macroeconomic contexts. We address this goal by designing a comprehensive theoretical and empirical framework where we examine these connections under different situations. We proceed through a three-stage structure starting on a macro level (countries), then on a sectoral

level (banks across countries), and ending on a country-specific level (Lebanon), ensuring validation and generalizability of our insights. Our focus is on developing and emerging economies where uncertainty is predominantly high, institutional governance and regulatory quality are questionable, and the economic and social bill of financial stability is exorbitant. To illustrate and deepen our analysis, we investigate the noticeable case of the Lebanese financial crisis of 2019.

As mentioned above, our analysis spans three levels: first we start by identifying broad relationships patterns between uncertainty, banks' behavior, and financial stability across 65 developing and emerging economies. Then we investigate the banks' strategy and performance nexus under uncertainty across more than 990 banks in 21 emerging countries to gain sectorial insights, and finally we deepen our analysis by carefully examining the impact of Lebanese banks strategies and outcomes on the country's financial stability.

To reach our research goal we try to answer the following three questions:

i. What are attributes of the reciprocal relationships between banks' liquidity creation, uncertainty, and financial stability in developing and emerging economies?

We answer this question through a cross-country analysis aiming to identify influences and causal relationships.

ii. How do banks adapt their strategy in response to uncertainty, and how does this behavior affect their overall performance?

To answer this question, we examine the impact of uncertainty on banks' liquidity, profitability, and overall performance in a large database covering more than 990 banks.

iii. What is the impact of Lebanese banks behavior and outcomes on systemic financial stability?

The main goal of this question is to investigate the role of Lebanese banks in the financial collapse. To answer this question, we examine the impact of banks' liquidity creation and profitability across 57 banks over more than 20 years.

At the macro level, we expect bidirectional causalities among liquidity creation, uncertainty, and financial stability. At the banking sector level, higher uncertainty should strengthen liquidity buffers and lessen profitability. However, the net effect on

overall bank performance can be positive if banks strategies are efficient. In the Lebanese case, we expect liquidity creation to fuel instability while profitability endorses more stability.

We explicitly consider banks' characteristics, financial development, institutional and supervisory quality, bank size and concentration, political stability, and macroeconomic factors as moderators of these relationships.

The questions above are addressed in three distinct articles constituting the core of this thesis.

Article 1 employs a panel VAR with Granger causality to capture bidirectional macro connections and to compare impulse responses across financial-development stages. Article 2 uses fixed-effects and a PCA-based composite performance index to quantify uncertainty's joint effects on liquidity and profitability while controlling for time-invariant heterogeneity. Article 3 estimates OLS and system-GMM specifications to identify the impact of liquidity creation and profitability on financial stability. This progression creates a procedural funnel from cross-country dynamics to sectoral behavior and, finally, to a country-specific crisis.

3. Conceptual framework and mechanisms

This section briefly introduces the theoretical framework that links uncertainty, banks' strategic choices, proxied by liquidity creation, and systemic financial (in)stability we clarify how shocks and feedback spread across banks' strategies and policymakers' decisions as well as markets perception.

From uncertainty to balance-sheet adjustments and liquidity creation.

An increase in policy, geopolitical, or economic uncertainty transmits first through banks' assets side choices with tighter screening, shorter maturities, slower loan growth, and, at the limit, liquidity hoarding. In parallel, it affects the liabilities side through either flight-to-safety[1] or deposit flight[2], with corresponding changes in funding costs and liquidity buffer needs. On a third level, it modifies banks' off-balance sheet positions. The net effect on liquidity creation is therefore context-dependent affected by the level of financial system development among other exogenous and banks' internal factors.

[1] Deposit inflows to strong banks
[2] Outflows from weaker banks

From liquidity creation to financial stability.

Changes in liquidity creation alter banks' profitability and liquidity ratios. A rise in liquidity creation may erode liquidity buffers and increases the risk of bank runs, raising the probability of systemic stress. These effects are typically stronger when off-balance-sheet exposures are included, because commitments may convert contingent liquidity risk into immediate balance-sheet pressure. Conversely, liquidity creation expansions that are backed by conservative measures and stable funding can support profitability without materially degrading stability.

Profitability channel and the liquidity–profitability trade-off.

Changes in liquidity creation transmit directly to profitability through the net interest margin (NIM) and the loan loss reserves. When uncertainty rises, banks typically expand their liquidity buffers and create less liquidity. This reaction compresses revenues, may raise funding costs, and consequently reduces earnings.

Profitability affects stability through lower insolvency risk and less volatility. The results of our analyses show that profitability is a stabilizing factor whereas excessive liquidity creation is destabilizing as shown in Chapter 3. In fact, profitability pressures can reshape strategic decisions including liquidity creation choices. Low profits may lead to aggressive lending policies and higher liquidity creations, while high profits may ease performance anxiety and lead to better risk management and thus less liquidity creation. This reciprocal linkage motivates modeling liquidity creation, profitability, liquidity, and financial stability jointly as shown in Chapters 2 and 3.

From stability shocks back to uncertainty.

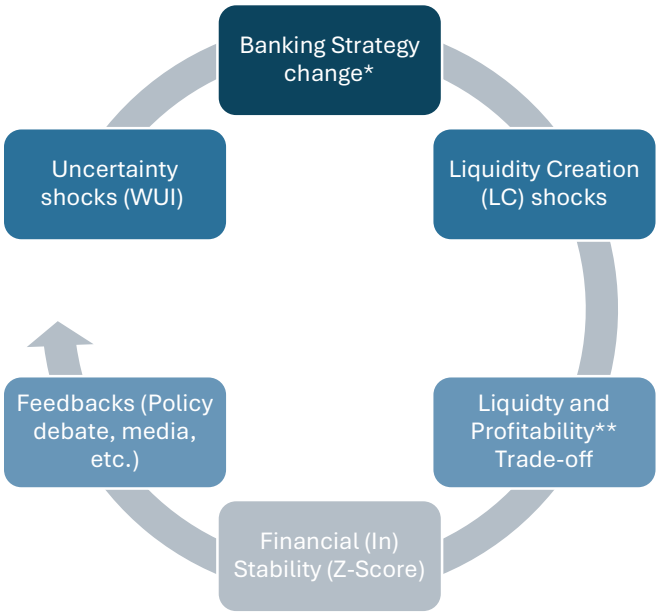
A deterioration in stability triggers regulatory, managerial, and market responses. Increased supervision, policy debates, media attention, risk repricing, and suspicious institutional and stakeholders' behaviors can swiftly raise uncertainty. This response loop clarifies why uncertainty and financial stability often move together and justifies our empirical emphasis on bidirectional causality and impulse responses in Chapter 1.

Moderators that affect these relationships.

The strength and direction of these linkages depend on observable moderators and controls. Financial development, financial inclusion, geographical and political context, institutional and supervisory quality, bank size, cost structure and managerial efficiency, banking system concentration, and other macroeconomic aspects may have

a strong influence on the relevance and the significance of these connections.

Figure 2: Conceptual roadmap: uncertainty-liquidity creation-profitability-liquidity-stability nexus and moderators



*** Moderators and influence factors**

**** Banks' outcomes: Liquidity and Profitability**

Moderators and controls:

Financial development stage, geographical and political context, institutional and supervisory quality, financial inclusion, bank size, cost structure and managerial efficiency, banking system concentration, and other macroeconomic aspects

4. Variables and indications

In this section we present a summary of the main variables including definitions, construction, and sign conventions used throughout our thesis.

4.1. Core variables and definitions

4.1.1. Liquidity creation

Liquidity creation designates banks' transformation of liquid liabilities into illiquid assets. At the bank level in chapter 3, we use the Berger & Bouwman preferred three steps approach based on balance sheet categories. Cat.fat stands for liquidity created by a bank through its on and off-balance sheet activities while cat.nonfat denotes liquidity created by the bank without its off-balance sheet. At the macro level in chapter 1, we use a novel aggregate liquidity creation measure based on Berger and Bouwman

approach but constructed from public banking aggregates to enable cross-country coverage. All liquidity creation measures are scaled by total assets to ensure comparability.

4.1.2. Uncertainty

In our thesis we use the "World Uncertainty Index" to capture uncertainty. the World Uncertainty Index (WUI) is a single-source text-based, country-level indicator capturing economic, political, social, and other forms of uncertainty.

4.1.3. Financial stability

We opt for the bank-level and country level Z-score to quantify financial stability. The Z-score measures the distance to insolvency. Higher Z-score reflects higher stability and vice versa.

4.1.4. Bank Profitability

We use different profitability measures in our thesis to account for different aspects of banking behavior and outcomes. We utilize return on assets (ROA) and return on equity (ROE) in the cross-country banks panel in Chapter 2. Subsequently, in the Lebanese case in chapter 3, we use the return on average assets (ROAA), the return on average equity (ROAE), and the net interest margin (NIM).

4.1.5. Bank liquidity

In chapter two, we use two ratios to account for bank liquidity, the liquid assets to total assets ratio (LATA = liquid assets / total assets), and the liquid assets to deposits and other similar short term liabilities ratio (LADEP = liquid assets / deposits (or short-term funding per data availability)).

4.1.6. Bank composite performance index

To measure the overall performance of banks, we use a principal component analysis based (PCA-based) index constructed from ROA, ROE, LATA, LADEP. Higher values indicate better overall performance resulting from higher profitability and stronger liquidity buffers and vice versa.

4.2. Sign conventions and interpretation

To facilitate interpretation and analysis across our thesis we present a summary of signs conventions, expectations, and interpretation for our core variables.

4.2.1. Z-score

Generally, higher Z-score values imply more financial stability. A negative coefficient on a regressor in a Z-score regression infers an instability-increasing effect while a positive coefficient indicates a stability-inducing impact.

4.2.2. Liquidity Creation

Hypothetically, higher liquidity creation values indicate more loans and lower liquidity buffers. A positive coefficient on a regressor in a liquidity creation regression implies a favorable effect on bank liquidity creation and a negative coefficient suggests a negative impact.

4.2.3. Uncertainty

By design, higher values of our uncertainty index (WUI) indicate more uncertainty as uncertainty terms and variants become more frequent in the Economist Intelligence Unit reports.

4.2.4. Profitability

Higher values of ROA, ROE, NIM, ROAA, and ROAE imply that the bank is making more profits. Consequently, a regressor with a positive coefficient in a profitability regression implies a positive effect on bank profitability.

Table 1: Variables used across chapters

Variable	Chapter 1	Chapter 2	Chapter 3
Uncertainty	WUI	WUI	-
Liquidity Creation	Aggregate consolidated LC (scaled by GTA)	-	Bank level LC (cat.nonfat / cat.fat, scaled by TA)
Financial Stability	Country level Z-score (High = more stable)	-	Bank level Z-score (High = more stable) and robustness with country level Z-score
Profitability	-	ROA & ROE	ROAA & ROAE and robustness with NIM
Liquidity	-	LATA & LADEP	
Composite Performance	-	PCA (ROA, ROE, LATA, LADEP)	

Note: “cat.fat” includes off-balance sheet commitments and guarantees; “cat.nonfat” excludes them.

5. Approach, methodology, and data

We follow a three-article structure that progressively narrows in scope to create a clear methodological funnel. We begin with a macro-level empirical analysis across 62 developing and emerging economies. Then we narrow our analysis by examining bank-level data across 992 banks in 21 countries. Finally, we complete our research with a detailed analysis of the Lebanese case representing the country-specific level.

Our empirical design follows a funnel that moves from a panel VAR with panel-Granger causality in article 1 to bank fixed-effects OLS enhanced with a PCA-based performance index in article 2, and finally to fixed-effects OLS plus system-GMM in article 3.

In the first article we adopt a macro-level perspective with regards to countries and banking data. We employ panel vector autoregression approach coupled with granger causality tests to test the characteristics of the connections between uncertainty, systemic financial stability, and aggregate banks liquidity creation. We employ panel vector autoregression (PVAR) and panel Granger causality tests using data from 62 developing and emerging countries from 2001 to 2015. Our findings show a reciprocal causality between uncertainty, liquidity creation, and financial stability. Remarkably, we notice that banks' liquidity creation may increase uncertainty in countries with underdeveloped financial systems. This cross-national analysis helps us understand how these three variables interact on set the directions and foundations of the second and third article.

In article 2 we use bank-level data to evaluate the banks' behavior under uncertainty by exploring the impact of uncertainty on banks' liquidity, profitability, and combined performance. Using a dataset of 992 banks from 21 countries from 2005 to 2022 we construct a composite bank performance index combining profitability and liquidity by utilizing the principal component analysis (PCA) approach. We construct a PCA-based composite performance index from ROA, ROE, LATA, and LADEP after standardizing each indicator. Then we employ fixed effect OLS regression model to test the effect of uncertainty of banks' liquidity, profitability, combined performance index. We find that uncertainty positively affects bank's liquidity and overall performance but negatively influences their profitability in line with prior studies. Though, our results prove that banks succefully manage their strategic liquidity-profitability balance in uncertain environments. In this article we study the bank-level responses to uncertainty by

building on the conclusions of the first article and expanding deeper into the banking sector.

In article 3 we narrow our scope to country-level analysis by shifting the focus to Lebanese banks. Our choice of Lebanon is driven by the disastrous collapse of the banking sector after three decades of remarkable performance. We model bank and country level stability (Z-score) on liquidity creation (cat.fat and cat.nonfat) and profitability (ROAA and ROAE, complemented by NIM), controlling banks' and banking sector specific characteristics plus macro controls and year dummies. We use annual bank level data for 57 Lebanese banks from 1997 to 2019 and we employ OLS regression and generalized method of moments (GMM) to examine the impact of liquidity creation and profitability on financial stability. Our results show that banks' liquidity creation is associated with higher financial instability in Lebanon while banks' profitability is positively linked to systemic stability. This article offers unique evidence on how financial system vulnerabilities can grow undetected over time in environments with doubtful institutional quality and constant political and economic uncertainty.

The Lebanese banks panel is compiled from BankFocus, Bankscope, Bilanbanques, and banks' annual reports. We perform manual reconciliation of missing items, harmonize classifications across sources and reporting periods, and run cross-source consistency checks. We create an unbalanced panel of 57 banks for the years 1997 to 2019 where mergers and exits are tracked explicitly to avoid bias. The resulting dataset is ready to be used in future research.

6. Originality and contributions

Our contribution to literature covers six dimensions: the conceptual framework, the choice of variables, the datasets, the empirical methodology, the results, and the policy and managerial recommendations.

First, we introduce an original conceptual framework linking banks' behavior and outcome with financial stability in uncertain environments. First, we explore the nature of relationships and possible causalities that exist between uncertainty, banks' strategic behavior measured by liquidity creation, and systemic financial stability. Then, we examine the impact of uncertainty on banks' outcomes measured by liquidity, profitability, and composite performance. And finally, we consider an exemplary case study where investigate the concurrent connections between financial stability, liquidity creation, and banks' profitability. Prior research examined these relationships

unconnectedly without offering a comprehensive analytical structure (Berger & Bouwman, 2009; Fungacova et al., 2021; Bonciani & Roye, 2016; Caglayan & Xu, 2018; Yuejiao Duan, Fan, & Wang, 2022).

Our framework treats uncertainty, liquidity creation, and financial stability as mutually dependent rather than as isolated relationships. Interpreting results from a holistic view explains why the effects can vary across contexts (e.g., liquidity creation supporting short-run earnings yet undermining long-run stability). For recommendations, our framework emphasizes early intervention, where signals from one variable (e.g., a deterioration in Z-scores) can be used to anticipate stress in the others (e.g., liquidity creation drop or a rise in macro uncertainty), improving the timeliness of corrective measures.

Second, on the variables level, we used a new liquidity creation calculation technique appropriate for consolidated data (D'Avino et al., 2022). We compute aggregate liquidity creation from available public banking financials for larger developing and emerging countries coverage where bank-level accounts are unavailable or inconsistent. We constructed an innovative composite bank performance index using principal component analysis. We build a composite performance index via PCA that jointly tracks the management of liquidity–profitability balance while avoiding the bias that arises when liquidity and profitability are examined in isolation. We used the world uncertainty index to capture multidimensional uncertainty as opposed to more restrictive uncertainty measures like the economic policy uncertainty index. To capture financial stability, we used country level and bank level scores simultaneously to account for both institutional and systemic stability. In addition, we adopt ROAA, ROAE, and NIM in the Lebanese case (chapter 3) to better capture profitability under volatile balance sheets.

Third, in addition to the original dataset compiled and used for the Lebanese case study (article 3), we use a comprehensive database covering all three levels of analysis which largely facilitates future analyses and research. For the macro level study, we use a dataset of 62 developing and emerging economies covering a period of 15 years. For the bank level tests, we use a large database of 2013 banks in 21 countries. and finally for the country level analysis, we use an original dataset of 57 Lebanese banks data from 1997 to 2019. To compile the dataset for Lebanese banks we followed a three-step process. Although the databases used are public, they do not provide data readily available for analysis. First, we collected annual observations from four different

sources: Orbis Bankfocus database, Bureau Vandijk's Bankscope, banks' annual reports, and the annual reports found in Bilanbanques[3]. Specifically, data between 1997 and 2007 was collected from Bankscope while Orbis BankFocus is the source of figures between 2007 and 2019. Second, missing financial figures were collected manually from electronic and print formats of the annual reports of "Bilanbanques" and individual banks. Third, to address reporting inconsistencies including different classifications and aggregation methods between different sources and across different time periods, we opted to a thorough control including comparisons between sources and across the years and a meticulous check of annual reports and notes.

Compiling our novel panels, we contribute to facilitating future research including Lebanon and other MENA countries. research infrastructure. Our work ensures auditability, allows extensions by adding future observations, and lowers the cost, effort, and time of future work where disclosure is limited.

Fourth, we employed different yet complementary empirical methodologies across different levels of the analysis to test the robustness of our models and the validity of our findings. For the cross-country macro level in article 1 we adopted the panel vector autoregression (PVAR) approach along with granger causality tests. The panel vector autoregression (PVAR) treats liquidity creation, uncertainty, and financial stability as reciprocally endogenous and employs orthogonalized impulse responses and Granger directional causality for validation. For bank and country level analysis we used OLS regressions with fixed and random effects and reinforced our results using the generalized method of moments method. The bank-level fixed-effects models control for time-invariant heterogeneity and use lags to handle endogeneity and cross-sectional dependence while the system-GMM addresses reverse causality. We also address heterogeneity by financial development, bank size, time periods using subpanels and dummy variables clarifying results discrepancies and validating findings contexts.

Fifth, our empirical findings add to the knowledge on banking behavior, outcomes, uncertainty and financial stability while challenging some dominant opinions. for instance, in article 1 we reveal that liquidity creation can directly affect financial stability and uncertainty. In article 2 we find that banks are successfully managing the tradeoff between liquidity and profitability under uncertainty. Finally in article 3 we reveal that, in Lebanon, vulnerability was endogenous to banks behavior was masked

[3] Local database for Lebanese banks.

by opacity and weak governance. A critical aspect of our research is the complementary aspect of all three articles and the convergence of our results. While on a macro level (chapter 1) we found that banks liquidity creation may jeopardize systemic financial stability, these findings were corroborated on a country and bank level (chapter 3). In addition, our findings in our first chapter (article 1) suggest that a timely intervention on bank's liquidity creation may attenuate the negative effects of uncertainty which is also validated by the results of chapter 2 showing that banks acting proactively are better in managing their overall performance and consequently their stability in uncertain environments.

Sixth, we offer practical policy and managerial recommendations. At the regulatory level, the results support early intervention targeting liquidity to mitigate the negative effect of uncertainty on financial stability. Our results support prudential policies that target liquidity creation directly while monitoring uncertainty. these policies include constraints on credit policies, surveillance of off-balance-sheet activities, and enhanced transparency and risk management standards. At the bank management level, the results emphasize the importance of operational efficiency and credit risk management in optimizing bank performance under uncertainty. Our findings support the fact that operational efficiency measured by the cost-to-income ratio and credit risk monitoring are the pillars that allow banks to carry prudent liquidity buffers without eroding overall performance in uncertain environments. Lastly, at the Lebanese national level, we stress the need for transparent regulatory actions and independent supervisory authorities. Our Lebanese case insights stress that independent supervision, reliable disclosure, and transparency are preconditions for restoring confidence and rebuilding the financial system.

In our thesis, we present systematic views of banking strategy under strategy by integrating a structured analysis of uncertainty, liquidity creation, banks' performance, and financial stability. We show when liquidity creation supports the stabilizing role of financial intermediation and when it becomes a destabilizing factor. We clarify how banks manage the liquidity–profitability frontier under uncertainty, and we translate these insights into practical managerial and policy recommendations.

7. The structure of the thesis

Our thesis is organized into three empirical articles framed by an introduction and a conclusion. We follow a logical progression starting with a macro-level exploration followed by a bank-level analysis and ending with a national level detailed investigation. This structure enables us to systematically explore the complex interactions between liquidity creation, profitability, uncertainty, and financial stability through diverse levels, and contexts.

Our thesis follows a funnel structure. Chapter 1 establishes macro-level relationships among liquidity creation, uncertainty, and financial stability and identifies directionality, causality, and timing. Chapter 2 then examines how individual banks adjust their strategies to simultaneously optimize their liquidity and profitability in response to uncertainty. Chapter 3 applies these insights to the Lebanese banking system, testing how banks' liquidity creation and profitability affect bank-level stability in a shady institutional setting. This succession ensures that findings at each level inform the next.

Chapter 1 examines the relationships between bank liquidity creation, uncertainty, and financial instability in developing and emerging economies using a macro-level analysis. We introduce the aggregate/consolidated liquidity creation measure, the World Uncertainty Index, and a country-level Z-score as the stability proxy where higher values imply greater stability. After testing and validation, we estimate a panel VAR with Impulse response functions and conduct panel-Granger causality tests and then we compare results across financial-development stages. In underdeveloped systems, we find that positive liquidity creation shocks tend to raise uncertainty and subsequently lower stability, whereas in more developed systems we document transient responses. From a policy recommendation perspective, we recommend a simultaneous monitoring of both liquidity creation and uncertainty indicators as well as early intervention when liquidity creation increases uncontrollably during uncertainty surges.

Chapter 2 analyses how uncertainty influences banks' strategy and outcomes in developing and emerging economies using a bank-level exploration. We define the PCA-based composite performance index that jointly reflects the liquidity–profitability frontier. We estimate bank fixed-effects regressions and reinforce our analysis with multiple robustness checks across regions and crisis periods and varying estimations

methods. Our results confirm existing literature offering additional evidence on how uncertainty increases liquidity and reduces profitability of banks. Though, our composite performance index shows improvement when uncertainty rises, which lead to our crucial findings proving the efficiency of banks' strategies to re-optimize their balance sheets and manage balance liquidity and profitability under uncertainty.

Chapter 3 investigates the role of Lebanese banks in nurturing financial instability. we provide detailed explanation of the measurement of bank-level liquidity creation using Berger–Bouwman categories three-step approach with and without off-balance-sheet items (cat.fat / cat.nonfat). we also present in detail the construction of bank-level Z-scores and the use of ROAA and ROAE with NIM as profitability indicators. We employ fixed-effects OLS and then system-GMM. We find that liquidity creation cultivates financial instability while profitability increases stability. Our results hold when using alternative profitability measures and aggregate country level Z-scores.

The three chapters of our thesis provide consistent evidence and insights. Macro and system-level interactions in the first chapter validate why banks rebalance liquidity and profitability under uncertainty as shown in the second chapter. Lastly, the Lebanese case investigated in chapter three demonstrates how unchecked liquidity creation can be destabilizing even when banks appear profitable.

Chapter 1: Bank liquidity creation, uncertainty, and financial instability: A panel VAR approach and causality analysis[4]

[4] *Article written with the support of D'Avino Carmela and Fromentin Vincent*

Abstract

In this article, we analyze the interrelationships and the causalities between banks' liquidity creation, uncertainty, and financial instability. We employ a panel VAR approach and panel Granger's causality tests and using a dataset of 62 developing and emerging countries. We find a robust reciprocal causal connection between uncertainty and financial stability, as well as a bidirectional causality between liquidity creation and financial stability. we find that financial stability may give rise to increased uncertainty, contrary to the consensus that uncertainty causes instability. We notice that liquidity creation may contribute to increased uncertainty mainly in countries with underdeveloped financial systems. Our findings underscore the importance of swift regulatory intervention to mitigate the adverse effects of uncertainty on financial stability. This recommendation is critical in countries with less developed financial systems.

Keywords: Liquidity creation; Uncertainty; Financial stability; Panel VAR; Granger causality; Impulse Response Function (IRF); Developing countries; Emerging countries.

1. Introduction

Liquidity creation is a fundamental function of the banking system, consisting in transforming liquid liabilities into illiquid assets. The factors affecting the extent of liquidity creation in banking have attracted notable seminal interest since the global financial crisis as an impairment of this functional activity by financial intermediaries has wider implications to financial and economic stability (Acharya & Thakor, 2016; Chatterjee, 2018; Van Dan Dang & Dang, 2021; V. T. Tran, Lin, & Nguyen, 2016; Wang, Lee, & Chen, 2022a; Xingmin Zhang et al., 2021). (Van Dan Dang & Dang, 2021; Horváth, Seidler, & Weill, 2014).

Understanding the relationship between the bank liquidity creation, uncertainty and financial stability is crucial given the macro-finance links established by banks via their liquidity creation function, in any given economy whether developed and developing (Allen & Carletti, 2012; Van Dan Dang & Dang, 2021; Horváth et al., 2014). Prior research document the negative effect of banking liquidity creation on financial stability by affecting banks' risk management approach and balance sheet positions (Acharya & Thakor, 2016; Davydov et al., 2021; Fungacova *et al.*, 2013). Berger & Bouwman, (2009) document the influence of bank liquidity creation on financial stability by highlighting the connection between excessive liquidity creation and the probability of a banking crises. However, the relationship between bank liquidity creation and financial stability under uncertainty has received limited attention.

Uncertainty is a disturbing factor that affects behavior of banks, corporations and individuals alike. Several studies report a decrease in bank liquidity creation under uncertainty (Berger, Guedhami, Kim, & Li, 2017, 2022; Van Dan Dang, 2022a; Wang et al., 2022a) while others document the relation between uncertainty and financial stability (Bilgin, Danisman, Demir, & Tarazi, 2021; T. C. Nguyen, 2021; Phan, Iyke, Sharma, & Affandi, 2021b; Shabir et al., 2021).

In this paper we investigate the relationship between banks' liquidity creation, uncertainty, and financial instability[5] at the cross-country level. We consider a large sample of 62 developing and emerging countries, using aggregate balance sheet variables, allowing us to overcome the shortcoming of missing, incomplete and incompatible financial information often encountered when considering non-developed

[5] In our paper, we refer to financial instability as a decline or absence of financial stability and therefore a decrease in financial stability and an increase in financial instability are used interchangeably.

countries data. The empirical framework employed in our investigation, namely the Panel VAR approach, allows us to account for the endogenous connections among our variables of interest and allowing us to empirically explore the direction and amplitude(s) of the interactions.

Our contribution to literature is threefold. First, we follow D'Avino et al., (2022) by using a novel approach to calculate the banks liquidity creation on an aggregate level overcoming the limitations of missing, incomplete, and incompatible financial information often encountered when considering non-developed country data. Second, we utilize the World Uncertainty Index developed by Ahir et al., (2022) to capture various forms of uncertainty not accounted for in other uncertainty measures. Third, by employing a panel VAR approach jointly with granger causality tests, we account for possible bidirectional causalities and endogenous interdependencies among our variables of interest. In our paper, we explore the linkage between bank liquidity creation, uncertainty, and financial instability in a new all-compassing macro-level empirical analysis. This approach allows us to draw general predictions instead of focusing on a single-country study.

Our paper is related to the body of literature that examines the causes and implications of bank liquidity creation. Among the causal effects, several studies have highlighted how monetary policy and regulatory interventions affect the extent of bank liquidity creation (Berger, Bouwman, Kick, & Schaeck, 2016; Pham, Le, & Nguyen, 2021). Regarding the implications, seminal contributions have shown a negative impact of bank liquidity creation on financial stability (Berger & Bouwman, 2017; Fungacova et al., 2013) and systemic risks (Louhichi et al., 2022; Xingmin Zhang et al., 2021). Turning to the role of uncertainty, various studies have highlighted the negative impact of rising uncertainties, caused by environmental or political risk, on liquidity creation and lending activity (Hsieh et al., 2022; Otero González et al., 2018).

The paper is organized as follows. Section 2 discusses the related literature and the theoretical framework. Section 3 provides a description of the variables and data. Sections 4 and 5 present the methodological approaches and the results respectively. Section 6 concludes.

2. Literature review and theoretical framework

2.1. Banks' liquidity creation and financial instability

Despite the crucial role of liquidity created by banks in promoting economic recovery and growth (Bassett et al., 2014; Chatterjee, 2018), a growing number of studies point to the adverse influence of bank liquidity creation on stability of the financial sector (Casu et al., 2019). Berger & Bouwman, (2017) found that relatively high liquidity creation is usually followed by financial crises. Relatedly, Berger et al., (2019) concluded that liquidity created by commercial banks negatively affects the financial stability of high-income countries but with no significant effect in low-income countries[6]. High levels of liquidity creation are also associated with higher probability of bank failure (Fungacova et al., 2021) and increased systemic risk of commercial banks (Louhichi et al., 2022; Xingmin Zhang et al., 2021). For instance, Davydov et al., (2021) and Acharya & Thakor (2016) showed that higher liquidity creation can exacerbate the vulnerability of financial institutions during times of market stress by increasing the degree of interconnectedness among institutions and markets. Turning to the links with financial stability, several papers recognize the negative relationship between liquidity creation and the capital of commercial banks (Casu et al., 2019; Fu et al., 2016; Fuad, 2021; Horváth et al., 2014; Le, 2019; Umar et al., 2018). Most notably, Berger & Bouwman (2017) find that a decrease in liquidity created follows tighter prudential regulatory measures, such as higher capital requirements. Similar results were found by Le & Pham, (2021) and Tang et al., (2021) for emerging economies. Conversely, Gupta & Kashiramka, (2020) report a positive relationship between liquidity creation and Indian banks stability, and Zheng et al., (2019) found a negative relationship between liquidity creation and bank failure risk for adequately capitalized US banks.

Based on the above literature, we posit that higher levels of liquidity creation are associated with lower financial stability of the banking system.

2.2. Banks' Liquidity Creation and Uncertainty

The uncertainty and liquidity creation nexus is examined extensively by previous literature with converging results. Wang et al., (2022) found that uncertainty, measured

[6] The authors use the World Bank's Atlas Method to identify low and high-income countries based on the development of their capital market.

by the economic policy uncertainty (EPU) negatively affects the assets-side liquidity creation while having a positive impact on liabilities-side liquidity creation[7]. The authors suggest that uncertainty motivates people to increase their deposits in banks considered safe and at the same time causes banks to reduce their risk-taking activities and thus reducing their loans. Furthermore, Hsieh et al., (2022) show that higher uncertainty driven by increased political risk negatively affects bank liquidity creation in Asian emerging economies. Similarly, Otero González et al., (2018) find a significant negative relation between environmental (country) risk and banks' liquidity transformation in five middle eastern countries and Gao et al., (2020) show that countries' internal conflict risk, proxied by the International Country Risk Guide (ICRG), has an adverse effect on the bank liquidity creation. Similarly, Dang (2022) finds that micro uncertainty prevents Vietnamese banks from creating more liquidity.

Several papers focus on the interdependence between monetary policy and liquidity creation. Van Dan Dang & Dang, (2021), Van Dan Dang & Huynh, (2022), and Kick, (2022) describe the linkage between monetary policy and Vietnamese banks' liquidity creation, while other papers report a decrease in liquidity creation in response to a regulatory intervention Berger et al., (2016) or a contractionary monetary policy Pham et al., (2021).

Turning to the connection with asset-side liquidity creation, different types of uncertainty have been found to decelerate bank lending. Particularly, higher levels of EPU are associated with a sizable drop in bank lending and a consequent decline in assets-side bank liquidity creation (Barraza & Civelli, 2020; Bordo et al., 2016; Caglayan & Xu, 2018; Hu & Gong, 2019; C. P. Nguyen et al., 2020; Shabir et al., 2022; Tian et al., 2022; Tran, 2020). Moreover, W. S. Wu & Suardi, (2021) reveal the negative impact of high economic uncertainty on bank loans. Also Jasova et al., (2021) report an

[7] The amount of liquidity created by a bank is the sum of the liquidity created on both sides of the bank's balance sheet: The assets-side liquidity creation is the amount of liquidity generated from the assets side of the bank's balance sheet; for instance, by holding liquid assets, including cash, balance with central banks, and some types of loans the banks are destructing liquidity, while they create liquidity by holding illiquid assets and therefore, the assets liquidity created can be summarized in the following formula: *liquid assets * (- 0.5) + semi liquid assets * 0 + illiquid assets * 0.5*

Moreover, the liabilities-side liquidity creation is the amount of liquidity generated from the liabilities side of the bank's balance sheet; by bearing liquid liabilities, including demand and saving deposits the banks are creating liquidity, while they destruct liquidity by assuming illiquid liabilities and therefore, the liabilities liquidity created can be summarized in the following formula: *liquid Liabilities * 0.5 + semi liquid Liabilities * 0 + illiquid Liabilities * (- 0.5)*

increase in bank lending of a decline in central bank policy uncertainty, while Gissler et al., (2016) find that banks tend to decrease their lending activity when they perceive a regulatory uncertainty. Banks' lending is found to have a general tendency to decrease during periods of significant economic volatility associated with country-level instability (Talavera et al., 2012) or in response to higher bank-level uncertainty (Buch et al., 2015; V. D. Dang & Nguyen, 2022). Nonetheless, the results of Cheng et al., (2021) show a growth in Chinese bank loans caused by higher political uncertainty in China. Lastly, good governance and proper capitalization have been found to mitigate the uncertainty effect on liquidity creation (Hsieh et al., 2022; Wang et al., 2022b).

2.3. Financial Instability and Uncertainty

A large body of literature discusses the relationship between different types of uncertainties and proxies of financial (in)stability. Several researchers document the negative effect of EPU on the financial stability of banks (T. C. Nguyen, 2021; Phan et al., 2021a; Qi et al.,2022; Shabir et al., 2021; Desalegn et al., 2023). This negative relationship is supported indirectly by a mounting number of papers that uncover a positive relation between EPU and banking risks and solvency aspects. For instance, T. P. T. Nguyen et al., (2021) find that EPU increases the risk appetite of banks, Duan et al., (2022) report an increased banks contribution to systemic risk associated with EPU, while the results of Matousek et al., (2020) show a decline in financial firms capital associated with economic policy uncertainty (EPU) which implies higher insolvencies and thus less stability. Moreover, Bilgin et al., (2021) and J. Wu et al., (2022) reveal that economic uncertainty, captured by Ahir et al's (2022) world uncertainty index (WUI), cultivates financial instability by impeding the stability of banks. Moreover, financial instability induced by higher risks and lower solvency of banks has been linked to political uncertainties (Al-Shboul et al., 2020; Karanasos & Yfanti, 2020), economic shocks and uncertainties in developed and emerging economies (Baum et al., 2021; J. Wu et al.,2021; J. Wu et al., 2020; Xing Zhang et al., 2022), and to monetary policy uncertainty (Ge et al., 2023).

While the damaging consequences on financial stability caused by uncertainties can be lessened by some cultural aspects and stronger regulatory and supervisory measures (Yuejiao Duan et al., 2022; T. C. Nguyen, 2021; Phan et al., 2021a; Shabir et al., 2021), a decrease in bank lending in response to uncertainty has been linked to amplified adverse effects on financial stability (Bonciani & Roye, 2016).

Based on the previous discussions, we can argue that higher levels of uncertainty can harm financial stability and increase systematic risk of banks[8].

3. Variables and Data

3.1. Liquidity Creation

D'Avino *et al.* (2022) propose a novel method to account for the banks' liquidity transformation function by calculating the amount of liquidity created using aggregate data of banks available through public sources such as the International Monetary Fund and countries' central banks. This method permits the inclusion of emerging and developing countries in our research where individual data of banks is not readily available. They use a two-step process to construct their liquidity creation measure: they start by classifying the balance sheet items of banks into liquid, semiliquid, and illiquid assets and liabilities. Then they assign a positive (+0.5) weight to illiquid assets and liquid liabilities and a negative (-0.5) weight to liquid assets and illiquid liabilities as well while semiliquid assets and liabilities are given a weight of zero. The signs of the weights are in line with Diamond & Dybvig's (1983) definition of liquidity creation while the weights follow Berger & Bouwman (2009). Finally, the liquidity creation is calculated as in the equation (1).

$$\begin{aligned} LC_{it} = {} & 0.5(Illiquid\ Assets)_{it} + 0(Semi-liquid\ Assets)_{it} \\ & - 0.5(Liquid\ Assets)_{it} + 0.5(Liquid\ Liabilities)_{it} \\ & + 0(Semi-liquid\ Liabilities)_{it} \\ & - 0.5(Illiquid\ Liabilities)_{it} \end{aligned} \tag{1}$$

Where LC is the amount of liquidity created by banks, i indicates the country, and t is the time index. One of our three variables of interest is the aggregate amount liquidity created by banks calculated by adopting the aforementioned two-step process divided by the amount of gross total assets (LC/GTA) to eliminate the effects of currency and size.

Data for our liquidity creation measure was obtained from the work of D'avino et al., (2022) who calculated the aggregate amount of liquidity created by banks for a set of

[8] Furthermore, the negative impact of economic and economic policy uncertainties on financial markets instability has been shown in the results of several papers (Cai *et al.*, 2020; Hoque *et al.*, 2019; Nalban & Smădu, 2021).

114 developing and emerging countries, by constructing an aggregate banks' liquidity creation measure similar to Berger & Bouwman's (2009) Cat.NonFat three steps procedure which excludes off-balance sheet items, as follows: First, using aggregate figures, they classified the total assets and liquidity of banks into three categories: liquid, semiliquid, and illiquid. Second, following the logic of Diamond & Dybvig (1983), where banks are considered to create liquidity by investing the money sourced from liquid liabilities (e.g. demand deposits) in illiquid assets (e.g. loans), they attributed positive weights of +0.5[9] to illiquid assets and liquid liabilities and negative weights of -0.5 to liquid assets and illiquid liabilities while semiliquid assets and liabilities are given the weight of 0. Third, they determined the amount of created liquidity by calculating the weighted sum of assets and liabilities using equation (1) above. As a final step, they normalized the values to one unit of currency by dividing the total amount of liquidity created by the total amount of banks' gross total assets, and thus, eliminating the size and currency effects. The authors used the publicly available dataset of the International Financial Statistics (IFS) database provided by the International Monetary Fund (IMF) to construct their dataset.

We complement this dataset by adding country-level bank liquidity creation for Lebanon, using the publicly available database of the Banque Du Liban (Lebanese Central Bank)[10]. Lebanon's current and recent financial, economic, and political crises are an example of uncertainty, instability, and banking function interactions (Krayem et al., 2022)[11].

We believe that utilizing this aggregate liquidity creation method is particularly important for three main reasons. Firstly, to the best of our knowledge, it is the first use of such measure to account for liquidity creation and examining its interaction with other financial and economic variables. Secondly, this method allows us to explore the relationship between the banking function (LC), uncertainty, and financial instability for a large array of developing and emerging economies usually ignored by previous research due to the absence or the unreliability of individual bank-level data. Thirdly, by using aggregate country-level data we gain a wider macro view of the examined

[9] The same weights adopted by Berger & Bouwman, (2009)

[10] Data Available for download from https://www.bdl.gov.lb/webroot/statistics/table.php?name=tsid4l and https://www.bdl.gov.lb/webroot/statistics/table.php?name=tsid4a

[11] *Lebanon Economic Monitor: Time for an Equitable Banking Resolution (English).* Washington, D.C. : World Bank Group. Report available for download at: http://documents.worldbank.org/curated/en/099927411232237649/IDU08288b3490ed820409e0886a08ea1efef93be

interactions between our variables from one side and a better comparability between countries from another side by reducing the impacts of the number of banks and the size of the banking sector. Additionally, it is worth to mention that, according to the authors, this liquidity creation measure is more accurate than other aggregate methods to capture liquidity creation. Particularly, CB/TA (credit to private sector / total assets) and LT gap (liquid assets – liquid liabilities) / total assets)) showed respectively slower reactivity and higher volatility in capturing the patterns of liquidity creation (D'Avino et al., 2022). Furthermore, the adopted aggregate liquidity creation measure successfully shows the buildup of liquidity in developing and emerging economies prior to the 2008 crisis and its decrease thereafter and thus implying the same association between liquidity creation and financial crises illustrated using the Berger and Bouwman's three steps Cat.Fat procedure (Berger & Bouwman, 2017).

3.2. Uncertainty

To account for uncertainty, we adopt the World Uncertainty Index (WUI) calculated by Ahir et al. (2022). The index corresponds to the frequency of the word "uncertain" or its variants in the Economist Intelligence Unit country reports. A higher level of uncertainty is reflected by a higher value of the index and vice versa. We use the smoothed three-quarter weighted moving average version of the World Uncertainty Index (WUI) which is the preferred measure for country-level data[12] (Ahir et al., 2022). The authors constructed their uncertainty measure (WUI) for a large array (143) of countries including developed, developing, and emerging economies. According to the authors, the index' value increases during periods of political and security turmoil, financial disruption, and social disorder such as the 9/11 attacks, the Gulf war, presidential elections, the Euro debt crisis, and the COVID-19 pandemic outbreak. Moreover, some evidence suggests that a surge in the index's value may precede a slump in output.

In several previous research (Wang et al., 2022, Berger; Guedhami et al., 2022; Nguyen, 2021; Shabir et al., 2021), uncertainty is usually measured by the Economic Policy Uncertainty index created by (Baker et al., 2016). However, we follow (Bilgin et al., 2021) in adopting the WUI for two main reasons: first, the WUI is based on a single source of reliable text-based information: the EIU which, in our opinion, makes it

[12] Data available for download from https://worlduncertaintyindex.com/data/

superior to the EPU in terms of reliability and comparability given that the latter is based on multiple text sources such as journals and newspapers which leaves room for low quality information and comparability issues. Second, the WUI is available for developing and emerging economies which makes it possible to cover the largest possible number of countries for our study. Consequently, to test the relationship between uncertainty, liquidity creation, and financial instability we use WUI country level data for 64 countries between 2000 and 2015 which gives us a total of 888 observations.

3.3. Financial Instability

To capture the degree of financial instability on a country's level, we employ the aggregate Z_{score} from the World Bank Global Financial Development database (GFD). The country-level annual Z_{score} is calculated as follows: (ROA+(E/A))/σ(ROA); Aggregate numbers are calculated from underlying individual bank's unconsolidated data from Bankscope and Orbis[13].

This Z_{score} measure is widely used in literature to depict the level of bank's financial stability, A lower score implies higher instability and vice versa (Gupta & Kashiramka, 2020; Soedarmono et al., 2011; Čihák et al., 2013; Detragiache et al., 2008; Fu et al., 2014; Lepetit & Strobel, 2013; Uhde & Heimeshoff, 2009; Strobel, 2011; Čihák et al., 2012).

According to Laeven & Levine, (2009), the $Z_{score}$is the inverse of the probability of insolvency knowing that insolvency is reached when accumulated losses wipe out the bank's equity. Therefore, a higher Z_{score} depicts lower probability of insolvency and consequently higher financial stability. In the same logic, we employ the aggregate country-level Z_{scores} from the World Bank's Global Financial Development database to capture the country's macro level of financial instability. This score is calculated, using the same bank's level methodology on an aggregate country-wide level, by dividing the sum of the banks' profitability (ROA) and capital adequacy ratio (Equity/Total Assets) by the volatility of profitability measured by its standard deviation (σROA). Our choice for this country-level Z_{score} is motivated by two causes. First, the reliability and consistency of the data given that country-year figures are not

[13] Data available for download from https://databank.worldbank.org/source/global-financial-development# Code: GFDD.SI.01 Indicator name : Bank Z_{score}

reported if bank-level observations are less than three[14]. Second, using a single and reliable source of data, tackles reporting and classification biases and enhances comparability between countries.

3.4. Control variables

In line with previous research (Berger & Bouwman, 2017; Berger & Sedunov, 2017; Gupta & Kashiramka, 2020; Schinasi, 2004; Al-Shboul et al., 2020; Berger et al., 2021; Dang, 2022; Hsieh et al., 2022; Nguyen, 2021) we add to our model other control variables that have been found to be linked to liquidity creation, financial stability, and uncertainty. These variables include real GDP growth (RGDP), inflation (INF) and governance effectiveness (GOVEFF).

Data for the real GDP growth and inflation are collected from the World Bank's World Development Indicators database. The annual GDP growth is the real annual growth rate based on 2015 U.S. dollars constant prices while the inflation is measured using the annual consumer price index (CPI)[15]. As for our governance and regulatory quality measure, we used a government effectiveness indicator from the World Bank's Worldwide Governance Indicators database. We opt for this indicator as a proxy for governance and regulatory quality since it captures the perceived quality of public services, civil service, and its resistance to political pressures, as well as policy application and government's policy commitment. The value of the indicator ranges between -2.5 and +2.5 where higher value depicts more effectiveness and vice versa[16].

3.5. Sub-panels

Lastly, given the mounting number of literature document the existence of close association between financial development, uncertainty and stability (Čihák et al., 2012; Kıvanç et al., 2019; Beck, et al., 2006; Loayza & Rancière, 2016), like Love & Zicchino (2006), we split the countries of our sample into two groups (details in

[14] See explanation and metadata available for download from https://databank.worldbank.org/source/global-financial-development# Code: GFDD.SI.01 Indicator name : Bank Z_{score}

[15] Data available for download from https://databank.worldbank.org/source/world-development-indicators Code: NY.GDP.MKTP.KD.ZG Indicator name : GDP growth (annual %) and Code: FP.CPI.TOTL.ZG Indicator name : Inflation, consumer prices (annual %)

[16] Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper No. 5430 (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130)
Data available for download from https://databank.worldbank.org/source/worldwide-governance-indicators Code: GE.EST Indicator name : Government Effectiveness: Estimate

appendix) based on the median of the "Financial system deposits to GDP" variable following Čihák et al., (2012), Demetriades & Hussein, (1996)[17] or Fromentin (2017). With this split (see tables A1 and A2), we investigate whether the LC – Uncertainty – Financial Stability relationship varies with the level of financial development, while controlling the robustness of our results.

3.6. Descriptive statistics

Tables 2 to 4 present the descriptive statistics of all countries in our sample, of the countries with high financial system development, and the of the countries with low financial development respectively. On average, the banks in our sample created 0.223 currency units to every one unit of gross total assets. This average drops to 0.214 among countries with highly developed financial systems while it rises to 0.234 for countries with low levels of financial development. Moreover, low financial development countries show a maximum of 0.551 of liquidity created while this amounts to only 0.443 in countries with stronger financial development. Regarding the uncertainty measure, the average WUI index is 0.057 for our sample and 0.059 for countries with stronger financial development. Surprisingly this index is lower (0.056) for countries with weaker financial development suggesting lower uncertainty. The average Z_{score} of our sample is 15.286 with a maximum value of 50.863 and a lowest score of 1.138. This average drops to 13.699 for the lower financial development subpanel implying higher financial instability for this group of countries. Details of the descriptive statistics by country are provided in the appendix (table A3).

Table 2 Descriptive Statistics: All Countries

Variable	Obs	Mean	Std. Dev.	Min	Max
lc	888	.223	.1	-.145	.551
wui	888	.057	.055	0	.325
zscore	888	15.286	8.606	1.138	50.863
goveff	888	-.326	.621	-2.091	1.254
rgdp growth	888	4.748	4.513	-21.1	36.9
inf	880	8.661	16.246	-4.9	359.9

Sources: Authors' computation based on data sources

The correlation matrices are presented in tables 5 to 7. In general, we notice a positive correlation between liquidity creation and uncertainty in addition to a positive

[17] Demetriades & Hussein (1996) excluded deposits in financial intermediaries other than banks. However, in our sample the difference between financial system deposits and banks deposits to GDP is zero and insignificant in extremely few cases.

correlation between liquidity creation and financial stability.

Table 3: Descriptive Statistics: High Financial Development

Variable	Obs	Mean	Std. Dev.	Min	Max
lc	457	.214	.104	-.095	.443
wui	457	.059	.051	0	.273
zscore	457	16.783	9.366	1.138	43.737
goveff	457	-.012	.558	-1.072	1.254
rgdp growth	457	4.137	3.793	-14.8	26.2
inf	449	6.17	6.856	-4.9	48.5

Source: Authors' computation based on data sources

Table 4 : Descriptive Statistics: High Financial Development

Variable	Obs	Mean	Std. Dev.	Min	Max
lc	431	.234	.095	-.145	.551
wui	431	.056	.059	0	.325
zscore	431	13.699	7.406	1.472	50.863
goveff	431	-.659	.499	-2.091	.64
rgdp growth	431	5.397	5.092	-21.1	36.9
inf	431	11.257	21.848	-3.3	359.9

Source: Authors' computation based on data sources

Uncertainty and financial stability seem to be negatively correlated. These expected preliminary observations hold for our sample in total and for our high financial development subsample.

Nevertheless, we observe the opposite relations for countries with lower financial development. We can notice that higher levels of liquidity creation are associated with more uncertainty and less financial instability in highly developed financial systems. Though, in countries with lower levels of financial development, higher liquidity creation is associated with lower uncertainty and higher financial instability. In addition, while we observe a positive correlation between financial instability and uncertainty in our sample and in countries with developed financial systems, this correlation becomes negative in our low financial development subsample. This is in line with Gupta & Kashiramka, (2020) who find that banks' liquidity creation is associated with higher Z_{score} and therefore higher stability for Indian banks that contradicts previous research in more developed countries. However, this divergence was linked to the different levels of banking systems' development. Consequently, we consider that these diverging preliminary results reinforce our decision to divide our dataset into subsamples based on the level of the countries' financial development.

Table 5: Matrix of correlations: All Countries

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) lc	1.000					
(2) wui	0.009	1.000				
(3) zscore	0.008	-0.026	1.000			
(4) goveff	-0.013	-0.003	-0.036	1.000		
(5) rgdp_growth	-0.035	-0.130	0.044	-0.097	1.000	
(6) inf	0.067	-0.071	0.020	-0.156	-0.060	1.000

Source: Authors' computation based on data sources

Table 6 : Matrix of correlations: High Financial Development

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) lc	1.000					
(2) wui	0.055	1.000				
(3) zscore	0.051	-0.072	1.000			
(4) goveff	0.011	-0.087	-0.338	1.000		
(5) rgdp_growth	-0.009	-0.138	0.191	0.012	1.000	
(6) inf	0.228	-0.006	0.339	-0.202	-0.102	1.000

Source: Authors' computation based on data sources

Table 7: Matrix of correlations: Low Financial Development

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) lc	1.000					
(2) wui	-0.031	1.000				
(3) zscore	-0.016	0.015	1.000			
(4) goveff	0.058	0.056	0.121	1.000		
(5) rgdp_growth	-0.078	-0.123	-0.042	-0.063	1.000	
(6) inf	0.008	-0.094	-0.057	-0.066	-0.086	1.000

Source: Authors' computation based on data sources

4. Empirical methodology

4.1. Panel Vector Autoregression (panel VAR) approach

Like Love & Zicchino (2006), we employ a panel-data VAR methodology to examine the interactions between banks' liquidity creation, uncertainty, and financial instability. This approach enables us to tackle the endogeneity of the variables in the system while tolerating potential individual heterogeneity.

Our reduced-form econometric VAR model is presented as follows:

$$X_{it} = \Gamma_0 + \Gamma_1 X_{it-1} + u_i + \varepsilon_{it}$$

Where X_t is a three-variable vector $[LC, WUI, Z_{score}]$. LC is the aggregate liquidity creation measure normalized to one unit of gross total assets, WUI is the world uncertainty index, and Z_{score} is the aggregate country-level banking sector. u_i is a vector of country's effects and ∈it is a vector of errors.

In line with Bassett et al. (2014), Lown & Morgan (2006) and Ciccarelli et al. (2015), we recognize the endogeneity between the variables of interest which motivates employing a VAR approach that acknowledges the mutual impacts of uncertainty, liquidity creation, and financial instability in a sample country. For instance, Wang, Lee, & Chen (2022) point to the possible existence of endogeneity between EPU and liquidity creation in a sense that excessive LC may trigger a response from regulators and thus increase uncertainty. In addition, we can isolate the responses of the variables to the shocks of other variables by using orthogonalized impulse response function. Following Boubtane et al. (2013) and Love & Zicchino, (2006), to avoid structural differences between cross-sectional units, we employ the Helmert procedure (Arellano & Bover, 1995) which maintains the orthogonality between lagged regressors and variables.

4.2. Panel causality tests

To test for causal relationship between our three variables, we adopt Dumitrescu & Hurlin's (2012) Granger's causality test applied for heterogeneous panel data (Fromentin, 2014). The model is perfectly adapted to our research in a way that allows us to account for the heterogeneous nature of our data composed of different countries, to consider the relatively small-time span (2001-2015), and to account for the time required for a shock on a given variable to produce an impact on the others.

Our employed Granger causality tests aim to examine a bidirectional relationship between the following variables: liquidity creation (LC), uncertainty (WUI) and financial instability (Z_{score}). We test the homogeneous non-causality between LC, WUI and Z_{score} for both directions. If the null hypothesis is accepted, then there is no homogenous directional causality between the variables and vice versa. The null hypothesis is rejected if $p < 0.05$ and indicating therefore the existence of a causal relationship. Moreover, we test the significance of our results using the normalized W-Stat and Zbar-Stat statistics suggested by (Dumitrescu & Hurlin, 2012).

Taking two stationary variables at a time, the bivariate granger causality equations are expressed as follows:

$$LC_{it} = \alpha_i + \sum_{k=1}^{k} \gamma_{ik}\, LC_{i,t-k} + \sum_{k=1}^{k} \beta_{ik}\, WUI_{i,t-k} + \varepsilon_{ik} \qquad \text{(G1)}$$

$$LC_{it} = \alpha_i + \sum_{k=1}^{k} \gamma_{ik}\, LC_{i,t-k} + \sum_{k=1}^{k} \beta_{ik}\, Zscore_{i,t-k} + \varepsilon_{ik} \qquad \text{(G2)}$$

$$WUI_{it} = \alpha_i + \sum_{k=1}^{k} \gamma_{ik}\, WUI_{i,t-k} + \sum_{k=1}^{k} \beta_{ik}\, LC_{i,t-k} + \varepsilon_{ik} \quad \text{(G3)}$$

$$WUI_{it} = \alpha_i + \sum_{k=1}^{k} \gamma_{ik}\, WUI_{i,t-k} + \sum_{k=1}^{k} \beta_{ik}\, Zscore_{i,t-k} + \varepsilon_{ik} \quad \text{(G4)}$$

$$Zscore_{it} = \alpha_i + \sum_{k=1}^{k} \gamma_{ik}\, Zscore_{i,t-k} + \sum_{k=1}^{k} \beta_{ik}\, LC_{i,t-k} + \varepsilon_{ik} \quad \text{(G5)}$$

$$Zscore_{it} = \alpha_i + \sum_{k=1}^{k} \gamma_{ik}\, Zscore_{i,t-k} + \sum_{k=1}^{k} \beta_{ik}\, WUI_{i,t-k} + \varepsilon_{ik} \quad \text{(G6)}$$

Where LC, WUI, and Z_{score} represent liquidity creation, uncertainty index, and Z_{score} respectively. The factors i and t depict time and country respectively, α represents individual fixed effects, k is the lags order, γik and βik stand for individual fixed factors, and εit represents the residual error term.

We can define for each equation the null hypothesis and its alternative as follows. For instance, considering equation (G1), we may formulate the following hypotheses:

H0: there is no causal relationship from WUI to LC for the whole sample.

$\beta_i = 0 \,; i = 1, \dots, N$

H1: there is at least one set (out of two coexisting sets) of individual values in the sample where causal relationship from WUI to LC exists.

$\beta_i = 0 \,; i = 1, \dots, N_1$

$\beta_i \neq 0 \,; i = N_1 + 1, \dots, N_1 + 2, \dots, N$

It is worth to note that the results are interpreted based on individual Wald statistics linked to non-causality hypothesis tests.

5. Results

5.1. Panel unit root tests

In order to correctly model the VAR panel, it is necessary to analyze the stationarity of the variables, using panel stationarity tests. We apply the test of Levin, Lin and Chu (LLC) (2002), which assumes common unit root process and Im–Pesaran–Shin (IPS) (2003), which assumes individual unit root process). In complement, because variables exhibit some dynamics common to the countries (in view of cross-section dependence test; Breusch-Pagan (LM): 6708.11 and Pesaran (CD): 7.84), the test of Pesaran (2007) in the presence of cross-section dependence (applied on a cylindrical panel) is also implemented. All tests strongly reject the null hypothesis that the panel has unit root (see Table 8). We can then estimate the VAR panel with I(0) variables.

Table 8: Panel unit root tests

	LLC	IPS	Pesaran CIPS
ALTM_GTA	-8.09***	-3.89***	-6.19***
ZSCORE	-10.01***	-6.66***	-6.15***
WUI	-11.08***	-8.53***	-5.91***

Note: *, **, and *** indicate statistical significance at the 10, 5, and 1% levels, respectively.

5.2. Panel causality tests

We present a summary of the Granger causality test results in Table 9, with our primary focus centered on the Dumitrescu and Hurlin (2012) (DH) methodology. Our analysis reveals compelling findings. Specifically, we find that liquidity creation (LC) Granger causes financial stability (Z_{score}) with statistical significance observed at lag orders one and two, at 1% and 10% significance levels, respectively. Additionally, it is evident that liquidity creation exhibits Granger causality over uncertainty (WUI) with a statistically significant level of 1%, operating under a one-lag delay.

Furthermore, our analysis suggests that financial stability (Z_{score}) exerts Granger causality upon liquidity creation (LC), exhibiting significance at both lag orders one and two, with significance levels of 1% and 5%, respectively. However, the converse relationship is observed for uncertainty (WUI) Granger causing financial stability, at a 5% significance level, but exclusively with a two-lag delay. Lastly, financial stability (Z_{score}) significantly Granger causes uncertainty (WUI) at the 1% significance level, operating with a lag of one year.

Table 9: Panel causality tests

	Common coefficients		Individual coefficients (DH)	
Lags	1	2	1	2
LC --> WUI	0.04	0.26	3.36***	0.43
WUI --> LC	1.26	1.09	-0.08	0.25
LC --> Z-score	0.19	0.32	5.26***	1.92*
Z-score --> LC	0.39	0.26	4.94***	2.00**
WUI --> Z-score	0.02	0.04	1.02	2.01**
Z-score --> WUI	0.55	0.98	2.69***	0.65

Note: The results suggested are F-statistics and Zbar-statistics. In our case, we prefer to comment on the significance of the Zbar statistics since the individual Wald statistic is less efficient as soon as T is fixed, even under the assumption of normality. The Dumitrescu and Hurlin test (2012) assumes that the order of the lags is common to all the individuals in the panel. *, **, and *** indicate statistical significance at the 10, 5, and 1% levels, respectively.

Evidently, a reciprocal causality relationship is apparent between LC and Z_{score}, demonstrating statistical significance exclusively at lag orders of 1 and 2 when employing the Dumitrescu and Hurlin (2012) (DH) method. A similar pattern of bidirectional causality is discernible in the association between uncertainty (WUI) and financial stability (Z_{score}). Specifically, uncertainty appears to Granger cause stability with a lag of 2 years, while Z_{score}Granger causes WUI with a lag of 1 year.

5.3. Panel VAR analysis and impulse-response functions

First, in connection with the literature review and panel causality tests, we estimate several reduced-form panel VAR with two equations for the two endogenous variables: 1) liquidity creation (LC) and financial instability (Z_{score}); 2) LC and uncertainty (WUI); and 3) Z_{score} and WUI. Secondly, we estimate a trivariate VAR panel, with the three endogenous variables for all countries, for countries with a "weak" level of financial development, and for those with a "strong" financial development level. We recall that the "weak" and "strong" differentiation is relative to our sample of countries. We believe that the level of development of the financial system can condition the sign and the amplitude of the interactions between the creation of liquidity, financial stability and instability. In addition, these additional estimates make it possible to verify the robustness of the results obtained, we integrate the following control variables: the GDP growth, inflation and government effectiveness.

Turning to the model selection, to best define the number of lags for the endogenous variables, we associate different factors: the lag retained in the panel causality tests and the optimal moment and model selection criteria (MMSC) following Andrews and Lu (2001)[18] and Abrigo and Love (2016), while remaining in consistency with our annual database. For parsimony, we chose one lag of the exogenous variables.

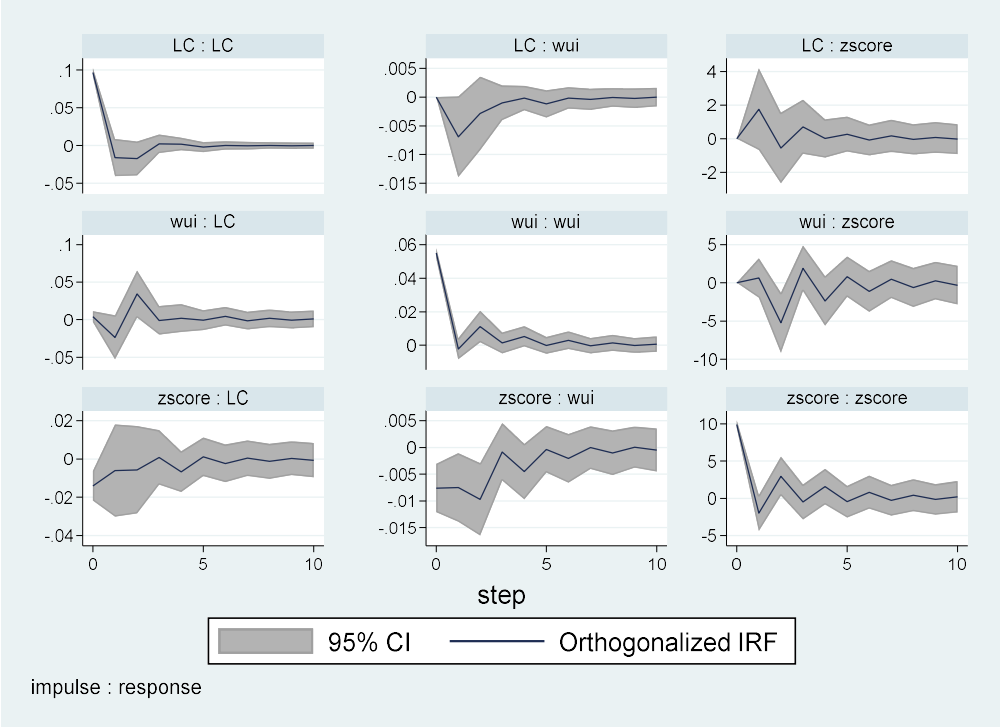
Concerning the estimation of the homogeneous panel VAR, we use direct mean differencing, also known as the "Helmert procedure" (see Arellano and Bover, 1995) to estimate the dynamic VAR model with the GMM system. This method preserves the orthogonality between the transformed variables and the regressors (for more details, see Love and Zicchino, 2006 or Khim et al., 2018). We check the stability condition of panel VAR estimates by calculating the modulus of each eigenvalue of the fitted model. For more readability on the interactions between the endogenous variables, we estimate

[18] They proposed MMSC for GMM models based on Hansen's (1982) J statistic of overidentifying restrictions.

the impulse response functions (IRF), using the Cholesky decomposition. Confidence intervals are determined using the IRF matrix from the coefficients of the VAR panel[19]. We present graphs of the IRF with the 5% error bands.

Figures 3, 4, and 5 display the graphs of impulse response functions (IRF) of the trivariate panel VAR for all countries, for countries with "developed" financial systems, and for countries with an "underdeveloped" level of financial development respectively. We analyze our orthogonalized impulse response function through three steps. First, we will analyze the results of the tri-variate VAR model in figure 1. Second, we will examine the results of developed separately as in figure 2. Lastly, we will study the results of the countries with underdeveloped financial systems as in figure 3. In addition, we will analyze the results of two endogenous variables VAR shown in figures A1-A6 in appendix.

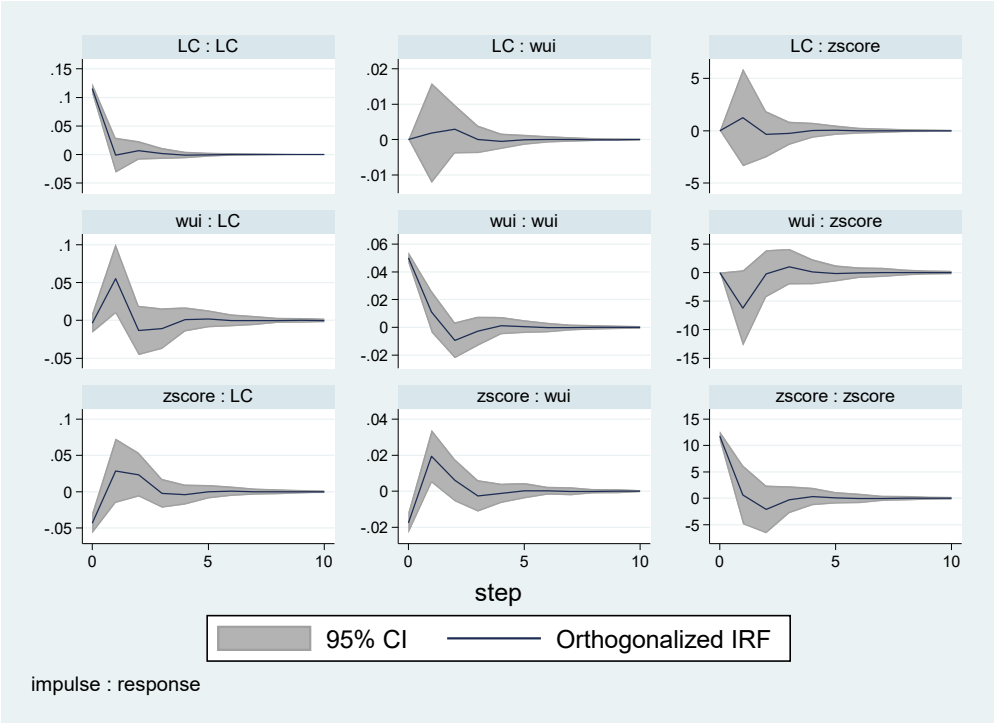
Figure 3: Interactions between LC, Z_score and WUI



Source: Authors' computation based on data sources

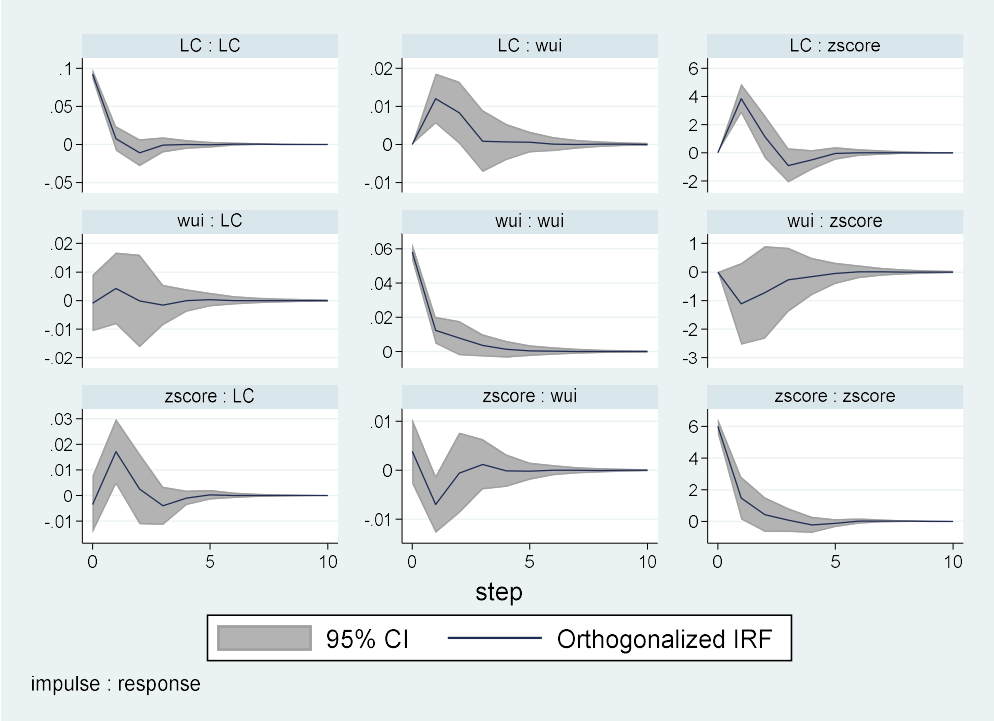
[19] Using the Monte Carlo simulation approach

Figure 4: Interactions between LC, Z_score and WUI – "Developed" financial systems – Panel 1



Source: Authors' computation based on data sources

Figure 5: Interactions between LC, Z_score and WUI – "Underdeveloped" financial systems – Panel 2



Source: Authors' computation based on data sources

Our tri-variate VAR model results are presented in figure 3. By analyzing the Impulse response functions, we observe that a shock on financial stability provokes immediate negative reactions from uncertainty and liquidity creation. While the liquidity creation reaction is short lived, the uncertainty response persists for more than two years. Moreover, we notice a lagging negative response from Zscore to a shock on "WUI" depicting a delayed increase in financial instability following an uncertainty shock. These initial results confirm the bi-directional relationship between our variables of interest previously shown in the causality tests.

To gain a deeper insight into the impulse responses among our three variables, while accounting for the heterogeneity within our panel, we partitioned our panel into two categories: countries characterized by low (underdeveloped) and high (developed) degrees of financial development. The corresponding results are presented in Figures 2 and 3.

Figure 4 illustrates the findings pertaining to countries characterized by developed financial systems. Consistent with our initial findings, a perturbation in financial stability, as quantified by the Z-score metric, precipitates an immediate, albeit transient, adverse impact on both liquidity creation (LC) and uncertainty (WUI).

Figure 5 depicts the outcomes pertaining to underdeveloped financial systems. In contrast to our prior observations, the impulse response functions reveal the following noteworthy relationships: a perturbation in liquidity creation exerts a positive, yet delayed, impact on both uncertainty and financial stability. Concurrently, a shock to the Z-score exhibits a positive influence on liquidity creation; nevertheless, this response is neither immediate nor long-lasting.

5.4. Summary of results

Our study reveals three pivotal findings. First, we establish the presence of bidirectional causality between liquidity creation, uncertainty, and financial stability. Precisely, our granger causality tests unveil a reciprocal causal relationship between uncertainty and financial stability proving that interventions aiming to reduce financial system shocks may lead to a reduction in uncertainty and consequently its effects. These assumptions are corroborated by the results of the Impulse Response Function analysis.

These relationships persist in countries with developed financial systems. Conversely, in countries with underdeveloped systems the results are not conclusive leading to our second finding verifying the heterogeneous relationships among our variables across

varying levels of financial development. Relatedly, we reveal a significant positive causality between liquidity creation and financial stability in countries with underdeveloped financial systems.

In terms of policy recommendations, our findings underscore the importance of addressing liquidity creation to promote financial stability in countries with less developed financial systems. Furthermore, careful control of banks' liquidity creation can have a stabilizing effect on the financial system and subsequently a reducing impact on uncertainty.

The results of our study diverge from the prevailing consensus by demonstrating that financial stability and liquidity creation can influence uncertainty, adding to the view that posits uncertainty as the causal factor for instability and liquidity creation disruption in partial contradiction of prior studies (Berger et al., 2019; Gupta & Kashiramka, 2020b; Zheng et al., 2019).

Our novel insights further emphasize the intricate interplay among these three variables and the complexity of maintaining systemic stability amid uncertainty.

To further elaborate, our results show that a shock in liquidity creation may temporarily increase uncertainty. This may be attributed to a prevailing negative perception of excessive liquidity creation among stakeholders. Such a situation may trigger regulatory responses from regulators and conservative behaviors among depositors which creates an uncertainty nurturing environment. These findings are particularly significant and persist in countries with less developed financial systems.

In accordance with prior research (Al-Shboul et al., 2020; Yuejiao Duan et al., 2022; T. C. Nguyen, 2021; Phan et al., 2021a; Shabir et al., 2021) we report an increase in financial instability in response to an uncertainty shock irrespective of the financial system development.

6. Conclusion

In this paper, we highlight the importance of the role of uncertainty in the relationship between bank liquidity creation and financial stability. We investigate the relationship between bank liquidity creation, uncertainty, and financial stability on a macro-level using a dataset of 62 developing and merging countries. Employing a panel VAR approach with granger causality tests we detect bidirectional causalities between liquidity creation and financial stability as well as between uncertainty and financial stability. Interestingly, we find a one direction causality from liquidity creation to

uncertainty. We complement our investigation with impulse response functions analysis adding more depth and a temporal dimension to our findings.

Our research adds to the existing literature by suggesting a new understanding of the interconnectedness between uncertainty, liquidity creation, and financial stability. Prior studies verified that negative impact of rising uncertainty on both financial stability and liquidity creation. However, our findings show that policy interventions and banks behavior liquidity creation may lessen the undesired effects of uncertainty on financial stability.

From a policy implications perspective, the results suggest that regulatory authorities should intervene early by adopting policies aimed at reducing uncertainty to mitigate its adverse effects on financial stability. Also, central bankers, particularly in countries with less developed financial systems, can achieve their objective of attaining and sustaining financial stability by monitoring and targeting both liquidity creation measures and uncertainty indicators. These policy implications underscore the centrality of monitoring the banks' liquidity creation during times of mounting uncertainty and the importance of early interventions which may strengthen financial stability in emerging and developing economies and help avoiding costly crises and economic downturns with dire social and human bills.

Chapter 2: The Impact of Uncertainty on Bank Liquidity and Profitability in Developing and Emerging Economies

Abstract

In this paper we explore how uncertainty affects banks' performance in developing and emerging economies. Using a dataset of 992 banks across 21 countries from 2005 to 2022, we examine the impact of uncertainty on banks' liquidity, profitability and a composite performance index constructed using principal component analysis. We employ OLS regression with fixed effect, and we validate the results using random effect and generalized method of moments methods. Our results show that uncertainty positively impacts the composite bank performance index and banks' liquidity, but its impact is negative on banks profitability confirming prior studies results. Contrary to typical expectations that uncertainty undermines performance, our results show that banks seem to strategically balance liquidity accumulation with profitability optimization in uncertain environments.

Our study offers practical managerial guidance for banks on efficiency as well as important policy recommendations for policy makers on inclusion and transparency.

JEL classification

G01 G21 G28

Keywords

Uncertainty, Bank Liquidity, Bank Profitability, Principal Component Analysis, Financial Stability, Banking Performance.

1. Introduction

A large body of literature examines the impact of uncertainty on banks profitability and liquidity from different perspectives (Diamond & Rajan, 2011; Dahal, 2024; Dang & Nguyen, 2022; Kouzez, 2023; Maroun & Fromentin, 2024; N. T. Nguyen et al., 2023; Shabir, Jiang, Wang, & Işık, 2023; Viet, Giau, Nguyen, & Viet, 2023; Berger, Guedhami, Kim, & Li, 2017; Barraza & Civelli, 2020; Hu & Gong, 2019; C. P. Nguyen, Le, & Su, 2020; Berger, Guedhami, Kim, & Li, 2022; Shabir, Jiang, Hashmi, & Bakhsh, 2022; Tian, Li, & You, 2022). Most studies examine the impact of uncertainty on banks profitability and liquidity as two separate outcomes while fewer studies investigate the effect of uncertainty on banks performance as a combined measure encompassing liquidity and profitability.

In response to rising economic and geopolitical uncertainties, banks tend to adopt more conservative measures by tightening their credit policies and minimizing their default risk exposure (Diamond & Rajan, 2011). These actions are useful in mitigating liquidity risk but they are harmful to the profitability of banks (Breitenlechner, Geiger, & Scharler, 2022; Ghosh, 2016a; Kouzez, 2023). Precisely, Vu (2024) reports an inverted U-shaped relationship between banks' liquidity and profitability where excessive liquidity holdings negatively impact the profitability of banks.

Liquidity risk is a primary concern for depositors, banks, and policymakers alike. In fact, liquidity shortages may trigger bank runs and even highly profitable banks may become insolvent leading widespread systemic instability (Acharya & Naqvi, 2012; Diamond & Rajan, 2005). Banks consistently increase their liquidity margins to preserve the confidence of stakeholders and prevent financial panic. However, as banks target higher liquidity ratios they are obliged to hold large amounts of cash and low yielding liquid assets which may dampen their profitability (Molyneux & Thornton, 1992). Reaching an optimal balance between liquidity and profitability is thus a crucial strategic concern for banks management.

Banks' liquidity and profitability are complementary indicators of bank performance, yet they are often examined separately. Liquidity reflects a bank's ability to meet short-term obligations and respond to external financial shocks (Kouzez, 2023; Shabir et al., 2021, 2022). Typically, liquidity is measured by the liquid assets to total assets and the liquid assets to deposits ratios. Profitability is commonly evaluated through the return on assets and the return on equity ratios. Bank's profitability measures its operational

efficiency in generating returns relative to its asset and equity bases (Pessarossi, Thevenon, & Weill, 2020; Shabir et al., 2021). While profitability and liquidity appear to be competing objectives, they are inherently interdependent. Specifically, increasing liquidity may lower returns while prioritizing profitability may reduce liquidity margins. This intricate situation emphasizes the need for a composite performance measure that integrates both liquidity and profitability that offers a holistic view of banks' performance.

To address this issue, we employ the principal component analysis to construct an integrated bank performance measure that combines profitability and liquidity in a single index. The PCA is a statistical dimensionality reduction technique that transforms several correlated indicators into a single composite measure. A major advantage of using the PCA method in financial and economic research is its ability to reduce dimensionality while preserving the relevant variance in the data (Sha'ban, Arun, Girardone, & Sarkisyan, 2023; Godspower-akpomiemie & Ojah, 2021; N. T. Nguyen et al., 2023). In addition, the use of PCA helps avoid multicollinearity problems arising from high correlations between profitability and liquidity ratios. By incorporating profitability and liquidity measures into a single PCA-based performance index, our research offers a comprehensive framework for analyzing banking sector behavior and performance under uncertainty.

In this study, we examine the impact of uncertainty on banks' liquidity and profitability across a large sample of 992 banks in 21 countries. We also investigate how this relationship is influenced by institutional and country-specific factors such as financial inclusion and political stability.

Our findings provide valuable insights for banks management, regulatory authorities, and policymakers, and offer practical guidance on how to improve banks' performance in uncertain environments.

Our study presents four key contributions to the body of literature. First, we develop an integrated approach to analyze the linkage between uncertainty, liquidity, and profitability while controlling for bank-specific and macroeconomic determinants. Second, we tackle the limitations of traditional single-metric approaches by constructing a composite performance index using principal component analysis. Third, we provide practical recommendations to banks' management to help them handle the effects of uncertainty and maintain long term stability. Fourth, we offer broad-based empirical insights by utilizing a large and diverse dataset covering multiple regional

and institutional conditions.

The rest of the paper is structured as follows: Section 2 presents the literature review and hypothesis development, Section 3 shows the data and variables selection, in section 4 we explain our methodology, in section 5 we report the empirical results of our models and the robustness tests, Section 6 presents a detailed discussion the findings and their implications, and Section 7 concludes with policy and managerial recommendations and directions for future research.

2. Literature review and hypothesis development

Our literature review is threefold, first we start by reviewing the relationship between uncertainty and banks liquidity, second we examine the relations between uncertainty and banks profitability, and finally we review the associations between banks' liquidity and their profitability.

2.1. Uncertainty and Bank Liquidity

Theoretically, in times of growing uncertainties, banks become more conservative and consequently more reluctant to giving new loans to enhance their liquidity margins (Diamond & Rajan, 2011). In fact, uncertainties may drive economic downturns and unexpected loans losses and write offs on corporate and individual levels alike. From an alternative viewpoint, depositors may face liquidity concerns during turbulent times, and therefore exceed their deposits withdrawals normal levels. Driven by financial soundness and profitability concerns, banks managers become more conservative and tighten their credit policies as uncertainties develop. This conservative approach eventually leads to improved banks liquidity to face the unexpected.

From an empirical perspective, a large body of research show a sizable drop in bank lending activity in association with high levels of economic policy uncertainties (Barraza & Civelli, 2020; Caglayan & Xu, 2018; Hu & Gong, 2019; T. V. H. Nguyen, Ahmed, Chevapatrakul, & Onali, 2020; Shabir et al., 2022; Tian et al., 2022; D. V. Tran, 2020). Furthermore, Breitenlechner, Geiger, & Scharler (2022) report the negative effect of uncertainty on US banks and found that this impact is more pronounced and lasts longer when banks liquidity is low.

Relatedly, we notice that the impact of uncertainty on bank liquidity is examined in literature from both sides: liquidity creation and liquidity hoarding. When banks create liquidity, they become less liquid and conversely banks become more liquid by

hoarding liquidity[20]. From a liquidity hoarding angle, Berger, Guedhami, Kim, & Li (2022) find an increase in bank liquidity hoarding in response to economic policy uncertainty (EPU). Additionally, Viet, Giau, Nguyen, & Viet (2023) document an increase in bank liquidity hoarding associated with the COVID pandemic escalation. Likewise, several studies report an increase in bank liquidity hoarding in response to interbank funding uncertainty shocks de Haan & van den End, 2013; Littke & Ossandon Busch (2021). Turning to liquidity creation perspective, a growing number of studies document the negative impact of different types of uncertainties on bank liquidity creation (Van Dan Dang, 2022b; Gao et al., 2020; Hsieh et al., 2022).

From the theoretical and empirical analyses explained above, we postulate our first hypothesis as follows:

H1: Increased uncertainty has a positive impact on overall banks liquidity.

2.2. Uncertainty and Bank Profitability

Like the impact of uncertainties on banks liquidity, the effect of these uncertainties on banks profitability is tightly connected to the perception and response of the banks' managers. Theoretically, as stated previously, uncertainty should lead to a more conservative behavior by banks and thus tightening their credit policies and limiting their loans. This behavior is normally a predecessor to lower Net interest Income and consequently lower profitability for banks.

In concordance with the theory, several empirical studies examined the relationship between uncertainty and banks' performance with converging findings. Precisely, Dang & Nguyen (2022) report a decrease in Vietnamese banks profitability in response to heightened uncertainty, while Shabir, Jiang, Wang, & Işık (2023) document a cross country decrease in banks' performance associated with uncertainties caused by the COVID-19 pandemic. In addition, Kouzez (2023) reports a deterioration in banks' performance during periods of mounting political instability in 58 countries. Also, Ghosh (2016) documents a decline in MENA banks' profitability during periods of political transition. Contrarywise, T. P. T. Nguyen, Nghiem, & Tripe (2021) found that increased uncertainty measured by the Economic Policy Uncertainty index (EPU) is associated with higher profitability and efficiency among Indian banks.

[20] For more info on liquidity creation and liquidity hoarding see (Deep & Schaefer, 2004), (Berger & Bouwman, 2009) and (Gale & Yorulmazer, 2013).

Based on the above review, we posit our second hypothesis as follows:

H2: An increase in uncertainty has a negative impact on banks' profitability

2.3. The Bank Liquidity-Profitability Relationship

In our last step in examining previous literature, we turn to explore the connection between banks' liquidity and their profitability.

Theoretically, bank liquidity and profitability are two banks outcomes that tend to be inversely related. In fact, prioritizing liquidity leads banks to hold more liquid assets that do not generate revenues and consequently resulting in lower profitability.

From an empirical perspective, Molyneux & Thornton (1992) report a negative but weak relationship between banks liquidity, measured by liquid asset holdings, and profitability due to cost associated with holding non-interest-bearing or low-yielding assets. However, the results of Pasiouras & Kosmidou (2007) show mixed results concerning the relationship between banks liquidity and profitability. More recently, while studying the effect of prudential regulatory policies on banks performance in China, He, Wu, Wang, & Xing (2023) found that these policies improve banks profitability and assets quality but decrease their liquidity. Similarly, Duan & Niu (2020) report a positive relationship between lower liquidity, as captured by total liquidity creation, and bank profitability. Though, V. T. Tran, Lin, & Nguyen (2016) and V. T. Tran et al. (2016) found that banks creating more liquidity, and therefore becoming less liquid, show lower profitability implying a direct positive relationship between liquidity and profitability.

Based on the above, we underline the important need for banks to find a balance between sufficient liquidity margins and optimal profitability to minimize their risk exposure without jeopardizing their performance.

To address the complexity of the relationship between bank profitability and liquidity, we follow (Godspower-akpomiemie & Ojah, 2021; N. T. Nguyen et al., 2023; Sha'ban et al., 2023) in adopting the Principal Component Analysis (PCA) approach to construct a combined performance indicator that includes both liquidity and profitability dimensions.

Using the PCA-based performance index in our study enables us to consolidate all four profitability and liquidity measures (ROA, ROE, LATA, LADEP) into a single measure. This approach facilitates our quest to evaluate the impact of uncertainty on both banks' performance outcomes simultaneously.

Based on theoretical insights and empirical findings, we propose the following hypotheses:

H3a: An increase in liquidity, accompanied by a decrease in profitability, suggests a conservative approach by bank management. This shift toward liquidity preservation at the expense of lending results in a lower PCA-based performance score due to the prioritization of financial stability over revenue generation.

H3b: An increase in liquidity, accompanied by an increase or no significant decrease in profitability, suggests more efficient liquidity management, leading to a stable or higher PCA-based performance score.

3. Data and variables

3.1. Data

Our bank level data covering bank profitability, liquidity, and other bank characteristics is obtained from Orbis BankFocus database. Our dataset covers 2 013 banks across 21 developing and emerging countries in the Middle East, Central Asia, and Asia-Pacific with a total of 17,856 bank-year observations from 2005 to 2022. To ensure consistency in economic development levels, we limit our analysis to countries under level 2 category of the IMF income classification.

To capture uncertainty, we utilize the World Uncertainty Index (WUI) developed by Ahir et al. (2022)[21]. We use the three-quarter weighted moving average version of the index for being the recommended measure for country-level data[22] (Ahir et al., 2022). Our WUI country level data for 21 countries between 2005 and 2022 gives us a total of 357 observations.

The data for control variables covering broader economic, regulatory and institutional influences are collected from different World Bank databases. We use the World Development Indicators (WDI) to source data related to financial development and macroeconomic indicators. The Worldwide Governance Indicators (WGI) provides data related to regulatory environment and governance. Also, we use the Global Financial Development (GFD) database to compile data covering financial inclusion.

[21] Data available for download from https://worlduncertaintyindex.com/data/
[22] Data available for download from https://worlduncertaintyindex.com/data/

3.2. Variables

We categorize our variables into four groups: uncertainty, bank liquidity, bank profitability, and control variables.

3.2.1. Uncertainty

To capture uncertainty, we opt for World Uncertainty Index (WUI) developed by Ahir et al. (2022). The WUI tracks the frequency of the word "uncertain" or its variations in the Economist Intelligence Unit country reports. A higher value of the index indicates a higher level of uncertainty and vice versa. Precisely the authors document an increase in the index' value s during periods of political instabilities and financial disruption, such as the 9/11 attacks, the Gulf war, presidential elections, the Euro debt crisis, and the COVID-19 pandemic outbreak (Ahir et al., 2022).

The Economic Policy Uncertainty (EPU) Index developed by Baker, Bloom, & Davis (2016) is commonly used by researchers to capture economic uncertainty (Berger et al., 2022; Wang, Lee, & Chen, 2022; T. C. Nguyen, 2021; Shabir, Jiang, Bakhsh, & Zhao, 2021).

However, following Bilgin, Danisman, Demir, & Tarazi (2021) we adopt the WUI for two main reasons: first, the WUI is superior to the EPU in terms of reliability and comparability given that it is based on the EIU as a single source of reliable text-based information. Second, the index is available for a large number of developing and emerging countries enabling us to cover the 21 countries in our dataset.

3.2.2. Bank Liquidity

To assess bank liquidity, we follow established literature and employ two widely recognized liquidity ratios that capture different dimensions of liquidity risk.

As a primary measure, we use the Liquid Assets to Total Assets (LATA) ratio following (Shabir et al., 2021, 2022). This ratio measures the proportion of liquid assets relative to total assets, providing insight into a bank's overall liquidity position and its ability to withstand short-term liquidity shocks. Liquid assets include vault cash and dues from central and other banks, trading securities, loans and advances to banks, repos, and other cash collaterals. A higher LATA ratio indicates a stronger liquidity buffer, reducing the likelihood of liquidity-driven financial distress.

We also follow (Kouzez, 2023; C. P. Nguyen et al., 2020) using the Liquid Assets to Deposits and Short-Term Liabilities (LADEP) ratio as another liquidity measure. This ratio assesses the availability of liquid assets to cover short-term funding needs, serving

as a key indicator of liquidity risk and potential funding stress. This ratio is particularly relevant in times of uncertainty as it reflects the bank's ability to manage sudden deposit withdrawals or funding disruptions.

3.2.3. Bank Profitability

Building on the existing literature, we employ two widely recognized financial metrics to assess bank profitability: Return on Assets (ROA) and Return on Equity (ROE) (Shabir et al., 2021; Shabir et al., 2022; Kouzez, 2023; C. P. Nguyen et al., 2020; Fang, Lau, Lu, Tan, & Zhang, 2019; Pessarossi, Thevenon, & Weill, 2020). These indicators are extensively utilized in banking and financial research as they offer distinct yet complementary insights into banks' financial performance. ROE is defined as net income per unit of shareholder equity and serves as a key measure of profitability from the perspective of shareholders. It reflects the efficiency with which a bank utilizes its equity capital to generate profits. A higher ROE signifies greater shareholder value making it particularly relevant for shareholders assessing financial performance and risk-adjusted returns. Conversely, ROA, measured as net income per unit of total assets provides a broader assessment of overall profitability, incorporating the bank's ability to effectively allocate and utilize its total assets to generate returns. Unlike ROE, which is influenced by financial leverage and capital structure, ROA offers a more comprehensive measure of operational efficiency and profitability unrestrained by the bank's financing decisions. Given these conceptual distinctions, the simultaneous use of ROA and ROE enables a rigorous and multifaceted analysis of bank profitability ensuring that both firm-level and shareholder-centric perspectives are adequately captured. This approach enhances the robustness of our empirical findings, allowing for a more nuanced interpretation of bank performance across different financial structures and economic contexts.

3.2.4. Control Variables

To account for bank-specific characteristics, following Gupta & Kashiramka (2020) and Zhenget al. (2019) we employ the CAMEL framework as a widely recognized system for evaluating banking performance and stability. Within this framework, we incorporate multiple financial indicators to comprehensively assess the key attributes of banking institutions. Capital adequacy is measured using the total capital adequacy ratio (CAR), which reflects the bank's financial resilience and ability to absorb potential losses. Asset quality is captured through loan loss reserves as a percentage of gross

customer loans and advances (RES), serving as an indicator of the bank's risk exposure and provisioning policies. Managerial efficiency is proxied by the cost-to-income ratio (CIR), which evaluates operational effectiveness and cost management. Liquidity risk is accounted for using either the ratio of liquid assets to total assets or the ratio of liquid assets to short-term funding and deposits (LIQ), with the specific measure depending on the model specification and the dependent variables employed. Furthermore, to capture earnings (EAR), either return on assets (ROA) or return on equity (ROE) is included, depending on the model framework. In addition to bank-specific factors, institutional and macroeconomic variables are integrated into the analysis. The "Absence of Violence or Terrorism" indicator (STA) is included to account for political stability and the strength of governance and legal frameworks within a given country. Financial inclusion is represented by the number of bank branches per 100 adults (INC), which serves as a proxy for accessibility to financial services. Finally, macroeconomic conditions are controlled for using GDP growth per capita (GDP), which captures economic expansion trends. This comprehensive approach ensures that the analysis systematically accounts for the interplay between bank-level, institutional, and macroeconomic determinants, thereby enhancing the robustness and validity of the empirical findings.

4. Methodology

4.1. Empirical methodology

To examine the relationship between uncertainty, banks liquidity, and profitability, we employ Ordinary Least Squares (OLS) regression with fixed effect for panel data following (Wooldridge, (2010); Baltagi, (2008); Flannery & Watson, (2013)) . This methodology enables us to control for heterogeneity across banks and countries in our data while accounting for other bank-specific and macroeconomic factors. Given that our study focuses on banks across multiple developing and emerging countries (DECs), the use of OLS regression with fixed effects is convenient as it allows us to control for time-invariant institutional factors such as regulatory frameworks and governance structures, as well as overall institutional quality and political stability.

Table 10: Definitions of variables

Variables	Description	Source
Dependent Variables		
Bank's Liquidity : LATA	Log of Liquid assets / Total Assets	BankFocus, and authors' calculation
Bank's Liquidity : LADEP	Log of Liquid assets / ST funding and deposits	
PCA Liquidity Component	C_LIQ	
Bank's profitability : ROE	Log of Net Income / Common Equity	
Bank's profitability : ROA	Log of Net Income / Total Assets	
PCA Liquidity Component	C_PROF	
Bank's Performance	C_PERF	
Independent Variables		
WUI	Log of the smoothed three-quarter weighted moving average version of the World Uncertainty Index (WUI) developed by Ahir *et al.* (2022)	www.theworlduncertainty index.com
Control Variables		
INC	Log of the number of bank branches per 100 adults as a proxy for financial inclusion	Global Financial Development (GFD)
STA	Political Stability – Absence of Violence	Worldwide Governance Indicators (WGI)
TA	Log of total assets	BankFocus, and authors' calculation
CAR	Capital Adequacy ratio	BankFocus, and authors' calculation
RES	loan loss reserves as a percentage of gross customer loans & advances	Same as above
CIR	Cost to income ratio	Same as above
GDP	GDP growth per capita	World Development Indicators (WDI)

Note(s): This table shows the description and the sources of our variables.

4.2. Model estimation and variables construction

We estimate three models to examine the impact of uncertainty on the different dimensions of bank performance:

The first is the Liquidity Model (LATA, LADEP, C_LIQ as dependent variables)
The second is the Profitability Model (ROA, ROE, C_PROF as dependent variables)
And the third is a PCA-based Combined Performance Model (C_PERF)
Our general model is estimated as follows:

$$Y_{i,t} = \alpha_0 + \beta_1 WUI_{i,t-1} + \beta_2 INC_{i,t-1} + \beta_3 STA_{i,t-1} + \beta_4 TA_{i,t-1} + \beta_5 CAR_{i,t-1} + \beta_6 RES_{i,t-1} + \beta_7 CIR_{i,t-1} + \beta_8 GDP_{i,t-1} + \beta_9 X_{i,t-1} + D + \varepsilon_{i,t}$$

Where:

$Y_{i,t}$ denotes the dependent variable (liquidity, profitability, or combined performance).

$WUI_{i,t-1}$ is the lagged uncertainty index.

INC, STA, TA, CAR, RES, CIR, GDP are the control variables for financial inclusion, political stability, total assets, capital adequacy, risk provisions, cost efficiency, and GDP growth respectively.

$X_{i,t-1}$ denotes additional control variables (ROA, ROE, LATA, LADEP).

D represents the dummy variables for region, COVID, and the Global Financial Crisis (GFC).

$\varepsilon_{i,t}$ is the error term.

4.3. Principal component analysis for combined performance measure

We use the Principal Component Analysis (PCA) to construct a comprehensive bank performance measure that combines both bank liquidity and profitability. The PCA has been extensively applied in banking and finance to develop composite indicators that synthesize multiple financial metrics into a singular index to reduce dimensionality while preserving the relevant variance in the data (Sha'ban, Arun, Girardone, & Sarkisyan, (2023); Godspower-akpomiemie & Ojah, (2021); N. T. Nguyen et al., (2023)).

The advantages of the PCA method in financial and economic research include dimensionality reduction which retains relevant explanatory capacity of the original data and minimizes redundancy. Additionally, the use of PCA addresses multicollinearity problems arising from high correlations between different profitability

and liquidity indicators. Furthermore, the PCA ensure objective weights allocation among our profitability and liquidity ratios.

For our analysis, we construct three composite performance measures:

First we build a profitability composite measure (C_PROF) combining the Return on Assets (ROA) and the Return on Equity (ROE) ratios. This measure provides a comprehensive bank profitability indicator combining both assets utilization and shareholders perspectives.

Our second PCA measure is a composite liquidity (C_LIQ) measure including both Liquid Assets to Total Assets (LATA) and Liquid Assets to Deposits (LADEP) ratios.

Our third PCA measure (P_PERF) is an all-encompassing bank performance indicator synthesizing all four profitability and liquidity measures. The main purpose of this indicator is to provide a comprehensive performance measure accounting simultaneously for liquidity and profitability.

In line with previous research(Godspower-akpomiemie & Ojah, 2021; N. T. Nguyen et al., 2023; Sha'ban et al., 2023), we examined the eigenvalues and factor loadings to verify the statistical validity of our indicators.

4.4. Model Specifications

To examine the impact of uncertainty on bank liquidity and profitability and to take into consideration the tradeoff between profitability and liquidity, we specify the following three models:

The first model enables us to examine the effect of uncertainty on bank liquidity.

Model 1: The Effect of Uncertainty on Liquidity

$$LIQ_{i,t} = \alpha_0 + \beta_1 WUI_{i,t-1} + \beta_2 INC_{i,t-1} + \beta_3 STA_{i,t-1} + \beta 4 TA_{i,t-1} + \beta_5 CAR_{i,t-1} + \beta_6 RES_{i,t-1} + \beta_7 CIR_{i,t-1} + \beta_8 GDP_{i,t-1} + \beta_9 X_{i,t-1} + D + \varepsilon_{i,t}$$

Where LIQ is measured using LATA or LADEP or C_LIQ.

Our second model measures the impact of uncertainty on bank profitability.

Model 2: The Effect of Uncertainty on Profitability

$$PRO_{i,t} = \alpha_0 + \beta_1 WUI_{i,t-1} + \beta_2 INC_{i,t-1} + \beta_3 STA_{i,t-1} + \beta 4 TA_{i,t-1} + \beta_5 CAR_{i,t-1} + \beta_6 RES_{i,t-1} + \beta_7 CIR_{i,t-1} + \beta_8 GDP_{i,t-1} + \beta_9 X_{i,t-1} + D + \varepsilon_{i,t}$$

Where PRO is measured using ROA or ROE or C_PROF.

Our third comprehensive model investigates the impact of uncertainty on bank performance as a combined measure of both profitability and liquidity.

Model 3: The Effect of Uncertainty on Combined Performance (PCA Measure)

$$PER_{i,t} = \alpha_0 + \beta_1 WUI_{i,t-1} + \beta_2 INC_{i,t-1} + \beta_3 STA_{i,t-1} + \beta_4 TA_{i,t-1} + \beta_5 CAR_{i,t-1} + \beta_6 RES_{i,t-1} + \beta_7 CIR_{i,t-1} + \beta_8 GDP_{i,t-1} + \beta_9 X_{i,t-1} + D + \varepsilon_{i,t}$$

Where PER represents the PCA-based combined performance measure C_PERF.

4.5. Robustness Checks

To validate the consistency of our findings, we run the following robustness tests. These checks strengthen our results and ensure that they are not influenced by sample-specific biases or modeling assumptions.

4.5.1. Geographic segmentation analysis

To investigate the potential impact of regional differences on the relationship between uncertainty and bank performance, we estimate our three models separately for different geographic regions. Precisely, to examine whether uncertainty affects bank performance differently across geographic regions with different governance and regulatory contexts, we run separate analysis for the Middle East and Central Asia Department (MCD) and the Asia and Pacific Department (APD).

4.5.2 Time-Break Analysis: The Role of Economic Crises

To assess the impact of uncertainty on bank performance across different periods marked by major crises or disruptions, we run our models across three distinct time periods as follows. First, we run our models for the period before the Global Financial Crisis (Pre-2008), then our second test covers the data between 2008 and the COVID-19 crisis (2008-2019) and finally we test the relationships validity for the COVID-19 era (Post-2019).

4.5.2. Alternative estimation techniques

To test the validity of our econometric approach, we employ alternative estimation techniques including the random effect model to determine whether results are influenced by unobserved time-invariant heterogeneity. Furthermore, we adopt the generalized method of moments (GMM) method to address potential endogeneity concerns.

These robustness tests help us confirm the consistency statistical robustness of our empirical findings.

5. Empirical results

In this section, we present the results of the study. First, we present the descriptive statistics and the correlation matrix of the variables used in our analysis. Then, we discuss the results of the panel model followed by a presentation of the robustness test results.

5.1. Descriptive statistics

Summary statistics are shown in Table 11. The mean value of The World Uncertainty Index (log WUI) is -3.17 with a standard deviation of 0.851 showing a relatively high level of uncertainty in the sample. The moderate fluctuations between our minimum and maximum values indicate the existence of heterogenous levels of uncertainty in our sample. . The mean and standard deviation values of both liquid assets to total assets (log LATA) and liquid assets to deposits (log LADEP) ratios are -1.073, -1.099, 0.561 and 0.971 respectively. These results indicate the presence of moderate liquidity margins across banks in our sample. Turning to profitability measures, the return on assets (log ROA) shows a mean value of -4.687 and a standard deviation of .968 while the return on equity (log ROE) shows a mean value of -2.528 and a standard deviation of 1.052. These results indicate low average profitability with significant variation across banks.

Table 11: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
WUI	15967	-3.17	.851	-6.107	-1.208
LALA	10607	-1.073	.561	-9.59	0
LADEP	10367	-1.099	.971	-6.127	11.707
ROA	8826	-4.687	.968	-11.752	-.246
ROE	8883	-2.528	1.052	-10.099	5.843
INC	13957	-4.451	.902	-8.662	.579
STA	17856	-.728	.758	-2.826	1.224
TA	10618	15.034	2.428	4.967	22.458
CAR	8920	.307	2.907	-1.379	200
RES	9622	.052	.142	0	6.882
CIR	9645	.052	56.405	-5517.875	440.647
GDP	17816	.038	.048	-.197	.33

Note(s): This table shows the summary statistics of our variables. All variables are defined in Table10. The amount of data differs from one variable to another due to unavailable temporal observations for some banks.

Turning to the control variables, we can detect low levels of financial inclusion (log

inclusion) with sizable disparities between countries. Similarly, political stability varies significantly across the sample with a standard deviation of .758. Bank's total assets display a standard deviation of 2.428 highlighting the size difference among banks in our sample. With a mean value of .307, the capital adequacy ratio suggests that most of the banks in our sample are sufficiently capitalized. The cost-to-income ratio mean and standard deviation values indicate significant differences between banks in terms of managerial efficiency, showing that some banks maybe experiencing critical operational inefficiencies.

5.2. Correlation matrix

The World Uncertainty Index (WUI) shows weak correlations with other variables. Its negative correlation with profitability indicators (ROA: -0.065, ROE: -0.048) suggests that increased uncertainty adversely affects bank profitability. The weak correlation between WUI and political stability (-0.011) curiously indicates their relative independence. The negative correlations between log LATA and ROA (-0.109) and between log LADEP and ROE (-0.133) show that banks liquidity is inversely related to their profitability. Additionally, the weak negative correlation between LADEP and political stability (-0.094) suggests that banks in politically unstable environments may hold higher liquidity reserves as a precautionary measure. The positive correlation between ROA and financial inclusion (0.133) suggests that financial inclusion may provide marginal benefits to profitability. Similarly, ROE's correlation with total assets (0.268) indicates that larger banks achieve higher returns on equity. The negative correlations between financial inclusion and liquidity indicators (LATA: -0.083, log LADEP: -0.068) suggest that banks in more financially inclusive environments maintain lower liquidity reserves. Political stability's negative correlation with loan loss reserves (-0.207) suggests that political instability leads banks to increase their credit risk provisions, reinforcing the link between political uncertainty and conservative risk management. The positive correlations between GDP growth and ROE (0.114) and total assets (0.112) imply that economic expansion nurtures profitability and bank growth.

Table 12: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) WUI	1.000											
(2) LATA	0.063	1.000										
(3) LADEP	-0.005	0.465	1.000									
(4) ROA	-0.065	-0.109	0.029	1.000								
(5) ROE	-0.048	-0.025	-0.133	0.841	1.000							
(6) INC	0.015	-0.083	-0.068	0.133	0.052	1.000						
(7) STA	-0.011	-0.233	-0.094	0.057	0.023	0.036	1.000					
(8) TA	0.046	0.138	-0.186	0.006	0.268	0.006	0.177	1.000				
(9) CAR	-0.010	-0.011	0.022	0.016	-0.011	-0.007	-0.014	-0.032	1.000			
(10) RES	0.021	0.150	0.208	0.011	-0.077	-0.100	-0.207	-0.123	0.010	1.000		
(11) CIR	-0.033	0.002	0.023	-0.009	-0.022	-0.024	-0.028	-0.052	-0.002	0.178	1.000	
(12) GDP	0.012	0.082	-0.089	-0.011	0.114	-0.155	-0.032	0.112	0.002	-0.148	-0.003	1.000

Note(s): This table shows the correlation coefficients matrix of the variables in our sample. All variables are defined in Table 10.

5.3.Results of the panel model

5.3.1 The Effect of Uncertainty on Liquidity

The results from our first model reveal that economic uncertainty exerts a statistically significant and positive effect on liquidity when measured by LATA and the PCA-based liquidity index which confirms our first hypothesis. However, its impact on deposit-based liquidity (LADEP) is statistically insignificant. In line with previous studies, (Acharya & Naqvi, (2012); Viet et al., (2023); Berger et al., (2022); de Haan & van den End, (2013); Littke & Ossandon Busch, (2021)), these findings suggest that banks respond to increased uncertainty by increasing their holdings of liquid assets relative to total assets.

Furthermore, our results indicate that financial inclusion shows a strong negative association with liquidity measures across all models. A possible explanation for this inverse relationship is that financial inclusion fosters deposit stability and thus, reducing the necessity for banks to retain precautionary liquidity margins (Morgan, (2014); Ahamed & Mallick, (2019)).

Besides, our results reveal a negative and statistically significant relationship between political stability and liquidity. Our findings may indicate that banks tend to hold less liquid assets in politically stable environments. Our results are in line with the findings of Attila (2024) and Alireza, Irani, & Alal (2023).

Also, the results of our first model reaffirm the trade-off between liquidity and profitability in line with previous research (Horváth, Seidler, & Weill, (2014); Distinguin, Roulet, & Tarazi, (2013)).

Turning to the relationship between liquidity and bank size, our results indicate a positive and statistically significant association between total assets and bank liquidity. Consistent with the previous studies (Horváth, Seidler, & Weill, (2014); Distinguin, Roulet, & Tarazi, (2013)), these findings highlight that larger banks benefit from better diversification and better access to interbank funding opportunities which allows them to maintain higher liquidity buffers. Besides, a possible explanation of the negative coefficient on LADEP is the relative stability of large banks in times of uncertainty making them more attractive to depositors and potentially reflecting a flight-to-safety phenomenon.

The strong and positive association between loan loss reserves and bank liquidity implies that banks with credit risk exposure tend to accumulate higher liquidity buffers.

Table 13: The effect of Uncertainty on Liquidity

VARIABLES	LADEP	LADEP	LATA	LATA	C_LIQ
WUI	-0.004	-0.005	0.016**	0.018**	0.042***
	(0.011)	(0.011)	(0.007)	(0.007)	(0.016)
INC	-0.088***	-0.087***	-0.030***	-0.034***	-0.063***
	(0.011)	(0.011)	(0.007)	(0.007)	(0.015)
STA	-0.034**	-0.032**	-0.135***	-0.141***	-0.224***
	(0.014)	(0.013)	(0.008)	(0.008)	(0.019)
ROA	0.019*		-0.041***		
	(0.010)		(0.007)		
TA	-0.051***	-0.040***	0.045***	0.048***	0.018**
	(0.005)	(0.005)	(0.003)	(0.003)	(0.007)
CAR	0.004	0.004	-0.001	-0.001	0.002
	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)
RES	1.441***	1.149***	0.963***	0.853***	0.364**
	(0.196)	(0.182)	(0.122)	(0.114)	(0.155)
CIR	-0.005	-0.002	-0.005	-0.002	0.000
	(0.006)	(0.005)	(0.004)	(0.003)	(0.005)
GDP	0.568*	0.733**	1.688***	1.723***	1.454***
	(0.324)	(0.324)	(0.201)	(0.202)	(0.445)
Region	0.309***	0.338***	0.120***	0.116***	0.153***
	(0.026)	(0.026)	(0.016)	(0.016)	(0.035)
ROE		-0.069***		-0.028***	
		(0.010)		(0.006)	
C_PROF					-0.056
					(0.044)
Constant	-0.915***	-1.356***	-2.229***	-2.174***	-0.674***
	(0.116)	(0.116)	(0.072)	(0.072)	(0.146)
Observations	5,300	5,303	5,306	5,309	5,702
R-squared	0.101	0.106	0.127	0.123	0.040
Number of time	17	17	17	17	17
r2_o	0.0963	0.104	0.121	0.116	0.0363

Note(s): this table reports the results of our first model examining the effect of uncertainty on liquidity. All variables are defined in Table 10. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

This result also suggest that banks adopt a prudent approach to liquidity management under uncertainty (Board & Berrospide, (2013); Imbierowicz & Rauch, (2014)).

Lastly, we document a positive and statistically significant relationship between GDP growth per capita and bank liquidity. This result suggests that economic growth facilitates banks' ability to accumulate liquid assets in anticipation of future credit demand and lending opportunities(Acharya & Naqvi, 2012).

5.3.2 The Effect of Uncertainty on Profitability

The empirical results from Model 2 confirm our second hypothesis by showing that uncertainty (WUI) has a statistically significant but negative effect both ROA and ROE profitability measures but not on the PCA-based profitability measure. Our results are consistent with previous studies highlighting the adverse effects of uncertainty on banks' earnings (Zhang, Li, Xu, & Ortiz, (2022); Dang & Nguyen, (2022)). Moreover, these findings posit that banks may respond to uncertainty by tightening credit policy and increasing liquidity reserves which negatively impact its profitability (Fabián Valencia, 2017).

Financial inclusion exerts a significantly positive impact on ROA, an insignificant effect on ROE, and a negative influence on the PCA-based profitability measure. These mixed results are consistent with the findings of Kumar, Thrikawala, & Acharya (2022).

Our results show that political stability emerges as a controversial determinant of bank profitability. The results depict its positive and statistically significant impact on ROA, an insignificant effect on ROE, and a negative association with the PCA-based profitability measure. These mixed findings suggest that politically stable environments may favor banks' profitability.

The relationship between liquidity and profitability further supports the liquidity-profitability trade-off hypothesis. The negative coefficients of LATA and LADEP indicate that higher liquidity levels are associated with lower profitability. However, the positive coefficient on LADEP in the ROA model suggests that liquidity derived from deposits can positively affect profitability under uncertainty, where deposit growth promotes lending aggressiveness (Acharya & Naqvi, 2012).

Table 14: The Effect of Uncertainty on Profitability

VARIABLES	ROE	ROA	ROA	C_PROF	ROE
WUI	-0.044***	-0.039***	-0.042***	-0.005	-0.041***
	(0.015)	(0.015)	(0.015)	(0.005)	(0.015)
INC	0.013	0.076***	0.082***	-0.017***	0.021
	(0.015)	(0.014)	(0.014)	(0.005)	(0.015)
STA	0.006	0.083***	0.110***	-0.016***	-0.009
	(0.018)	(0.018)	(0.018)	(0.006)	(0.019)
LADEP	-0.126***		0.033*		
	(0.019)		(0.018)		
TA	0.137***	0.019***	0.013**	-0.009***	0.149***
	(0.007)	(0.007)	(0.007)	(0.002)	(0.007)
CAR	-0.001	0.004	0.004	-0.001	-0.001
	(0.003)	(0.003)	(0.003)	(0.001)	(0.003)
RES	-0.289	0.006	-0.217	0.481***	-0.326
	(0.247)	(0.259)	(0.260)	(0.047)	(0.248)
CIR	-0.006	-0.005	-0.004	-0.008***	-0.006
	(0.006)	(0.008)	(0.008)	(0.002)	(0.006)
GDP	2.561***	1.064**	0.726*	-0.134	2.715***
	(0.437)	(0.428)	(0.427)	(0.136)	(0.441)
Region	0.271***	0.331***	0.301***	-0.054***	0.245***
	(0.035)	(0.034)	(0.034)	(0.011)	(0.035)
LATA		-0.185***			-0.132***
		(0.029)			(0.030)
C_LIQ				-0.005	
				(0.004)	
Constant	-5.054***	-5.098***	-4.710***	0.030	-5.182***
	(0.143)	(0.150)	(0.139)	(0.044)	(0.154)
Observations	5,303	5,306	5,300	5,702	5,309
R-squared	0.101	0.050	0.043	0.038	0.097
Number of time	17	17	17	17	17
r2_o	0.110	0.0632	0.0519	0.0412	0.105

Note(s): this table reports the results of our second model examining the effect of uncertainty on profitability. All variables are defined in Table 10. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

The results concerning bank size reveal a positive relationship between size and profitability measured by ROE and ROA. Turning to macroeconomic factors, our results show that GDP growth per capita exerts a strong positive influence on bank profitability. These findings corroborate prior research establishing a procyclical relationship between economic growth and bank profitability (Albertazzi & Gambacorta, (2009); Dietrich & Wanzenried, (2011); Trujillo-Ponce, (2013)).

5.3.3 The Effect of Uncertainty on Combined Performance (PCA Measure)

The results of model 3 indicate that uncertainty (WUI) has a statistically significant positive effect on the PCA performance measure which validates our third hypothesis H3b. This finding is partially consistent with prior research demonstrating that heightened uncertainty prompts banks to adopt more conservative and efficient resource allocation strategies to mitigate risk exposure (Caglayan & Xu, 2016). Additionally, the results confirm that banks with strong liquidity reserves and cost-effective management are better positioned to sustain performance during periods of mounting uncertainty (Beltratti, 2012).

The findings related to financial inclusion reveal a weak and inconsistent effect on PCA performance. Also, The results regarding political stability are ambiguous. Likewise, bank size exhibits contradictory effects on PCA-based performance across different models. In Model 1, total assets positively influence performance, while in Models 2 and 3, the relationship turns negative. This mixed outcome suggests that while larger banks benefit from economies of scale and diversification, their increased exposure to systemic risks may reduce their overall performance (Laeven & Levine, 2007).

Additionally, loan loss reserves exhibit conflicting effects across different models. While higher reserves negatively impact performance in Models 1 and 3, Model 2 reports a positive association.

Turning to managerial aspects, the results show a consistent positive impact of the cost-to-income ratio on the PCA-based performance measure across all models. These findings demonstrate that banks with better operational efficiency perform better under uncertainty.

Turning to the GDP growth per capita, our results are mixed. While Model 1 reports a significant positive relationship between our PCA-based performance measure and the GDP growth, the association is insignificant in Models 2 and 3. This suggests that while economic growth generally supports stronger banking performance, its effects are

contingent on other macroeconomic and bank-specific factors.

Table 15: The Effect of Uncertainty on Combined Performance (PCA Measure)

VARIABLES	C_PERF	C_PERF	C_PERF
WUI	0.030***	0.015*	0.022**
	(0.010)	(0.008)	(0.009)
INC	-0.019*	0.000	0.006
	(0.010)	(0.007)	(0.008)
STA	-0.116***	0.002	0.001
	(0.012)	(0.009)	(0.010)
TA	0.022***	-0.037***	-0.048***
	(0.004)	(0.003)	(0.004)
CAR	0.002	0.001	0.002
	(0.002)	(0.002)	(0.002)
RES	-0.319***	0.488***	-0.409***
	(0.100)	(0.134)	(0.138)
CIR	0.009***	0.025***	0.020***
	(0.004)	(0.004)	(0.003)
LATA		0.810***	0.803***
		(0.015)	(0.017)
ROA		0.159***	
		(0.007)	
GDP	1.033***	0.025	-0.143
	(0.290)	(0.222)	(0.246)
Region	0.153***	0.031*	0.077***
	(0.023)	(0.018)	(0.019)
ROE			0.095***
			(0.008)
Constant	-0.440***	2.270***	1.991***
	(0.095)	(0.086)	(0.095)
Observations	5,702	5,300	5,303
R-squared	0.030	0.411	0.341
Number of time	17	17	17
r2_o	0.0311	0.411	0.340

Note(s): this table reports the results of our third model examining the effect of uncertainty on combined performance (PCA measure). All variables are defined in Table 10. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

The combined results from our third Model 3 underscore the importance of using the Principal Component Analysis (PCA) to assess overall bank performance by integrating both liquidity and profitability dimensions. The findings indicate that uncertainty has a positive influence on overall performance and therefore suggest that banks are capable of effectively balancing liquidity and profitability trade-offs and consequently are well positioned to navigate volatile environments.

5.4.Robustness Checks results.

In this section, we conduct a series of robustness tests to validate the significance and sensitivity of our results in alternative settings. The detailed results are provided in the appendix.

5.4.1. *Regional Segmentation*

In our first robustness check, we explore the potential impact of regional variations on how banks adjust their strategies in response to uncertainty. Our test results show that in the Middle East and Central Asia (MCD) region, uncertainty (WUI) displays a strong and statistically significant positive effect on PCA-based performance validating our initial results. Conversely, the results for Asia-Pacific (APD) region are not significant and negative in some cases. This implies that the banks in this region do not systematically adjust their liquidity and investment strategies in response to uncertainty which may be due to a more developed and heavily regulated financial systems and an easier access to liquidity sources.

These findings underscore the importance of geographic location in shaping banking performance under uncertainty and so highlight the need for region-specific policy approaches targeting financial stability.

5.4.2. *Time-Break Analysis: Global Financial Crisis (GFC) and COVID-19*

In our second robustness check, we examine how banking performance under uncertainty evolves over time specifically before, during and after financial crises. Our results depict a significant and positive effect of uncertainty on PCA-based performance before the 2008 global financial crisis. Additionally, uncertainty continues to have a positive but slightly weaker impact on PCA performance during and after crisis. The results indicate that regulatory reforms and improved risk management frameworks implemented after the global finance crisis of 2008 contributed to the stabilization of banking outcomes and reduced the direct impact of uncertainty.

Likewise, the results show that the positive effect of uncertainty on PCA performance persists during the 2019 COVID disruption confirming our previous assumptions and highlighting that the crisis-induced learning effects have strengthened banks' adaptive capabilities over time.

5.4.3. *Alternative Estimation Techniques: Fixed Effects, Random Effects, and GMM*

In our third robustness tests, we use alternative estimation methods, including Random Effect (RE) and Generalized Method of Moments (GMM) models.

The results of both Random Effect and GMM models confirm our primary findings by showing a positive effect of uncertainty on PCA-based performance indicators. However, the slightly weaker association shown in the GMM results suggests that past financial performance plays a moderating role in shaping banks' responses to uncertainty.

The results of these tests show that our initial results are not driven by model specification bias or endogeneity concerns.

These findings confirm that the essential findings of our study remain robust and reinforce our empirical framework's validity.

Together, the robustness tests provide strong empirical support for the main assumption that banks strategically adjust their liquidity and profitability strategies to optimize financial performance in uncertain situations.

6. Discussion and policy implications

Our empirical findings contribute to the literature on bank stability and performance by providing insights into how banks manage the trade-offs between liquidity and profitability in uncertain environments. The positive relationship between uncertainty and the PCA-based composite performance index suggests that banks successfully adopt conservative financial strategies to optimize liquidity and profitability in response to volatility. These findings demonstrate that banks effectively adjust their risk management approaches to mitigate the negative effects of uncertainty by strengthening their liquidity buffers while maintaining steady profit margins.

On the contrary, the impact of financial inclusion on banks' performance is not conclusive. Essentially, financial inclusion enhances deposits stability but its direct effect on bank performance remains weak.

Political stability emerges as another factor influencing bank performance. We found that banks in politically stable environments do not hold sizable liquidity margins but their impact on profitability and overall bank performance is unclear.

Similarly, our results show that the impact of bank size on bank performance presents an interesting paradox. Large banks benefit from economies of scale and revenue diversification but their exposure to systemic risks and operational complexities can erode these advantages. Larger banks may be better equipped to absorb shocks but their engagement in complex financial operations and potential reliance on interbank funding can expose them to greater financial distress in times of crises.

Our results reveal that banks with higher credit risk measured by higher loan loss reserves tend to experience reduced performance during uncertainty. However, those that proactively increase reserves may mitigate potential losses and sustain long-term stability.

Operational efficiency emerges as a key driver of bank performance. Our findings reveal that banks with well-managed cost structures perform better under uncertainty which demonstrate that efficiency in banking operations is a central determinant of performance especially when external conditions are volatile.

The mixed effects of GDP growth on PCA-based performance displayed in the irregularity of results across models propose that even though economic growth provides a favorable environment for banking liquidity and profitability in general, its impact on overall performance is interestingly debatable.

Our findings underscore the importance of using an integrated approach to evaluate bank performance, where bank liquidity and profitability outcomes are considered as interconnected components of a bank's overall strategy rather than in isolation. The positive relationship between uncertainty and PCA-based performance index implies that banks that successfully balance their liquidity margins with profitability optimization. It also shows that banks who efficiently control their costs are better positioned to face uncertainties. However, the impact of financial inclusion, political stability, bank size, and credit risk remains perplexing emphasizing the need for tailored regulatory frameworks and managerial strategic decisions.

Concerning the recommendations, we posit that a holistic approach to banking performance management seems essential to ensure financial stability and resilience in uncertain situations. Banks management should focus on ensuring that banks maintain adequate liquidity reserves without compromising profitability. Equally, a better cost

control and credit risk management can help banks adapt to economic fluctuations and uncertainty shocks while maintaining profitability and long-term stability.

Our findings also stress the need for macroprudential policies that promote financial inclusion without aggravating competitive pressures between banks.

Given the mixed impact of political stability on bank performance, regulatory authorities should focus on creating strong governance frameworks and transparent financial regulations to improve predictability and instigate confidence.

The role of bank size in financial performance, as shown in our analysis, necessitates regulatory measures targeting systemically important banks. Besides, banks should adopt proactive loan loss provisioning policies which may strengthen their ability to overcome market uncertainty.

Importantly, operational efficiency should remain a central focus of bank management as it seems to improve their ability to overcome shocks and instability. Regulatory authorities should focus on encouraging efficiency measures and best cost reduction practices across the banking sector.

7. Conclusion

Our study investigates the impact of uncertainty on bank performance by examining its effect on profitability and liquidity separately and then on the overall banks' performance integrating both liquidity and profitability into a composite index. We follow Sha'ban, Arun, Girardone, & Sarkisyan (2023), Godspower-akpomiemie & Ojah (2021), and N. T. Nguyen et al. (2023) by using Principal Component Analysis (PCA) to construct this combined measure. By developing a PCA-based performance index in addition to traditional liquidity and profitability measures, we provide an all-encompassing approach to assess banking performance under uncertainty while we address the limitations of traditional single-metric approaches.

Ou findings reveal that uncertainty, positively influences the overall banks' performance and liquidity while negatively affects banks' profitability. These results are in concordance with existing literature showing a positive relationship between uncertainty and liquidity and a negative effect of uncertainty on profitability (Acharya & Naqvi, 2012; Viet et al., 2023; Berger et al., 2022; de Haan & van den End, 2013; Zhang, Li, Xu, & Ortiz, 2022; Dang & Nguyen, 2022). These combined results indicate that banks strategically mange their liquidity and profitability trade-offs to optimize their outcomes under uncertainty. Notably, our results demonstrate that banks' ability

to optimize their liquidity-profitability balance has strengthened over time reflecting a learning effect from past financial crises including the GFC and COVID-19 disruptions. Our study illustrates the mixed impact of financial inclusion on bank performance despite positively affecting liquidity. Also, we find that political stability exerts a negative impact on liquidity while remaining insignificant to profitability and overall performance which further emphasize the need the need for a composite performance metric. We reveal that bank size positively influences profitability and liquidity while its impact on PCA-based performance is unclear. This interesting observation suggests that larger banks are better positioned to benefit from economies of scale but their exposure to systemic risks and operational complexities may hinder their overall performance. Remarkably, we find that banks with efficient cost structures and effective credit risk management demonstrate better performance under uncertainty.

The application of PCA in constructing a unified performance index offers a novel contribution allowing for a better understanding of how liquidity and profitability interact under uncertain conditions.

Our paper underlines the importance of a multidimensional approach to assessing banks' performance where liquidity and profitability, operational efficiency, and credit risk management are assessed together rather than in isolation.

Banks management should focus on operational efficiency and proactive credit risk management to improve their performance in volatile environments.

Policymakers should focus on prudent liquidity regulations and financial inclusion strategies without jeopardizing banks' profitability.

Future research may extend the present analysis to developed economies with more advanced financial systems and higher financial inclusion. Additionally, this analysis can be extended to a specific country or regional levels and lastly we can investigate additional and possibly more advanced methods to construct a composite performance index.

Chapter 3: Financial instability in Lebanon: Do the liquidity creation and performance of banks matter?*[23]

[23] Maroun, G., & Fromentin, V. (2024). Financial instability in Lebanon: Do the liquidity creation and performance of banks matter?. *The Quarterly Review of Economics and Finance*, *96*, 101864.

Abstract

Our paper explores the existence and nature of an established relationship between the function of Lebanese banks as liquidity creators, their profitability, and the instability of the financial system in Lebanon. Using original, annual observations of Lebanese bank data for the period 1997 – 2019, and employing fixed effect OLS regressions and system GMM to account for the dynamic aspect of our data, we show that liquidity creation is significantly associated with lower financial stability and thus higher instability. Banks' profitability is positively linked to their systemic stability. The results vary slightly from one estimate to another, but they stand up to robustness tests. Our empirical results have a substantial impact on the control and regulatory approaches of banks in Lebanon and similar developing countries while contributing to a deeper understanding of systematic and broader financial instabilities in these countries.

JEL classification

G01 G21 G28

Keywords

Bank liquidity creation, Bank performance, Bank stability, Financial crises, Lebanon

1. Introduction

The ongoing Lebanese crisis has rekindled interest in the systematic stability of financial systems and their role in nurturing economic recoveries and growth in developing and emerging economies. In fact, the said crisis is set to rank among the three most severe economic downfalls worldwide since the mid-nineteenth century (World Bank, 2021). Prior to 2019, Lebanon served as the main financial center of the Middle East and Gulf region for more than three decades. In addition, the Lebanese banking sector was renowned for its stability and reliability, despite frequent political and economic upheavals (Banque du Liban, 2016; Desquilbet, 2012; Jad, 2011). For instance, Lebanese banks were relatively untouched by the 2008 global financial crises and its aftermath due to the resilience of the system and the prudential conservative policies of the Banque Du Liban (BDL)[24] (Jad, 2011). Moreover, in 2014, the Lebanese banking system was ranked 29th in the world in terms of financial soundness (World Economic Forum, 2013-2014). This flawless reputation, coupled with the attractiveness of the Lebanese banking secrecy law, increased the flow of foreign capital and consequently the size of the Lebanese financial services sector. Precisely, the total assets of Lebanese banks represented 433% of the Lebanese GDP in 2017 (McKensie, 2018). The current crisis has raised reasonable questions about the possible linkage between Lebanese banks' activities and the country's present perilous financial instability.

In this paper, we aim to uncover the roots of this crisis by exploring potential associations between banks' outcomes, measured by liquidity creation, banks' performance, measured by their profitability, and financial instability. We contribute to the existing literature by examining, for the first time, the triptych of bank liquidity creation, bank profitability, and systemic financial instability in Lebanon from 1997 to 2020, using an unpublished, original database. Moreover, the dire economic, social, and political impacts of the current Lebanese financial crisis have raised important questions about the role of the Lebanese banking sector in fostering an unprecedented level of instability that was unthinkable two years earlier. Understanding these relationships will give researchers and policymakers valuable insights into the instability indicators concealed within the ostensibly robust banking systems of some

[24] The Lebanese Central Bank.

developing countries. In addition, the paper makes policy recommendations to prevent similar crises in the future.

In general, in times of crisis or instability, particularly in developing countries that rely heavily on commercial banks as their sole financing channel, the role of such banks can be called into question. Moreover, the relationship between banks' output and financial instabilities and crises is a key concern for researchers and policy makers (Kim, 2018; Rajan, 2006; Soedarmono, Machrouh, & Tarazi, 2011; Vogel & Winkler, 2010; Diamond & Rajan, 2005). For instance, Rajan (2006), finds that deregulation leads to increased competition among banks, fostering an aggressive risk appetite and jeopardizing banks' role as liquidity providers in times of crisis. Dietrich & Vollmer (2012) document a financially stabilizing effect of German universal banks during the global financial crisis.

Theoretically, banks bridge the gap between the diverging needs of lenders and borrowers by assuming a transformation task in terms of size, maturity, and risk. Casu et al. (2015) argue that banks can easily offer liquidity-smoothing and risk-sharing solutions with lower transaction costs. In fact, banks benefit from economies of scale and increased scope, as well as possessing the capacity to overcome the asymmetric information problems of moral hazard and adverse selection. In addition to liquidity transformation, the authors also identify four theories to explain the need for financial intermediation: delegated monitoring, information production, consumption smoothing, and commitment mechanics. Additionally, Allen and Carletti (2012) identify the crucial role of banks in economic growth. However, they conversely highlight the controversial role of banks as contributors to the fragility of the financial system during financial crises.

Particularly, transforming mainly short-term, liquid, relatively safe deposits into long-term, illiquid, risky loans is the essence of financial intermediation (Diamond and Dybvig, 1983). The output of this transformation is measured by Deep and Schaefer (2004) using a single unit: the liquidity transformation gap (LT Gap) and more recently by Berger and Bouwman (2009), who present a comprehensive approach to measure liquidity creation.

Given the importance of liquidity creation as the main measure of banks' output, and in the absence of an empirically proven method to measure the risk transformation function (Berger and Sedunov, 2017; Jayasekara et al., 2020), a large body of empirical studies examine the relationship between bank liquidity creation and different financial

and economic variables (Pana, 2023; Lee et al., 2022; Wang et al., 2022; Berger et al., 2019; Sahyouni & Wang, 2018, 2019; Acharya & Thakor, 2014; Berger & Bouwman, 2017; Berger et al., 2017; Berger & Sedunov, 2017; Fungacova et al., 2013; Gupta & Kashiramka, 2020). Precisely, Weill et al. (2018) observe that bank liquidity creation may intensify the volatility of economic activity, while Bhattacharya et al. (1998) suggest that banks become intrinsically unstable by providing liquidity, hence creating a need for regulatory intervention. Besides, Gao et al. (2020) and Otero González et al. (2018) conclude that a country's risk has an adverse effect on banks' liquidity creation. In addition, Kim (2018) shows that large banks with higher market power create more liquidity, making them more prone to liquidity risk than smaller ones. Furthermore, Dang and Huynh (2022) find that banks may expand liquidity creation aggressively after the central bank relaxes its monetary policy.

Likewise, several studies examine the relationship between banks' liquidity creation and profitability, with divergent findings (Duan & Niu, 2020; Tran, Lin, & Nguyen, 2016; Sahyouni & Wang, 2018). For instance, when creating liquidity, banks may jeopardize financial stability (Acharya & Thakor, 2016; Berger et al., 2019; Berger & Bouwman, 2017). Precisely, to maximize their profits, banks may be tempted to adopt loose and even predatory credit policies, thus creating excessive liquidity, promoting crisis-nurturing bubbles, increasing risk, and augmenting the probability of bank failure (Fungacova et al., 2013). Moreover, during turbulent periods, the interrelations between the creation of liquidity and the profitability of banks can vary, and even cancel each other out.

Turning to financial instability, it is best defined as periods of absence of financial stability (World Bank, 2021). During these periods, the financial system does not work efficiently to maximize resource allocation and other aspects of the economy in order to optimize the performance of economic agents. Relatedly, Financial stability is mainly defined by its role in the efficient functioning of the real economy (Schinasi, 2004; World Bank, 2021). Vo et al. (2019) highlight the importance of understanding financial instability from both macroeconomic and banking sector performance perspectives. Gadanecz & Jayaram (2009) argue that financial stability should be broadly defined to include macroeconomic dimensions and capture the interrelations between the real sector and the financial sector. Consequently, a financial system is stable when it ensures the smooth functioning of interactions in a broad micro- and macro-economic context while remaining resilient to shocks (World Bank, 2021).

Regarding Lebanese banks, some aspects of the Lebanese banking sector and its outputs have been studied previously. For instance, El Khoury (2015) analyzes the liquidity determinants of the Lebanese banks before, during, and after the global financial crisis. Awdeh (2016) studies the evolution of Lebanese banks' fragility and its determinants over two decades from 1990 to 2013. Naimy & Karayan (2015) examine the impact of the global financial crisis on the performance of Lebanese banks using the Chow model to test for structural breaks in profitability, liquidity, credit quality and capitalization. Peters, Raad & Sinkey (2004) evaluate the performance and financial soundness of banks in Lebanon between 1993 and 2000. Khoury (2018) discusses the impact of Lebanese banks' liquidity on their risk appetite. Lebanese liquidity creation and its relationship with banks' performance is considered by Sahyouni & Wang (2019) as part of a broad regional study. However, the liquidity creation, profitability, and financial instability triad has not been tackled in the Lebanese context.

In this paper, we use the ordinary least squares (OLS) method to estimate the interrelations between banks' liquidity creation, their financial performance, and financial instability. In addition, to address the problem of possible endogeneity and to check for the absence of serial auto correlation of the error terms, we employ the two-step system Generalized Methods of Moments (GMM) (Davydov, Fungáčová, & Weill, 2018; Davydov et al., 2018; Gupta & Kashiramka, 2020a; Hou, Li, Li, & Wang, 2018; Kim, 2018; Otero González, Ashour, Redondo-López, & Rodríguez Gil, 2018; Soedarmono et al., 2011; Tran et al., 2016).

To calculate bank liquidity creation, we follow the three-step procedure developed by Berger & Bouwman (2009) using two proposed measures, i.e., the cat.fat method, which is the preferred method of these authors, taking into consideration the liquidity created by the off-balance sheet items of banks; and the cat.nonfat method, which only considers banks' balance sheets. The financial performance of banks is captured using the return on average assets (ROAA) and the return on average equity (ROAE), two measures commonly used in the previous literature (Jayasekara et al., 2020), in addition to the net interest margin (NIM) as an alternative measure (Sahyouni & Wang, 2018). Following existing studies, we use the bank level Z-score to measure financial instability.

Our contribution to the literature is summarized below:

First, to the best of our knowledge, no previous analysis of the triple association – banks' liquidity creation, performance, and financial instability – has been conducted

in the Lebanese context. In addition, the Lebanese banking system, long admired for its resilience and ability to attract foreign flows of capital, is currently facing an unprecedented crisis coupled with record low confidence in banks, financial authorities, and policymakers. We add to the literature by exploring possible associations between Lebanese banks' liquidity creation, their profitability, and financial instability in Lebanon over a period of 23 years starting in 1997, which marked the end of post-war financial instability, and finishing in 2019, the start of the current crisis.

Second, our study presents a newly compiled dataset for Lebanese banks that largely facilitates future analyses and research. We collected annual observations for 57 Lebanese banks for the years 1997 to 2019, from four different sources, i.e., (1) the Orbis Bankfocus database, (2) Bureau Vandijk's Bankscope, (3) the banks' annual reports, and (4) the annual reports in Bilanbanques[25]. Although the data used are public, they are not readily available from one source for analysis. For instance, relevant data before the GFC (2007) are not available from Bankfocus. Subsequently, data from 1997, the date of the most recent Lebanese financial and monetary stabilization, up to 2007 were collected from Bankscope. However, since some necessary financial figures were missing, we had to complete our dataset manually using two documentary sources consisting of the annual reports of "Bilanbanques" and individual banks, which were available either in electronic or print formats.

Third, the usefulness of the current study lies in its potential to uncover the possible relationship between Lebanese banks' function as liquidity creators and the current financial crisis, and to suggest possible solutions. This is crucial for regulatory bodies, policymakers, international donors, and banking authorities to formulate preventive policies and early warning signals for the future and to plan corrective ex-post and ex-ante interventions. Particularly, in the absence of a direct financial system, active liquid and deep financial markets, and an adequate regulatory framework, Lebanese banks are the sole providers of financial and liquidity services for the Lebanese economy. Critically, the Lebanese banking sector acts as the main government creditor, financing up to 60% (Naimy & Karayan, 2015) of the Lebanese gross public debt.

Fourth, the results and conclusions of this study resist robustness tests, based on different estimation methodologies (OLS and GMM) and different variables of interest and control from one model to another.

[25] Local database for Lebanese banks.

Finally, our paper brings a constructive addition to the literature on liquidity creation, profitability, and financial instabilities in developing countries subject to political uncertainty. Doubtlessly, understanding the current Lebanese crisis, its indicators, and its interrelatedness with the banking sector will pave the way to a improving comprehension of the instability indicators hidden behind the ostensibly strong banking systems of some developing countries.

The remainder of the paper is organized as follows. Section 2 presents the literature review. Section 3 depicts the data and the variables. Section 4 introduces the methodology and the models. Section 5 discusses the empirical results, while Section 6 discusses the empirical findings. Section 7 concludes and draws policy implications.

2. Theoretical framework and hypothesis development

2.1. Banks' liquidity creation and financial instability

A sizable array of research reveals the central role of the liquidity created by banks in furthering economic recoveries and nurturing economic growth (Bassett et al., 2014; Chatterjee, 2018). However, an increasing number of studies examine the possible relationship between the function of banks as liquidity creators and the instability of the financial system. For instance, Berger & Sedunov (2017) show that excessive liquidity creation may trigger bubble-related financial crises despite the significant positive relationship between bank liquidity creation and real economic output. Likewise, Berger & Bouwman (2017) show that relatively high liquidity creation, generated mainly by off-balance activities, is usually followed by financial crises. Moreover, Berger et al. (2019) find that liquidity created by commercial banks has a negative impact on the national financial stability of high-income countries[26]. Likewise, Fungacova et al. (2021) report a positive association between the increasing probability of bank failure and excessive levels of liquidity creation, while other studies link high liquidity creation to higher systemic risk (Acharya & Naqvi, 2012; Acharya & Thakor, 2016; Louhichi et al., 2022; Zhang et al., 2021). In addition, Davydov et al. (2021) emphasize the difference between the bank's specific risk and its exposure to financial system shocks (Van Oordt & Zhou, 2019) and show that increasing liquidity creation may reinforce the connection between individual banks and systemic shocks,

[26] The authors use the World Bank's Atlas Method to identify low and high-income countries based on the development of their capital market.

suggesting that a high level of liquidity creation may magnify the vulnerability of financial institutions in general during times of market instability. Likewise, turning to the capital adequacy of commercial banks as a gauge of financial stability, the negative relationship between banks' capital and liquidity creation is reported by numerous studies (B. Casu et al., 2019; Fu et al., 2016; Fuad, 2021; Horváth et al., 2014; T. Le, 2019; Umar et al., 2018). Similarly, other papers show that higher capital requirement, along with other tight regulatory measures, leads to a decline in liquidity creation (Berger & Bouwman, 2017; Le & Pham, 2021; Tang, et al., 2021).

Besides, to study the relationship between banks' liquidity creation and systemic risk, Davydov et al. (2021) use a new method to account for systemic risk, emphasizing the difference between the bank's specific risk and its exposure to financial system shocks (Van Oordt & Zhou, 2019).

In contrast to the above, Gupta & Kashiramka (2020) find a positive relationship between Indian banks' liquidity creation and their stability, while Zheng et al. (2019) report a negative association between the risk of bank failure and liquidity creation among adequately capitalized US banks.

Based on the above literature, we posit that higher levels of liquidity creation are associated with lower financial stability of the banking system. We thus formulate our first testable hypothesis as follows:

H1: An increase in bank liquidity creation jeopardizes the financial stability of Lebanese banks.

2.2. Bank profitability and financial instability

Theoretically, in line with the risk-return tradeoff, we can postulate that banks' profitability is negatively linked to their stability. Notably, Martynova et al. (2015) argue that profitable banks are inclined to take more risks and consequently expose their soundness to menace. Accordingly, Pessarossi et al. (2020) find that high profitability does not reduce the financial distress of European banks and may even be associated with a rise in the probability of such instances over a period of three to four years. In addition, Betz et al. (2014) link higher returns on assets to bank instability. However, Keeley (1990) proposes an opposing view suggesting that profitable banks are more risk averse given their higher exposure to adverse conditions and their ability to build their capital.

Besides, from an empirical perspective, Wheelock & Wilson (2000) and Cole & White

(2012) report a negative relationship between banks' profitability measured by their return on assets and the likelihood of failure which implies a positive impact of the profitability of banks on their stability. Likewise, Arena (2008) identifies a lower probability of failure associated with higher profitability among Latin American and East Asian banks, while Lin & Yang (2016) find similar results for East Asian banks. Moreover, the positive association between banks' profitability and financial stability is reported by Gupta & Kashiramka (2020) and VO et al. (2019).

Based on the above research, we put forward the second testable hypothesis positing a positive impact of profitability on financial stability.

H2: Higher levels of profitability improve the stability of Lebanese banks.

3. Data and variables

3.1. Data

The sample used in our empirical analysis consists of annual observations of 57 Lebanese commercial, private, and Islamic banks between 1997 and 2019. We obtained related data on these banks from four different sources: first we used the Orbis Bankfocus database, second, we used the old Bureau Vandijk's Bankscope database for the years 1997 to 2005, or 2007 for some banks, then we drew from the banks' annual reports and the Bilanbanques base to fill in missing information where needed. For instance, Bankfocus data are available from 2005 for some banks but show figures for only 2 or 3 years for others.

Due to some differences in classification, aggregation, and reporting between the different sources used to complete our database, we paid special attention to detect any discrepancies or flaws by making comparisons and sometimes checking annual reports and notes. The main objective was to avoid major data misrepresentations that could affect our analysis.

In addition, data concerning financial stability indicators, political stability, regulatory and environment, transparency, and other possible control variables for the same periods were collected form the World Bank and IMF databases, such as World Development Indicators (WDI) Worldwide Governance Indicators (WGI), Global Financial Development (GFD), the Global Economic Monitor (GEM), International Financial Statistics (IFS), World Economic Outlook (WEO), and the Central Bank of Lebanon (Banque du Liban).

This compilation and standardization work made it possible to create an original, unpublished database for Lebanon from 1997 to 2019. The amount of data varies from one variable to another due to unavailable temporal observations for some banks. We thus obtain a minimum of 712 observations and a maximum of 1,311 observations.

3.2. Variables

This section includes the description of the variables used in the model.

3.2.1. *Financial instability*

Our main dependent variable is the Z-score, a measure commonly used in the literature to capture banks' solvency and stability (Gupta & Kashiramka, 2020; Soedarmono et al., 2011; Čihák et al., 2013; Detragiache et al., 2008; Fu, Lin, & Molyneux, 2014; Lepetit & Strobel, 2013; Uhde & Heimeshoff, 2009). These studies use the bank level Z-score rather than aggregate country or regional scores. However, Strobel, (2011) indicates that aggregate Z-score levels are usually used to measure the level of financial soundness.

In terms of financial stability indicators, several studies (Čihák et al., 2013; Dhiman, 2018; Gadanecz & Jayaram, 2009; Gersl & Hermanek, 2010; Vo et al., 2019) examine different indicators, trying to determine an aggregate indicator or the best available proxy. The Z-score is a commonly used measure of financial stability; however, it is overly dependent on banks' accounting data and ignores the interrelations between individual banks (Čihák et al., 2013). Another indicator, highlighted by Čihák et al. (2013) is excessive credit growth, although "excessive" levels are hard to determine. Gadanecz & Jayaram, (2009) compile a list of commonly used variables to measure financial stability, covering different levels of economic sectors. According to Worrell (2004), an analysis of financial stability, and consequently instability, should be based on the difference across periods and on changing trends. It should also be combined with some careful observations of shocks and sudden breaks in patterns between normal and abnormal situations.

Moreover, Gadanecz & Jayaram (2009) analyze the financial stability reports (FSRs) of a number of both developing and developed countries. In general, they conclude that emerging countries focus on capital inflows, exchange rate fluctuations, and balance of payments, while industrial economies examine the exposure of their banks to emerging markets. Nevertheless, they stress the fact that all financial stability analyses should take into consideration indicators from the following three sectors: the real sector, the

financial and banking sector, and the external sector. Likewise, Gersl & Hermanek (2010) analyze the use and adequacy of different financial stability indicators employed by the IMF and the ECB. Given the nonexistence of optimal values for most of the indicators, the authors recommend analyzing them based on the evolution of their values and by comparing them with those of other countries.

3.2.2. *Liquidity creation*

To calculate the amount of liquidity created by Lebanese banks, following prior literature (Berger & Bouwman, 2010, 2017; Berger et al., 2017; Berger & Sedunov, 2017; Davydov et al., 2018; Fungacova et al., 2013; Lei & Song, 2013; Tran et al., 2016) we apply Berger & Bouwman's (2009) three-step procedure, which suggests four measures of liquidity: mat.nonfat, mat.fat, cat.nonfat, and cat.fat where "mat" and "cat" indicate classification according to maturity and category respectively, while "fat" and "nonfat" designate the inclusion or exclusion of off-balance sheet activities. In our calculations, we opt for two measures: cat.fat, which is the preferred and most comprehensive measure according to Berger & Bouwman, 2009, and cat.nonfat because some studies show varying results in developing countries (Gupta & Kashiramka, 2020a).

Deep & Schaefer (2004) propose an alternative model to assess bank liquidity creation based on the Liquidity Transformation Gap (LT gap) model. The value of this LT Gap varies between -1 and +1, where banks with values close to +1/-1 transform/destroy liquidity. Nevertheless, the comprehensive nature of Berger and Bouwman's liquidity creation measure encompassing assets, liabilities, and off-balance sheet activities makes it our preferred approach.

Based on Berger et al., 2019 and following the classification of Lei & Song, 2013, we start by classifying assets, liabilities, equity, and off-balance sheet activities as liquid, semi-liquid, and illiquid.

Concerning assets, liquidity classification depends on the cost, time, and effort employed by the banks to settle their obligations and respond to their clients' needs. As for liabilities and equity, the same criteria are considered from the customers' perspective to obtain liquid money from their banks. Off-balance sheet guarantees and commitments are treated like their on-balance sheet equivalents. Following (Berger et al., 2019; Gupta & Kashiramka, 2020a), we depart from the initial classification of Berger & Bouwman (2009) to adapt to the less-developed Lebanese banking and

financial systems. For instance, Lebanese banks cannot securitize or sell their mortgage or consumer loans, and consequently they should be considered to be illiquid as opposed to semi-liquid in the initial classification.

Table A1 (in the appendix) includes a detailed classification of the assets, liabilities and equity, and off-balance activities in our model (step one).

The second step of the procedure consists in assigning weights to the classified on- and off- balance sheet items based on the liquidity creation theory. Since banks create liquidity by transforming illiquid assets (e.g., loans) into liquid liabilities (e.g., deposits), negative weights are assigned to liquid assets and illiquid liabilities, while positive weights are assigned to illiquid assets and liquid liabilities. Table A2 (in the appendix) contains the details of the weights assigned to the classified items.

The third step consists in calculating the liquidity created. This is done by multiplying the classified items by their respective weights. The details of our calculations are presented in Table A3 (in the appendix).

Additionally, to remove the impact of the bank's size, following Berger & Bouwman (2009), we calculate the liquidity created by one dollar of total gross assets. Table A4 (in the appendix) shows the details of these calculations.

3.2.3. *Performance*

The existing literature uses the Return on Assets (ROA) and Return on Equity (ROE) to measure banks' profitability. Consequently, following Jayasekara et al. (2020) we utilize the Return on Average Equity (ROAE), which is equal to the net income per dollar of equity, to capture the profitability of Lebanese banks.

3.2.4. *Control variables*

Following the existing literature (Gupta & Kashiramka, 2020b; Zheng et al., 2019), we use the CAMELS[27] system to control for banks' specific characteristics[28]. We opt for the Equity to Assets ratio to capture an individual bank's capital adequacy (EQ), the provision to loan losses as a percentage of gross loans as a measure of assets quality (PROV), the cost to income ratio to capture managerial efficiency (COST), the ratio of liquid assets to total assets to account for the bank's liquidity (LIQ), and finally, the systematic (market) sensitivity of individual banks is proxied by the loans to deposits

[27] The CAMELS acronym stands for: C for capital adequacy, A for assets quality, M for management efficiency, E for earnings, L for liquidity, and S for sensitivity to market or systemic risk.

[28] The CAMELS system is commonly used by regulators in the US to assess the soundness of commercial banks (Zheng et al., 2019).

ratio (LOAN). However, we do not include a proxy for earnings since we are already considering the bank's profitability (ROAE) as a dependent variable. We also use the five banks' assets concentration (CONC) to account for the concentration of Lebanese banking activities on the aggregate level. Furthermore, we use the GDP per capita growth to control for macroeconomic cyclicality (GDP), the change in foreign reserves to control for the impact of the external sector (RES), and the change in total government expenditure to control for the change in policy and consequently policy uncertainty (GOV). Finally, we use one dummy variable (GFC) to account for the global financial crisis, where 1 is used to indicate a crisis for the years 2007 to 2009 (Berger et al., 2019).

4. Methodology and models

To test the effects of banks' liquidity creation and performance on financial stability, following Berger *et al.*, (2019); Berger & Bouwman, (2017); Berger & Sedunov, (2017); Gao *et al.*, (2020) we adopt a two-step analysis.

The general form of our equation is finally:

$$\textit{Bank stability} = f(\textit{Liquidity creation}, \textit{bank controls}, \textit{macro and institutional controls variables})$$

We begin by estimating the following fixed effects ordinary least squares regressions:

$$Z - Score_{i,t} = \alpha_0 + \beta_1 LC_{i,t-1} + \beta_2 ROAE_{i,t-1} + \beta_3 \mathrm{EQ}_{i,t-1} + \beta_4 \mathrm{PROV}_{i,t-1} + \beta_5 \mathrm{COST}_{i,t-1} + \beta_6 \mathrm{LIQ}_{i,t-1} + \beta_7 \mathrm{LOAN}_{i,t-1} + \beta_8 \mathrm{CONC}_{i,t-1} + \beta_9 \mathrm{GDP}_{i,t-1} + \beta_{10} \mathrm{RES}_{i,t-1} + \beta_{11} \mathrm{GOV}_{i,t-1} + + \beta_{12} \mathrm{GFC}_{i,t-1} + \gamma_i + \delta_t + \varepsilon_{i,t}$$

where $Z - Score$ is the Z-score of the banks; LC is the measure of liquidity creation; ROAE represents the return on average equity; X is a vector of controls with EQ (equity to assets ratio to capture the bank's capital adequacy), PROV (the provision to loan losses as a percentage of gross loans as a measure of asset quality), COST (the cost to income ratio to capture managerial efficiency), LIQ (the ratio of liquid assets to total assets to account for the bank's liquidity), LOAN (the loans to deposits ratio to capture the systematic (market) sensitivity of individual banks), CONC (the concentration of the five banks' assets to account for the concentration of Lebanese banking activities

on the aggregate level), GDP (the gross domestic product per capita growth to control for macroeconomic cyclicality), RES (the change in foreign reserves to control for the impact of the external sector), GOV (the change in total government expenditure to control for the change in policy and consequently policy uncertainty), and GFC (Global Financial Crisis expressed as a dummy variable); β are the estimated parameters of interest; γ is a bank-fixed effect, δ is a time-fixed effect, and$\varepsilon i,t$ is a noise. The subscripts i and t represent the banks and the time period, respectively.

Moreover, to mitigate the risk of potential endogeneity in our analysis (due to reverse causality and omitted variables), we lag all control variables by one year and we include time and bank fixed effects following Berger et al., 2019.

As a robustness check, and in line with the existing literature, to address the problem of possible endogeneity and reverse causality, we use the two-step Generalized Method of Moments (GMM) model, like Davydov, Fungáčová, & Weill, 2018; Gupta & Kashiramka, 2020; Hou, Li, Li, & Wang, 2018; Kim, 2018; Otero González, Ashour, Redondo-López, & Rodríguez Gil, 2018; Soedarmono et al., 2011; Tran et al., 2016; Weill, Davydov, & Fungác, 2018. We conduct estimations using lagged values of the regressors as instruments in a GMM dynamic framework similar to Arellano and Bover (1995).

With the GMM method, the process may be dynamic, with current realizations of the dependent variable influenced by past ones, and some regressors may be endogenous. Using lagged values of the regressors as instruments can help deal with the problem of reverse causality, which may exist between bank performance/stability and LC. Indeed, for example, Zheng et al. (2019) show that banks that are already in trouble could modify their LC in response to this.

We employ the GMM system estimator in the study. System-GMM combines the regression in differences with the regression in levels using a system of equations. Blundell and Bond (1998) have shown that this estimator is very powerful (relative to the GMM difference estimator) in short sample periods and when the variables are persistent over time; particularly with a two-step system GMM procedure (Baltagi, 2008; Roodman, 2009).

Table 16: Definitions of Variables

Variables	Description	Source
Dependent Variable		
Z-score	Bank's Z-score	BankFocus, BankScope, Bilanbanques, Banks' annual reports, and authors' calculation
Independent Variables		
LCCF	Bank liquidity creation including off-balance sheet activities normalized by gross total assets (CAT.FAT) *(Berger and Bouwman, 2009)*	Same as above
LCCNF	Bank liquidity creation excluding off-balance sheet activities normalized by gross total assets (CAT.NONFAT) *(Berger and Bouwman, 2009)*	Same as above
ROAE	Return on average equity	Same as above
Control Variables		
EQ	Equity to assets ratio	Same as above
PROV	Provision to loan losses to gross total loans ratio	Same as above
COST	Cost to income ratio	Same as above
LIQ	Liquid assets to total assets ratio	Same as above
LOAN	Loans to deposits ratio	Same as above
CONC	Concentration of five banks' assets	Global Financial Development (GFD)
GDP	Gross domestic product per capita growth	World Development Indicators (WDI)
RES	Change in foreign reserves	International Financial Statistics (IFS)
GOV	Change in total government expenditure	World Economic Outlook (WEO)
GFC	Dummy variable to capture the global financial crisis, where 1 is used to indicate a crisis for the years 2007 to 2009	

Note(s): This table shows the description and the sources of our variables.

To check the suitability of the models, two conditions are required to ensure that estimators are consistent. The first one is a test of second-order serial correlation. By construction, the residuals in the first differences (AR(1)) should be correlated, but there should not be serial correlation in the second differences (AR(2)). Second, the validity of the additional instruments can be tested using the standard test developed by Sargan (1958) and Hansen (1982) for over-identifying restrictions. This test checks the validity of the additional instruments. In addition, like Gupta and Kashiramka (2020), we restrict the number of lags used as instrumented. One-year lagged values of all control variables are used in the equation to treat them as strictly exogenous. To check different assumptions and provide robust estimates, we use the several tests proposed by Roodman (2009).

To test the impact of banks' liquidity creation and profitability on financial instability we use the banks' Z-score to capture systematic financial stability, where a higher score means higher stability. We use the bank-level Z-score and the country-level aggregate Z-score in separate experiments for robustness.

5. Empirical results

The results of the study are presented in this section. First, we present the descriptive statistics and the correlation matrix of the variables considered in our analysis. In the second part we discuss the results of the panel model. The robustness test results are presented in the third part.

5.1. Descriptive statistics

Summary statistics are shown in Table 17. The mean value of the bank-level Z-score in our sample is 19.884 with a standard deviation of 22.783, indicating a relatively low level of systematic stability of the sample. The mean values of both cat.fat (LCCF) and cat.nonfat (LCCNF) liquidity creation measures are 3.5% and -1.7% respectively. The negative value observed for the cat.nonfat measure indicates that, in our sample, banks destroy liquidity when the liquidity created by off-balance sheet items is ignored. The standard deviation values imply that the liquidity created varies greatly between the banks in the sample, which is also depicted in the minimum and maximum values of these measures.

Turning to the profitability of the banks, the mean return on average equity (ROAE) is 8.8%, indicating a relatively high bank profitability. However, the standard deviation,

the minimum value, and maximum value of 12.8%, -155.4%, and 76.9% respectively, signal a large divergence in the profitability of the banks on our sample and support the use of specific bank control variables in our model.

Looking at the control variables, Lebanese banks seem to be well capitalized, with a 11.9% mean of equity to total assets (EQ) while, on average, the provision to loan losses represents 9.3% of total loans showing a deterioration in the asset quality (PROV). The cost to income ratio (COST) is 63% on average, while liquid assets represent 66.1 % of total assets. Moreover, the exposure of banks to systemic risks (LOAN) is relatively low with an average ratio of loans to deposits of 37.7%. Concerning the banks' aggregate level, 66.44% of bank assets are controlled by the largest five banks, which indicates a certain amount of activity concentration in the Lebanese banking sector.

Table 18 provides the correlation coefficient matrix of the variables. Multicollinearity does not seem to pose a problem in our study; the correlation values are all lower than 0.8. Notably, the high correlation between the two liquidity measures is not a cause for concern as they are considered separately in our model.

Systematic stability, as measured by the bank-level Z-score, is negatively correlated with both liquidity creation measures but positively correlated with bank profitability. Moreover, the bank stability measure is positively correlated with banks' capitalization (EQ), liquidity (LIQ), systemic exposure (LOAN), and activity concentration (CONC), and the change in general government total expenditure (GOV), but negatively correlated with bank's asset quality (EQ), management efficiency (COST), and total central bank reserves excluding gold (RES).

5.2. Results of the panel model

The results of the fixed effect OLS regressions are presented in Table 19, where we can observe that the liquidity created by Lebanese banks significantly jeopardizes the stability of the financial system. These results are in line with the previous literature analyzing the negative impact of liquidity creation on financial stability (Berger et al., 2019; Fungacova et al., 2013; Berger & Bouwman, 2017; Berger & Sedunov, 2017; Fungacova et al., 2021; Louhichi et al., 2022; Zhang et al., 2021; Davydov et al., 2021). However, our results are opposed to those of Gupta & Kashiramka, 2020, who document a positive relationship between liquidity creation and banks' stability in India. Moreover, our findings contradict Zheng, et al, 2019, who find a positive relationship between banks' liquidity creation and higher Z-scores.

Table 17: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Z-score	783	19.884	22.783	-2.574	355.43
LCCF	802	.035	.248	-.998	.762
LCCNF	802	-.017	.245	-.998	.739
ROAE	712	.088	.128	-1.554	.769
EQ	802	.119	.11	.003	.997
PROV	793	.093	.114	0	1
COST	507	.63	.789	-1.13	11.061
LIQ	802	.661	.14	.142	1.038
LOAN	792	.377	1.249	-31.866	11.043
CONC	1140	66.44	5.767	57.618	76.83
GDP	1311	.111	4.236	-6.65	9.137
RES	1254	.109	.231	-.236	.728
GOV	1254	1.047	.082	.925	1.194

Note(s): This table shows the summary statistics of our variables. All variables are defined in Table 16. The amount of data differs from one variable to another due to unavailable temporal observations for some banks.

With respect to bank profitability, we conclude that a higher profitability of Lebanese banks contributes significantly to the stabilization of the financial system. For instance, we find a strong positive association between Lebanese banks' return on average assets and their stability, which supports the conjecture of Keely (1990) and reinforces previous empirical results reported by Wheelock & Wilson (2000), Cole & White (2012), Arena (2008), and Lin & Yang (2016). Nonetheless, these findings are in contrast with the results of Martynova et al. (2015), Pessarossi et al. (2020), and Betz et al. (2014).

Turning to our control variables, we find that adequate capitalization of banks has a positive impact on their financial stability, which is identified through a statistically significant positive relationship between banks' capitalization and financial stability. These results are in line with previous studies (Zheng, et al., 2019) and confirm the conclusions of Casu et al. (2019), Fu et al. (2016), Fuad (2021), Horváth et al. (2014), T. Le, (2019), Umar et al. (2018), Berger & Bouwman (2017), Le & Pham (2021), and Tang, et al. (2021) maintaining a negative liaison between bank capital and liquidity creation.

Table 18: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Z-score	1.000												
(2) LCCF	-0.190	1.000											
(3) LCCNF	-0.220	0.965	1.000										
(4) ROAE	0.233	-0.050	-0.058	1.000									
(5) EQ	0.450	-0.325	-0.332	-0.078	1.000								
(6) PROV	-0.036	-0.123	-0.130	-0.105	0.068	1.000							
(7) COST	-0.388	0.141	0.150	-0.664	-0.161	0.113	1.000						
(8) LIQ	0.090	-0.552	-0.561	0.152	0.015	0.302	-0.070	1.000					
(9) LOAN	0.112	0.129	0.123	-0.053	0.388	-0.073	-0.101	-0.573	1.000				
(10) CONC	0.118	-0.133	-0.155	0.044	0.032	-0.190	-0.148	-0.045	-0.004	1.000			
(11) GDP	-0.000	0.035	0.004	0.223	-0.126	0.071	-0.111	0.159	-0.095	-0.042	1.000		
(12) RES	-0.072	0.074	0.080	0.092	-0.121	0.088	-0.013	0.086	-0.072	-0.153	0.164	1.000	
(13) GOV	0.114	-0.136	-0.159	0.150	0.002	-0.035	-0.221	0.046	-0.022	0.116	0.329	0.249	1.000

Note(s): This table shows the correlation coefficients matrix of the variables in our sample. All variables are defined in Table 1.

The negative coefficient of the control (COST) implies a strong positive linkage between management efficiency and the bank's stability. In fact, a lower cost to income ratio indicates higher efficiency and vice versa. Besides, we attribute the negative coefficient of the bank's liquidity to the adverse consequence of holding excessive, non-revenue-generating, liquid assets, which decreases the profitability of the bank and thus contributes to a lower Z-score[29]. However, an increase in foreign reserves shows a negative association with the stability of the financial system, which interestingly implies that the continuous flow of foreign capital into Lebanese banks does not apparently contribute to their stability. Lastly, it is worth noting that the Global Financial Crisis (GFC) had a surprisingly positive impact on Lebanese banks' stability. The untarnished reputation of the Lebanese banking sector coupled with conservative regulatory measures may have furthered this outcome by enhancing the attractiveness of Lebanese banks during periods of distress.

In terms of statistical significance, both extended models (3) and (4) are statistically significant with an R-squared of 50.4% and 50.3% respectively for catfat and cat.nonfat measures.

6. Robustness check

In this section, we conduct a series of robustness tests to validate the significance and sensitivity of our results in alternative settings.

In our first robustness check, we explore an alternative measure to capture financial stability on an aggregate level rather than on an individual bank level. Since we are measuring the relationship between banks' function and financial stability at the country level, following Strobel, (2011), we perform our estimations using the aggregate country-level Z-score as the dependent variable to capture the stability of the national banking system. The results reported in the appendix (Table A17) confirm our initial results for all of our dependent variables. Specifically, the liquidity created by Lebanese banks negatively impacts the soundness of the financial system. Moreover, the results show that profitable banks enhance the stability of the Lebanese banking system in general.

[29] The bank-level Z-score is calculated as follows: (ROAA+(E/A))/σ(ROAA); where ROAA is the return on average assets, E/A is the ratio of equity to total assets, and σ(ROAA) is the standard deviation of ROAA.

Table 19: OLS Regressions

	(1)	(2)	(3)	(4)
VARIABLES	**Z-Score**	**Z-Score**	**Z-Score**	**Z-Score**
LCCF	-7.339***		-3.915***	
	(2.063)		(1.407)	
LCCNF		-8.987***		-4.092***
		(2.318)		(1.547)
ROAE	1.173	0.980	4.356**	4.503**
	(3.162)	(3.151)	(2.030)	(2.033)
L.EQ			93.308***	93.845***
			(5.830)	(5.808)
L.PROV			-4.257	-3.830
			(2.950)	(2.962)
L.COST			-2.551***	-2.595***
			(0.378)	(0.376)
L.LIQ			-7.214*	-7.143*
			(4.122)	(4.129)
L.LOAN			-3.041	-3.173
			(1.942)	(1.943)
L.CONC			0.016	0.015
			(0.033)	(0.033)
L.GDP			-0.067	-0.063
			(0.095)	(0.095)
L.RES			-2.194***	-2.166***
			(0.785)	(0.788)
L.GOV			3.172	2.845
			(2.524)	(2.554)
L.GFC	1.743	1.556	1.945*	1.852
	(1.062)	(1.063)	(1.174)	(1.178)
Constant	19.391***	19.015***	12.285**	12.459**
	(0.453)	(0.454)	(4.851)	(4.878)
Observations	709	709	452	452
R-squared	0.024	0.027	0.504	0.503
Number of ID	55	55	42	42
r2_o	3.84e-06	3.02e-05	0.231	0.236

Note(s): this table reports the results of our regressions analysis examining the impact of Lebanese banks' liquidity creation and profitability on financial stability using ordinary least squares analysis. Controls are lagged one year. All columns include bank and year fixed effects. All variables are defined in Table 1. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

Secondly, we perform our estimations using an alternative measure of bank profitability. Like Sahyouni & Wang, (2018), we employ the Net Interest Margin (NIM) to capture the profitability of banks. The results reported in Table A18 in the appendix confirm our initial findings. Precisely, financial stability is positively impacted by higher bank profitability, but higher liquidity creation seems to destabilize the financial system.

Thirdly, to tackle potential endogeneity concerns in our model due to possible interdependence and reverse causality between our variables in our third robustness test, we estimate our initial regression model using the two-step system Generalized Method of Moments (GMM) (Arellano and Bover, 1995; Blundell and Bond, 1998; Baltagi, 2008; Roodman, 2009). The results are presented in Table A19 in the appendix. For both models presented, the AR(2) tests are not significant at 5%, indicating the absence of second order autocorrelation. Additionally, the p-values of the Hansen test do not reject the null hypothesis and consequently validate the used instruments. The use of the GMM estimation, which considers the dynamic nature of the data, is further confirmed by the continuance of the dependent variables. for instance, the Z-score lagged value is significant at 1% in all models. To be precise, a 1% increase in the previous year's Z-score leads to an increase of between 81.3% and 82.6% in the current Z-score. In line with our main findings, our GMM results confirm the negative relationship between liquidity creation and financial stability. Likewise, higher bank profitability is associated with a higher Z-score and is consequently believed to promote financial stability. These results are consistent with previous studies (Gupta & Kashiramka, 2020; VO et al., 2019).

Moreover, to test the sensitivity of our results and to tackle possible endogeneity between our independent variables, we validate our initial results by running our extended model for each dependent variable separately (Table A20 in the appendix).

Additionally, following Berger et al., 2022, we conduct heterogeneity tests to examine how the linkages between liquidity creation, profitability, and financial stability vary across subsamples. We start by probing the size effect. We split the banks in our sample into two groups based on the median of the "gross total assets" variable. With this split, we investigate whether the liquidity creation, profitability, and financial stability relationships vary with bank size. In Tables A21 and A22 in the appendix, we present

the results of the "large[30]" and "small[31]" bank subpanels respectively. In line with our primary findings, liquidity creation is markedly associated with lower degrees of financial stability, while higher profitability among large banks has a substantial positive impact on the stability of the financial system. The results are not statistically significant for smaller banks. Connected results are reported by Kim (2018) and Gupta & Kashiramka (2020), which highlights the considerable impact of large banks on financial stability.

Lastly, we complete our heterogeneity analysis by examining the time effect. We split our sample into two panels before and after the global financial crisis. Subsequently, we investigate whether our results vary over time. The results (Tables A23 and A24 in the appendix) show that, before the global financial crisis, both liquidity creation and profitability were negatively associated with financial stability. However, after 2007, bank profitability started to promote financial stability. Accordingly, we can assume that after the global financial crisis Lebanese banks adopted more conservative approaches in managing their assets, specifically loans, and probably their liabilities. These approaches, which aimed to preserve profits while decreasing risks, coupled with a good reputation earned during the crisis, lowered the volatility and risk exposures of banks while boosting their profits.

7. Discussion and key findings

Our findings demonstrate that bank stability is consistent from one year to another, meaning that banks tend to preserve their financial soundness over time, which is in line with previous studies (Gupta & Kashiramka, 2020b). In fact, we found that systematic financial stability in one year is significantly positively associated with the year that follows. Our results on liquidity creation show a strong negative association between on- and off-balance sheet liquidity creation and financial stability in Lebanon. Generally, before 2007, Lebanese banks created liquidity that jeopardized the stability of the financial system. Precisely, our analysis shows that liquidity created by relatively large Lebanese banks leads to a decrease in the banks' financial stability. These results are supported by the existing literature (Berger et al., 2019; Fungacova et al., 2013; Berger & Bouwman, 2017; Berger & Sedunov, 2017; Fungacova et al., 2021; Louhichi

[30] Large banks are those whose gross total assets are above the median.
[31] Small banks are those whose gross total assets are below the median.

et al., 2022; Zhang et al., 2021; Davydov et al. 2021). Particularly, Berger et al., (2019) find that liquidity created by commercial banks is associated with reduced financial stability; furthermore, Fungacova et al. (2013) show that a higher probability of the failure of Russian banks is associated with excessive liquidity creation between 2000 and 2007. Moreover, Berger & Bouwman (2017) suggest that high levels of liquidity creation may serve as a financial crisis predictor. Nevertheless, our results are in contrast with Gupta & Kashiramka, 2020 and Zheng, et al, 2019, who find that increased liquidity creation by US banks between 2003 and 2014 leads to a higher Z-score and therefore greater stability.

These results confirm our first hypothesis H1 and show that the liquidity created by banks over a period of 23 years contributed to the instability of the financial system in Lebanon, while controlling for other aspects of banks' outcomes and macroeconomic and regulatory preconditions. Our findings emphasize the importance of regulatory intervention to monitor and control the levels of liquidity created primarily by large banks to mitigate the risk of financial instability and crisis.

Moreover, we document that the profitability of Lebanese banks is an important stabilizing factor in the Lebanese financial system, especially after the global financial crisis. In line with other studies (Wheelock & Wilson, 2000;Cole & White, 2012; Arena, 2008; Lin & Yang, 2016), our results show a strong positive nexus between bank profitability and systematic financial stability. Particularly, our model depicts a significant positive association between a bank's return on average assets (ROAE) and its stability proxied by the bank's Z-score. Still, we find that this relationship was established only after the global financial crisis.

The above results verify our second hypothesis H2 showing that profitable large Lebanese banks tend to be more stable, particularly in the period after the global financial crisis. In this context, policymakers should monitor the profitability of large systemic banks as sponsors of financial stability and soundness.

The extensive robustness tests conducted reinforce the key findings of our initial model. Moreover, the results hold across different subsamples and alternative variables. Consequently, our tests present additional proof that liquidity created by Lebanese banks reduces the stability of the financial system while higher levels of profitability tend to have a stabilizing effect.

In terms of policy recommendations, regulators in the Lebanese context are caught between the two extremes of controlling liquidity creation and endorsing the high

profitability of banks. This delicate balance requires preventive and continuous monitoring by the regulatory authorities as well as good governance and risk management practices from banks.

8. Conclusion

This paper studies the relationship between banks' liquidity creation, their profitability, and national financial stability in Lebanon. The function of banks as liquidity creators is inherently risky; in fact, banks transform liquid and relatively safe deposits into illiquid risk-bearing assets. However, this transformation is at the center of banks' operations and revenues. Therefore, banks may opt to increase their profitability by creating more liquidity. Nevertheless, several studies have linked excessive liquidity creation to periods of financial instability, mainly in developed countries. The current financial collapse in Lebanon highlighted the importance of analyzing the performance of Lebanese banks from a different angle to understand the link between their outcomes and systematic stability. Our paper questions the role that these apparently sound and resilient banks played in the crisis by examining, for the first time, the relationship between Lebanese banks' liquidity creation, their profitability, and financial stability.

In our empirical study we used data on Lebanese banks covering the period 1997 – 2019. To calculate the amount of liquidity created, we adopted the Berger and Bouwman (2009) three-step procedure. Following the existing literature, we used aggregate and bank-level Z-scores to capture the financial (in)stability and the return on average equity (ROAE) to account for bank profitability.

Our findings, supported by robustness tests, suggest a strong negative relationship between the creation of liquidity by banks and financial stability in Lebanon for the observed period. In addition, profitability seems to affect financial stability positively for the same period.

Our paper may have significant policy implications for the expected recovery plan of the Lebanese banking sector and the Lebanese economy in general. We conclude that to foster financial stability, policy makers and researchers should promote higher profitability, particularly among large banks. Moreover, regulators and controlling agencies should keep an eye on the function of banks as liquidity creators by imposing stricter regulations (Zheng et al., 2019) and determining optimal levels of liquidity created to favor economic growth while avoiding the perils of financial instability.

General Conclusion

In this thesis, our main objective is to examine the complex interactions between banks' strategy proxied through liquidity creation, banks' profitability and liquidity, uncertainty, and financial stability in developing and emerging economies. The mounting economic, social, and geopolitical uncertainties that started in 2019 rekindled the interest of bankers, policy makers, and researchers in understanding these interconnections.

The three articles of our thesis provide a triangulated interpretation of how uncertainty, banks' liquidity creation, profitability, liquidity, and systemic stability interact in developing and emerging economies. The macro evidence identifies bi-directional connection among uncertainty, liquidity creation, and financial stability. The bank-level analysis shows that banks successfully manage the liquidity–profitability outcomes under uncertainty without necessarily sacrificing overall performance. The Lebanese case reveals how excessive liquidity creation in a fragile institutional setting can erode financial stability even when profitability is consistently high. The present conclusion summarizes our findings, contributions, and policy recommendations while acknowledging limitations and offering plans for future research.

1. The results of the thesis

The results of our thesis are structured using the same three-level funnel starting at the macro level, proceeding to the banking sector level and ending at the country level. At the macro level, we document bidirectional links among uncertainty, liquidity creation, and systemic financial stability, with heterogeneous impulse responses across different levels of financial development. At the bank level, we find that uncertainty raises precautionary liquidity buffers but reduces profitability. However, banks can preserve composite performance by adopting the right preventive strategies. At the country level, in Lebanon we show that liquidity creation reduces bank and country level financial stability while profitability improves it.

Our work follows a structured methodological trajectory starting by examining the bidirectional causalities between uncertainty, liquidity creation, and financial stability on a macro-level using a database of 62 developing and emerging countries and employing panel vector autoregression and granger causality tests. The results confirm the bidirectional causality between liquidity creation, financial stability, and uncertainty. Interestingly, our results show that uncertainty and liquidity creation granger cause financial instability while liquidity creation may give rise to uncertainty.

These findings are consistent with three previously mentioned mechanisms. First, uncertainty shocks encourage conservative banks' behaviors which reduce liquidity creation almost immediately but potentially affect future stability through reduced profitability. Second, liquidity creation shocks, especially in underdeveloped systems, can raise uncertainty by fueling credit bubbles and increasing banks' liquidity risks which stir public concerns about the risk of bank runs. Third, deteriorations in financial stability may trigger managerial and policy debate, which sparks institutional and public uncertainty.

Then, we investigate the relationship between banks' behavior under uncertainty and the subsequent impact on liquidity, profitability, and overall bank performance. We construct a PCA based composite performance index and employ fixed effect regressions using a database of more than 990 banks in 21 countries. the bank-level results reveal that banks succefully balance their liquidity and profitability in response to uncertainty and maintain a positive overall performance.

At the banking sector level, we measure performance using a PCA-based index that combines profitability (ROA and ROE) with liquidity ratio (LATA and LADEP). We find that uncertainty measured by the world uncertainty index (WUI) is associated with higher liquidity buffers and lower profitability, but the composite performance index typically increases, indicating that banks strategically re-optimize their tactics to sustain overall performance through managerial efficiency, cost control, and prudent credit risk management. The result is robust to alternative lag structures for WUI, and subsample splits considering major impactful variables like the GFC, COVID among other contextual factors including geographical location, IMF classification, and bank's specific characteristics.

Finally, our detailed analysis of 57 Lebanese banks behavior over a period 20 years reveal a negative impact of excessive liquidity creation on systemic stability even when accompanied by high levels of profitability.

In the Lebanese case, the destabilizing role of liquidity creation is stronger when off-balance-sheet activities are included (cat.fat) than when they are excluded (cat.nonfat). Profitability, measured by ROAA and ROAE and complemented by NIM, enhances financial stability, consistent with capital increase via retained earnings and a lower probability of insolvency. Our results hold across FE-OLS and system-GMM specifications and remain robust to substituting aggregate country level for bank level Z-score.

Across the three chapters of our thesis, the triangulation of macro, sectorial, and country-specific analyses strengthens the validity of our results and clarifies when banking strategies supports their central financial intermediation role and when they becomes destabilizing.

2. Thesis' contributions

Our thesis offers significant contributions to the body of literature covering six levels including the framework, the variables, the data, the methodology, the results, and the managerial and policy implications.

Our thesis also presents a coherent research project that links macro level connections to bank level strategies and country specific fragility offering cumulative analysis and consolidating distinct findings.

First, we introduce a novel comprehensive framework that simultaneously uncovers the relationships between bank's strategic behavior and outcomes, macro-level uncertainties and systemic stability adding to seminal works that examined these relationships unconnectedly without offering a comprehensive analytical structure (Berger & Bouwman, 2009; Fungacova et al., 2021; Bonciani & Roye, 2016; Caglayan & Xu, 2018; Yuejiao Duan, Fan, & Wang, 2022). We first study the nature of connections and the existence of reciprocity and bidirectional causalities between our variables of interest on a macro level. We complement our analysis by evaluating the impact of uncertainty on banks' performance on a sectorial and bank level. Lastly, using a model case we analyze the effect of banks' strategic behavior on systemic financial stability on a country level.

Treating uncertainty, liquidity creation, and financial stability as a combined structure explains how and why the sign and timing of reactions to shocks change depending on the context. It also helps us considering a system approach to monitor the co-movements of uncertainty, liquidity creation, and systemic stability indices rather than checking single indicators.

Second, to measure liquidity creation, we utilized a new calculation method based on Berger & Bouwman, (2009) and adapted for consolidated data (D'Avino et al., 2022) offering more precision than the traditional Deep & Schaefer, (2004) model and solving bank-level data limitations problem in developing and emerging economies. Also, we introduce a new consolidative index to analyze banks' performance by combining liquidity and profitability measures. We use principal component analysis and thus

addressing the limitations of single-metric indices dealing with liquidity and profitability separately. Besides, we used the world uncertainty index as a proxy for uncertainty opposed to the economic policy uncertainty index developed by Baker et al., (2016) which is more restrictive and unavailable for most developing and emerging economies. Finally, we use both country and bank level measures to capture both institutional and systemic financial stability.

Our aggregate liquidity creation indicator extends coverage where bank-level accounts are incomplete, while Berger and Bouwman three step liquidity creation approach isolates the role of individual banks behavior. The PCA performance index formalizes the liquidity–profitability frontier and adopting the normalized profitability measures (ROAA and ROAE with NIM) in Lebanon improves inference when balance sheets figures are prone to high variability across the year. Using WUI ensures cross-country comparability in uncertainty.

Third, we compile and use three comprehensive and original datasets enabling us to generalize our findings by comprising cross-country, sectorial, and national specific levels. We constructed an original dataset of 57 Lebanese banks data from 1997 to 2019 using a particular three-step process and utilizing four different data sources: Orbis Bankfocus database, Bureau Vandijk's Bankscope, banks' annual reports, and the annual reports found in Bilanbanques. Our datasets, particularly for Lebanon, constitute research infrastructure for future work.

Fourth, we employ different econometric methodologies including panel VAR approach, granger causality tests, OLS regression with fixed effect, and generalized method of moments to tackle the linkages between our variables across different levels and contexts. We use panel vector autoregression approach along with granger causality tests to examine macro level interconnections. For bank and country level tests we used OLS regressions with fixed and random effects and strengthened our conclusions using generalized method of moments.

Fifth, our findings contribute to the body of literature on banking behavior, banks' performance, uncertainty, and financial stability by providing complementary and converging findings reinforcing theories and previous findings and challenging others. We show that banks' liquidity creation may directly impact uncertainty and financial stability while we also document that banks in developing and emerging economies are successfully balancing between liquidity and profitability under uncertainty. Furthermore, in an exemplary crisis on a country level model, we reveal how

vulnerabilities can be endogenous to banks behavior and maliciously masked by high profitability and opacity.

Our findings align with models where assets transformation generates liquidity but also fragility. Our results extend existing knowledge by showing that uncertainty is not purely exogenous but can be endogenously affected by liquidity creation and financial stability, particularly in underdeveloped financial systems.

Sixth, we extend our empirical investigation to cover different geographical regions, varying levels of financial systems development, and diverging institutional characteristics. At the policy and managerial recommendations level, our conclusions support early intervention targeting liquidity creation to mitigate the negative effect of uncertainty on financial stability. Our results also emphasize the importance of operational efficiency and proactive credit risk management to maximize combined bank performance under uncertainty.

3. Policy and managerial recommendations

Our results primarily show that prudential guidance should be based context-based where the intensity of interventions is conditioned by the prevalence of uncertainty rather than applying uniform rules across time. During uncertainty surges, authorities should target liquidity creation moderation by imposing funding stabilization measures and higher liquidity buffers. Moreover, regulatory bodies may enhance surveillance of off-balance sheet activities given their potential to convert into immediate liquidity needs. In context where uncertainty rises are less frequent, regulators should emphasize transparency, disclosure, and policy clarity to preserve market discipline without unnecessarily constraining financial intermediation.

Turning to policy and managerial implications, we show that regulatory bodies should proactively monitor banks liquidity creation and uncertainty indicators to prevent financial instability. Also, we highlight the importance of adjusting banks liquidity management strategy to counter uncertainty by actively promoting operational efficiency and actively limiting credit risk exposure.

Our findings suggest that policymakers closely control banks' liquidity creation to nurture financial stability. this recommendation becomes especially important in time of heightened uncertainty and in countries with less developed financial and banking systems. Moreover, we suggest that banks can contribute to stabilizing the financial system and reducing the impact of uncertainty when they prudently manage their

liquidity creation outcomes.

Our findings also demonstrate that a liquidity creation shock can increase uncertainty and financial stability adding more pressure on regulators and banks' management in partial disagreement with prior studies (Berger et al., 2019; Gupta & Kashiramka, 2020b; Zheng et al., 2019). Stakeholders may associate excessive liquidity creation with potential financial disruption and instability and therefore give rise to perceived uncertainty. This situation invites regulatory response and conservative measures which in turn increase uncertainty about the future policies and macro-economic directions.

Moreover, our results underline the importance of early regulatory and supervisory intervention to reduce the effects of uncertainty and mitigate their risk on financial stability.

Because liquidity creation shocks can trigger perceived uncertainty, policy changes and communications should be predictable and transparent. For instance, publishing notes on the methodologies and on the activation or deactivation of regulatory tools, releasing relevant statistics, and committing to regular reviews may reduce the propagation of misinformation and prevent needless volatility while anchoring expectations.

Our findings also highlight the importance of supervising the banks' liquidity creation under uncertainty to maintain financial stability, especially in emerging and developing economies to avoid extreme economic and social costs.

In terms of managerial decisions and recommendations, our findings highlight the importance of optimizing the trade-offs between liquidity and profitability to sustain financial stability in uncertain situations. Our conclusions stress the importance of efficient cost control and prudent credit risk management in fostering effective stability and performance under uncertainty.

At the bank level, management should also strengthen asset–liability management (ALM) governance with explicit risk management statements for liquidity creation and funding stability.

In terms of financial inclusion, our results highlight the importance of policies promoting inclusion without causing competitive pressure between banks.

Moreover, policymakers and regulators should implement strong governance frameworks and encourage transparency to incite confidence and improve predictability in times of political instability.

Likewise, regulatory measures targeting systemically important banks present a critical need given the role of bank size in financial performance under uncertainty.

Particularly, in a geopolitically unstable situations as highlighted in our third chapter, we conclude that policymakers and researchers should promote higher profitability while keeping an eye on the banks' function as liquidity creators.

In systems resembling the Lebanese financial system characterized with banks overreliance, high concentration, and weak governance, the priority should be given to independent supervision and standardized liquidity creation reporting surpassing the traditional credit, liquidity positions, and profitability reports.

4. Limitations of the research

While our work advances robust empirical insights, we acknowledge several limitations in our work. These limitations are mainly caused by the difficulties and constraints related to data collections and general research work environment.

Specifically, to prepare the dataset for Lebanese banks we were constrained to follow lengthy process. Four different sources were used to source data, namely: Orbis Bankfocus database, Bureau Vandijk's Bankscope, banks' annual reports, and the annual reports found in Bilanbanques. Then we manually completed the dataset using several electronic and print formats of the banks' annual reports. Lastly, to avoid reporting inconsistency biases between diverse sources and across the years, we diligently examined and constantly referred to annual reports and notes. Moreover, since our research coincided with the Lebanese financial collapse and heightened distrust between banks, authorities, and stakeholders, demanding access to data was very difficult and generally met with skepticism and refusal. Moreover, access to international databases was very limited due lack of funding options caused by the crisis.

Furthermore, the Lebanese financial crisis causing extreme loss of purchasing power coupled with geopolitical instability and ongoing wars lead to very limited mobility and travel options and thus complicating the research work.

On the limitations level, we acknowledge that the aggregate liquidity creation measure adopted in our first article overlooks bank-specific characteristics and may present over aggregation bias. However, this was addressed in chapters two and three. Additionally, the use of PCA based composite measures in our second article may simplify the complex interactions between liquidity and profitability and should be complemented with other aggregation methods in future studies. Finally, constrained by data

availability, we used the world uncertainty index to capture uncertainty which may overlook some types of uncertainties and should be complemented by adopting other uncertainty measures.

5. Future research

Future work should test explicitly for thresholds in the uncertainty-liquidity creation-financial stability nexus. The central hypothesis is that the marginal effect of liquidity creation on stability may change once uncertainty crosses a critical level producing diverging effects across different financial development and other circumstantial levels.

A natural extension of our work is to incorporate interbank networks to explore how liquidity creation and funding shocks propagate through interbank exposures. In specific cases, network analysis can reveal how concentration and correlated exposures interact with liquidity creation to magnify systemic risk.

In dollarized systems, the interaction between foreign currencies funding and liquidity creation can be critical. Future work may consider interactions between liquidity creation and balance sheet currencies mismatches.

We may investigate the role of technological innovations in financial industry and the rise of fintech and decentralized finance in shaping banks behavior and impacting systemic stability.

Technological innovation may alter the link between liquidity creation and financial stability by changing deposits availability speed. Instant payments, mobile apps, and fintech platforms can make retail funding more rate-sensitive and unstable, increasing the volatility of returns and tightening the time window for adjustment under uncertainty. A possible research area is to estimate heterogeneous strategies and outcomes across banks with different levels of digital adaptation and funding structures.

We may investigate the effect of the rise of geopolitical tensions and climate change and regulatory pressures on banks behavior and systemic stability.

Integrating climate transition and physical risk as well as geopolitical shocks into the framework would clarify how sectoral exposures condition the liquidity creation and stability connection.

Future work can also explore the effect of policy discontinuity shocks and extraordinary exogenous shocks such as natural disasters on banks behavior and outcomes and on financial stability.

Additionally, we may extend our comprehensive analysis to more advanced economies

by conducting comparative studies and testing the findings on broader levels.

Extending our cross-country analysis to advanced economies provides a contrast where market depth, regulatory quality, and disclosure may affect the persistence of liquidity creation shocks. Also, updating our dataset to include post-2019 information would test whether the signs and durations of impulse responses have changed after the consecutive uncertainty shocks.

Finally, to ensure that conclusions are not dependent on the PCA definition of performance, future studies should compare PCA index with dynamic factor models (DFM), Data Envelopment Analysis (DEA), and Stochastic Frontier Analysis (SFA).

Our thesis advances a comprehensive analysis of the interconnectedness between uncertainty, banking strategy, banks performance, and financial stability in developing and emerging economies. Evidence drawn from our three-level research design spanning a macro level exploratory analysis, a bank level examination, and a country level investigation of Lebanon, show that liquidity creation effects can vary according to the macro and banks specific situations. In weak institutional environments an increase in liquidity creation can raise uncertainty and erode financial stability even when profitability appears robust. At the same time, we notice that banks do not passively absorb uncertainty. In fact, banks strategies to counter uncertainty shocks based on building liquidity buffers and adjusting income composition, appear to be successful by preserving overall performance despite pressure on profit margins. Policymakers and regulatory authorities can tune these outcomes through conditioned, transparent, and clear interventions that recognize bidirectional causalities across liquidity creation, uncertainty, and systemic financial stability.

By integrating macro linkages, sectoral behavior, and a country case of severe crisis, our thesis offers a novel, practical, and evidence-based plan for policymakers and bank managers seeking to optimize the benefits of financial intermediation without impeding systemic financial stability.

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Table A 1: Panel 1: List of Countries with High Levels of Financial Development

1	Albania	11	Czech Republic	21	Malaysia	31	Ukraine
2	Algeria	12	Egypt	22	Mongolia	32	Uruguay
3	Bangladesh	13	Guatemala	23	Morocco		
4	Bolivia	14	Hounduras	24	Nepal		
5	Bosnia and Herzegovina	15	Hungary	25	Panama		
6	Botswana	16	India	26	Philippines		
7	Brazil	17	Jamaica	27	Poland		
8	Bulgaria	18	Kuwait	28	Qatar		
9	Chile	19	Lebanon	29	South Africa		
10	Croatia	20	Macedonia, FYR	30	Thailand		

Table A 2: Panel 2: List of Countries with Low Levels of Financial Development

1	Angola	11	Gabon	21	Mozambique
2	Armenia	12	Georgia	22	Nicaragua
3	Azerbaijan	13	Haiti	23	Nigeria
4	Belarus	14	Indonesia	24	Pakistan
5	Burundi	15	Kazakhstan	25	Paraguay
6	Cambodia	16	Kenya	26	Romania
7	Cameroon	17	Kyrgyz Republic	27	Sierra Leone
8	Congo, Democratic Republic of	18	Lesotho	28	Uganda
9	Costa Rica	19	Mexico	29	Venezuela, Republica Bolivariana de
10	Dominican Republic	20	Moldova	30	Zambia

Table A 3: Summary statistics by country

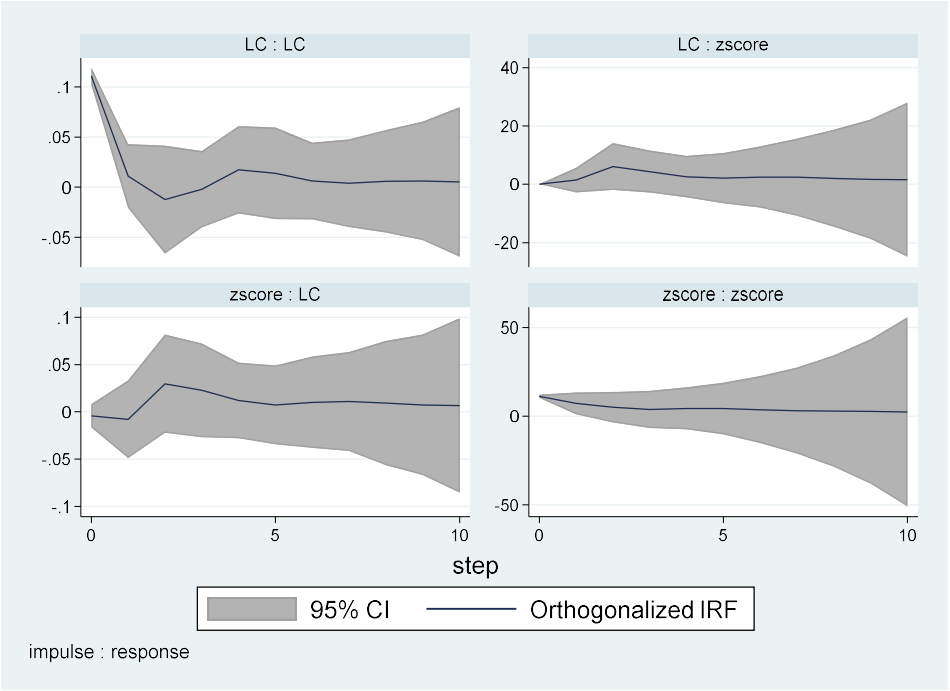
Country	ALTM_GTA		WUI		Z-Score		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Obs.
Albania	0.156466	0.068738	0.033504	0.032075	18.84726	3.346774	14
Algeria	0.080057	0.037962	0.044454	0.038602	14.48635	5.002197	15
Angola	0.217837	0.049843	0.024813	0.020931	9.250323	0.899833	15
Armenia	0.198117	0.034769	0.018919	0.016043	17.49088	3.892908	15
Azerbaijan	0.210300	0.031055	0.029875	0.039578	5.906335	1.724901	15
Bangladesh	0.286438	0.022412	0.041548	0.039442	16.00546	2.255655	15
Belarus	0.198748	0.075183	0.013390	0.008710	23.69692	10.35928	15
Bolivia	0.300354	0.058692	0.092531	0.056149	13.68338	2.131781	15
Bosnia and Herzegovina	0.249703	0.030711	0.049445	0.040408	15.56866	2.275982	15
Botswana	0.122602	0.086701	0.071520	0.055446	7.778467	1.307084	15
Brazil	0.099613	0.045454	0.087413	0.043434	16.26925	1.195055	15
Bulgaria	0.266827	0.039003	0.058688	0.051477	8.743348	0.792775	15
Burundi	0.407368	0.073324	0.052752	0.046186	13.38824	1.748432	13
Cambodia	0.079850	0.091921	0.050377	0.074368	27.28417	1.954858	14
Cameroon	0.207157	0.035688	0.033920	0.027026	10.16898	0.888285	14
Chile	0.326637	0.122612	0.028472	0.023913	9.260160	0.485652	12
D. R. of Congo,	0.292308	0.062959	0.047795	0.046326	9.467888	1.334274	14
Costa Rica	0.388259	0.036796	0.044233	0.031074	20.09759	1.277079	15
Croatia	0.201800	0.021703	0.038040	0.027677	6.618246	1.182484	15
Czech Republic	0.260457	0.069843	0.061652	0.039378	10.63285	1.209069	14
Dominican Republic	0.272525	0.053544	0.026411	0.025806	32.84284	2.427265	15
Egypt	0.113292	0.018268	0.063540	0.068465	17.40713	2.892294	12
Gabon	0.200421	0.048941	0.027938	0.026001	14.83695	3.033356	12
Georgia	0.243582	0.040101	0.069283	0.082915	10.17085	2.105633	15
Guatemala	0.251547	0.027011	0.069167	0.070822	28.68091	2.100282	15
Haiti	0.096595	0.028243	0.050416	0.057509	10.45681	1.697658	13
Hounduras	0.204312	0.024837	0.040852	0.039094	30.28959	2.092390	15
Hungary	0.201479	0.033617	0.086052	0.052128	7.478361	0.863408	13
India	0.349185	0.020752	0.015935	0.010773	15.08330	2.061613	12
Indonesia	0.176818	0.041325	0.061800	0.036255	3.820933	0.696886	15
Jamaica	0.102181	0.049030	0.051054	0.029878	17.54290	2.811701	14
Kazakhstan	0.191500	0.027313	0.038620	0.065389	2.764108	1.375486	13
Kenya	0.271204	0.027449	0.110697	0.057328	19.76362	2.791067	15
Kuwait	0.233366	0.039728	0.051252	0.028678	16.62869	2.129569	14
Kyrgyz Republic	0.201295	0.076690	0.077732	0.058905	18.77341	3.223904	14
Lebanon	-0.057846	0.040375	0.085991	0.050601	17.78739	2.363051	15
Lesotho	0.257287	0.050458	0.109320	0.107235	16.27311	1.427008	12
Macedonia, FYR	0.169682	0.044844	0.044263	0.034481	11.16870	1.900961	13
Malaysia	0.251589	0.020844	0.043940	0.045416	16.22344	2.369991	15

Mexico	0.171453	0.029329	0.080531	0.035403	19.94400	3.408823	15
Moldova	0.172207	0.033634	0.058563	0.076075	10.20953	2.101547	15
Mongolia	0.247590	0.055076	0.065260	0.059459	31.51505	5.007503	15
Morocco	0.381405	0.032087	0.029255	0.026887	37.61917	3.056893	15
Mozambique	0.291959	0.045717	0.037688	0.044813	5.000696	1.415566	13
Nepal	0.252219	0.027423	0.090338	0.076865	24.85548	2.437506	14
Nicaragua	0.149951	0.092738	0.103310	0.081624	16.27384	2.288586	15
Nigeria	0.208805	0.053448	0.109715	0.062847	16.51493	2.349843	15
Pakistan	0.381122	0.044880	0.037542	0.031353	11.14898	2.271492	15
Panama	0.189066	0.023239	0.059934	0.052430	36.95621	4.243053	14
Paraguay	0.292087	0.064832	0.047849	0.035047	15.80167	1.695554	15
Philippines	0.121568	0.015096	0.061492	0.039446	22.61008	6.176119	13
Poland	0.288901	0.076203	0.063330	0.041365	8.451052	2.109680	15
Qatar	0.173846	0.034148	0.012382	0.015461	26.76177	3.459086	15
Romania	0.176412	0.082683	0.059206	0.033311	11.14933	2.923565	15
Sierra Leone	0.162591	0.059508	0.033738	0.024827	5.727721	1.574151	15
South Africa	0.364647	0.022180	0.126361	0.078880	14.16109	1.764169	13
Thailand	0.210021	0.028495	0.062689	0.046158	5.945405	1.219814	15
Uganda	0.270629	0.019949	0.045329	0.031157	11.87609	2.326254	14
Ukraine	0.318590	0.021624	0.080435	0.058765	5.400291	1.294508	15
Uruguay	0.149183	0.041246	0.062381	0.030503	4.959619	1.651530	15
Venezuela	0.379484	0.064609	0.075016	0.060839	9.890951	3.640758	15
Zambia	0.236016	0.033116	0.099420	0.100890	9.221264	1.576970	15
All	0.223406	0.099901	0.057327	0.054914	15.28582	8.606123	888

Table A 4: Variables codes and sources

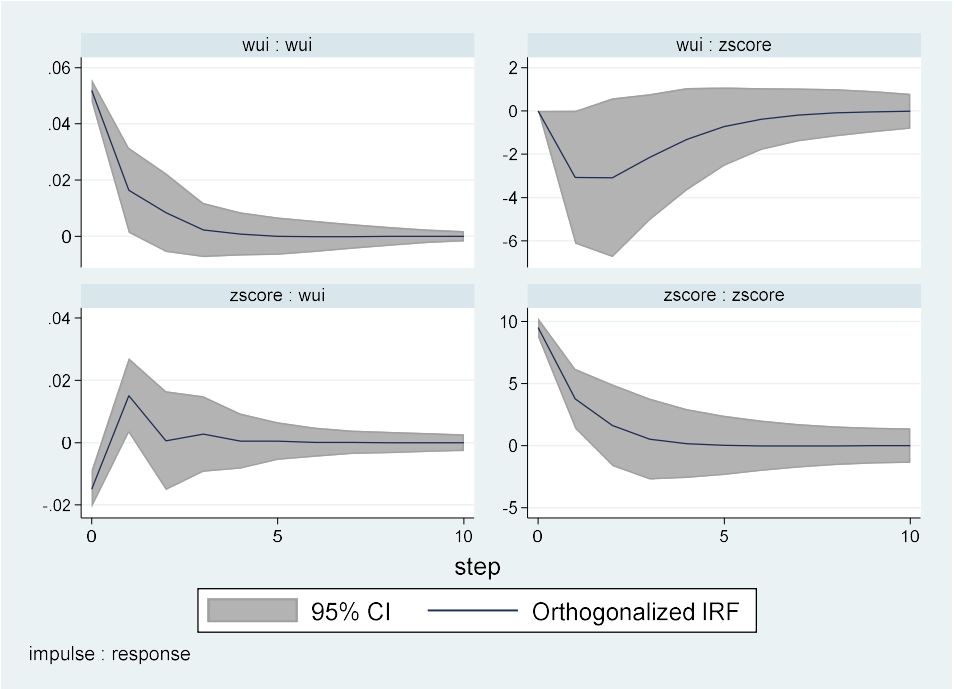
Variable	Description	Source
lc	Liquidity creation measure	D'avino *et al.*, (2022) calculations based on IFS data Authors calculations based on https://www.bdl.gov.lb/webroot/statistics/table.php?name=tsid4l and https://www.bdl.gov.lb/webroot/statistics/table.php?name=tsid4a
wui	The "World Uncertainty Index" to capture uncertainty	https://worlduncertaintyindex.com/data/
zscore	Country-level annual Z_{score} to capture financial instability	https://databank.worldbank.org/source/global-financial-development# Code: GFDD.SI.01 Indicator name : Bank Z_{score}
goveff	Governance effectiveness variable	https://databank.worldbank.org/source/worldwide-governance-indicators Code: GE.EST Indicator name : Government Effectiveness: Estimate
rgdp growth	Real GDP growth	https://databank.worldbank.org/source/world-development-indicators Code: NY.GDP.MKTP.KD.ZG Indicator name : GDP growth (annual %)
inf	Inflation	https://databank.worldbank.org/source/world-development-indicators Code: FP.CPI.TOTL.ZG Indicator name : Inflation, consumer prices (annual %)

Figure A 1: Interactions between LC and Z_score– "Developed" financial systems – Panel 1



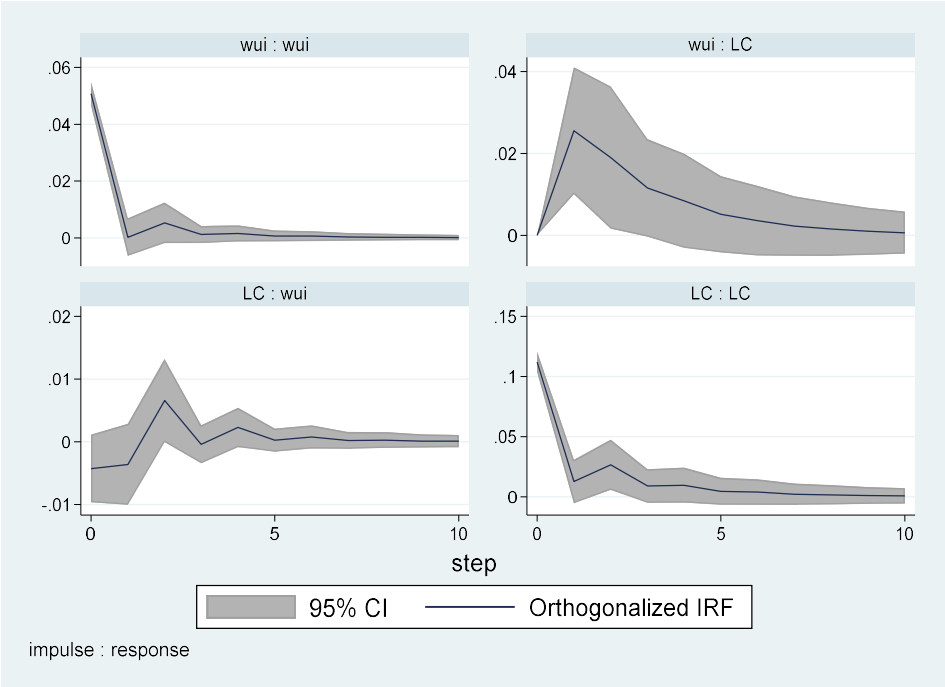
Source: Authors' computation based on data sources

Figure A 2: Interactions between WUI and Z_score– "Developed" financial systems – Panel 1



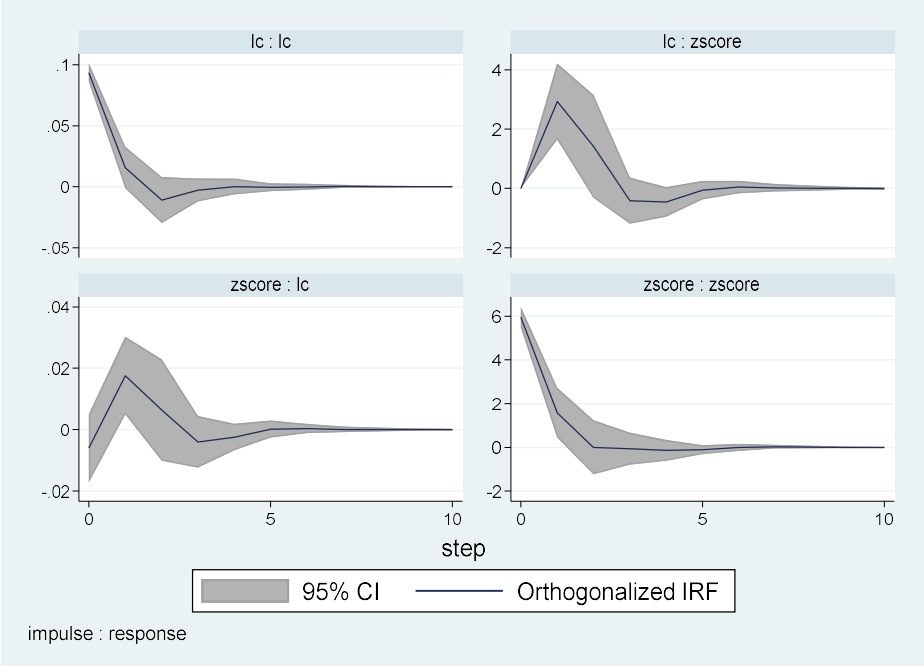
Source: Authors' computation based on data sources

Figure A 3: Interactions between LC and WUI – "Developed" financial systems – Panel 1



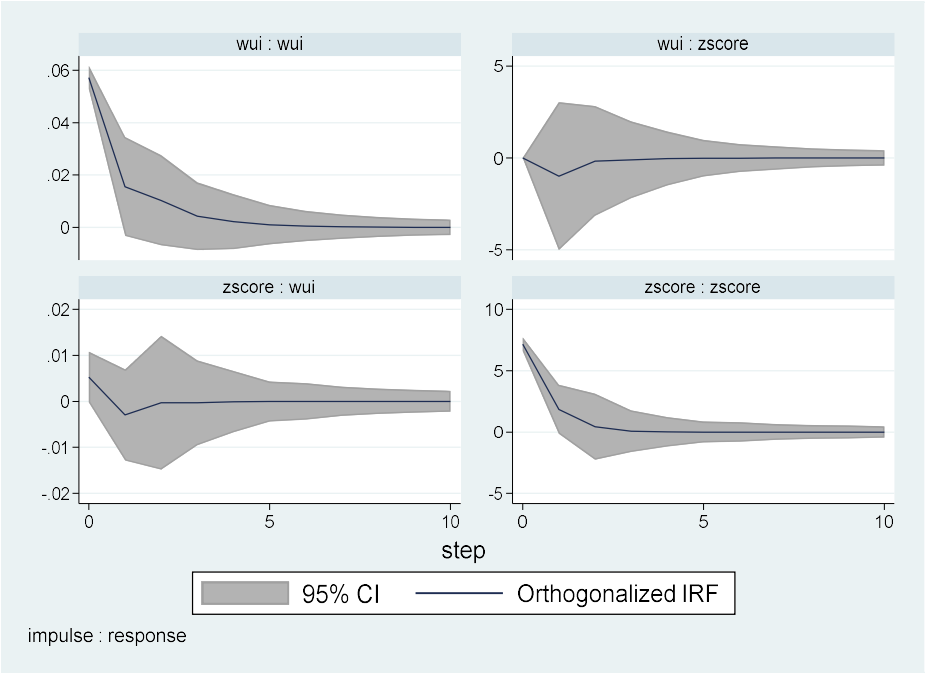
Source: Authors' computation based on data sources

Figure A 4: Interactions between LC and Z_score– "Underdeveloped" financial systems – Panel 2



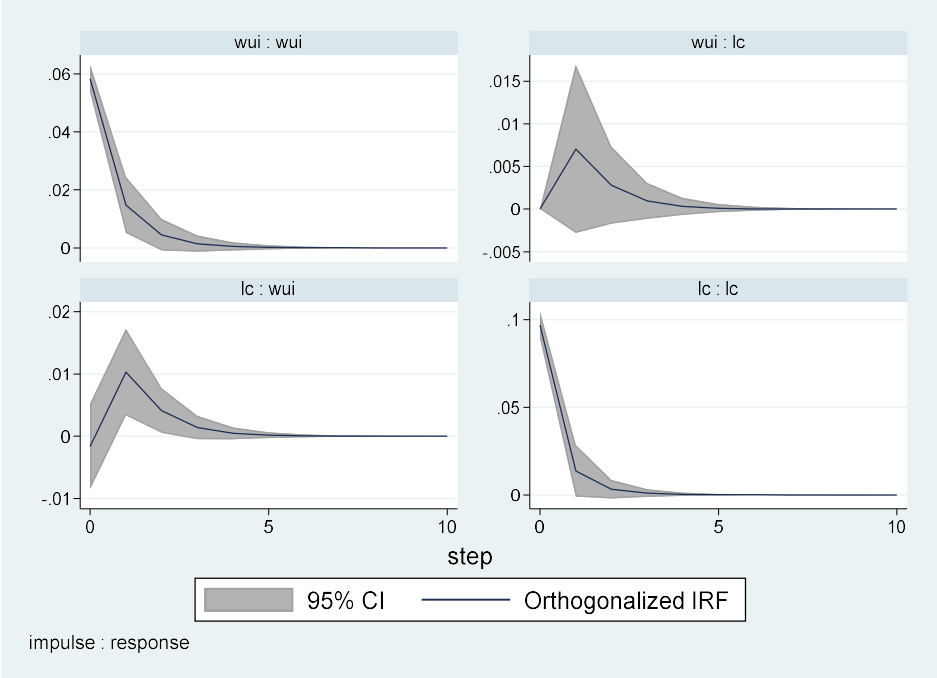
Source: Authors' computation based on data sources

Figure A 5: Interactions between WUI and Z_score– "Underdeveloped" financial systems – Panel 2



Source: Authors' computation based on data sources.

Figure A 6: Interactions between LC and WUI – "Underdeveloped" financial systems – Panel 2



Source: Authors' computation based on data sources

Table A 5: List of countries

Country Code	Country	Number of banks per country	IMF classification by Income	IMF classification by Region
ARE	United Arab Emirates	32	2	MCD
ARM	ARMENIA	15	2	MCD
AZE	AZERBAIJAN	23	2	MCD
CHN	China	256	2	APD
GEO	GEORGIA	14	2	MCD
IDN	INDONESIA	109	2	APD
IDN	INDIA	70	2	APD
IRQ	IRAQ	45	2	MCD
IRN	IRAN	33	2	MCD
JOR	JORDAN	18	2	MCD
KWT	KUWAIT	18	2	MCD
KAZ	KAZAKHSTAN	26	2	MCD
LBN	LEBANON	40	2	MCD
LKA	SRI LANKA	32	2	APD
MYS	Malaysia	48	2	APD
OMN	Oman	11	2	MCD
PHL	Philippine	110	2	APD
PAK	Pakistan	36	2	MCD
QAT	Qatar	10	2	MCD
SAU	Saudi Arabia	17	2	MCD
THA	Thailand	29	2	APD

Table A 6: MCD region results

	(1)	(2)	(3)
VARIABLES	C_PERF	C_PERF	C_PERF
WUI	0.097***	0.046***	0.060***
	(0.014)	(0.005)	(0.010)
INC	-0.004	-0.005	0.002
	(0.010)	(0.004)	(0.007)
STA	-0.153***	-0.022***	-0.010
	(0.013)	(0.006)	(0.010)
TA	0.060***	-0.026***	-0.033***
	(0.009)	(0.004)	(0.006)
CAR	0.387***	0.132***	0.426***
	(0.037)	(0.018)	(0.030)
RES	-0.473***	0.379***	-0.865***
	(0.098)	(0.077)	(0.121)
CIR	0.020***	0.027***	0.023***
	(0.004)	(0.002)	(0.003)
ROA		0.174***	
		(0.006)	
LATA		0.716***	0.702***
		(0.012)	(0.021)
GDP	-0.320	-0.331**	-0.181
	(0.323)	(0.131)	(0.236)
ROE			0.118***
			(0.010)
Constant	-0.695***	2.138***	1.803***
	(0.156)	(0.070)	(0.125)
Observations	1,974	1,763	1,769
R-squared	0.153	0.799	0.548
Number of time	17	17	17
r2_o	0.142	0.798	0.543

Table A 7: APD region results

	(1)	(2)	(3)
	ols22	ols33	ols11
VARIABLES	C_PERF	C_PERF	C_PERF
WUI	-0.009	-0.011	-0.039**
	(0.015)	(0.016)	(0.018)
INC	0.022	0.051	-0.378***
	(0.039)	(0.040)	(0.043)
STA	-0.023	-0.061**	0.087***
	(0.029)	(0.030)	(0.033)
TA	-0.039***	-0.049***	-0.020***
	(0.006)	(0.006)	(0.006)
CAR	0.001	0.001	0.000
	(0.002)	(0.002)	(0.002)
RES	0.053	-0.221	0.414
	(0.409)	(0.416)	(0.427)
CIR	-0.007	-0.133**	-0.020***
	(0.054)	(0.054)	(0.007)
ROA	0.147***		
	(0.012)		
LATA	0.858***	0.851***	
	(0.026)	(0.026)	
GDP	0.326	-0.316	3.185***
	(0.601)	(0.607)	(0.677)
ROE		0.078***	
		(0.012)	
Constant	2.321***	2.153***	-1.595***
	(0.194)	(0.197)	(0.185)
Observations	3,537	3,534	3,728
R-squared	0.291	0.272	0.049
Number of time	17	17	17
r2_o	0.290	0.270	0.0416

Table A 8: Pre-2008 (Before GFC) results

	(1)	(2)	(3)
VARIABLES	**C_PERF**	**C_PERF**	**C_PERF**
WUI	0.048**	0.027***	0.019**
	(0.019)	(0.008)	(0.009)
INC	0.056***	0.025***	0.026***
	(0.017)	(0.007)	(0.008)
STA	-0.040**	0.016*	0.012
	(0.019)	(0.008)	(0.009)
TA	0.013	-0.018***	-0.017**
	(0.016)	(0.007)	(0.007)
CAR	1.121***	0.261***	0.559***
	(0.232)	(0.095)	(0.113)
RES	1.505***	0.347*	0.265
	(0.483)	(0.199)	(0.218)
CIR	-0.058	0.002	-0.172**
	(0.098)	(0.067)	(0.072)
ROA		0.107***	
		(0.012)	
LATA		0.722***	0.675***
		(0.019)	(0.021)
GDP	-0.552	-0.328*	-0.316*
	(0.426)	(0.169)	(0.185)
Region	0.235***	0.110***	0.126***
	(0.044)	(0.018)	(0.020)
ROE			0.050***
			(0.013)
Constant	-0.026	1.722***	1.295***
	(0.336)	(0.149)	(0.158)
Observations	354	343	342
R-squared	0.317	0.880	0.858
Number of time	3	3	3
r2_o	0.313	0.880	0.857

Table A 9: 2008–2019 (Between GFC and COVID-19) results

	(1)	(2)	(3)
VARIABLES	C_PERF	C_PERF	C_PERF
WUI	0.023**	0.011*	0.023***
	(0.011)	(0.006)	(0.008)
INC	-0.031***	-0.011*	-0.004
	(0.010)	(0.006)	(0.008)
STA	-0.135***	-0.010	-0.020**
	(0.012)	(0.008)	(0.010)
TA	0.035***	-0.029***	-0.039***
	(0.004)	(0.003)	(0.004)
CAR	0.000	0.000	0.001
	(0.002)	(0.001)	(0.001)
RES	-0.588***	0.422***	-0.546***
	(0.162)	(0.117)	(0.138)
CIR	0.026***	0.026***	0.033***
	(0.005)	(0.003)	(0.004)
ROA		0.150***	
		(0.006)	
LATA		0.751***	0.742***
		(0.012)	(0.015)
GDP	1.815***	0.421**	0.375
	(0.326)	(0.198)	(0.244)
region	0.179***	0.055***	0.098***
	(0.025)	(0.015)	(0.019)
ROE			0.091***
			(0.007)
Constant	-0.769***	1.933***	1.690***
	(0.096)	(0.073)	(0.089)
Observations	4,108	3,857	3,857
R-squared	0.060	0.557	0.440
Number of time	11	11	11
r2_o	0.0604	0.557	0.437

Table A 10: Post-2019 (COVID-19) results

	(1)	(2)	(3)
VARIABLES	C_PERF	C_PERF	C_PERF
WUI	0.050	0.057	0.157***
	(0.045)	(0.045)	(0.045)
INC	0.026	0.030	-0.011
	(0.028)	(0.028)	(0.030)
STA	0.026	0.050	-0.065
	(0.046)	(0.046)	(0.044)
TA	-0.032**	-0.034***	0.025*
	(0.013)	(0.013)	(0.013)
CAR	0.646***	0.811***	0.736***
	(0.082)	(0.078)	(0.067)
RES	-0.178	-0.737**	-0.412**
	(0.424)	(0.372)	(0.166)
CIR	-0.052	0.007	0.001
	(0.091)	(0.007)	(0.006)
ROA	0.140***		
	(0.023)		
LATA	0.869***	0.844***	
	(0.061)	(0.061)	
GDP	-0.200	-0.547	0.453
	(0.825)	(0.833)	(0.774)
Region	0.012	0.047	0.174**
	(0.076)	(0.075)	(0.076)
ROE		0.111***	
		(0.022)	
Constant	2.318***	1.933***	-0.227
	(0.330)	(0.316)	(0.289)
Observations	1,100	1,104	1,240
R-squared	0.305	0.301	0.109
Number of time	3	3	3
r2_o	0.305	0.300	0.113

Table A 11: Random Effects Model results

	(1)	(2)	(3)
VARIABLES	C_PERF	C_PERF	C_PERF
WUI	0.029***	0.013*	0.019**
	(0.010)	(0.008)	(0.008)
INC	-0.020**	0.001	0.006
	(0.010)	(0.007)	(0.008)
STA	-0.115***	0.005	0.003
	(0.012)	(0.009)	(0.010)
TA	0.023***	-0.038***	-0.048***
	(0.004)	(0.003)	(0.004)
CAR	0.002	0.001	0.002
	(0.002)	(0.002)	(0.002)
RES	-0.316***	0.499***	-0.410***
	(0.100)	(0.134)	(0.138)
CIR	0.009***	0.025***	0.019***
	(0.004)	(0.004)	(0.003)
LATA		0.810***	0.800***
		(0.015)	(0.017)
ROA		0.157***	
		(0.007)	
GDP	1.122***	0.177	0.108
	(0.257)	(0.197)	(0.219)
Region	0.161***	0.034**	0.087***
	(0.022)	(0.017)	(0.019)
covid19	0.022	0.034*	0.019
	(0.024)	(0.018)	(0.020)
GFC	-0.067*	-0.022	-0.066**
	(0.035)	(0.026)	(0.029)
ROE			0.094***
			(0.008)
Constant	-0.454***	2.252***	1.967***
	(0.095)	(0.086)	(0.094)
Observations	5,702	5,300	5,303
Number of time	17	17	17
r2_o	0.0320	0.411	0.341

Table A 12: Generalized Method of Moments (GMM) results

	(1)	(2)
VARIABLES	C_PERF	C_PERF
L. C_PERF	-0.363	0.0878
	(0.445)	(0.147)
WUI	0.141	0.0252
	(0.328)	(0.0293)
INC	0.0345	0.00747
	(0.173)	(0.0811)
STA	-0.100	-0.0179
	(0.161)	(0.0408)
TA	-0.00117	-0.0339
	(0.0463)	(0.0440)
CAR	-0.00251	0.000823
	(0.00588)	(0.00284)
RES	0.782	-1.080
	(3.127)	(2.843)
CIR	-0.0384	0.0203
	(0.0792)	(0.113)
LATA		0.764***
		(0.0470)
ROE		0.0839***
		(0.0263)
GDP	-20.27	-1.976
	(74.16)	(11.38)
Constant	1.148	1.796**
	(3.324)	(0.742)
Observations	4,095	3,790
Number of time	17	17
Sargan statistic	1723	1723
Prob > Sargan	5.58e-05	5.58e-05
Hansen statistic	9.951	9.951
Prob > Hansen	1	1
AR(2)	0.558	0.558

Table A 13: Detailed classification of assets, liabilities & equity, and off-balance activities

Assets		
Liquid Assets	**Remarks / Notes**	**Explanation**
Cash & balances with central banks		These assets can be easily, economically (minimal loss), and rapidly turned into cash.
Net loans & advances to banks		
Total financial assets: securities	The change in classification dummy variable denotes the possible omission ofother securities from this account prior to 2003. However, the amounts and therefore the impact are minimal.	
Semi-liquid Assets		
No semi-liquid assets		Due to underdeveloped financial markets, Lebanese banks cannot securitize or sell their mortgages or consumer loans and consequently they should be considered illiquid and not semi-liquid as in the initial classification
Illiquid Assets		
All other assets		These assets cannot be easily and rapidly withdrawn without incurring substantial costs turned into cash

Liabilities and Equity		
Liquid Liabilities		**Remarks**
Demand deposits		These liabilities can be easily,
Savings deposits		
Derivative financial instruments	The change in classification dummy variable denotes the omission of this account mainly prior to 2007. However, the amounts and therefore the impact are minimal	

Trading liabilities	The change in classification dummy variable denotes the omission of this account mainly prior to 2007. However, the amounts and therefore the impact are minimal	economically(minimal or no penalty), and rapidly withdrawn by the bank's customers
Semi-liquid Liabilities		
Time deposits		These liabilities can be less easily withdrawn by the bank's customers, although incurring a penalty
Other customer deposits		
Bank deposits		
Other wholesale deposits		
Short-term borrowings and debt securities at historical cost < 1 year	The change in classification dummy variable denotes the omission of this account mainly prior to 2007. However, the amounts and therefore the impact are minimal	
Illiquid Liabilities and Equity		
All other liabilities and equity		These liabilities cannot be withdrawn without involving substantial losses and time. Equity components are illiquid sincethey are residual claims by nature.
Off-balance Sheet Activities / Guarantees		
Liquid Guarantees		**Remarks**
Non-liquid Guarantees		
Semi-liquid Guarantees		
Non-liquid and semi-liquid guarantees		Off-balance sheet derivatives, when available, are reported at par book value and consequently they are not consideredin our calculation. Berger and Bouwman consider gross fair values in their analysis.
Illiquid Guarantees		

All other off-balance sheet liabilities		Off-balance sheet guarantees and commitments are treated like their similaron-balance sheet equivalents

Table A 14: Weights assigned to the classified items

Assets	
	Weight
Liquid Assets	-0.5
Semi-liquid Assets	0
Illiquid Assets	+0.5
Liabilities and Equity	
Liquid Liabilities	+0.5
Semi-liquid Liabilities	0
Illiquid Liabilities and Equity	-0.5
Off-balance Sheet Activities / Guarantees	
Liquid Guarantees	-0.5
Semi-liquid Guarantees	0
Illiquid Guarantees	+0.5

Table A 15: Liquidity created by multiplying the classified items by their respective weights

Variable	Description	Calculation
LC_A	Liquidity created byassets	liquid assets * (- 0.5) + semi-liquid assets * 0 + illiquid assets *0.5
LC_L&E	Liquidity created by liabilities and equity	liquid L&E * 0.5 + semi-liquid L&E * 0 + illiquid L&E * (-0.5)
LC_OBS	Liquidity created by off-balance sheet activities	liquid OBS * (- 0.5) + semi-liquid OBS * 0 + illiquid OBS * 0.5
LC_ CAT.FAT	Total liquidity created including off-balance sheet activities	LC_A + LC_L&E + LC_OBS
LC_ CAT.NONFAT	Total liquidity created excluding off-balance sheet activities	LC_A + LC_L&E + LC_OBS

Table A 16: Liquidity created per dollar of total gross assets

Variable	Description	Calculation
GTA	Gross total assets	Total assets + Provision for loan losses
LC_A / GTA	Liquidity created by assets for one dollar of GTA	LC_A / GTA
LC_L&E / GTA	Liquidity created by liabilities and equity for one dollar of GTA	LC_L&E / GTA
LC_OBS / GTA	Liquidity created by off-balance sheet activities for one dollar of GTA	LC_OBS / GTA
LC_ CAT.FAT / GTA	Total liquidity created including off-balance sheet activities for one dollar of GTA	LC_ CAT.FAT / GTA
LC_ CAT.NONFAT / GTA	Total liquidity created excluding off-balance sheet activities for one dollar of GTA	LC_ CAT.NONFAT / GTA

Table A 17: OLS regressions with aggregate country-level Z-score

	(1)	(2)
VARIABLES	Z-score (A)	Z-score (A)
LCCF	-1.552**	
	(0.745)	
LCCNF		-1.930**
		(0.817)
ROAE	7.399***	7.474***
	(1.074)	(1.073)
L.EQ	18.355***	18.362***
	(3.085)	(3.066)
L.PROV	-4.833***	-4.613***
	(1.561)	(1.564)
L.COST	-0.750***	-0.761***
	(0.200)	(0.199)
L.LIQ	-12.739***	-12.876***
	(2.181)	(2.179)
L.LOAN	-2.835***	-2.884***
	(1.028)	(1.025)
L.CONC	0.131***	0.130***
	(0.018)	(0.018)
L.GDP	-0.123**	-0.120**
	(0.050)	(0.050)
L.RES	-1.970***	-1.936***
	(0.416)	(0.416)
L.GOV	3.098**	2.856**
	(1.336)	(1.348)
L.GFC	2.811***	2.756***
	(0.621)	(0.622)
Constant	16.097***	16.367***
	(2.567)	(2.575)
Observations	452	452
R-squared	0.562	0.564
Number of ID	42	42
r2_o	0.440	0.444

Note(s): this table reports the results of our regressions analysis examining the impact of Lebanese banks' liquidity creation and profitability on financial stability using ordinary least squares analysis. The dependent variable is the country-level Z-score (aggregate) in both columns. Controls are lagged one year. All columns include bank and year fixed effects. All variables are defined in Table 1. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

Table A 18: Including a new measure for bank profitability: the Net Interest Margin (NIM)

	(1)	(2)
VARIABLES	**Z-score**	**Z-score**
LCCF	-3.850***	
	(1.400)	
LCCNF		-4.133***
		(1.539)
NIM	111.392***	115.955***
	(37.867)	(37.910)
L.EQ	90.658***	91.002***
	(5.880)	(5.863)
L.PROV	-6.347**	-5.992**
	(2.999)	(3.007)
L.COST	-2.646***	-2.692***
	(0.377)	(0.375)
L.LIQ	-6.765	-6.735
	(4.106)	(4.109)
L.LOAN	-3.542*	-3.690*
	(1.930)	(1.930)
L.CONC	0.034	0.033
	(0.033)	(0.033)
L.GDP	-0.047	-0.042
	(0.094)	(0.094)
L.RES	-2.014***	-1.972**
	(0.772)	(0.775)
L.GOV	3.553	3.214
	(2.514)	(2.542)
L.GFC	1.590	1.478
	(1.171)	(1.174)
Constant	9.315*	9.431*
	(4.982)	(4.997)
Observations	452	452
R-squared	0.509	0.508
Number of ID	42	42
r2_o	0.223	0.227

Note(s): this table reports the results of our regressions analysis examining the impact of Lebanese banks' liquidity creation and profitability on financial stability using ordinary least squares analysis. The dependent variable is the bank-level Z-score in both columns. We use the net interest margin (NIM) as an alternative measure of profitability. Controls are lagged one year. All columns include bank and year fixed effects. All variables are defined in Table 1. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

Table A 19: GMM system regressions

	(1)	(2)	(3)	(4)
	Cat.Fat (GMM_Reduced)	Cat.NonFat (GMM_Reduced)	Cat.Fat (GMM_Reduced)	Cat.NonFat (GMM_Reduced)
VARIABLES	**Z-score**	**Z-score**	**Z-score**	**Z-score**
L.Z-score	0.826***	0.813***	0.949***	0.927***
	(0.0239)	(0.0293)	(0.0590)	(0.0673)
LCCF	-7.306*		-5.141***	
	(4.622)		(1.959)	
LCCNF		-9.944*		-6.601***
		(5.972)		(2.379)
ROAE	5.831*	5.962*	-1.736	-1.561
	(3.767)	(3.936)	(2.962)	(2.759)
GFC	0.573	0.968	0.951***	0.773**
	(0.459)	(0.660)	(0.313)	(0.377)
Constant	2.248***	2.039**	1.806	2.259
	(0.707)	(0.885)	(1.798)	(2.037)
Observations	700	700	658	658
Number of id	55	55	56	56
Sargan statistic	233.3	237.6	223.4	223.4
Prob > Sargan	0	0	0	0
Hansen statistic	25.59	17.43	36.21	36.21
Prob > Hansen	0.0292	0.0653	0.000299	0.000299
AR(2)	0.296	0.321	3.61e-06	3.61e-06

Note(s): This table reports the results of our two-step system GMM analysis examining the impact of Lebanese banks' liquidity creation and profitability on financial stability. The dependent variable is the banks' Z-score in all four columns. The three explanatory variables are LCCF, LCCNF, and ROAE. All variables are defined in Table 1. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

Table A 20: OLS regressions - Testing each independent variable on a standalone basis

	(1)	(2)	(3)
VARIABLES	**Z-score**	**Z-score**	**Z-score**
LCCF	-3.958***		
	(1.410)		
LCCNF		-3.994**	
		(1.553)	
ROAE			4.283**
			(2.047)
L.EQ	92.715***	93.339***	96.570***
	(5.816)	(5.799)	(5.759)
L.PROV	-4.556	-4.154	-4.510
	(2.959)	(2.973)	(2.973)
L.COST	-2.588***	-2.635***	-2.686***
	(0.373)	(0.372)	(0.378)
L.LIQ	-7.885*	-7.769*	-4.956
	(4.120)	(4.131)	(4.075)
L.LOAN	-3.448*	-3.599*	-3.220
	(1.943)	(1.945)	(1.957)
L.CONC	0.022	0.021	0.012
	(0.033)	(0.033)	(0.034)
L.GDP	-0.043	-0.040	-0.086
	(0.095)	(0.095)	(0.096)
L.RES	-1.947**	-1.921**	-2.475***
	(0.779)	(0.783)	(0.785)
L.GOV	2.386	2.097	4.328*
	(2.490)	(2.525)	(2.511)
L.GFC	1.848	1.754	2.099*
	(1.174)	(1.178)	(1.183)
Constant	13.739***	13.858***	9.789**
	(4.811)	(4.844)	(4.808)
Observations	454	454	452
R-squared	0.496	0.495	0.494
Number of ID	42	42	42
r2_o	0.214	0.217	0.233

Note(s): This table reports the results of our regressions analysis examining the impact of Lebanese banks' liquidity creation and profitability on financial stability using ordinary least squares analysis. The dependent variable is the bank-level Z-score in all three columns. Controls are lagged one year. All columns include bank and year fixed effects. All variables are defined in Table 1. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

Table A 21: Testing for firm-size effects: large bank subpanel

	(1)	(2)
VARIABLES	**Z-score**	**Z-score**
LCCF	-4.418***	
	(1.288)	
LCCNF		-4.430***
		(1.422)
ROAE	4.983***	5.131***
	(1.872)	(1.879)
L.EQ	105.746***	107.136***
	(8.460)	(8.466)
L.PROV	0.885	1.303
	(2.923)	(2.942)
L.COST	-1.983**	-2.035***
	(0.768)	(0.769)
L.LIQ	-10.047*	-9.797*
	(5.346)	(5.361)
L.LOAN	0.607	0.510
	(3.436)	(3.446)
L.CONC	0.040	0.038
	(0.031)	(0.032)
L.GDP	-0.064	-0.061
	(0.087)	(0.088)
L.RES	-2.254***	-2.208***
	(0.754)	(0.760)
L.GOV	2.389	1.984
	(2.435)	(2.472)
L.GFC	1.870*	1.770
	(1.080)	(1.086)
Constant	11.742**	11.776**
	(5.852)	(5.879)
Observations	372	372
R-squared	0.560	0.557
Number of ID	25	25
r2_o	0.0642	0.0697

Note(s): This table reports the results of our regressions analysis examining the impact of large Lebanese banks' liquidity creation and profitability on financial stability using ordinary least squares analysis. The dependent variable is the bank-level Z-score in all three columns. Controls are lagged one year. All columns include bank and year fixed effects. All variables are defined in Table 1. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

Table A 22: Testing for firm size effects: small bank subpanel

	(1)	(2)	(3)	(4)
VARIABLES	**Z-score**	**Z-score**	**Z-score**	**Z-score**
LCCF	-13.267*		-10.497	
	(6.917)		(8.531)	
LCCNF		-22.052**		-15.098
		(9.198)		(9.027)
ROAE	11.696	6.372	9.793	10.732
	(13.691)	(13.331)	(12.186)	(12.069)
L.EQ			91.038***	86.681***
			(15.608)	(15.905)
L.PROV			-24.571**	-21.511**
			(10.070)	(10.031)
L.COST			-2.118***	-2.101***
			(0.752)	(0.740)
L.LIQ			24.928*	24.542*
			(12.800)	(12.643)
L.LOAN			-1.721	-2.105
			(3.557)	(3.510)
L.CONC			-0.071	-0.078
			(0.140)	(0.136)
L.GDP			0.376	0.369
			(0.580)	(0.569)
L.RES			-0.096	-0.530
			(3.305)	(3.246)
L.GOV			-6.594	-7.106
			(10.244)	(9.981)
L.GFC	-0.573	-1.010	-0.400	-0.369
	(4.445)	(4.411)	(6.530)	(6.451)
LCCNF		-22.052**		-15.098
		(9.198)		(9.027)
Constant	23.019***	22.846***	2.253	3.543
	(1.411)	(1.360)	(16.861)	(16.688)
Observations	197	197	80	80
R-squared	0.023	0.035	0.550	0.561
Number of ID	28	28	17	17
r2_o	0.000398	0.000256	0.480	0.447

Note(s): This table reports the results of our regressions analysis examining the impact of small Lebanese banks' liquidity creation and profitability on financial stability using ordinary least squares analysis. The dependent variable is the bank-level Z-score in all three columns. Controls are lagged one year. All columns include bank and year fixed effects. All variables are defined in Table 1. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

Table A 23: Testing for time effect: data before 2007 subpanel

	(1)	(2)	(3)	(4)
VARIABLES	**Z-score**	**Z-score**	**Z-score**	**Z-score**
LCCF	-7.251		-1.867	
	(4.565)		(2.174)	
LCCNF		-9.789**		-3.739*
		(4.702)		(2.214)
ROAE	-0.046	-0.000	-16.496**	-16.758**
	(5.984)	(5.965)	(7.196)	(7.137)
L.EQ			67.836***	64.439***
			(22.109)	(22.030)
L.PROV			1.863	2.459
			(4.207)	(4.190)
L.COST			-4.760**	-4.665**
			(1.951)	(1.935)
L.LIQ			-6.604	-7.682
			(10.399)	(10.232)
L.LOAN			-7.253	-6.989
			(4.648)	(4.597)
L.CONC			-0.554	-0.442
			(1.114)	(1.104)
L.GDP			0.021	0.086
			(0.683)	(0.675)
L.RES			-4.479	-3.980
			(4.333)	(4.287)
L.GOV			8.704	7.572
			(6.622)	(6.577)
oL.GFC	0.000	0.000		
	(0.000)	(0.000)		
Constant	20.661***	20.433***	49.111	44.021
	(0.979)	(0.884)	(63.705)	(63.183)
Observations	355	355	171	171
R-squared	0.008	0.014	0.363	0.373
Number of ID	50	50	34	34
r2_o	0.00445	0.00754	0.0510	0.0454

Note(s): This table reports the results of our regressions analysis examining the impact of Lebanese banks' liquidity creation and profitability on financial stability before the global financial crisis using ordinary least squares analysis. The dependent variable is the bank-level Z-score in all three columns. Controls are lagged one year. All columns include bank and year fixed effects. All variables are defined in Table 1. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

Table A 24: Testing for time effect: data after 2007 subpanel

	(1)	(2)	(3)	(4)
VARIABLES	**Z-score**	**Z-score**	**Z-score**	**Z-score**
LCCF	-1.055		2.019	
	(1.670)		(2.286)	
LCCNF		-1.128		1.752
		(1.758)		(2.616)
ROAE	5.364***	5.371***	7.030***	7.024***
	(1.749)	(1.749)	(1.771)	(1.773)
L.EQ			146.305***	146.035***
			(11.343)	(11.376)
L.PROV			-14.468**	-14.108**
			(6.185)	(6.159)
L.COST			0.363	0.382
			(0.497)	(0.497)
L.LIQ			8.785	8.469
			(5.537)	(5.577)
L.LOAN			1.756	1.799
			(2.123)	(2.123)
L.CONC			-0.027	-0.025
			(0.032)	(0.032)
L.GDP			-0.172**	-0.174**
			(0.082)	(0.082)
L.RES			4.552**	4.628**
			(2.188)	(2.186)
L.GOV			1.283	1.284
			(3.053)	(3.096)
L.GFC	-0.263	-0.269		
	(0.509)	(0.507)		
Constant	18.629***	18.571***	-2.525	-2.388
	(0.258)	(0.305)	(5.604)	(5.645)
Observations	328	328	258	258
R-squared	0.033	0.033	0.500	0.500
Number of ID	40	40	34	34
r2_o	0.0563	0.0648	0.239	0.236

Note(s): This table reports the results of our regressions analysis examining the impact of Lebanese banks' liquidity creation and profitability on financial stability after the global financial crisis using ordinary least squares analysis. The dependent variable is the bank-level Z-score in all three columns. Controls are lagged one year. All columns include bank and year fixed effects. All variables are defined in Table 1. ***,**,* indicate significance at 1%, 5%, and 10% levels respectively.

Abstract

In our thesis, we examine the complex interactions between banks' strategy, banks' performance, macro-level uncertainty, and financial stability, with a special focus on developing and emerging economies. The mounting macroeconomic, social, and geopolitical instabilities that started in 2019 rekindled the interest of bankers, policymakers, and researchers in understanding the interconnectedness between banks' function as liquidity creators, their profitability, their liquidity, and systemic financial stability under uncertainty.

To understand these relationships, we follow a funnel structure based on three articles that progressively narrow in scope. We start with a macro-level empirical analysis across 62 developing and emerging economies in the first article. We employ a panel vector autoregression with Granger causality to identify potential bidirectional and causal linkages across different levels of financial development. Then, in article 2, we narrow our analysis by examining bank-level data across 992 banks in 21 countries. We use fixed-effects regressions and a PCA-based composite performance index to measure uncertainty's effects on overall bank performance while controlling for time-invariant heterogeneity. Lastly, we finalize our research with an in-depth analysis of the Lebanese case, exemplifying the country-specific level. We employ OLS and system GMM specifications to identify the impact of banks' liquidity creation and profitability on financial stability. This progression creates a procedural funnel from cross-country dynamics to sectoral behavior and, finally, to a country-specific crisis.

Our findings show bidirectional relations between uncertainty, liquidity creation, and systemic financial stability. These relations vary in magnitude and persistence among different stages of financial system development. At the bank level, our results show that uncertainty raises precautionary liquidity buffers but reduces profitability. However, we reveal that banks can optimize overall performance by adopting the right preventive strategies. The Lebanese case illustrates how excessive liquidity creation in a fragile institutional setting can erode financial stability even when profitability is consistently high. At the country level, we show that in Lebanon, excessive liquidity creation reduces bank and country level financial stability even when profitability remains high.

Our thesis presents a comprehensive research project that links macro level interactions to bank level strategies and country specific financial fragility. Our contributions cover six areas including the framework, the variables, the data, the methodology, the results, and the managerial and policy implications.

In our thesis, we propose practical recommendations to bank's management concerning prudential policies and strategies for liquidity creation and operational effectiveness to optimize bank performance under uncertainty and to prevent large scale financial instability. Also, we offer practical policy recommendations for early intervention targeting bank policy and liquidity creation to limit the negative effects of uncertainty and prevent systemic instability.

Keywords: Liquidity creation; Bank strategy; Bank profitability; Bank liquidity; Uncertainty; Financial stability

Résumé de la thèse

Dans cette thèse, nous examinons les interactions complexes entre la stratégie des banques, leur performance, l'incertitude au niveau macroéconomique et la stabilité financière, en mettant l'accent sur les économies en développement et émergentes. Les instabilités macroéconomiques, sociales et géopolitiques qui se sont intensifiées depuis 2019 ont ravivé l'intérêt des banquiers, des décideurs publics et des chercheurs pour la compréhension des interdépendances entre la fonction de création de liquidité des banques, leur rentabilité, leur liquidité et la stabilité financière systémique en contexte d'incertitude.

Afin d'analyser ces relations, nous mobilisons une démarche en entonnoir articulée autour de trois articles à périmètre progressivement restreint. Dans le premier article, nous conduisons une analyse empirique macroéconomique portant sur 62 économies en développement et émergentes. Nous y estimons un modèle VAR en panel, complété par des tests de causalité de Granger, afin d'identifier des liens bidirectionnels et causaux potentiels selon différents niveaux de développement financier. Dans le deuxième article, nous concentrons notre analyse au niveau micro-bancaire, à partir de données couvrant 992 banques dans 21 pays. Nous utilisons des régressions à effets fixes et un indice composite de performance construit par analyse en composantes principales (ACP), afin de mesurer les effets de l'incertitude sur la performance bancaire globale, tout en contrôlant l'hétérogénéité invariante dans le temps. Enfin, nous concluons par une étude approfondie du cas libanais, représentative du niveau pays. Nous y mobilisons des estimations en MCO et en GMM-système pour identifier l'impact de la création de liquidité et de la rentabilité des banques sur la stabilité financière. Cette progression méthodologique crée un entonnoir allant des dynamiques transnationales aux comportements sectoriels, puis à une crise propre à un pays.

Nos résultats mettent en évidence des relations bidirectionnelles entre l'incertitude, la création de liquidité et la stabilité financière systémique. L'ampleur et la persistance de ces relations varient selon le stade de développement des systèmes financiers. Au niveau bancaire, nous montrons que l'incertitude accroît les coussins de liquidité de précaution mais réduit la rentabilité. Toutefois, nos analyses révèlent que les banques peuvent optimiser leur performance globale en adoptant les stratégies préventives appropriées. Le cas libanais illustre comment une création de liquidité excessive, dans

un environnement institutionnel fragile, peut éroder la stabilité financière alors même que la rentabilité demeure élevée. Au niveau national, nous démontrons qu'au Liban, une création de liquidité excessive réduit la stabilité financière tant bancaire que macroéconomique, y compris lorsque la rentabilité reste soutenue.

Cette thèse constitue un projet de recherche intégrateur reliant les interactions macro-financières aux stratégies bancaires et aux fragilités financières propres à certains pays. Nos contributions se déclinent en six volets : le cadre conceptuel, les variables, les données, la méthodologie, les résultats, ainsi que les implications managériales et de politique publique.

Nous formulons des recommandations pratiques à l'attention des directions bancaires concernant les politiques prudentielles et les stratégies de création de liquidité et d'efficacité opérationnelle, afin d'optimiser la performance bancaire en contexte d'incertitude et de prévenir les instabilités financières de grande ampleur. Nous proposons également des recommandations de politique publique portant sur des interventions précoces, ciblant la politique bancaire et la création de liquidité, afin de limiter les effets négatifs de l'incertitude et de prévenir l'instabilité systémique.

Mots-clés : Création de liquidité ; Stratégie bancaire ; Rentabilité bancaire ; Liquidité bancaire ; Incertitude ; Stabilité financière.

Résumé étendu de la thèse

Stratégie bancaire sous incertitude : interrelations entre la création de liquidité, la rentabilité et la stabilité financière

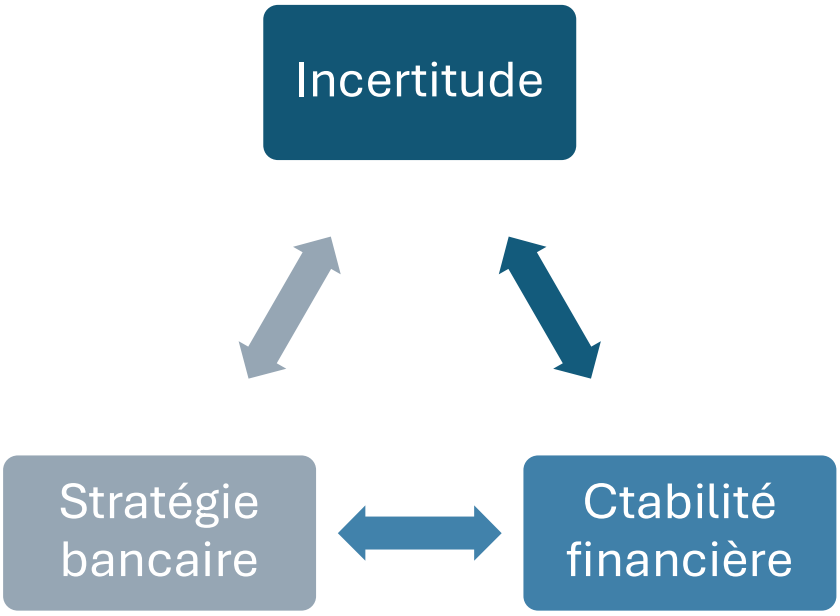
Dans cette thèse, nous analysons les interactions complexes qui existent entre la stratégie des banques, leur performance, l'incertitude macroéconomique et la stabilité financière, en accordant une attention particulière aux économies en développement et émergentes. Les instabilités macroéconomiques, sociales et géopolitiques qui se sont amplifiées depuis 2019 ont ravivé l'intérêt des acteurs financiers et des autorités publiques pour une compréhension approfondie des interdépendances qui relient la création de liquidité, la rentabilité, la liquidité bancaire et la stabilité systémique dans un environnement marqué par une incertitude accrue. Afin d'examiner ces relations, la thèse adopte une démarche en entonnoir structurée autour de trois articles complémentaires, dont le périmètre analytique s'affine progressivement.

Le premier article, inscrit au niveau macroéconomique, mobilise un échantillon de soixante-deux économies en développement et émergentes et recourt à un modèle VAR en panel, complété par des tests de causalité de Granger, afin d'identifier l'existence éventuelle de relations bidirectionnelles entre la création de liquidité, l'incertitude et la stabilité financière. Le deuxième article, positionné au niveau sectoriel, repose sur l'analyse de neuf cent quatre-vingt-douze banques réparties dans vingt et un pays émergents. À l'aide de régressions à effets fixes et d'un indice composite de performance fondé sur une analyse en composantes principales, il étudie l'incidence de l'incertitude sur la liquidité, la rentabilité et la performance globale des établissements bancaires. Le troisième article, consacré au niveau national, propose une analyse approfondie du cas libanais et mobilise des estimations en moindres carrés ordinaires et en GMM-système dans le but de mesurer l'impact de la création de liquidité et de la rentabilité sur la stabilité bancaire et macro-financière dans un environnement institutionnel fragilisé.

L'ensemble des résultats empiriques met en lumière l'existence de relations bidirectionnelles entre l'incertitude, la création de liquidité et la stabilité financière systémique, dont l'intensité varie selon le degré de développement financier des pays étudiés. Au niveau microéconomique, l'incertitude incite les banques à accroître leurs réserves de liquidité de précaution, tout en exerçant un effet négatif sur leur rentabilité. Le cas libanais illustre de manière particulièrement éclairante qu'une création de liquidité excessive, lorsqu'elle s'inscrit dans un cadre institutionnel fragile et peu transparent, est susceptible d'éroder la stabilité financière même lorsque les indicateurs de performance apparaissent encore favorables.

Cette thèse constitue ainsi un projet de recherche intégrateur reliant les dynamiques macro-financières, les stratégies bancaires et les fragilités propres à certains pays. Ses contributions s'articulent autour du développement d'un cadre conceptuel unifié, de la construction et de l'exploitation de variables adaptées, de l'élaboration d'ensembles de

données originaux, de l'application d'une méthodologie économétrique multi-niveaux, de la mise en évidence de résultats nouveaux et robustes, et de la formulation d'implications managériales et de recommandations de politique publique.



1. Introduction

Dans l'introduction générale, nous soulignons le rôle central que jouent les banques dans la stabilité et le développement des économies contemporaines. À travers leur fonction d'intermédiation, leur capacité à créer de la liquidité, à financer l'activité économique et à transformer l'épargne en investissement productif, les banques occupent une position stratégique dans l'architecture financière et constituent des relais essentiels entre les agents économiques, les marchés et les autorités publiques. Leur rôle dans la gestion et l'absorption des risques, qu'il s'agisse de risques de crédit, de liquidité ou de marché, les place au cœur des dynamiques macro-financières, mais en fait également des institutions particulièrement exposées aux perturbations exogènes. De ce fait, les banques réagissent de manière amplifiée aux fluctuations de l'incertitude, qui influencent leurs flux de financement, leurs arbitrages de portefeuille, leurs comportements en matière de prêt et, in fine, la stabilité du système financier dans son ensemble.

Depuis 2019, l'environnement économique mondial a été marqué par une succession de crises géopolitiques, sanitaires, financières et sociales d'une intensité rarement observée depuis plusieurs décennies. Ces événements ont contribué à un accroissement rapide et durable de l'incertitude, affectant à la fois les anticipations des agents, les conditions de financement, les chaînes d'approvisionnement et la stabilité des marchés. Cette incertitude généralisée a mis à l'épreuve les capacités d'ajustement des systèmes bancaires, en particulier dans les économies émergentes et institutionnellement fragiles, où les marges de manœuvre en matière de supervision, de politique monétaire et de filet de sécurité financier demeurent limitées.

Dans ce contexte, analyser la manière dont les banques ajustent leurs stratégies de liquidité et de rentabilité apparaît comme un enjeu scientifique et politique majeur. Comprendre ces mécanismes est indispensable pour anticiper les vulnérabilités du secteur bancaire, orienter les politiques prudentielles et renforcer les dispositifs de stabilité financière. Ces questions revêtent une importance particulière dans les économies sujettes à des chocs récurrents ou à une forte volatilité institutionnelle.

Le Liban constitue, à cet égard, un terrain d'observation privilégié. Depuis 2019, le pays connaît l'une des crises bancaires, financières et économiques les plus sévères de l'histoire contemporaine, caractérisée par un effondrement de la confiance, une crise de liquidité profonde, une forte dollarisation et une désintégration progressive du cadre institutionnel. Cette situation met en lumière les tensions structurelles qui traversent l'interaction entre la création de liquidité, la recherche de rentabilité et la stabilité du système financier, dans un contexte où les faiblesses institutionnelles et la fragilité macroéconomique exacerbent les dynamiques d'instabilité. L'analyse de ce cas extrême permet d'illustrer, de manière empirique et conceptuelle, les risques associés à la combinaison d'incertitude élevée, de déséquilibres structurels et de modèles bancaires vulnérables, tout en offrant des enseignements transposables aux autres économies émergentes confrontées à des défis similaires.

2. Cadre conceptuel

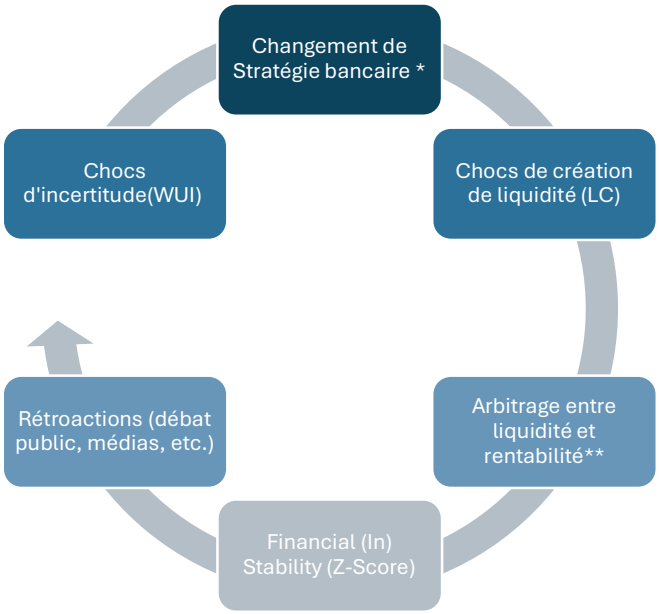
Le cadre conceptuel de cette recherche s'articule autour de trois dimensions complémentaires qui permettent d'appréhender de manière systémique les interactions entre incertitude, stratégie bancaire et stabilité financière. Ces trois dimensions forment la colonne vertébrale de l'analyse et éclairent les mécanismes par lesquels les chocs macroéconomiques se diffusent au sein du système bancaire et influencent, en retour, la dynamique du risque systémique.

La première dimension concerne l'incertitude, envisagée comme un choc exogène initial susceptible de modifier en profondeur les comportements des banques. L'incertitude, qu'elle soit d'origine macroéconomique, géopolitique ou institutionnelle, agit sur les anticipations des agents et perturbe les mécanismes de transmission traditionnels. Une hausse de l'incertitude altère la perception du risque, modifie les conditions d'accès au financement, influence les politiques de crédit et reconfigure les décisions d'investissement. Elle conduit également les banques à ajuster leurs stratégies de gestion de liquidité, en renforçant leurs buffers de sécurité ou en révisant leur appétit pour le risque. Dans ce cadre, l'incertitude apparaît non seulement comme un déterminant direct des choix stratégiques, mais aussi comme un catalyseur des tensions financières susceptibles d'affecter durablement la stabilité du système.

La deuxième dimension est liée à la création de liquidité, entendue comme un mécanisme stratégique au cœur de l'activité d'intermédiation bancaire. La création de

liquidité découle du processus de transformation des dépôts en crédits, permettant aux banques de financer l'économie réelle et de soutenir l'activité productive. Toutefois, cette fonction essentielle comporte un revers : elle peut fragiliser les bilans lorsque son expansion devient excessive ou s'effectue dans un cadre réglementaire inadéquat. Une intensification non maîtrisée de la création de liquidité peut accroître la transformation des échéances, accentuer les risques de retraits massifs, réduire la capacité des banques à absorber les chocs et, en définitive, amplifier les vulnérabilités systémiques. La création de liquidité revêt ainsi un caractère ambivalent : elle constitue à la fois un moteur de croissance et un potentiel facteur d'instabilité.

La troisième dimension concerne la stabilité financière, appréhendée comme le résultat systémique des arbitrages opérés par les banques en matière de liquidité, de rentabilité et de gestion du risque. La stabilité financière dépend étroitement de l'équilibre que parviennent à établir les établissements entre rendement et prudence, du niveau de risque qu'ils sont prêts à assumer, et de l'efficacité du cadre institutionnel et prudentiel dans lequel ils évoluent. Elle est également influencée par les conditions macroéconomiques globales, qui façonnent la vulnérabilité du système aux chocs externes. Certaines configurations peuvent donner lieu à des boucles de rétroaction : une stabilité apparente peut encourager les banques et les acteurs financiers à accroître leur prise de risque, ce qui génère de nouvelles fragilités susceptibles, à terme, de compromettre la résilience du système. Ces dynamiques autoréalisatrices soulignent le caractère profondément endogène de l'instabilité financière et la nécessité d'une analyse intégrée des comportements bancaires, des structures institutionnelles et des conditions macro-financières.



*** Modérateurs et facteurs d'influence**
**** Résultats bancaires : liquidité et rentabilité**

Les modérateurs et variables de contrôle incluent :
le degré de développement financier, le contexte géographique et politique, la qualité institutionnelle et prudentielle, le niveau d'inclusion financière, la taille des établissements bancaires, la structure des coûts et l'efficacité managériale, le degré de concentration du système bancaire, ainsi que divers facteurs macroéconomiques.

Ainsi, le cadre conceptuel développé dans cette thèse met en lumière l'articulation complexe entre ces trois dimensions et montre que les comportements bancaires, loin d'être déterminés uniquement par des variables internes, s'inscrivent dans un environnement plus large où l'incertitude et les structures institutionnelles jouent un rôle déterminant. Cette approche systémique fournit une grille de lecture essentielle pour comprendre l'émergence, la diffusion et l'amplification des risques financiers dans les économies en développement et émergentes.

3. Objectifs et questions de recherche

La thèse s'articule autour de trois interrogations centrales qui structurent l'ensemble de l'analyse empirique et théorique. La première consiste à déterminer la nature et l'ampleur des relations qui unissent l'incertitude, la création de liquidité et la stabilité financière, en évaluant la manière dont ces variables interagissent dans différents contextes macro-financiers. La deuxième vise à comprendre comment l'incertitude affecte la liquidité, la rentabilité et, plus largement, la performance globale des établissements bancaires, en tenant compte des ajustements stratégiques qu'elle induit. La troisième s'attache à examiner la manifestation de ces mécanismes dans un contexte extrême, en l'occurrence celui du Liban, afin d'identifier les spécificités des économies confrontées à une fragilité institutionnelle et à une incertitude systémique particulièrement élevées.

La thèse répond ainsi à trois questions principales :

1. Quelles sont les relations entre incertitude, création de liquidité et stabilité financière ?
2. Comment l'incertitude influence-t-elle la liquidité, la rentabilité et la performance globale des banques ?
3. Comment ces liens se manifestent-ils dans un cas extrême comme le Liban ?

4. Article 1 - Analyse macro-financière portant sur 62 pays

L'analyse présentée dans le premier article repose sur un dispositif empirique de grande ampleur couvrant un panel de soixante-deux pays en développement et émergents sur la période 2001–2015, ce qui représente 888 observations annuelles. Ce périmètre large permet non seulement de capturer une diversité structurelle significative entre économies, mais également d'examiner la manière dont les turbulences

macroéconomiques se propagent dans des environnements financiers hétérogènes. Trois variables principales structurent l'étude : la création de liquidité, mesurée par le ratio LC/GTA proposé par D'Avino et al. (2022) ; l'incertitude macroéconomique, appréhendée par le World Uncertainty Index, un indicateur désormais standard dans l'analyse des chocs d'incertitude ; et la stabilité financière, approchée par le Z-score agrégé, qui synthétise le risque d'insolvabilité du secteur bancaire.

Sur le plan méthodologique, l'article mobilise un modèle VAR en panel, particulièrement adapté à l'étude des dynamiques financières, dans la mesure où il permet de considérer simultanément les rétroactions et interactions entre les variables. Cette approche bénéficie de l'hétérogénéité inter-pays, tout en permettant de neutraliser les effets spécifiques inobservables. Les tests de causalité au sens de Granger complètent cette analyse en permettant d'identifier la direction des relations causales, élément essentiel pour comprendre les mécanismes de transmission entre incertitude, création de liquidité et stabilité financière.

Les résultats empiriques mettent clairement en évidence l'existence de relations bidirectionnelles entre ces trois dimensions, validant l'hypothèse d'une dynamique circulaire dans laquelle l'incertitude influence la création de liquidité et la stabilité, mais dans laquelle les changements dans la stabilité financière peuvent également intensifier l'incertitude perçue. L'analyse révèle en outre que le niveau de développement financier joue un rôle modérateur déterminant : les pays dotés de marchés financiers plus profonds présentent des interactions moins volatiles et des mécanismes d'absorption plus robustes. Enfin, l'étude met en lumière un résultat particulièrement original : une stabilité financière apparente peut paradoxalement engendrer davantage d'incertitude lorsque les agents économiques interpretent cette stabilité comme un signe de sur-confiance institutionnelle ou de prise de risque excessive. De même, une expansion rapide de la création de liquidité peut amplifier ces tensions lorsqu'elle s'inscrit dans des environnements institutionnels insuffisamment solides.

5. Article 2 - Analyse micro-bancaire fondée sur 992 banques

Le deuxième article s'appuie sur un ensemble de données exceptionnellement riche couvrant 992 banques réparties dans vingt et un pays émergents entre 2005 et 2022. Cette base longitudinale permet d'étudier les comportements individuels des banques sur une période marquée par plusieurs épisodes majeurs d'instabilité, dont la crise financière mondiale, les turbulences post-crise et la crise sanitaire de 2020. L'analyse mobilise un ensemble de variables essentielles à la compréhension de la performance bancaire :

- La liquidité, mesurée par les ratios LATA et LADEP, reflétant respectivement la proportion d'actifs liquides dans le bilan et le degré de couverture des dépôts ;
- La rentabilité, appréhendée par le ROA et le ROE ;

- Et la performance globale, synthétisée par un indice composite construit via l'analyse en composantes principales, permettant de réduire la dimensionnalité tout en conservant l'information essentielle sur les interactions entre liquidité et rentabilité.

La méthodologie combine des régressions à effets fixes estimées par moindres carrés ordinaires, permettant de contrôler l'hétérogénéité invariante dans le temps entre banques, et des estimations en GMM-système, qui traitent les éventuels problèmes d'endogénéité dynamique liés aux relations complexes entre performance, liquidité et incertitude. Cette double approche renforce la robustesse des conclusions et assure une identification fiable des mécanismes étudiés.

Les résultats font apparaître une série de régularités empiriques cohérentes avec la littérature mais enrichies par la profondeur de l'échantillon. D'une part, l'incertitude conduit à une accumulation des actifs liquides, traduisant une stratégie prudente de gestion du risque et une volonté de renforcer les coussins de sécurité. D'autre part, cette prudence a un coût en termes de rentabilité, confirmant l'existence d'un arbitrage partiel entre liquidité et performance financière. L'étude montre également que les banques les plus efficientes, notamment celles bénéficiant d'une meilleure structure de coûts ou d'une gouvernance plus efficace, parviennent à maintenir une performance stable malgré la montée de l'incertitude. Enfin, l'analyse suggère un effet d'apprentissage sectoriel : au fil des crises successives, les banques semblent mieux anticiper et internaliser les chocs d'incertitude, ce qui atténue leur exposition aux risques systémiques.

6. Article 3 - Analyse au niveau national : le cas du Liban

Le troisième article propose une étude approfondie du système bancaire libanais sur la période 1997–2019, une période marquée par une succession d'événements économiques, politiques et institutionnels ayant profondément affecté la stabilité financière du pays. Cette analyse s'appuie sur un ensemble de données couvrant la quasi-totalité des banques opérant au Liban, permettant d'examiner la manière dont les spécificités structurelles de cette économie fortement dollarisée influencent les comportements bancaires. La création de liquidité est mesurée selon la méthodologie de Berger et Bouwman (2009), qui repose sur une classification fonctionnelle des postes du bilan ; la rentabilité est appréhendée via le ROAE ; et la stabilité financière est mesurée au moyen du Z-score, calculé à la fois au niveau individuel et au niveau agrégé afin de capturer les dynamiques systémiques.

Sur le plan méthodologique, l'article combine des estimations en moindres carrés ordinaires et en GMM-système, permettant de surmonter plusieurs défis empiriques : l'endogénéité potentielle entre les variables, les effets dynamiques liés à la persistance des comportements bancaires, et l'hétérogénéité structurelle entre établissements. Ce cadre méthodologique est particulièrement pertinent pour une économie comme le

Liban, où les tensions institutionnelles et les déséquilibres macroéconomiques accentuent les fragilités des bilans bancaires.

Les résultats montrent qu'une expansion excessive de la création de liquidité contribue à accroître la vulnérabilité financière du secteur bancaire, notamment lorsque les ressources en devises deviennent insuffisantes pour couvrir les engagements locaux. Ce mécanisme reflète la dépendance structurelle de l'économie libanaise aux flux financiers extérieurs et met en évidence les limites du modèle d'intermédiation fondé sur une transformation agressive des maturités dans un contexte de gouvernance faible. À l'inverse, une rentabilité plus élevée exerce un effet stabilisateur, en renforçant la capacité des établissements à absorber les chocs et à maintenir leurs fonds propres. Ces résultats, cohérents avec les enseignements des deux articles précédents, illustrent les dynamiques particulières des économies dollarisées, caractérisées par une vulnérabilité accrue aux chocs externes, une forte asymétrie d'information et un encadrement prudentiel souvent insuffisant.

7. Contributions de la thèse

Les contributions de cette thèse se déclinent sur plusieurs plans interdépendants, reflétant la volonté d'articuler rigueur théorique, solidité méthodologique et pertinence empirique. Sur le plan conceptuel, la recherche propose un cadre analytique intégré permettant de comprendre de manière systémique les relations entre la création de liquidité, la rentabilité bancaire, l'incertitude macroéconomique et la stabilité financière. Ce cadre offre un approfondissement théorique substantiel en mettant en lumière les mécanismes d'interdépendance entre comportements bancaires, conditions institutionnelles et dynamiques macro-financières, et en soulignant le caractère circulaire de ces interactions, encore peu étudié dans la littérature.

Sur le plan méthodologique, la thèse innove en développant une mesure de création de liquidité adaptée aux données consolidées, susceptible de surmonter certaines limites des approches traditionnelles, notamment en contexte de reporting hétérogène. Elle élabore également un indice composite de performance fondé sur l'analyse en composantes principales, permettant de saisir simultanément les dimensions de liquidité et de rentabilité dans une perspective globale. L'ensemble de la démarche méthodologique mobilise une approche économétrique multi-niveaux, reposant sur un modèle VAR en panel, des régressions à effets fixes et la méthode GMM-système, garantissant une identification robuste des relations étudiées et une prise en compte fine de l'endogénéité, de l'hétérogénéité et de la dynamique temporelle.

Sur le plan empirique, la thèse s'appuie sur une base de données inédite couvrant plus de deux décennies d'informations bancaires au Liban, complétée par des données internationales pour les analyses macroéconomiques et sectorielles. Elle met en évidence des résultats nouveaux concernant les interactions entre incertitude, liquidité et stabilité financière, en montrant notamment comment ces mécanismes s'accentuent

dans les économies émergentes, caractérisées par une gouvernance financière fragile et une dépendance accrue aux évolutions macroéconomiques internationales.

Les contributions managériales soulignent l'importance de stratégies prudentes de gestion de la liquidité, mais également de l'amélioration continue de l'efficacité opérationnelle et de la gouvernance interne. Elles montrent que les banques les plus efficientes sont mieux armées pour absorber les chocs d'incertitude et maintenir leur performance globale.

Enfin, les contributions de nature politique mettent en lumière la nécessité de mécanismes d'intervention précoce et de politiques de régulation plus rigoureuses portant notamment sur la création de liquidité bancaire. Elles insistent sur le rôle crucial de la transparence, de la supervision prudentielle, de la qualité institutionnelle et de l'indépendance des autorités de contrôle pour garantir la résilience financière, en particulier dans les environnements vulnérables et fortement dollarisés.

8. Limites et perspectives

Cette thèse comporte plusieurs limites qui découlent principalement de la nature des données disponibles, du contexte de recherche et des choix méthodologiques adoptés. La première limitation tient à l'hétérogénéité des données bancaires, souvent issues de sources multiples et caractérisées par des formats de consolidation et de publication différents. Cette diversité a nécessité un travail minutieux de normalisation et de vérification manuelle, dont la complexité souligne le besoin de bases de données plus harmonisées, en particulier dans les économies émergentes où l'accès à l'information financière demeure parfois lacunaire.

La seconde limitation relève du contexte socio-économique instable dans lequel la recherche a été menée, marqué par une succession de chocs géopolitiques, sanitaires et financiers ayant généré un niveau d'incertitude exceptionnel. Si ce contexte offre un cadre empirique riche pour analyser la réaction des banques en période de stress, il peut également limiter la généralisation des résultats aux économies bénéficiant de structures institutionnelles plus robustes ou de conditions macroéconomiques plus stables.

La troisième limitation réside dans la simplification méthodologique induite par l'usage d'indicateurs agrégés et par la construction d'un indice composite de performance via la PCA. Bien que cette approche permette de synthétiser des dimensions multiples de l'activité bancaire et de limiter la colinéarité, elle ne restitue pas toujours l'intégralité des spécificités micro-économiques et institutionnelles susceptibles d'influencer les décisions bancaires.

Ces limites ouvrent néanmoins plusieurs perspectives de recherche fécondes. Une première piste consiste à étendre l'analyse aux économies avancées, de manière à comparer les mécanismes d'ajustement bancaire sous incertitude dans des contextes

institutionnels plus stables. Une seconde perspective invite à développer des modèles composites alternatifs, offrant une meilleure représentation de la non-linéarité ou des effets d'interaction entre liquidité, rentabilité et stabilité.

D'autres axes de recherche portent sur l'examen des tensions géopolitiques, du changement climatique et de la digitalisation, dont les effets sur les comportements bancaires et la stabilité systémique demeurent encore largement sous-explorés. Enfin, deux domaines apparaissent particulièrement prometteurs : l'analyse de la propagation interbancaire des chocs de liquidité, essentielle pour comprendre les mécanismes de contagion systémique, et l'étude des fluctuations de devises dans les économies fortement dollarisées, susceptibles de modifier profondément la relation entre création de liquidité, performance bancaire et vulnérabilité financière.

9. Conclusion

La thèse démontre de manière convaincante que l'incertitude constitue un déterminant central des comportements bancaires et influence profondément la création de liquidité, la rentabilité, les décisions stratégiques et, plus largement, la stabilité financière. En combinant des analyses macroéconomiques, sectorielles et nationales, elle met en évidence des dynamiques structurelles qui traversent l'ensemble des économies émergentes, mais qui se manifestent avec une intensité particulière dans les environnements institutionnellement fragiles et fortement dollarisés.

Grâce à une approche multi-niveaux et multi-méthodes, associant modèles VAR en panel, régressions à effets fixes, estimations en GMM-système et indicateurs composites fondés sur la PCA, la recherche parvient à identifier des mécanismes de transmission de l'incertitude qui demeurent difficiles à capturer par les approches traditionnelles. Les résultats soulignent notamment le rôle central de la gestion de liquidité, de la qualité institutionnelle et de la gouvernance bancaire dans la capacité des établissements à absorber les chocs et à prévenir les épisodes d'instabilité systémique.

Ces insights contribuent à éclairer les débats relatifs à la résilience bancaire, à la supervision prudentielle et aux politiques publiques destinées à renforcer la stabilité financière dans les économies émergentes. Ils ouvrent également la voie à de nouvelles recherches visant à affiner les modèles conceptuels et empiriques permettant de saisir les comportements bancaires en période d'incertitude croissante et de transformations structurelles globales.

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