

The Dark (and Bright?) Side of Shadow Banking: Evidence on Bank Stability and Market Power

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Abstract

This paper examines the effect of shadow banking activity on the stability of traditional banks. Using a panel of 5,559 banks across 27 countries during 2009–2023, we find that shadow banking activity adversely affects bank stability. However, the magnitude and direction of this effect depend on the specific economic function carried out by shadow banks. Our results show that shadow banking significantly influences both the asset and liability sides of banks' balance sheets, mainly through its effect on the volume of loans and customer deposits, thereby ultimately shaping bank performance. Employing a two-stage least squares (2SLS) estimation with an instrumental variable (IV) strategy, we show that the impact of shadow banking on stability operates through bank market power. To reinforce causal identification, we exploit the 2017–2018 Asset Management Reform Plan (AMRP) in China as a quasi-exogenous regulatory shock. Consistent with global evidence, the AMRP analysis confirms that restricting shadow intermediation enhances banks' resilience, expands lending capacity, and enables banks to attract greater deposit funding.

Keywords: shadow banking; bank stability; assets; deposits, market power; AMRP

JEL codes: G20; G21; G23

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1. INTRODUCTION

The rise of the shadow banking (SB) system¹, defined as “*credit intermediation involving entities and activities (fully or partially) outside the regular banking system*” (FSB, 2017), has significantly transformed the financial landscape over the past years and, in particular, after the Global Financial Crisis (GFC) of 2007/2008. By 2023, the size of the shadow banking sector had reached approximately USD 238.8 trillion, representing about 49.1% of total global financial assets. As shadow banking has expanded, the range and complexity of activities undertaken by these entities have also evolved. Initially focused on traditional credit intermediation and securitization, the sector has progressively diversified into a broad array of activities, including asset management, securities financing, and market-based lending. The shadow banking model can thus be understood as a network of specialized financial institutions that facilitate the flow of funds from savers to investors through various securitization structures and secured funding mechanisms (Adrian and Ashcraftm, 2016).

In recent years, as regulatory frameworks have evolved and technology has advanced, the expansion of shadow banking has filled market gaps by offering innovative financing solutions and broader access to credit for both individuals (Frost et al., 2019; Fuster et al., 2019; Gambacorta et al., 2019) and firms alike (Tian et al., 2024). This trend reflects a structural shift partly driven by the retrenchment of traditional banks, with shadow banking entities increasingly serving underserved segments and fostering financial innovation. Nevertheless, this expansion has also introduced vulnerabilities. Beyond their role during the GFC, shadow banking institutions have been connected to more recent episodes of financial stress, including the March 2020 market turmoil, the Archegos collapse in 2021, the 2022 commodities market volatility, or the Liability-Driven Investment (LDI) crisis in the UK gilt market (FSB, 2023).

Building on this reality, previous research has primarily examined the implications of shadow banking activity for the stability of the overall financial system and the broader economy (see Aramonte et al., 2021; Bengtsson, 2013; Tian et al, 2024; among others), often treating the sector as a

¹ The term shadow banking is employed throughout this paper to refer to credit intermediation activities conducted outside the traditional banking system. In line with more recent regulatory and analytical frameworks—particularly those of the Financial Stability Board (FSB)—this sector is also commonly referred to as Non-Bank Financial Intermediation (NBFi). In its reports prior to 2018, the FSB referred to these institutions as part of the shadow banking system. Subsequently, the FSB replaced this terminology with NBFi to capture the diverse nature and functions of these entities more accurately. The two terms are used interchangeably in this paper, although NBFi is increasingly preferred in policy and official discourse for its broader and more precise reflection of the sector’s heterogeneity.

homogeneous whole and overlooking the heterogeneity among its constituent institutions. Moreover, when examining the impact on banks' activity, some studies have focused narrowly on specific types of shadow banking lenders (Di Maggio & Yao, 2021; Fuster et al., 2019; Gambacorta et al., 2019; among others)—such as fintech lenders or money market funds—while neglecting the broader spectrum of entities and functions that constitute the shadow banking system. In this sense, the extent to which the development of the shadow banking sector affects the traditional banking industry remains largely unexplored. This is relevant because the rise of shadow banking has moved part of credit intermediation outside the regulatory perimeter, thereby shaping banks' incentives and risk-taking behavior. Understanding these dynamics is essential for evaluating financial stability and designing effective macroprudential policies.

To the best of our knowledge, previous literature has not yet explicitly examined whether and how the development of the shadow banking activity affects bank stability and bank business models—specifically, loan and deposit growth, pricing behavior, and overall performance. This gap leaves open the question of how shadow banking development shapes banks' competitive dynamics and financial soundness. In this paper, we aim to address this gap by examining the relationship between the expansion of the shadow banking sector and the financial stability of traditional banks. Specifically, we investigate whether and to what extent the activities of shadow banking entities, across the diverse economic functions, alter the competitive environment faced by banks and, consequently, affect their stability.

Our paper contributes to previous literature on shadow banking in the following terms. First, using a specific measure of shadow banking which considers those activities—involving credit intermediation, liquidity and maturity transformation, and leverage—that could pose bank-like vulnerabilities, we provide additional insights into the impact of the shadow banking sector on the traditional banking industry. Moreover, unlike prior literature, we analyze the impact on bank stability considering the distinct economic functions performed by shadow banks, thereby uncovering functional heterogeneity in their effects on financial stability. Second, we present evidence on how shadow banking reshapes the traditional banking business model, influencing both the asset and liability sides of the balance sheet, the pricing of loans and deposits, and overall bank performance. Third, we propose an empirical framework that identifies bank market power as a key transmission mechanism, where the competitive pressures arising from shadow banking activities alter banks' market position, which in turn affects their stability.

The empirical analysis is carried out for an international database composed of 5,559 banks from 27 countries over the period 2009-2023. Our baseline results are consistent with a negative effect of shadow banking activity on bank stability. We assess the economic magnitude of the relationship by examining how bank stability changes with an interquartile increase in shadow banking activity. Moving from the 25th to the 75th percentile of the shadow banking distribution corresponds to a 16.23% reduction in bank stability. However, the effect is not homogeneous, but it finally depends upon the specific economic function associated with each shadow banking entity. The most pronounced effect is observed for entities managing collective investment vehicles, which are particularly vulnerable to risks, leading to a 31.37% decrease in stability. Similarly, entities engaged in securitization-based credit intermediation and the funding of financial institutions are associated with a 15.31% decline in bank stability. Our results further reveal that the expansion of the shadow banking sector influences the traditional banking business model through its effects on loan growth, loan pricing, and variations in customer deposits. Consistent with this, our empirical evidence also indicates that shadow banking activity has a negative impact on bank performance.

Using a two-stage least squares (2SLS) estimation with an instrumental variable (IV) strategy, we identify bank market power as a key mechanism driving the relationship between shadow banking activity and bank stability. In further analyses, we examine the potential heterogeneities in the impact of shadow banking on bank stability. Specifically, we find that the negative effect of shadow banking activity is less pronounced for banks operating in countries with higher levels of institutional quality. Moreover, stricter macroprudential policy frameworks appear to mitigate the adverse consequences of shadow banking for financial stability.

Finally, to strengthen causal inference regarding the impact of shadow banking on bank stability, we exploit the 2017–2018 Asset Management Reform Plan (AMRP) in China as a quasi-exogenous regulatory shock. The reform’s abrupt and comprehensive tightening of shadow intermediation allows us to isolate exogenous variation in shadow banking exposure, providing additional causal evidence that restricting such activities strengthens bank balance sheets and reduces systemic risk. Using a Difference-in-Differences (DiD) framework, we find that, following the AMRP, Chinese banks expanded their lending activity, attracted greater customer funding through deposits, and exhibited improvements in financial intermediation efficiency, as reflected in higher net interest margins.

The rest of the paper is organized as follows. In Section 2, we present the related literature. Section 3 describes the sample, variables, and econometric model. Section 4 shows the main empirical results on bank stability, while Section 5 examines the impact of shadow banking activity on banks' business models. In Section 6, we explore the role of market power as the main channel through which shadow banking activity affects bank stability. Additional tests are conducted in Section 7. Finally, Section 8 concludes.

2. LITERATURE REVIEW

Previous research has highlighted that the development of shadow banking may provide a valuable alternative to bank funding and also increase bank efficiency (Chen et al., 2025). This should be translated into additional support to the real economic activity. For instance, the recent paper by Jiang (2024) uses the Chinese market as a laboratory and, in particular, the change in a policy that restricts the issuance of wealth management products (WMP) in China.² The author shows that firms with high WMP exposure experience a decline in investments. The effects are more pronounced for more profitable firms that have higher revenue growth and are more financially constrained. Exploration of the possible channels of these effects shows a decline in the credit supply of banks that relied more on WMPs. In the same line, the paper by Tian et al. (2024) provides firm-level evidence of the real effects of shadow banking activity in terms of technological innovation. They provide evidence that firm-to-firm entrusted loans, the largest part of the shadow banking sector in China, enhance the borrowers' innovation output. The effects are more prominent when the borrowers are subject to more severe financial constraints, information asymmetry, and takeover exposures. A plausible underlying channel is capital reallocations from less productive but easily financed lender firms to more innovative but financially less privileged borrower firms.

At the same time, academics as well as policymakers have raised the importance of shadow banking as a source of potential vulnerabilities in the financial sector in a context characterized by the implementation of reforms aimed at mitigating risks and fostering a resilient, market-based financial system.³ Related literature has highlighted that stricter bank supervision has improved bank stability (Beck et al., 2022), reduced financial distress (Chortareas et al., 2012), and benefited the economy

² In November 2017, the People's Bank of China (PBOC), China Stock Regulatory Commission, China Bank Regulatory Commission (CBRC), and China Insurance Regulatory Commission (CIRC) jointly released the draft "New Regulations on Asset Management" (NRAM).

³ See Adrian and Ashcraft (2016).

(Pagano & Sedunov, 2016), although it may inadvertently drive financial activities to the less-regulated shadow banking sector. This shift can increase intermediation costs, restrict traditional banking products, and reduce lending, particularly in countries with stringent banking oversight, where the shadow banking activity becomes more prominent (see Buchak et al., 2018; Duca, 2016; Irani et al., 2017; among others).

In the same vein, using information from the Chinese FinTech and traditional banking markets, Bao and Huang (2021) show that FinTech entities are more likely to expand credit access to new and financially constrained borrowers after the start of the pandemic. However, this increased credit provision may not be sustainable over time. Their results provide evidence that the delinquency rate of FinTech loans tripled after the COVID-19 outbreak, whereas there is no significant change in the delinquency of bank loans. Within the same line of evidence, papers such as Si and Li (2022) have focused on the effects of shadow banking on corporate activity. These authors show that shadow banking business significantly increases firm risk-taking. Furthermore, the impact of firms' shadow banking business on their risk-taking is particularly pronounced in the case of firms with greater financing constraints and poorer corporate governance, as well as also in times of loose monetary condition and severe financial stress. Moreover, increasing commercial credit, reducing main business performance, and eroding the quality of information disclosure are channels through which shadow banking entities seem to affect firms' risk-taking.

When talking about the channels through which shadow banking may affect the real economy, it is necessary to consider that, like traditional banks, these entities are based on short-term funding and leverage can be vulnerable to “runs” due to liquidity and maturity transformation, which in turn can generate contagion risk (Bellavite et al., 2022a; 2022b; Leong et al., 2020). In this sense, previous papers have shown that the GFC brought shadow banking to the forefront of scholars' and policymakers' attention because of its supposed contribution to exacerbating the effects of the financial turmoil (Bengtsson, 2013). Shadow banking entities are often part of complex financial intermediation chains, which can also involve traditional banks (Pozsar et al., 2013; Cetorelli, 2014). Within this context, Bernanke et al. (2011) document that shadow banking provides funding in a similar way to traditional banks, but without the same regulatory oversight, which can induce systemic risk. Gennaioli et al. (2013) study the relationship between shadow banking and systemic risk, finding that shadow banking entities may help to withstand the systemic risk but are vulnerable to crises and liquidity dry-ups when investors neglect tail risk. Aramonte et al. (2021) review structural shifts in

intermediation and how shadow banking has shaped the demand and supply of liquidity in financial markets. They identify key channels of systemic-risk propagation in the presence of shadow banking entities, emphasizing the central role of leverage fluctuations through changes in margins. Nevertheless, the shadow banking sector has been largely discussed as a diversified system (Pozsar et al., 2013), also to its different impacts on the GFC (Lysandrou and Nesvetailova, 2015), highlighting it as a welcome source of diversification of credit supply from the banking system that may provide healthy competition for banks.

When it comes to banks' exposure to shadow banking activity, one primary channel is the provision of explicit or implicit backstops, where banks may act as a safety net for the shadow banking sector, thus increasing interdependence between their activities. Indirect exposure can arise through common asset holdings, such as bonds or structured products, creating shared risk and amplifying connections between banks and shadow banking entities. This interconnectedness, while facilitating capital flow and financing across different parts of the financial system, also introduces inherent vulnerabilities. Abad et al (2022) provides an in-depth examination of the exposure of EU banks to the shadow banking system. Drawing on a dataset constructed from the EBA data in 2015, they show that 60% of the EU banks' exposures are towards non-EU entities, particularly US-domiciled shadow banking entities. According to their results, bank size and efficiency present a positive relationship with EU banks' exposures to shadow banking. Bank capitalization and profitability are negatively associated with the exposures to these types of entities.

Apart from liquidity- and interconnections-based arguments, other mechanisms have been also proposed. Xiao (2020) proposes a new transmission channel of monetary policy. The shadow monetary tightening could unintentionally increase financial fragility by driving deposits into the uninsured sector of shadow banking entities, therefore enhancing the competition between the shadow banking sector and commercial banks in a deposit market. Facing a more yield-sensitive clientele, shadow banking entities passed through more rate hikes to depositors, thereby attracting more deposits when the Federal Reserve raised rates. Given these results, and because shadow banking deposits are outside of government safety nets, such as deposit insurance and the discount window, shifts in the relative shares of deposits may have important implications for financial stability.

The advent of shadow banking has fundamentally reshaped the competitive landscape of the traditional banking sector. This intensified competition can act as an additional channel through which the growth of shadow banking may impact bank stability. This mechanism is best explained by the

well-established “competition-fragility” view (Hellmann et al., 2000; Repullo, 2004). This theoretical framework posits that increased competition erodes the market power of banks, leading to a decline in their profit margins. As profits shrink, so do the banks’ charter value. A decrease in charter value can reduce the long-term incentives for banks to act prudently. Since the penalty for failure (the loss of the charter) becomes less severe, banks can be more prone to engage in risk-taking behaviors to find new sources of income and/or maintain profitability levels. The direct relationship between competition and bank stability has been empirically validated by previous literature (Agoraki et al., 2011; Jiménez et al., 2013; Turk Ariss, 2010; Yeyati & Micco, 2007), which consistently finds that greater competition is associated with reduced stability.

Given these arguments, it is highly plausible that if the rise of shadow banking entities truly diminishes the market power of traditional banks, it could trigger this risk-taking response. As previously argued, shadow banking entities often operate with lower regulatory and operational costs, allowing them to offer more competitive conditions in lending and other financial intermediation products. This could create significant pressure on traditional banks to either lower their own margins or find alternative ways to generate returns. For instance, focusing on FinTech companies, Cuadros-Solas et al. (2024) provide compelling empirical evidence for this channel. The authors demonstrate that a higher level of credit provision by FinTech companies provokes a reduction in the level of market power of commercial banks. Hence, they provide evidence on the specific mechanism—the erosion of market power—through which FinTech companies can negatively influence the stability of commercial banks. Taking the above-mentioned research as a reference, one can expect the increased competition from these non-bank entities to force traditional banks into a difficult position where the pursuit of profitability might supersede prudent risk management, ultimately raising the fragility of the entire financial system. Therefore, the rise of shadow banking is not just an ancillary development but a fundamental driver of a new competitive dynamic that may directly threaten the stability of traditional banks.

When referring specifically to the FinTech entities, as a particular type of shadow banking entity, several studies have documented a superior capacity of FinTech lenders to assess borrowers’ creditworthiness compared to incumbent lenders (Frost et al., 2019; Fuster et al., 2019; Gambacorta et al., 2019). Di Maggio & Yao (2021) or Ghosh et al. (2021), among others, find that, compared to traditional banks, these FinTech lenders are able to screen borrowers more efficiently, because they are able to screen better borrowers’ verifiable payment information. This would additionally suggest

that shadow banking entities, when acting as lenders, might be better at pricing on an intensive margin. As a result, banks may find themselves providing financing to borrowers exhibiting a greater level of uncertainty, thereby increasing their overall risk exposure. Given all the previous arguments and evidence, it seems logical to think that the development of the shadow banking system can influence individual banks' financial stability via reduced levels of bank market power.

3. DATA AND EMPIRICAL APPROACH

3.1. Data

To carry out the empirical analyses, we use a unique bank-level dataset retrieved from several sources. Bank-level information is obtained from the ORBIS Bank Focus Database (Bureau Van Dijk), focusing on commercial banks, savings banks, cooperative banks, bank holding companies, investment banks, and private banks. These institutions are central to the financial system, either as primary providers of traditional credit or as key players in financial intermediation. Data on the shadow banking sector is retrieved from the FSB's Global Monitoring Report on Non-Bank Financial Intermediation. This database provides information on the shadow bank total assets, offering insights into the size and structure of these entities while focusing on the different economic functions carried out by them. Information on the characteristics of the banking sector and key macroeconomic indicators are sourced from the Global Financial Development database, accessible through the World Bank (WB), and the International Financial Statistics dataset provided by the International Monetary Fund (IMF).

After addressing missing data for key variables and ensuring the availability of bank-level information for at least three consecutive years, the final dataset consists of an unbalanced panel of 5,559 banks from 27 countries⁴ that are members of either the G20 or the OECD, covering the period from 2009 to 2023. This yields a total of 42,050 bank-year observations.

3.2. Empirical Approach

3.2.1. Measuring shadow banking activity and bank stability

The shadow banking sector broadly encompasses all entities engaged in financial intermediation, either fully or partially, outside the traditional banking system. However, the shadow

⁴ Argentina, Australia, Belgium, Brazil, Canada, Chile, China, France, Germany, Hong Kong, India, Indonesia, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, Saudi Arabia, Singapore, South Africa, Spain, Switzerland, Turkey, UK, United States, South Korea.

banking ecosystem comprises a diverse range of interconnected entities. According to the [FSB \(2020\)](#), five different types of economic functions (EF1-EF5) could be attributed to the shadow banking business, namely: (i) management of collective investment vehicles with features that make them susceptible to runs (MMFs, fixed-income funds, mixed funds, credit hedge funds, real estate funds); (ii) loan provision dependent on short-term funding (finance companies, leasing/factoring companies, consumer credit companies); (iii) Intermediation of market activities that is dependent on short-term funding or secured funding of client assets (broker-dealers, securities finance companies); (iv) facilitation of credit creation (credit insurance companies, financial guarantors, monoline); and (v) securitization-based credit intermediation and funding of financial entities (securitization vehicles, structured finance vehicles, asset-backed securities). **Table B1** in Appendix B summarizes the business models of the shadow bank entities categorized by their respective economic functions.

Furthermore, distinguishing between the broad and narrow measures of shadow banking is crucial for understanding the nature of shadow banking activities and their implications for financial stability. The broad measure encompasses non-bank financial institutions (such as insurance corporations, pension funds, and long-term investment funds) that channel savings into financial markets through the purchase of sovereign and corporate securities. In this case, credit intermediation follows a stable, long-term intermediation pattern with limited exposure to liquidity or funding risks, as these institutions do not engage in maturity or liquidity transformation, operate with limited leverage, and are generally subject to comprehensive regulatory and supervisory frameworks.

By contrast, the narrow measure focuses on entities whose credit intermediation is active and transformative, replicating bank-like functions such as maturity and liquidity transformation, leverage, imperfect credit risk transfer, and regulatory arbitrage ([FSB, 2024](#)). This subset of entities (comprising money market funds, credit funds, finance companies, broker-dealers, and securitization vehicles) interacts more directly with the banking sector through funding and credit channels, thereby increasing the potential for the transmission of systemic risk. Given that the objective of this paper is to examine the effect of non-bank financial intermediation on the stability of traditional banks, we rely on the narrow measure of shadow banking, as it more accurately reflects the segment of non-bank activity whose credit intermediation entails bank-like vulnerabilities and may directly affect the resilience of the banking sector. Therefore, we use the annual ratio of total assets of the narrow measure of the shadow banking sector to GDP (SB_GDP) as the main proxy for measuring the importance of shadow banking in each country. Additionally, we also use the ratio of total assets to GDP for each of the five

economic functions (EF1 to EF5), encompassing the specific types of entities classified by the FSB as part of the shadow banking sector.

As shown in Figure 1, the importance of shadow banking activity increased significantly between 2009 and 2023, rising from about USD 27 trillion in 2009 to nearly USD 70 trillion in 2023—an overall growth of approximately 159%—despite a slight decline in 2022. Among the different economic functions, EF1 (collective investment vehicles) holds the largest share and has seen its importance grow over time, rising from approximately 50% in 2009 to over 70% in recent years, reflecting its central role in the intermediation activities of shadow banks. In contrast, EF5 (securitization-based intermediaries), EF2 (entities reliant on short-term funding), and EF3 (market intermediaries) account for average shares during the period analyzed 10.8%, 9.3%, and 9.8%, respectively. Meanwhile, EF4 (credit facilitators) represents the smallest share, averaging just 0.3%.

<INSERT FIGURES 1 and 2>

Table B2 in Appendix B presents the average values for the ratio of shadow banks' assets to GDP (SB_GDP) as well as for the different economic functions over the period 2009-2023 across our sample countries. As can be observed, Luxembourg (5073.94%), Ireland (874.17%), and the United States (85.11%) stand out with the highest ratios, primarily driven by EF1 (4579.57%, 589.59%, and 51.94%, respectively). The high ratios of shadow banks' assets to GDP in Luxembourg and Ireland reveal that both countries are global hubs for shadow banks, attracting significant financial intermediation business thanks to their favorable tax environments and regulatory frameworks. Countries like the Netherlands (13.72%) and South Korea (9.66%) also show significant shares in EF5, alongside Luxembourg (313.16%) and Ireland (176.43%). Similarly, EF2 has notable contributions in India (15.54%) and Canada (10.27%), with additional activity in South Africa (5.02%) and Chile (5.37%). Furthermore, EF3 (market intermediaries) also plays an important role in certain jurisdictions: Japan (23.42%), Hong Kong (11.12%), South Korea (14.31%), and the United States (10.72%) stand out with particularly high shares, reflecting the relevance of broker-dealers, securities companies, and other market-based intermediaries in their financial systems. These patterns reveal the heterogeneity in the prominence of shadow bank entities and their economic functions across countries.

To measure bank stability, we use the Z-score indicator. Previous papers have traditionally used this variable (see [Beck et al., 2013](#); [Laeven & Levine, 2009](#); [Schaeck & Cihák, 2014](#); among others)

which is computed as the return on assets plus the capital asset ratio divided by the standard deviation of asset returns. A three-year rolling window is applied to calculate the standard deviations for each bank annually. A higher Z-score implies greater bank stability, as it is inversely associated with bank insolvency probability. Given that the Z-score is highly skewed, we use the natural logarithm of the Z-score, which is normally distributed. **Table 1** shows that the natural logarithm of the ZSCORE (*ZSCORE*) is distributed with a mean value of 4.15 and a standard deviation of 1.15 in our international sample of banks.

3.2.2. *Control variables*

In line with previous literature on bank stability (e.g., Beck et al., 2013; Behr et al., 2010; Laeven et al., 2016), we incorporate both bank-level and country-level control variables in all estimations. For the bank-level control variables, we consider the natural logarithm of total assets in the bank balance sheet as the proxy for bank size (*Size*). We also include the share of interest income in total assets (*Traditional*) as a proxy for bank business activity. Moreover, we consider the cost-to-income ratio as an inverse proxy of bank efficiency (*Cost-to-Income*), the annual growth rate in total profits ($\Delta Profits$), the annual growth rate in the volume of granted loans ($\Delta Loans$), and the liquidity ratio (*Liquidity*).

In order to account for the potential effects of the economic cycle, we include the annual change in the GDP per capita adjusted by Purchasing Power Parity (PPP) ($\Delta GDPpc$) and the annual percentage change in the consumer price index (*Inflation*). We also consider the ratio of private credit by deposit money banks to GDP (*Private Credit*) to assess each country's financial development. We also include changes in macroprudential banking regulation ($\Delta MacropruReg$) to capture the incentives for regulatory arbitrage arising from tighter prudential requirements, and changes in the central bank policy rate ($\Delta Interest Rates$) to capture shifts in the monetary policy stance that influence leverage-driven intermediation under low-rate conditions and alter the relative attractiveness of market-based financing as interest rates rise. In addition, we incorporate the Kaufmann-Kraay-Zoido-Lobaton governance indicators (*Institutional Quality*) to capture the overall quality of governance, including regulatory effectiveness, rule of law, and control of corruption. Finally, we include the Heritage Foundation index (*Financial Freedom*), which reflects the degree of liberalization, efficiency, and independence of the financial sector from government intervention. The variable definitions and data sources are presented in **Table B3** of the Appendix. The main descriptive statistics are reported in **Table 1**.

<INSERT TABLE 1>

Our empirical approach is based on a linear panel data regression. We regress our proxy for bank stability (*ZSCORE*) on the shadow banking indicators previously defined, including the narrow measure of the shadow banking sector (*SB_GDP*) and the corresponding economic functions defined by the FSB (*SB_EF1-EF5_GDP*), while controlling for a set of traditional bank- and country-level variables. Apart from explicitly controlling traditional bank- and country-level variables explaining bank stability, in all the estimates we include bank-fixed effects to capture the effects of potential unobserved heterogeneity:

$$ZSCORE_{ijt} = \beta_0 + \beta_1 SB_GDP_{jt-1} + \sum_{l=1}^7 \gamma_l BANK_{ijt-1} + \sum_{h=1}^6 \delta_h COUNTRY_{jt-1} + \mu_i + \lambda_t + \varepsilon_{i,t}$$

[eq. 1]

where i, j , and t refer to the bank, country, and year, respectively. The vector *BANK* includes the abovementioned bank-level control variables, which enter the regressions lagged by one period to reduce potential endogeneity concerns. The vector *COUNTRY* includes country-level controls, lagged by one period. μ_i is a parameter that represents an independent term for each bank in the panel to control characteristics that are specific to each bank. These specific controls allow us to capture any unobserved effects that are specific to each bank, persistent over time, and not directly included in the regressions⁵. λ_t is a set of year dummy variables to capture unobserved bank-invariant time effects not included in the regression. $\varepsilon_{i,t}$ is a white-noise error term. Moreover, to address potential correlations in the dependent variable (*ZSCORE*), standard errors are clustered at the country level, as the primary explanatory variable (*SB_GDP*), is measured at the country level and uniformly affects all banks within a country. Furthermore, banks operating within the same regulatory, economic, and institutional framework are subject to shared influences, creating intra-country correlations that violate the assumption of independent observations. Clustering at the country level

⁵ As further robustness tests, in Table B9 of the Appendix, we use country and year fixed effects. The results are qualitatively similar.

accounts for these dependencies, ensuring robust standard errors and valid statistical inferences, whereas clustering at the bank level would fail to capture such correlations⁶.

To further examine the impact of shadow banks on bank stability, we decompose the Z-score indicator into its components: the capital equity ratio and ROA ($\log(roa+equity/assets)$) as the numerator; and the standard deviation of ROA over a three-year rolling window ($\log(sd(roa))$) as the denominator. In each case, these variables replace the Z-score as the dependent variable in Equation (1), enabling us to assess how exposure to the shadow banking activity influences different dimensions of bank stability. The capital equity ratio and ROA are positively associated with the Z-score, indicating their role in enhancing financial resilience. The standard deviation of ROA is negatively associated with the global indicator of bank stability, as greater variability in returns signals higher systemic risk. This approach aligns with the methodologies of Beck et al. (2022) and Raykov and Silva-Buston (2022), offering a more detailed understanding of how each component contributes to the overall assessment of bank stability.

4. BASELINE RESULTS

In this section, we present the results of our baseline model on how shadow banking activity influences bank stability. The results are reported in **Table 2**, where the dependent variable is the logarithm of the Z-score, representing bank stability (*ZSCORE*). In column (1), we examine the effect of aggregate shadow banking activity on bank stability. In columns (2) to (6), we present the results obtained when shadow banking activity is decomposed into the five distinct economic functions (EF1-EF5) defined by the FSB, in order to capture their specific effects on bank stability.

As shown in column (1) of **Table 2**, the aggregate measure of shadow banking activity (*SB_GDP*) presents a negative and statistically significant coefficient when explaining bank stability. This result suggests that the expansion of the shadow banking sector may intensify competition in the banking market and exacerbate risks related to liquidity and maturity transformation. As these entities expand their role in financial intermediation, traditional banks may respond by assuming higher levels of risk to mitigate the potential loss of market share, thereby reducing their financial resilience. These findings would be consistent with the notion that shadow bank entities, due to their operational flexibility and softer regulatory frameworks, are better positioned to capture higher-quality borrowers,

⁶ As further robustness tests, in Table B9 of the Appendix, we consider clustering at the bank level. The results are qualitatively similar.

leaving banks to focus on riskier clients (as observed, for instance, in the case of FinTech lenders; see [Frost et al., 2019](#); [Fuster et al., 2019](#); [Gambacorta et al., 2019](#); [Di Maggio & Yao, 2021](#); [Ghosh et al., 2021](#)). Consequently, shadow banking activity affects the dynamics of resource allocation and increases financial interconnectedness, which may, in turn, contribute to lower bank stability.

The analysis of the shadow banking activity decomposed by economic functions is reported in columns (2) to (6). As can be seen, notable differences emerge in terms of the impact each economic function has on bank stability. Specifically, in terms of *SB_F1_GDP* (collective investment vehicles) we obtain a significant negative association with bank stability (column (2)). This result highlights the risks posed by entities such as money market funds and fixed-income funds susceptible to liquidity runs. These entities may also intensify competition for savings as well as exacerbating liquidity mismatches, as highlighted by the [FSB \(2020\)](#). Similarly, as for the results of the *SB_F5_GDP* (securitization-based intermediaries), we obtain a negative and significant coefficient in column (6), which may emphasize the systemic risks associated with securitization chains, which may increase complexity and propagate financial contagion ([Aramonte et al., 2021](#)). By contrast, *SB_F2_GDP* (entities reliant on short-term funding), *SB_F3_GDP* (market intermediaries), and *SB_F4_GDP* (credit facilitators) do not exhibit statistically significant effects on bank stability (columns (3), (4), and (5), respectively). These functions are more focused on their operations and/or complement traditional banking activities, thereby limiting their broader systemic implications ([Pozsar et al., 2013](#); [FSB, 2020](#)).

In conclusion, aggregate shadow banking activity negatively impacts bank stability. This result may be motivated by the more intensive competition that banks face in credit markets and the increasing risks related to liquidity and maturity mismatches. Among the economic functions, EF1 (collective investment vehicles) and EF5 (securitization-based intermediaries) emerge as the main contributors to this destabilizing effect. Specifically, EF1 heightens competition for savings and creates liquidity mismatches, while EF5 adds systemic complexity through securitization chains.

<INSERT TABLE 2>

The estimated coefficients from the baseline regressions provide evidence on the direction and statistical significance of the relationship between shadow banking activity and bank stability. However, these estimates alone do not reflect the magnitude of the effects in economic terms. To assess their practical relevance, we compute the economic impact of shadow banking activity on bank stability, taking into account the observed variation in each explanatory variable across the sample.

Specifically, for each specification, we calculate the change in bank stability associated with an increase in the shadow banking variable from its 25th to its 75th percentile. The results, presented in **Figure 3**, reveal that the aggregate measure of shadow banking activity (*SB_GDP*) is associated with a 16.23% decline in bank stability. In practical terms, considering two otherwise identical banks that differ only in the extent of shadow banking activity in their respective countries, the bank operating within a system characterized by a high level of shadow banking (75th percentile) would exhibit approximately 16% lower stability compared to the bank operating in a system with a low level of shadow banking (25th percentile). By economic functions, **Figure 3** also reveals that the most pronounced negative impact corresponds to collective investment vehicles (EF1), with an estimated economic effect of −31.37%. By contrast, market intermediaries (EF3) exhibit a positive average effect of 16.60%, indicating that their activity may, under certain conditions, contribute to stabilizing the banking sector through market-based risk redistribution. The effects for loan-providing entities (EF2) and credit facilitators (EF4) are close to zero, suggesting a limited aggregate influence on bank stability, while securitization-based intermediaries (EF5) show a negative impact of −15.31%, consistent with their role in amplifying maturity and liquidity mismatches.

Overall, these results show that shadow banking activity exerts an economically significant effect on bank stability, with substantial heterogeneity across functional categories. While entities involved in asset management and securitization tend to exert destabilizing effects, those engaged in market intermediation may provide offsetting stabilizing mechanisms by diversifying funding channels and improving market liquidity. These findings underscore the importance of distinguishing between different components of the shadow banking system when assessing their systemic implications, as the narrow measure of shadow banking encompasses activities with both stabilizing and destabilizing potential for the traditional banking sector.

<INSERT HERE FIGURE 3>

Tables 3 and 4 present the results for the decomposition of the Z-score indicator. We analyze separately, the numerator ($\log(roa + equity/assets)$), which reflects profitability and capitalization, and the denominator ($\log(sd(roa))$), which captures the volatility of returns as a measure of risk. In particular, the results in Table 3 show that aggregate shadow banking activity (column (1)) does not exhibit a statistically significant effect on profitability and capitalization, suggesting that, within the narrow measure of the sector, shadow banking may have a limited direct impact on these dimensions. However, when analyzing specific economic functions, securitization-based intermediaries (EF5,

column (6)) show a negative and statistically significant coefficient, indicating that the expansion of securitization activity is associated with lower profitability and capitalization. This result is consistent with the compression of intermediation margins and the higher capital requirements stemming from retained tranches and complex risk-transfer structures, which increase monitoring and compliance costs and expose banks to valuation losses on their securitized portfolios. By contrast, credit facilitators and insurers (EF4, column (5)) exhibit a positive and statistically significant coefficient, suggesting that this segment of shadow banking activity contributes to strengthening banks' financial stability through enhanced profitability and capitalization. This result is consistent with the functional role of types of entities, which provide guarantees or credit insurance that reduce expected losses and regulatory capital requirements, thereby reinforcing the capacity of banks to absorb shocks through higher and more stable earnings.

<INSERT TABLE 3>

In **Table 4**, we present the results obtained when the dependent variable is the return volatility, as a measure of risk (i.e. the denominator of the Z-score indicator). As can be seen in column (1), the aggregate measure of shadow banking activity (*SB_GDP*) shows a significant positive effect on the standard deviation of ROA, underscoring the risk-amplifying nature of broader shadow banking activity. Similarly, collective investment vehicles (reported in column (2)) and securitization-based intermediaries (EF5, column (6)) are associated with increased volatility, reflecting the systemic risks posed by liquidity mismatches and complex securitization chains. By contrast, EF2, EF3, and EF4 do not exhibit statistically significant effects on return volatility, suggesting that their operations have a more localized or negligible influence on risk.

<INSERT TABLE 4>

Taken together, these results indicate that the effect of shadow banking on bank stability operates primarily through the risk channel, as evidenced by higher return volatility rather than by changes in profitability and capitalization. The increase in banks' exposure to risk associated with shadow banking activity accounts for most of the observed decline in the Z-score, suggesting that the impact on stability is mainly transmitted through the risk component of the stability measure.

5. IMPACT OF SHADOW BANKING ON BANKS' BUSINESS MODEL

To examine the impact of shadow banking activity on traditional banks and their stability, we focus on how it affects banks' business models along two central dimensions. On the asset side, we analyze the influence of shadow banking on banks' lending activities, which are central to their role in financial intermediation. Understanding how shadow banking activity impacts credit allocation and loan volumes is crucial, as changes in these areas can directly affect banks' asset portfolios and their overall business model. We also assess the pricing of loans, since competitive pressures from non-bank lenders may influence the terms and risk-adjusted returns of bank lending, with potential implications for profitability and credit risk management. On the liability side, we examine how shadow banking activity influences banks' funding structures. Deposits are a fundamental and stable source of financing and shifts in customer preferences toward shadow bank products can alter banks' liquidity profiles and increase reliance on more volatile funding sources. In addition, we analyze the pricing of deposits, as competition from money market funds and other non-bank instruments may raise banks' funding costs, directly affecting their margins, profitability, and stability.

Taken together, the analysis of lending activities, funding structures, and pricing behavior provides a comprehensive framework for assessing how shadow banking affects the structure of banks' business models and the impact on their stability. Finally, we extend the analysis to bank performance, as potential changes in business models may also influence banks' ability to generate income.

5.1. Assets-side impact: Lending

5.1.1. Loan volume

The impact of the shadow banking activity on the asset side of traditional bank balance sheets is primarily reflected in changes to their lending activities. Lending represents a core function of traditional banks, serving as a critical channel for allocating financial resources across the economy. The entry and expansion of shadow bank entities, some of which specialize in niche lending markets or offer competitive financing alternatives, can significantly influence banks' lending activity. In this section, we aim to understand to what extent the dynamics of banks' lending could be affected by the presence of shadow bank entities.

We rely on the same baseline regression model described in Equation (1), but in this specification the dependent variable is the annual change in bank loans ($\Delta Bank\ Loans$), which captures the variation in banks' lending activity over time. This measure is particularly relevant for

understanding these dynamics because it captures both the scale and priority of lending activities within the broader context of a bank's balance sheet. The proportion of loans over total bank assets reflects the strategic emphasis banks place on their core lending operations relative to other asset classes, such as securities or investments. By focusing on the annual growth rate, we can identify trends and shifts over time, providing insights into whether banks are expanding, contracting, or reallocating their lending portfolios in response to the competitive pressures or opportunities introduced by shadow bank. To be consistent with our main specification, we control for bank-level (*BANK*) and country-level characteristics (*COUNTRY*) while considering bank (μ_i) and time (λ_t) fixed effects.

The results are reported in **Table 5**. In column (1), the effect of aggregate shadow bank activity is examined, while columns (2) to (6) decompose shadow banking activities into the five distinct economic functions (EF1 to EF5). The results in column (1) reveal that aggregate shadow banking activity (*SB_GDP*) is negatively and significantly associated with the growth of bank loans. This finding suggests that as the shadow bank sector increases the lending activity of banks is negatively affected, as the share of loans over total assets is reduced. This result is consistent with the notion that shadow bank entities, through their alternative financial products and services, increasingly compete with traditional banks for borrowers and influence the overall demand for bank credit. This negative impact on bank lending is mostly driven by market intermediaries (*SB_F3_GDP*) and securitization-based credit intermediation (*SB_F5_GDP*). For both types of shadow banking functions (columns (4) and (6)) the coefficients are negative and statistically significant, indicating that the activities of these significantly reduce banks' lending activity. In the case of EF3 entities financing activity from the banking system by reallocating credit flows toward capital markets. By offering direct access to market-based funding instruments, they reduce firms' reliance on bank loans, which can undermine banks' ability to maintain or grow their loan portfolios. Similarly, EF5 entities absorb a portion of credit market activity, thereby challenging the traditional role of banks in credit intermediation. Through the securitization process, illiquid bank assets (such as loans) are transformed into marketable securities, altering banks' balance sheet structures and their approach to credit provision. Shadow bank entities engaged in securitization-based intermediation thus offer alternative credit instruments that attract borrowers who might otherwise rely on traditional bank lending.

Further evidence from **Table B4** of the Appendix shows that the negative aggregate association between shadow banking activity and bank lending is mainly driven by consumer loans, where the coefficient is negative and significant at the 1% level. This indicates that the expansion of

non-bank financial intermediation is particularly associated with a contraction in banks' retail lending, consistent with increasing competition in the retail credit market. **Figure B1** of the Appendix also indicates that this effect is primarily explained by collective investment vehicles (EF1), which compete directly with banks in the retail credit segment, and by finance companies and other specialized lenders (EF2), which also operate in consumer markets. Overall, the results underline the heterogeneity in how different shadow bank activities influence bank lending dynamics.

<INSERT TABLE 5>

5.1.2. *Loan pricing*

We now analyze the influence of shadow banking activity on loan prices, with the aim of assessing whether the expansion of non-bank financial intermediation affects banks' capacity to determine credit conditions. As previously discussed, the effects of shadow banking are mainly reflected on the asset side of banks' balance sheets, not only through changes in credit volumes but also through potential adjustments in the pricing of loans. In this context, we examine whether the annual evolution of loan prices (*Price of Loans*)—defined as the ratio of interest income on loans to total loans—can be partly explained by the development of shadow banking activity. This analysis allows us to assess whether banks adjust their lending behaviour in response to the presence of shadow banking entities, not only through the volume of credit supplied but also through price-setting decisions, thereby reflecting competitive pressures arising from the expansion of non-bank financial intermediation. Again, we rely on the same baseline regression model described in Equation (1), but in this specification the dependent variable is the *Price of Loans*. As in the model on loan growth, this specification allows us to examine how shadow banking activity, both in aggregate terms and across the five economic functions (EF1–EF5), influences banks' lending behavior through pricing decisions. The results are presented in Table 6. Column (1) shows the influence of the aggregate measure of shadow banking activity on the *Price of Loans*. In columns (2) to (6) we present the regression results for the five different economic functions developed by the shadow bank entities. As shown in column (1), aggregate shadow banking activity (SB_GDP) does not exhibit a statistically significant effect on loan prices. This suggests that, although shadow banking may influence banks' lending volumes and portfolio composition, its expansion does not appear to translate into systematic adjustments in loan pricing behaviour. When disaggregating by economic function, the results in column (3) indicate that the coefficient associated with SB_F2_GDP is negative and statistically significant, implying that the

expansion of EF2 entities—such as finance companies, leasing and factoring firms, and consumer credit providers—is associated with lower loan prices. These entities are directly involved in loan provision and therefore compete with banks in overlapping credit segments. Their activity exerts downward pressure on lending rates, reflecting their ability to offer alternative credit sources under comparable conditions. This result suggests that EF2 entities engage in functional competition with banks, particularly in markets where products and funding structures are similar, thereby influencing banks’ pricing behavior even if the overall volume of credit remains broadly unaffected.

Therefore, the results presented for banks’ lending activities highlight that shadow banks primarily compete with banks in terms of volume, both at the aggregate level and through specific economic functions such as market intermediaries and securitisation-based entities, while effects on loan pricing are limited to finance companies, leasing/factoring firms, and consumer credit providers. This underscores that the degree of competition between shadow banks and banks ultimately depends on the specific type of activity undertaken by these entities.

<INSERT TABLE 6>

5.2. Liabilities-side impact: Deposits and funding

The liability-side impact of shadow banks can be primarily observed through its influence on bank deposits and wholesale funding. Deposits represent a core and stable funding source for banks, enabling them to finance lending activities and manage liquidity. However, the growth of the shadow banking sector introduces competitive pressures that can erode the traditional dominance of banks in deposit collection, alter the composition of wholesale funding, and reshape the pricing of deposit liabilities. In this section, we analyze how shadow banking activity affects the ability of banks to attract and retain deposits, as well as the broader implications for their funding stability and liquidity management.

5.2.1. Deposits and funding volume

Shadow banks often offer alternative investment products, such as money market funds, collective investment vehicles, and other short-term instruments that compete directly with bank deposits. These products frequently provide higher returns, greater flexibility, or more tailored investment solutions, making them attractive to both retail and institutional investors. Moreover, shadow banking activities can affect the broader short-term funding landscape. Certain shadow banks

entities, such as finance companies, broker-dealers, and securitization vehicles, actively participate in short-term funding markets through instruments like commercial paper and repurchase agreements. By doing so, they not only introduce additional competition for funding but also alter the dynamics of these markets.

Empirically, we examine the impact of shadow bank activities on deposits by focusing on the dynamics of customer deposits, measured by the annual growth rate of the proportion of customer deposits over total bank liabilities ($\Delta Customer\ Deposits$). Customer deposits include funds placed by clients in banks under different contractual arrangements. These comprise demand deposits, which are transaction accounts withdrawable on demand or at short notice; savings deposits, which allow limited withdrawals per period but have no fixed maturity; time deposits, which carry a predetermined maturity date and typically bear interest; and other customer deposits. This measure captures both the scale and the strategic role of customers deposits in banks' liability structures. These deposits play a strategic role in banks' liability structures, as they provide predictable inflows that support lending activities and liquidity management. Following the same empirical strategy used in the analysis of loan volume and pricing behavior, we assess how shadow banking activity influences changes in the proportion of customer deposits to total bank liabilities. In particular, this approach allows us to evaluate the extent to which alternative investment products offered by shadow banks divert household and institutional savings away from traditional banks and primarily toward market-based instruments, thereby altering the conventional composition of banks' funding structures.

The results can be found in **Table 7**. The results show that aggregate shadow banking activity (SB_GDP) is negatively and statistically significant at the 10% level, indicating that the expansion of the shadow bank sector as a whole reduces banks' ability to attract or grow customers deposits. The disaggregated results by economic function indicate that the aggregate effect is explained by the activities of EF2, EF3, and EF5 entities, while the remaining categories show no significant impact. In the case of EF2 entities, such as finance companies, leasing/factoring firms, and consumer credit providers, the effect can be explained by their ability to divert household savings into specialized credit contracts or short-term investment products (e.g., consumer credit agreements, leasing contracts, factoring schemes). By contrast, EF3 entities, including broker-dealers and securities finance companies, channel funds toward market-based instruments (e.g., securities lending, repos, or margin financing) that provide alternative short-term vehicles for allocating liquidity and savings. Finally, EF5 entities, such as securitisation vehicles, contribute to this negative association by offering structured

instruments (e.g., mortgage-backed securities, asset-backed securities, or collateralized debt obligations) that attract household and institutional savings away from banks and into capital markets.

<INSERT TABLE 7>

The analysis by type of customer deposits, reported in **Table B5** of the Appendix, shows that the negative association between shadow banking activity and deposits is mainly driven by demand deposits, where the coefficient is negative and significant at the 10% level, while no significant effects are observed for time deposits, savings deposits, or other categories. Furthermore, as shown in **Figure B2** of the Appendix, the impact on demand deposits is primarily explained by finance companies and specialized lenders (EF2) and market intermediaries (EF3). Demand deposits are the most liquid component of banks' liabilities, which makes them more easily substituted by alternative short-term or market-based instruments offered by shadow banks. By contrast, time and savings deposits are less exposed to this competition, as their contractual features limit the scope for immediate substitution.

Additionally, we also analyze the effect on other types of funding. **Table B6** of the Appendix reports the results for interbank, short-term, and long-term funding. In all cases, the coefficients for aggregate shadow banking activity are not statistically significant, indicating that the expansion of the shadow banking sector does not affect banks' wholesale funding in the aggregate. **Figure B3** of the Appendix, however, shows that EF4 entities -such as credit insurers and financial guarantors- have a negative and statistically significant effect on interbank funding, suggesting that their activity constrains banks' access to this source of short-term liquidity. By contrast, these entities exhibit a positive association with long-term funding, indicating that they may support banks' ability to secure more stable and resilient liabilities. This pattern aligns with the stabilizing role of EF4 entities in the allocation of liquidity risk within the financial system, as the provision of guarantees and credit enhancements mitigates counterparty and rollover risks, thereby reducing banks' reliance on volatile interbank markets and facilitating access to longer-term and safer funding sources. Furthermore, EF5 entities—securitization-based intermediaries—exert a negative and statistically significant effect on banks' short-term funding, suggesting that the expansion of securitization reduces banks' reliance on traditional short-term funding channels. This reflects both a shift toward market-based refinancing mechanisms and a reallocation of liquidity away from bank balance sheets.

5.2.2. *Cost of funding: deposits*

After examining whether and to what extent the different types of bank deposits and wholesale funding are affected by shadow bank entities, we now analyze whether the cost of deposits is also a variable potentially affected by the development of these types of entities. The premise is that shadow banks may also affect traditional banks' business model, not only affecting the amount of the different types of deposits that a traditional bank collects, but also the extent to which the bank pays interest for those deposits. As previously argued, shadow bank entities may also compete with traditional banks' deposits through the provision of alternative investment products and other short-term instruments for investors that compete directly with bank deposits. Hence, it could be also reasonable to think that banks may also suffer from these competitive pressures and react via increased interest paid to deposits.

To do so, and following a similar procedure to that reported above, we compute a measure of the cost of deposits defined as the annual ratio between the amount of interest paid on deposits over the total amount of customer deposits (*Cost of Deposits*). As in the previous analyses, in all the regressions explaining the cost of deposits, we also include the vectors of bank-level (*BANK*) and country-level characteristics (*COUNTRY*) and consider bank- and year-fixed effects. The results are reported in **Table 8**. In column (1), we report the results for the aggregate measure of shadow banking activity (*SB_GDP*). The estimated coefficient is not statistically significant, suggesting that, when considered as a whole, shadow banking does not exert a significant impact on the cost of bank deposits. This result indicates that the expansion of non-bank financial intermediation has not translated into systematic adjustments in banks' deposit pricing strategies.

<INSERT TABLE 8>

In columns (2) to (6), we present the results for the different economic functions of shadow banking entities. The coefficients are generally not statistically significant at conventional levels, except for EF3 (market intermediaries), which shows a positive and statistically significant effect. This finding may be explained by the role of these entities in providing alternative short-term liquidity instruments—such as securities lending, repurchase agreements, or margin financing—which, although not conventional investment vehicles, function as close substitutes for bank deposits, particularly for institutional agents seeking flexibility and yield. This competitive pressure may compel banks to increase the remuneration of deposits in order to preserve their funding base and mitigate

potential liquidity outflows. For the remaining functions and at the aggregate level, no significant effects are observed, suggesting that the competition derived from shadow banking activity is more evident in terms of deposit volumes than in deposit pricing.

To sum up, the results for banks' deposits and funding show that shadow banks primarily competes with banks in terms of volumes, especially in demand deposits and in wholesale funding through certain economic functions (EF3: broker-dealers, EF4: credit insurers and guarantors, and EF5: securitisation vehicles), while effects on deposit pricing are limited only to market intermediaries (EF3). This underscores that, as in the case of loans, the degree of competition between shadow banks and banks ultimately depends on the specific type of activity undertaken by these entities.

5.3. Performance

As shown in previous sections, the development of shadow banking activity impacts both assets and liabilities side of the bank balance sheets. Hence, it seems logical to expect a translation of these competitive pressures into the performance metrics of the bank. To examine whether and to what extent shadow banking influences bank performance and following a similar procedure to that used in previous sections, we now consider three measures of bank performance: the return on assets (*ROA*), the net interest margin (*NIM*) and the variation in net fees and commissions income ($\Delta Net\ fees\ and\ commissions\ income$).

As in the previous analyses, we also include the vectors of bank-level (*BANK*) and country-level characteristics (*COUNTRY*) and consider bank- and year-fixed effects. The results are shown in **Table 9**. In column (1) we report the results obtained for when the bank's ROA is used as dependent variable. Columns (2) and (3) present the results when *NIM* and $\Delta Net\ fees\ and\ commissions\ income$ are considered, respectively. As can be observed, in all the estimates reported we obtain a negative and statistically significant coefficient for *SB_GDP* variable, suggesting that the higher the levels of shadow banking activity, the lower the bank's performance. The underlying argument for these results could be based on the competitive pressures that the shadow banking activity imposes on traditional banks. As previously argued, the activity of non-bank financial institutions implies the development of different economic functions, some of them directly related to products offered by traditional commercial banks, such as lending and payment services. Hence, although this effect is associated with the overall shadow banking activity, there could be in fact economic functions developed by non-bank financial institutions particularly leading to this result. As can be observed in **Figure B4** of the

Appendix, when referring to the ROA as an indicator of bank performance, it comes to EF1 (collective investment vehicles) and EF2 (entities reliant on short-term funding) being the economic functions that mainly lead to the negative impact of shadow banking activity on bank stability. Regarding the other indicators of bank performance, we do not find a clear pattern on the economic functions that drive the negative association between the development of shadow banking activities and bank performance. As can be observed in the case of Δ Net fees and commissions income as the performance indicator, the economic function developed by entities reliant on short-term funding (EF2) shows a negative effect on this measure of performance. This result may reflect the competitive pressure exerted by finance companies, leasing and factoring firms, and consumer credit providers, which tend to substitute part of banks' fee-generating activities related to credit origination and servicing. Similarly, securitization-based intermediaries (EF5) exhibit a negative and statistically significant relationship, suggesting that the expansion of these entities may reduce banks' ability to generate fee-based income, possibly due to disintermediation effects in credit distribution and risk transfer processes.

<INSERT TABLE 9>

Overall, the results suggest that the growth of shadow banking activity poses a significant competitive threat to traditional banks, negatively affecting key performance indicators such as ROA, NIM, and net fees and commissions income. This competitive pressure appears to be driven by specific economic functions within the shadow banking system, particularly those related to collective investment vehicles (EF1), entities reliant on short-term funding (EF2), and securitization-based intermediaries (EF5), whose activities tend to compress margins and erode banks' fee-generating capacity through disintermediation and risk transfer mechanisms. These findings highlight how non-bank financial institutions directly compete for and erode the traditional profit streams of commercial banks, suggesting how the level of bank market power may be finally influenced by these new players in the financial intermediation landscape.

6. MECHANISM: THE ROLE OF MARKET POWER

The results presented in previous sections highlight that the development of the shadow banking sector poses new competitive pressures to traditional banks both on the asset side of the bank balance sheet (via growth in loans and loan pricing), on the liabilities-side (via changes in short-term funding, mainly) as well as in terms of bank performance. As previously shown, the degree to which

shadow banking entities compete with banks is different depending on the type of business developed by the specific economic function that they serve. Competition from the shadow banking sector can be reflected in the amount of loans and credits that the traditional bank may grant, as well as in terms of its ability to set prices for the loans granted, which may finally have a clear impact on banks' performance ratios.

Hence, we further explore the role of bank market power as the main mechanism underlying the relationship between the activity of the shadow banking sector and bank stability. In particular, our empirical approach assumes that shadow banking may affect bank market power and bank stability simultaneously and that changes in bank market power may be an indirect channel leading to changes in bank stability. This analysis requires a two-stage procedure that controls for the potential endogeneity of both bank market power and bank stability and their potential simultaneous dependence on the shadow banking activity. Therefore, we combine our baseline model with a Two-Stage Least Squares (2SLS) procedure. In particular, we regress our measure of bank stability on the global shadow banking measure (*SB_GDP*) and a proxy of each bank's market power, controlling for other relevant factors as in the baseline model [eq.1]. To carry out the empirical analysis, we first compute the Lerner index (*LERNER*) as a measure of the level of bank market power (i.e., it is an inverse proxy for bank competition)⁷. The Lerner index has been widely used in the banking sector as an indicator of the degree of market power (see, for instance, Beck et al., 2013; Cuadros-Solas et al., 2024; Cruz-García et al., 2021; Cubillas & González, 2014; Maudos & Fernández de Guevara, 2004). This index defines the difference between the price (interest rate) and marginal cost expressed as a percentage of the price, considering that divergence between product price and marginal cost of production is the essence of monopoly power. It takes the value 0 in the case of perfect competition, and 1 under perfect monopoly.

The structural equation (equation 2) to be estimated is:

$$\begin{aligned} ZSCORE_{ijt} = & \beta_0 + \beta_1 SB_GDP_{jt-1} + \beta_2 \widehat{LERNER}_{ijt} + \sum_{l=1}^7 \gamma_l BANK_{ijt-1} \\ & + \sum_{h=1}^6 \delta_h COUNTRY_{jt} + \mu_i + \lambda_t + \varepsilon_{i,t} \end{aligned}$$

⁷ Appendix A describes in detail the construction of the Lerner index.

[eq. 2]

In order to determine whether the effect of shadow banking on bank stability is transmitted by different level of bank market power resulting from the new competitive pressures imposed by the shadow banking activity, we calculate the predicted values of the Lerner indicator, $\widehat{LERNER}_{ijt}$. We do so by estimating a first-stage regression, in which the observed value of the Lerner index is the dependent variable. The first-stage equation is defined as follows:

$$\begin{aligned} LERNER_{ijt} = & \lambda_0 + \lambda_1 SB_GDP_{jt-1} + \lambda_2 \Delta INTANGIBLE_ASSETS_{ijt} + \lambda_3 CONCENTRATION_{jt} \\ & + \sum_{l=1}^7 \gamma_l BANK_{ijt-1} + \sum_{h=1}^6 \delta_h COUNTRY_{jt} + \mu_i + \lambda_t + \varepsilon_{i,t} \end{aligned}$$

[eq. 3]

As independent variables of the first-stage regression, we include all the explanatory variables in the baseline model and the bank and year fixed effects [eq.1]. Likewise, standard errors are clustered at the country level. This equation (equation 3) has its own predetermined variables or instruments: $\Delta Intangible Assets$ which accounts for the variation of a bank's intangible asset-to-total assets ratio in the balance sheet, and *Concentration*, measuring the level of bank market concentration, as the ratio of assets of the three largest banks to total assets in the banking industry, in each country. Instruments should affect the second-stage variable only through their effect on the first-stage endogenous variable. As it is always difficult to find suitable instruments, we motivate the choice of our instrument with economic and statistical arguments.

From an economic point of view, intangible assets, such as brand reputation, proprietary technology, and human capital, are fundamentally linked to a bank's competitive advantage and ability to differentiate its products, thereby directly influencing its market power. Banks that invest more in these assets are expected to be better positioned to attract and retain customers, allowing them to gain market share. Furthermore, intangible asset investment is considered a strategic, long-term decision driven by a bank's internal growth strategy rather than by short-term concerns about banking stability. Hence, it could be logical to think that any impact of intangible asset investment on banking stability is presumed to operate through its effect on bank market power. As regards bank market concentration (*Concentration*), on the one hand, it may be associated with lower levels of individual banks' competitive conditions by favoring the adoption of collusive agreements between entities. On

the other hand, competition may increase in highly concentrated banking markets by causing banks that are considered to be inefficient to disappear. As for its relationship with bank stability, previous literature suggests that concentration in the banking market may affect bank stability through market power (Allen & Gale, 2000; 2004). As bank concentration changes, so does bank market power, and this latter change in market power may affect bank stability. Boyd & Nicoló (2005) show that as concentration is positively associated with market power, there is an indirect relationship between concentration and bank stability channeled by market power. Cubillas & González (2014) use bank concentration as an instrument when examining the relationship between market power and bank stability and find that banking systems with higher levels of concentration promote a greater degree of individual banks' market power. In a more recent study, Cuadros-Solas et al. (2024) analyze how the expansion of FinTech credit affects bank stability through changes in market structure and competitive dynamics. Their results show that higher bank concentration reinforces market power—measured by the Lerner index—acting as a transmission channel through which FinTech-induced competitive pressures are reflected in the banking sector. Hence, these findings suggest that market concentration amplifies the effect of FinTech credit on bank stability by shaping the degree of market power within the system.

The 2SLS approach allows us to separate the various effects of shadow banking in the equation explaining bank stability. In the second stage, the fitted values of bank market power ($\widehat{LERNER}_{ijt}$) from equation (eq. 3) are used as the independent variable to estimate model (eq. 2). Therefore, the coefficient β_2 of equation (2) would capture the extent to which shadow banking activity influence bank stability through bank market power. Coefficient β_1 of equation (2) would indicate the direct effect of shadow banking on bank stability regardless of bank market power.

We report the results obtained in **Table 10**. Column (1) reports the results for the first-stage equation explaining the Lerner indicator as out proxy for bank market power. *SB_GDP* presents a negative and statistically significant coefficient, indicating that, as expected, bank market power decreases as a consequence of shadow banking activity. Both $\Delta Intangible Assets$ and *Concentration* variables enter the regression with a positive and significant coefficient, suggesting that increases in intangible assets and higher levels of bank market concentration increase bank market power.

Column (2) of **Table 10** reports the results for the second-stage equations explaining how the shadow banking sector affects bank stability. The predicted value of the Lerner index presents a

positive and statistically significant coefficient. This result provides empirical evidence of the indirect effect of shadow banking on bank stability through bank market power. This finding suggests that the reduced degree of market power caused by the development of the shadow banking sector affects bank stability. This result points out the role of market power as a channel underlying the relationship between shadow banking and bank stability. Moreover, we also find that the coefficient of $NBFI_GDP_{jt-1}(\lambda)$ is negative and statistically significant, suggesting that there is a direct negative effect of shadow banking on bank stability. In other words, part of the effect of shadow banking on bank stability is not taking place through bank market power.

To test the validity of both instruments, we compute the Sargan-Hansen test of overidentifying restrictions (orthogonality conditions). The joint null hypothesis of this test is that the instruments are valid (i.e., uncorrelated with the error term) and that the excluded instruments are correctly excluded from the estimated equation. We also compute the statistic of Kleibergen-Paap rk LM (under-identification test) and the statistic of the Kleibergen-Paap rk Wald F test (weak identification test) in order to determine whether the instruments are under-identified and/or weak. According to the p-value of the Sargan-Hansen test, reported in **Table 10**, the null hypothesis (instruments are valid) cannot be rejected, suggesting that our instruments do not run into overidentifying restrictions. Moreover, the statistics of Kleibergen-Paap rk LM (under-identification test) and the statistic of the Kleibergen-Paap rk Wald F test (weak identification test) are statistically significant, suggesting that our instruments are neither under-identified nor weak.

<INSERT TABLE 10>

7. ADDITIONAL ANALYSES

7.1. Causal evidence: The Asset Management Reform in China (AMRP)

To strengthen causal inference regarding the impact of shadow banking on bank stability, we exploit the 2017–2018 Asset Management Reform Plan (AMRP) in China as a quasi-exogenous regulatory shock. In April 2018, Chinese regulators—including the PBC, CBIRC, and CSRC—jointly issued Guiding Opinions on Regulating the Asset Management Business of Financial Institutions, accompanied later by detailed implementation rules. These reforms aimed squarely at curtailing off-balance-sheet channeling, dismantling fund pools, prohibiting implicit guarantees, and reducing maturity and liquidity mismatches—key practices underpinning shadow banking activities such as wealth management products (WMPs) and entrusted loans. The AMRP thus represents an external

and institutionally targeted intervention affecting shadow banks (not traditional banks directly), especially those aligned with FSB's EF-1 and EF-5 categories, while leaving traditional banking operations outside its immediate regulatory scope.

Importantly, the shock can be treated as plausibly exogenous to underlying bank health but is likely to disrupt their operations through the asset and liability channels explored in this study—by restricting banks' ability to rely on shadow-bank intermediated short-term funding and off-balance-sheet financing. Empirical studies using this policy as a natural experiment—employing difference-in-differences and similar identification strategies—have documented that the AMRP led to measurable contractions in shadow banking, declines in corporate investment among firms with high WMP exposure, and reduced firm-level idiosyncratic risk. Accordingly, the AMRP provides a convincing setting to causally isolate how regulatory suppression of shadow banking activity affects the stability of traditional banking institutions, allowing us to observe how banks respond—both in terms of asset-side adjustments (loan growth, risk-based pricing) and liability-side responses (funding composition)—thus complementing our international evidence on heterogeneous spillovers from shadow banking on bank stability.

As this regulation was aimed at reducing the magnitude of shadow banking activities, we would expect that, following its implementation, Chinese banks would improve their stability by reabsorbing part of the intermediation previously conducted by shadow banks. This reintermediation process likely contributed to enhancing bank resilience by reducing exposure to opaque and riskier credit channels, alleviating competitive pressure in low-risk lending segments, and encouraging a shift toward more stable, on-balance-sheet funding and lending activities subject to regulatory oversight. Accordingly, we should anticipate a positive coefficient of the interaction term in the Z-score regressions, reflecting the stability gains derived from the contraction of shadow banking. Furthermore, according to our baseline results, this reintermediation process should be reflected in higher lending volumes, a stronger reliance on customer deposits as a funding source, and performance improvements. Moreover, by alleviating the competitive pressure from shadow entities and reducing exposure to off-balance-sheet risks, the reform could allow banks to regain market power and enhance overall stability.

To identify the causal impact of shadow-banking curtailment on bank stability by exploiting China's 2017–2018 Asset Management Reform Plan (AMRP), we implement a difference-in-differences (DiD) design that compares Chinese banks (treated) to a control group of banks from

other countries. The treatment indicator is $China_i$, the post-reform indicator is $Post_t$, which takes the value one when and after 2018, and the coefficient on $China_i \times Post_t$ captures the average treatment effect on the treated. Our baseline specification includes bank fixed effects to absorb time-invariant heterogeneity and year fixed effects to absorb global shocks and the same bank and country-level factors used in the baseline regressions. We estimate the following equation

$$Y_{i,c,t} = \beta(China_i \times Post_t) + \gamma'X_{i,c,t} + \mu_i + \tau_t + \theta_c + \varepsilon_{i,c,t} \quad [\text{eq. 4}]$$

where $Y_{i,c,t}$ is a bank outcome (Z-score, Δ Bank Loans, Δ Customer Deposits, etc.), $X_{i,c,t}$ are controls (including the same one-period lagged bank- and country-level variables used in the baseline regression, Eq. 1), μ_i are bank fixed-effects, τ_t are year fixed-effects and θ_c are country fixed-effects.

To ensure our results are not an artifact of control selection, we adopt a dual control strategy. First, we use banks from other Asia-Pacific economies in our sample⁸—excluding Hong Kong due to its tight financial linkage with Mainland China—as the primary control group. This choice maximizes comparability in exposure to regional macro shocks and financial conditions, while avoiding direct exposure to the AMRP. Second, we broaden the control set to banks from other emerging economies in our sample⁹. Since emerging economies, like China, typically share structural characteristics of their banking sectors and relatively recent but rapidly expanding shadow banking activity, this comparison group provides a meaningful benchmark to assess whether our results reflect general features of bank–shadow bankings interactions in similar institutional environments rather than China-specific factors. The use of both control groups ensures that our estimates are robust to alternative benchmarks: the Asia-Pacific controls emphasize geographic and macroeconomic comparability, while the emerging-economy controls emphasize structural and developmental similarity in financial systems. Importantly, for all these control countries we verified that there were no major regulatory interventions over the sample period that directly targeted shadow banking, ensuring that the observed effects are uniquely attributable to the AMRP rather than contemporaneous reforms in other jurisdictions.

The results are shown in **Table B7 of the Appendix**. Across both specifications, the treatment effect on the Z-score is positive and highly significant for both groups of controls. This

⁸ Indonesia, Singapore, South Korea, Japan, and Australia.

⁹ India, Brazil, Mexico, Turkey, South Africa.

suggests that Chinese banks experienced a marked increase in stability following the AMRP, consistent with the idea that the regulatory crackdown on shadow banking activity reduced competitive pressure and off-balance-sheet risk transmission from shadow banking into the traditional banking sector. By exploiting the AMRP as an exogenous regulatory shock in a difference-in-differences framework, we are able to provide causal evidence that restricting shadow banking activity can strengthen the stability of traditional banks, complementing our broader international findings and shedding light on the mechanisms through which shadow banking affects the banking system.

Regarding the other outcomes, we also see that the results are consistent with the expectations based on the baseline findings of the paper. Following the AMRP, Chinese banks expanded the volume of lending, attracted more customer funding through deposits, and showed signs of improved financial intermediation performance, as reflected in net interest margins. In addition, relative to some control benchmarks, banks appear to have regained market power. Taken together, these results reinforce the idea that restricting shadow banking activity not only enhanced banks' stability but also reallocated intermediation back to the formal banking sector, thereby providing causal evidence that the AMRP reshaped the competitive and functional dynamics of China's financial system in ways that align with our broader international evidence.

7.2. The role of the institutional and regulatory framework

We now analyze whether the institutional and regulatory framework at the country level shapes the influence of shadow banking on bank stability. This is important because, as prior literature has shown, the legal and institutional environment can have an impact on the shadow banking. In particular, differences in the degree of investor protection, contract enforcement, regulatory stringency, and the overall quality of governance can alter both the incentives and constraints faced by shadow banks. A stronger institutional framework may mitigate the potential risks posed by the expansion of shadow banks, as it ensures adequate supervision, transparency, and accountability in financial markets. Conversely, in weaker institutional settings, the rapid growth of shadow banks may increase systemic vulnerabilities, for instance by fostering regulatory arbitrage, excessive risk-taking, or opaque interconnections with the banking system. Therefore, understanding how these country-level factors moderate the shadow banking–bank stability nexus is crucial for interpreting cross-country differences and for designing effective regulatory responses.

Specifically, we consider a set of variables that serve as proxies for the characteristics of the institutional and regulatory setting in each country. In particular, we include measures that capture the

government's ability to design and implement effective policies (*Regulatory Quality* and *Government Effectiveness*), as well as the degree of compliance with the rule of law and the strength of the legal system (*Rule of Law*). All these variables are retrieved by the World Bank Worldwide Governance Indicators (WGI). In addition, the Financial Freedom index, computed by the Heritage Foundation and incorporated as a control variable in the baseline specification (*Financial Freedom*), is also considered to account for the extent to which the institutional environment fosters market-oriented financial activity and limits government intervention. Finally, we also check whether recent changes in macroprudential policies (Δ Macroprud Banking Reg.), which capture the evolution of regulatory constraints imposed on the banking and financial sector, such as stricter capital requirements or limits on specific activities might alter the relationship between shadow banking development and bank stability¹⁰. In this sense, each macroprudential tool implemented is coded as a +1, each macroprudential tool removed is coded as a -1, and no or neutral action is coded as a zero.

The results obtained are presented in **Table B8** of the Appendix. In columns (1)-(6), we sequentially introduce the interactions between the measure of shadow banking (*SB_GDP*) and each one of the variables capturing the different institutional and regulatory level characteristics. Results indicate that the negative and significant coefficient at conventional levels of the *SB_GDP* remains invariant to explain bank stability. The interaction terms reveal important heterogeneities in this relationship depending on the institutional and regulatory environment. When interacted with measures of the institutional framework—such as Financial Freedom, Regulatory Quality, Government Effectiveness, and the Rule of Law—the negative effect of shadow banking activity on bank stability is mitigated. The positive and significant coefficients on the interaction terms suggest that in countries with stronger regulatory quality, more effective governments, and greater respect for the rule of law, the adverse impact of shadow banks is less pronounced. The findings also highlight the role of recent changes in macroprudential banking regulation. The interaction between *SB_GDP* and Δ Macroprudential Banking Regulation is positive and highly significant, suggesting that tighter

¹⁰ The measures considered by iMaPP can be grouped into five broad categories. First, policy indicators include average and median LTV limits. Second, capital requirements and buffers cover the countercyclical and Basel III conservation buffers, as well as capital measures by sector. Third, prudential restrictions involve leverage limits, loan loss provisioning, credit growth ceilings, and tailored loan restrictions. Fourth, specific quantitative limits address foreign currency lending, LTV and income-based ratios, loan-to-deposit ratios, and reserve requirements. Finally, other regulatory measures include taxes, liquidity and funding risk controls, FX exposure limits, surcharges for systemically important banks, stress testing, profit distribution restrictions, and structural measures.

macroprudential policies—such as stricter capital requirements or limits on risky activities—dampen the negative consequences of shadow banks for bank stability.

Taken together, these results suggest that the quality of institutions and the strength of the regulatory framework play a central role in shaping how shadow banks interact with banks. Stronger governance, better regulatory design, and the timely use of macroprudential instruments all help mitigate the risks that shadow banks pose to the stability of the banking sector.

7.3. Additional analyses and robustness tests

To ensure that our results are robust, we analyze the impact of shadow banking activity using alternative variables proxying to bank stability and the activity of shadow banks. The results are presented in **Table B9** of the Appendix. In Panel A we present the robustness tests based on alternative measures for bank stability. In column (1), we use the Z-score using a four-year moving window. In column (2) we compute an alternative Z-score variable that replaces the total capital ratio with the Common Equity Tier 1 capital (CET1). In column (3), we compute an alternative Z-score variable using the net interest margin (as a measure of bank profitability) rather than the returns on assets. In column (4), following [Berger et al. \(2020\)](#) and [Demirgüç-Kunt and Huizinga \(2010\)](#), we use the accounting Sharpe ratio, which is defined as the return on equity divided by the standard deviation of the return on equity using a 3-year rolling time window. In column (5), we use the natural logarithm of the ratio of total impairments on loans and advances to total assets to total equity. As can be seen from these results, we continue to observe a negative relationship between the shadow banking activity and bank stability.

In Panel B of **Table B9**, we report the results when alternative measures for the shadow banking activity are used. In column (5) we use the shadow banking assets-to-total financial system assets ratio (*SB_FINASSETS*). Results presented in column (6) are obtained using the ratio of shadow banking assets over total banking sector assets (*SB_BANKASSETS*). Both measures are aimed at capturing the weight of the shadow banking activity in a more specific manner and using the financial system and the banking sector, respectively, as references. As can be observed, the results are consistent with those reported in the baseline regressions when the *SB_GDP* variable is used.

Then, to ensure that our results are not driven by a set of countries and banks in our sample, we conduct additional subsample analyses (**Table B10** of the Appendix). We first conduct a subsample analysis excluding those non-high-income countries according to the World Bank's income level

classification¹¹. Since the shadow banking could have a special relevance in emerging economies, we also aim to ensure that our results are not driven by these countries. Results are shown in column (1) of **Table B10**. The results reported are consistent when considering only high-income economies. To ensure that our results are not driven by banks operating in countries where shadow banking is excessively large or structurally dominant, we perform a robustness test by excluding those observations and re-estimating our baseline specification. Specifically, we exclude banks from those countries where the ratio of shadow banking to GDP is above 100% (Luxembourg and Ireland). The results shown in column (2) are consistent with the main findings of the paper. Then, since the FSB does not report total financial assets by shadow banking function for all countries—so as to avoid potential sample biases—we re-run our model on the subsample of banks located in countries with available data for all shadow banking functions¹². The results shown in column (3) are qualitatively similar to the baseline findings. In columns (4) and (5), we present the results obtained when restricting the sample to commercial banks and, separately, to the largest institutions, specifically, those with total assets exceeding \$30 billion. This threshold follows a criterion similar to that used by some regulatory authorities for identifying significant institutions. For instance, in the context of the implementation of the Single Supervisory Mechanism (SSM) in Europe, considers banks with total assets above €30 billion as significant. We thus ensure that our results are not just driven by the impact of shadow banking on non-commercial banks and medium-sized banks. As can be seen, even after these subsample analyses, the results are consistent with the baseline findings.

Finally, we also run some alternative specifications in Panel B of **Table B10**. In column (6), we show the results when country and year fixed effects are considered, while Column (7) shows the results when standard errors are clustered at the bank level. In doing so, we provide further evidence that the baseline results are not sensitive to alternative specifications or inference strategies.

8. CONCLUSIONS

The shadow banking sector has gained remarkable prominence in recent years, reflecting its critical role in the evolving financial landscape. Shadow banks have expanded their footprint by

¹¹ A description of the World Bank's methodology for classifying countries based on income level can be found at <https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2021-2022>. According to the definition from the World Bank, banks from the following (8) countries are removed from the regression: Argentina, Brazil, China, India, Indonesia, Mexico, South Africa and Turkey.

¹² As shown in Table B2, those countries with available data for all shadow banking economic functions are Argentina, Brazil, Canada, Chile, France, Hong Kong, India, Italy, Mexico, South Africa, Spain, the UK, the United States, and South Korea.

offering innovative financial solutions and filling gaps left by traditional banks, particularly in the wake of the GFC. Their activities now represent a significant portion of global financial assets, with steady growth driven by advancements in technology, regulatory arbitrage opportunities, and the increasing demand for diversified investment and funding options. According to recent data, the shadow banking sector's share of financial intermediation has risen substantially, with specific segments, such as collective investment vehicles and securitization-based entities, leading this growth. This expansion highlights the sector's importance in facilitating credit provision, supporting economic activity, and fostering competition within the financial system. However, it also highlights the need for robust regulatory frameworks to manage the potential risks associated with its rapid development and interconnectedness with traditional banking.

This paper examines the impact of shadow banks on the stability of traditional banks, utilizing an extensive international sample covering 5,559 banks across 27 countries during 2009–2023. Our findings reveal that aggregate shadow banking activity negatively influences bank stability, with the effect particularly pronounced in the context of entities focused on collective investment vehicles and securitization-based intermediation. These entities may intensify competition for financial resources, increase systemic risk through liquidity mismatches, and propagate complexity within financial intermediation chains.

The results suggest that shadow banking, by competing in both credit and deposit markets, alters traditional banks' business models. On the asset side, shadow banking activity mainly leads to slower loan growth, reflecting increased competition faced by traditional banks. On the liability side, certain shadow banking functions exert pressure on bank funding structures, notably reducing the growth of customers' deposits. Consistent with this impact on banks' business models, our evidence also shows that shadow banking activity adversely affects bank performance. Additionally, we identify bank market power as one channel through which shadow banking activity influences bank stability. Finally, we complement our analysis by showing that the effect of shadow banking on banks' stability appears to be causal when exploiting the 2017–2018 Asset Management Reform Plan (AMRP) in China as a quasi-exogenous regulatory shock that tightened shadow intermediation activities.

From a policy perspective, these findings underline the need for a balanced approach to shadow banking regulation. While shadow banks play a critical role in diversifying financial intermediation and enhancing access to funding, their activities can amplify risks to the traditional banking sector and the broader financial system. Policymakers should consider frameworks that

ensure a level playing field between the traditional banking and the shadow banking sector, particularly in terms of regulatory oversight and systemic risk mitigation. Enhanced monitoring of the shadow banking interconnections with banks and their contributions to market fragility is essential to address potential vulnerabilities. Furthermore, banks must adapt to the competitive pressures posed by shadow banking activity. Strategies such as leveraging technological innovations, optimizing risk management frameworks, and focusing on customer-centric business models may help banks maintain resilience. Simultaneously, regulators should facilitate an environment where both sectors can coexist and complement each other, contributing to a more stable and efficient financial ecosystem.

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APPENDIX A

The Lerner index measures the capacity of a bank to set a price above its marginal cost. Specifically, it defines the difference between price and marginal cost expressed as a percentage of price. It assumes that the divergence between product price and the marginal cost of production is the essence of monopoly power, such that the higher the margin, the greater its market power. The Lerner index ranges between 0 and 1, with 0 being the case of perfect competition, and 1 of perfect monopoly.

Algebraically the Lerner index for each bank i and year t is calculated as follows:

$$L_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \quad [A1]$$

where P_{it} is the average price of the output of bank i in year t . It is estimated as the ratio between total income and total assets. The underlying assumption is that the flow of goods and services that banks produce is proportional to their total assets, generating financial and non-financial income. MC_{it} is the marginal cost of bank i in year t . The traditional approximation of the Lerner index does not consider the credit risk faced by banks. If a bank sets a higher interest rate as a result of the risk it assumes, a greater difference between price and marginal cost does not necessarily imply greater market power but may simply reflect the higher cost of risk. Following Maudos and Fernández De Guevara (2004), marginal cost is calculated based on a translog cost function, that we correct for credit risk as in Cruz et al. (2021)¹³:

$$\begin{aligned} \ln C_{it} = & \alpha_0 + \alpha_1 \ln TA_{it} + \frac{1}{2} \alpha_k (\ln TA_{it})^2 \\ & + \sum_{j=1}^4 \beta_j \ln w_{jit} + \frac{1}{2} \sum_{j=1}^4 \sum_{k=1}^4 \beta_{jk} \ln w_{jit} \ln w_{kit} + \frac{1}{2} \sum_{j=1}^4 \gamma_j \ln TA_{it} \ln w_{jit} + \mu_1 Trend \\ & + \frac{1}{2} \mu_2 Trend^2 + \mu_3 Trend \ln TA_{it} + \sum_{j=1}^4 \delta_j Trend \ln w_{jit} + v_i + u_{it} \end{aligned} \quad [A2]$$

¹³ Jiménez et al., (2013) construct a risk-corrected Lerner index, using information on the probability of default (PD) from the Central Credit Registry (CCR) of Bank of Spain, to which we do not have access.

where C is the total costs (financial costs, operating costs, and provisions) of bank i at time t . The cost function differs from the traditional one in that as well as the financial and operational costs, it includes the provisions that a bank makes each year, with this variable being an ex-post proxy of the cost of risk. TA is total assets and w the price of the different production factors of bank i at time t . We consider the price of four inputs:

$$w_1: \text{Price of labor} = \text{staff costs} / \text{total assets}^{14}$$

$$w_2: \text{Price of lendable funds} = \text{financial costs} / \text{lendable funds}$$

$$w_3: \text{Price of capital} = \text{operating costs (except staff costs)} / \text{fixed assets}$$

$$w_4: \text{Price of credit risk} = \text{provisions} / \text{volume of lending}^{15}$$

We estimate the costs' function (and hence marginal costs) separately for each country over the sample period. We allow the parameters of the cost function to vary from one country to another to reflect different technologies. To capture the influence of variables specific to each bank, we estimate the function by introducing fixed individual effects (v_i). We capture the influence of technical change in the cost function over time by including Trend. u_{it} is a random disturbance.

¹⁴ The price of this input (labor) could be calculated as staff costs over number of employees (instead of staff costs over total assets). However, the "number of employees" variable is not available in ORBIS Bank Focus for many of the banks in our sample (implying fewer observations). For this reason, we decided to use total assets as the denominator to calculate the price of labor.

¹⁵ Given that risk is included in the dependent variable, it is necessary to include the unit cost of this production input, which we can call "credit risk", as a determinant, approximating it as a ratio between provisions and the volume of lending.

APPENDIX B

Table B1. Description of Shadow Banking by Economic Functions

Economic Function (EF)	Definition	Examples	Business Model
EF1: Collective Investment Vehicles with Features that Make Them Susceptible to Runs	Entities that pool funds from multiple investors to invest in financial assets, offering redemption rights that can lead to liquidity mismatches.	Money Market Funds (MMFs), Open-ended Fixed Income Funds, Hedge Funds, Exchange-Traded Funds (ETFs), Real Estate Investment Trusts (REITs).	Pooling investor funds to invest in diversified portfolios, offering daily liquidity, which can create liquidity mismatches during market stress.
EF2: Loan Provision That Is Dependent on Short-Term Funding	Entities providing loans or credit facilities financed predominantly through short-term funding sources.	Finance Companies, Leasing Companies, Consumer Credit Providers, Peer-to-Peer Lending Platforms, Factoring Companies.	Extending credit to consumers or businesses, funded by issuing short-term commercial paper, borrowing from wholesale markets, or relying on retail deposits.
EF3: Intermediation of Market Activities Dependent on Short-Term Funding or on Secured Funding of Client Assets	Entities facilitating market intermediation activities reliant on short-term funding, including the use of client assets as collateral.	Broker-Dealers, Securities Lending Agents, Market Makers, High-Frequency Trading Firms, Repo Markets Participants.	Engaging in securities trading and lending, funded through repurchase agreements, securities borrowing, or other short-term mechanisms.
EF4: Provision of Financial Guarantees or Insurance	Entities offering credit enhancements or insurance products that support credit intermediation by mitigating credit risk.	Monoline Insurers, Credit Derivative Product Companies, Financial Guaranty Insurers, Credit Enhancement Providers, Swap Dealers (in credit default swaps).	Providing guarantees, insurance, or credit default swaps to protect investors against losses from credit events, thereby supporting credit market activities.
EF5: Facilitation of Credit Intermediation Through Securitization and Funding Structures	Entities involved in the process of transforming illiquid assets into tradable securities, facilitating credit intermediation.	Structured Investment Vehicles (SIVs), Asset-Backed Commercial Paper (ABCP) Conduits, Collateralized Loan Obligations (CLOs), Mortgage-Backed Securities (MBS) Issuers, Special Purpose Entities (SPEs).	Purchasing pools of loans or receivables (e.g., mortgages, auto loans) and financing these through the issuance of asset-backed securities to investors.

Table B2. Shadow banking by country (2009 – 2023)

	SB_GDP (%)	SB_F1_GDP (%)	SB_F2_GDP (%)	SB_F3_GDP (%)	SB_F4_GDP (%)	SB_F5_GDP (%)
Argentina	7.48	4.46	1.22	0.27	0.34	1.32
Australia	58.39	45.79	4.81		0.35	7.43
Belgium	29.31	24.70	1.92	-	-	2.69
Brazil	39.23	37.02	0.06	0.18	0.34	1.62
Canada	80.70	61.58	10.27	2.75	0.35	5.74
Chile	22.16	15.15	5.37	1.16	0.10	0.38
China	43.22	38.16	1.33	2.02	-	7.21
France	59.61	50.63	0.54	2.24	0.74	5.64
Germany	49.52	45.82	2.02	0.14	-	1.84
Hong Kong	24.59	9.51	4.85	11.12	0.06	0.02
India	20.76	5.10	15.54	0.06	0.00	0.07
Indonesia	4.36	1.18	3.16	-	-	0.03
Ireland	874.17	589.59	-	3.73	5.93	176.43
Italy	33.24	11.81	4.17	0.08	1.06	16.20
Japan	55.92	16.93	11.25	23.42	-	4.32
Luxembourg	5073.97	4579.57	-	0.54	1.67	313.16
Mexico	17.26	7.86	4.89	2.68	0.02	1.81
Netherlands	62.89	45.05	2.76	1.54	-	13.72
Saudi Arabia	6.82	4.08	1.22	-	-	-
Singapore	10.71	6.14	0.11	2.82	-	1.66
South Africa	44.12	36.52	5.02	1.44	0.20	0.87
Spain	24.73	19.68	0.80	0.40	0.10	3.74
Switzerland	92.66	79.04	2.23	1.45	0.07	-
Turkey	7.69	2.46	3.21	0.63	-	-
UK	45.56	24.97	10.21	4.21	0.15	6.02
United States	85.11	51.94	10.25	10.72	0.27	8.86
South Korea	47.63	15.20	7.23	14.31	1.23	9.66

Table B3. Variables definitions and sources

This table describes the variables used in the paper and indicates the sources from which the data were retrieved.

Variable	Definition	Source
PANEL A: Main variables		
<i>SB_GDP</i>	Natural logarithm of the ratio of total assets of SB to GDP	FSB
<i>SB_F1_GDP</i>	Natural logarithm of the ratio of total assets of SB to GDP, where F1 refers to total assets of collective investment vehicles susceptible to runs (money market funds, fixed income funds, mixed funds, credit hedge funds, real estate funds)	FSB
<i>SB_F2_GDP</i>	Natural logarithm of the ratio of total assets of SB to GDP where F2 refers to total assets of entities reliant on short-term funding for lending (finance companies, leasing and factoring companies, consumer credit companies)	FSB
<i>SB_F3_GDP</i>	Natural logarithm of the ratio of total assets of SB to GDP where F3 refers to total assets of market intermediaries engaging in short-term funding activities (broker-dealers, custodial accounts, securities finance companies)	FSB
<i>SB_F4_GDP</i>	Natural logarithm of the ratio of total assets of SB to GDP where F4 refers to total assets of credit facilitators offering guarantees and insurance (credit insurance companies, financial guarantors, monoline insurers)	FSB
<i>SB_F5_GDP</i>	Natural logarithm of the ratio of SB to GDP where F5 refers to total assets of securitization-based credit intermediaries (securitization vehicles, structured finance vehicles, asset-backed securities)	FSB
<i>ZSCORE</i>	The natural logarithm of $(ROA + CAP)/sd(ROA)$, where ROA is the return on assets, CAP is the capital to asset ratio, and $sd(ROA)$ is an estimate of the standard deviation of the rate of return on assets. To calculate the standard deviation of ROA, we use a three-year moving window. A higher Z-score indicates that the bank is more stable because it is inversely related with the bank's default probability.	BankFocus
PANEL B: Bank-level control variables		
<i>Size</i>	The natural logarithm of total bank assets	BankFocus
<i>Cost-to-Income</i>	Total operating expenses by total operating income. It represents the efficiency of a bank's operations. A lower ratio means the bank is more efficient.	BankFocus
$\Delta Profits$	Annual growth rate in total profits of the bank.	BankFocus
$\Delta Loans$	Annual growth rate in the volume of bank loans.	BankFocus
<i>Liquidity</i>	High liquid assets (Cash & balances with central banks + Net loans and advances to banks) to total bank assets.	BankFocus

<i>Traditional</i>	Total interest income to total bank assets. A higher ratio means that the bank is less diversified.	BankFocus
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PANEL C: Macroeconomic control variables

<i>Inflation</i>	Annual percentage change of the end-of-period consumer price index.	IMF
<i>ΔMacprud Banking Reg</i>	Sum of the changes in macroprudential banking regulations implemented by each country since 2000.	Integrated Macprudential Policy (iMaPP) Database
<i>ΔInterest Rates</i>	Annual changes (difference) in the central bank policy rates	IMF
<i>ΔGDPpc</i>	Change of GDP per capita in constant international dollars per person adjusted for differences in the cost of living using the Purchasing Power Parity (PPP)	IMF
<i>Private Credit_GDP</i>	Private credit by deposit money banks and other financial institutions to GDP.	Global Financial Development Database (World Bank)
<i>Institutional Quality</i>	Kaufmann-Kraay-Zoido-Lobatón governance indicators	World Bank
<i>Financial Freedom</i>	Index that reflects the degree of liberalization, efficiency, and independence of the financial sector from government intervention.	Heritage Foundation

PANEL D: Other variables

<i>ΔBank Loans</i>	Natural logarithm of the annual growth rate of the proportion of bank loans over total bank assets	BankFocus
<i>Price of Loans</i>	Natural logarithm of the ratio of interest on loans over total loans	BankFocus
<i>ΔCustomer Deposits</i>	Natural logarithm of the annual growth rate of the proportion of customers deposits over total bank liabilities	BankFocus
<i>Cost of Customer Deposits</i>	Natural logarithm of the annual ratio between the amount of interest paid on customer deposits over the total amount of customer deposits	BankFocus
<i>ROA</i>	Return on assets	BankFocus
<i>Net interest margin</i>	Ratio of net interest revenue to total loans	BankFocus
<i>ΔNet fees and commissions income</i>	Natural logarithm of the annual growth rate of net fees and commission income	BankFocus
<i>LERNER</i>	The difference between the interest rate and marginal cost expressed as a percentage of price. This index moves between 0 (pure perfect competition) and 1 (perfect monopoly). $L_{it} = \frac{P_{it} - MC_{it}}{P_{it}}$	Own calculations using data from BankFocus

<i>Concentration</i>	Five-bank assets concentration ratio	World Bank
<i>ΔIntangible assets</i>	Logarithm of the Growth of the intangible assets over total assets	BankFocus

Table B4. Shadow banking and the type of bank loans

This table shows the results of the relationship between shadow banking activity and the growth of different types of bank loans. The dependent variable is the natural logarithm of the annual growth rate of each type of loan. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	ΔBank Loans				
	(1) Consumer loans	(2) Mortgage loans	(3) Corporate loans	(4) Other loans	(5) Interbank deposits (loans to banks)
<i>SB_GDP</i>	-0.086*** (-3.209)	-0.005 (-0.106)	0.013 (0.256)	-0.082* (-1.766)	-0.105* (-1.792)
Bank and macroeconomic controls	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	20,741	17,149	16,400	39,441	41,856
Number of banks	2,671	2,037	2,179	5,360	5,539
R-squared	0.174	0.268	0.222	0.126	0.110

Figure B1. Shadow banking and the type of bank loans: by economic function

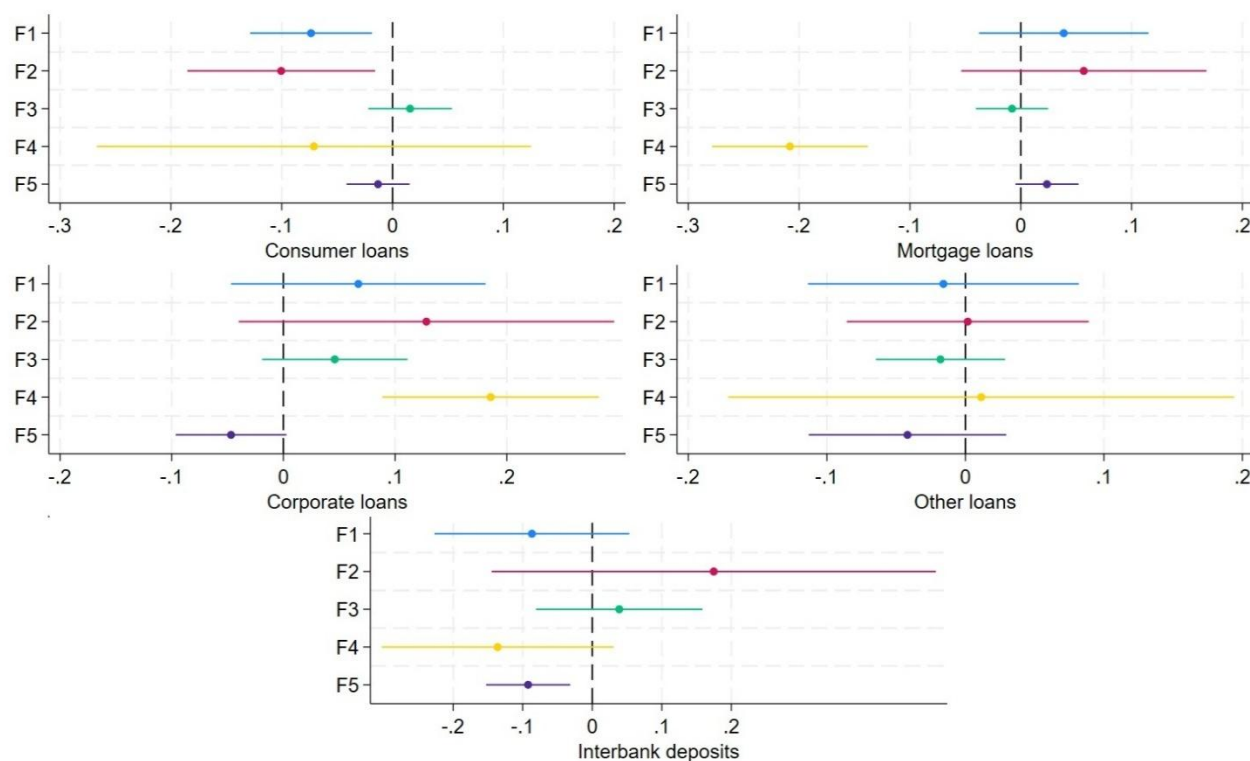


Table B5. Shadow banking and the type of customer deposits

This table reports the estimation results for the relationship between shadow banking activity and the growth of different categories of customer deposits. The dependent variables are defined as the natural logarithms of the annual growth rates of each deposit type. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	Δ Customer Deposits			
	(1) Demand deposits	(2) Time deposits	(3) Saving deposits	(4) Other customer deposits
<i>SB_GDP</i>	-0.084* (-1.740)	-0.077 (-0.745)	-0.009 (-0.123)	-0.110 (-0.738)
Bank and macroeconomic controls	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level
Observations	36,834	35,447	28,242	19,078
Number of banks	4,962	4,797	3,672	2,825
R-squared	0.154	0.934	0.217	0.141

Figure B2. Shadow banking and types of customer deposits: by economic function

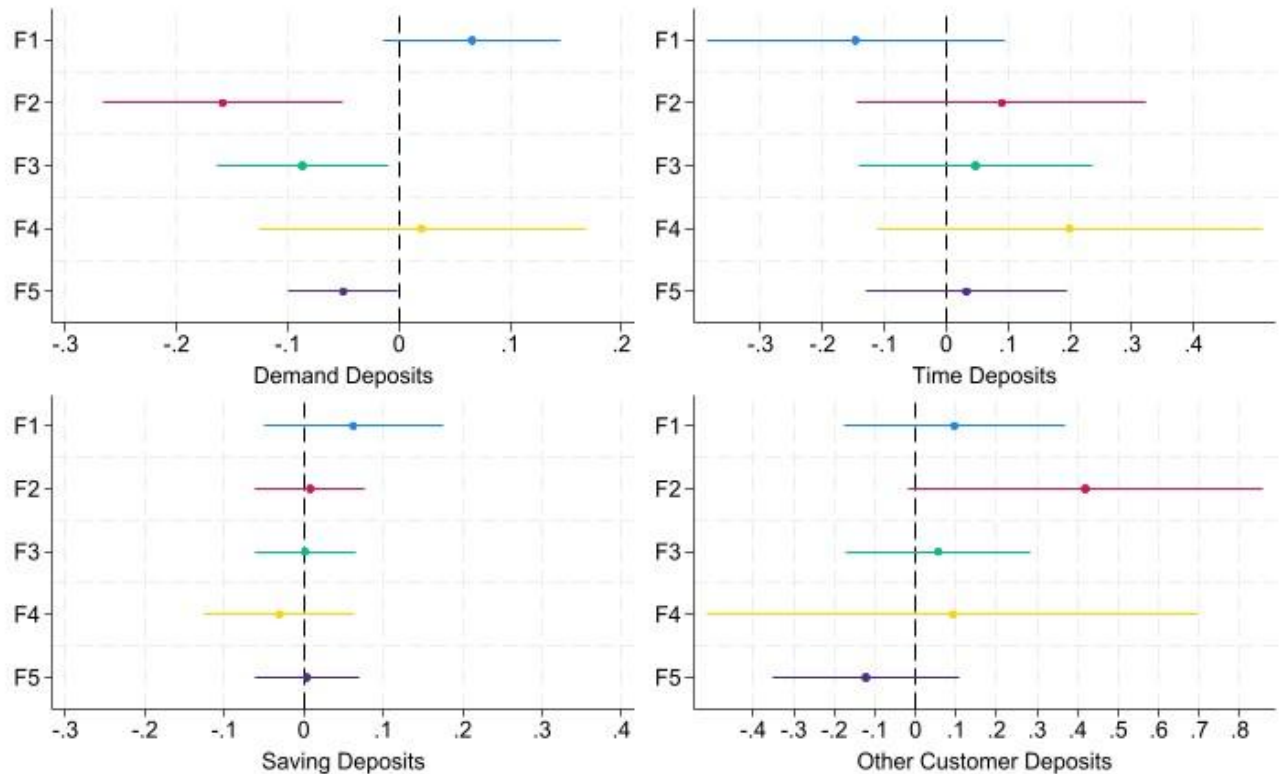


Table B6. Shadow banking and the type of bank funding

This table reports the estimation results for the relationship between shadow banking activity and the growth of different sources of bank funding. The dependent variables are defined as the natural logarithms of the annual growth rates of each funding source. *Interbank Fundings* refers to deposits, loans and repos from banks. *Short-term Funding* refers to commercial paper, notes and short-term part of debt securities. *Long-term Funding* refers to long term borrowings and debt securities. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	Δ Funding		
	(1) Interbank Funding	(2) Short-term Funding	(3) Long-term Funding
<i>SB_GDP</i>	0.008 (0.127)	0.033 (0.274)	-0.076 (-0.573)
Bank and macroeconomic controls	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level
Observations	27,479	13,943	21,286
Number of banks	3,975	2,321	3,166
R-squared	0.102	0.137	0.181

Figure B3. Shadow banking and the type of bank funding: by economic function

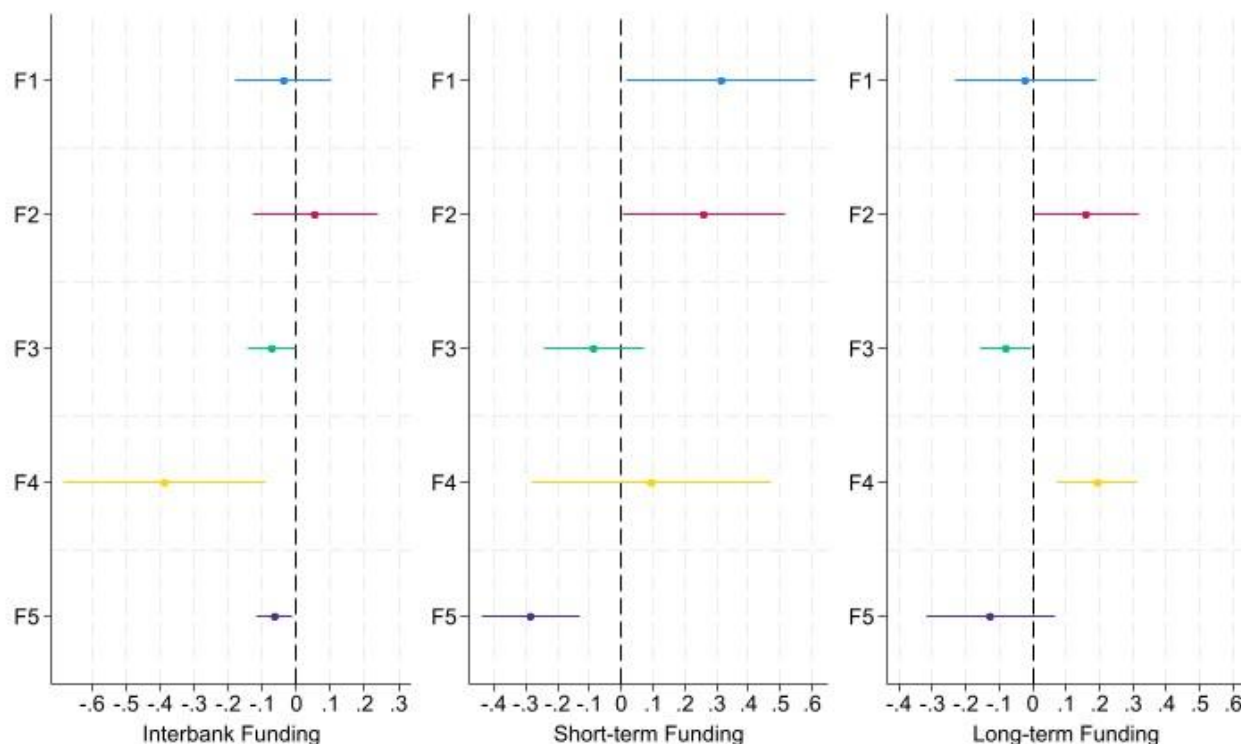


Figure B4. Shadow banking and performance: by economic function

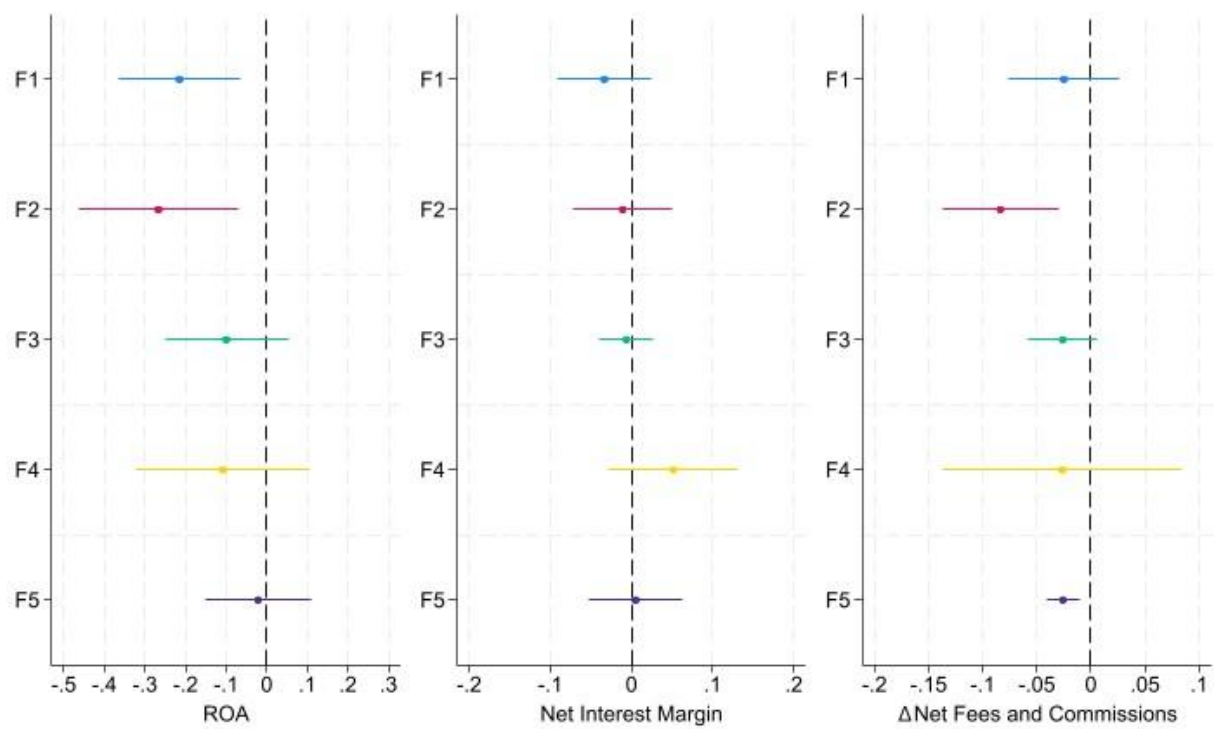


Table B7. Causal Evidence from the AMRP reform in China

This table reports the difference-in-differences estimates of the effect of the 2017–2018 Asset Management Reform Plan (AMRP) in China on bank stability and related outcomes. The treatment group consists of Chinese banks, while the control group is defined alternatively as (i) banks from other Asia-Pacific economies in the sample (excluding Hong Kong) in Panel A, and (ii) banks from other emerging economies in the sample in Panel B. The dependent variables include the Z-score (column 1), its numerator— $\log(\text{ROA} + \text{equity/assets})$ (column 2)—and its denominator— $\log(\text{sd}(\text{ROA}))$ (column 3)—as well as changes in bank loans (column 4), the price of loans (column 5), changes in customer deposits (column 6), net interest margins (NIM, column 7), and the Lerner index (column 8). The main variable of interest is the interaction term $\text{China}_i \times \text{Post}_t$, where Post_t equals 1 for years ≥ 2018 , marking the formal implementation of the AMRP. All variables are defined in Table B3 of the Appendix. All regressions include bank- and macroeconomic-level controls, as well as bank, time, and country fixed effects. Standard errors are clustered at the bank level, and t-statistics are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

PANEL A: Control group Asia-Pacific banks								
Dependent variable:	ZSCORE	ZSCORE numerator: $\log(\text{roa} + \text{equity/assets})$	ZSCORE denominator: $\log(\text{sd}(\text{roa}))$	Δ Bank Loans	Price of Loans	Δ Customer Deposits	NIM	Δ LERNER
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{China}_i \times \text{Post}_t$	0.353*** (4.116)	-0.005 (-0.217)	-0.001 (-1.162)	0.075*** (4.570)	0.002 (1.232)	0.014 (0.723)	0.003*** (3.633)	0.149*** (4.043)
Bank and macroec. controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Std. Errors	Bank-level	Bank-level	Bank-level	Bank-level	Bank-level	Bank-level	Bank-level	Bank-level
Observations	9,351	9,351	9,363	9,363	8,888	9,354	8,867	7,146
Number of banks	1,304	1,304	1,305	1,305	1,270	1,302	1,268	1,165
R-squared	0.611	0.923	0.697	0.313	0.863	0.499	0.907	0.348
PANEL B: Control group banks from emerging economies								
Dependent variable:	ZSCORE	ZSCORE numerator: $\log(\text{roa} + \text{equity/assets})$	ZSCORE denominator: $\log(\text{sd}(\text{roa}))$	Δ Bank Loans	Price of Loans	Δ Customer Deposits	NIM	Δ LERNER
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{China}_i \times \text{Post}_t$	0.517*** (5.146)	0.021 (0.610)	-0.003** (-2.104)	0.162*** (4.905)	-0.011* (-1.952)	0.130*** (3.811)	-0.002 (-1.128)	-0.008 (-0.142)
Bank and macroec. controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Std. Errors	Bank-level	Bank-level	Bank-level	Bank-level	Bank-level	Bank-level	Bank-level	Bank-level
Observations	4,374	4,374	4,399	4,386	4,060	4,211	3,949	3,311
Number of banks	651	651	660	658	627	614	612	534
R-squared	0.678	0.848	0.768	0.332	0.749	0.293	0.895	0.221

Table B8. Shadow banking and bank stability: heterogeneities

This table shows the results for the role of the bank-level characteristics on the relationship between shadow banking activity and bank stability. The dependent variable is the bank Z-score. *Financial Freedom* is an index reflecting banking efficiency as well as the independence of the financial sector from government control and interference. *Regulatory Quality* is an index measuring the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. *Government Effectiveness* is an index that captures perceptions of the quality of public services, the quality of the civil service and its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. *Rule of Law* is an index measuring the perceptions of the extent to which agents have confidence in and abide by the rules of society. Δ *Macroprud Banking Reg.* is the sum of the changes in macroprudential banking regulations implemented by each country since 2000. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	ZSCORE				
	(1)	(2)	(3)	(4)	(5)
<i>SB_GDP</i>	-0.564*** (-4.274)	-0.363*** (-3.026)	-0.502*** (-4.478)	-0.344*** (-2.850)	-0.343*** (-9.059)
<i>SB_GDP * Financial Freedom</i>	0.005** (2.178)				
<i>SB_GDP * Regulatory Quality</i>		0.205*** (3.302)			
<i>SB_GDP * Government Effectiveness</i>			0.277*** (4.108)		
<i>SB_GDP * Rule of Law</i>				0.183** (2.599)	
<i>SB_GDP * ΔMacroprud Banking Reg.</i>					0.009*** (4.136)
<i>Financial Freedom</i>	-0.028** (-2.619)				
<i>Regulatory Quality</i>		-0.602* (-1.743)			
<i>Government Effectiveness</i>			-1.261*** (-4.566)		
<i>Rule of Law</i>				-0.389 (-0.909)	
<i>ΔMacroprud Banking Reg.</i>					-0.039*** (-4.513)
Bank and macroeconomic controls	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	42,050	42,050	42,050	42,050	42,050
Number of banks	5,559	5,559	5,559	5,559	5,559
R-squared	0.706	0.706	0.707	0.706	0.706

Table B9. Shadow banking and bank stability: robustness (I)

This table shows the results for the robustness checks. The dependent variable is the bank Z-score. Panel A shows the results obtained when different measures of bank stability are used. In column (1), we use the Z-score using a four-year moving window. In column (2), we compute an alternative Z-score variable that replaces the total capital ratio with the Common Equity Tier 1 capital (CET1). In column (3), we compute an alternative Z-score variable using the net interest margin (as a measure of bank profitability) rather than the returns on assets. In column (4), we use the accounting Sharpe ratio, which is defined as the return on equity divided by the standard deviation of the return on equity using a 3-year rolling time window. In column (5), we use the natural logarithm of the ratio of total impairments on loans and advances to total assets to total equity. In Panel B, we replace the *SB_GDP* variable for the ratio of SB assets-to-total financial system assets (column (6)) and the SB assets-to-total banking sector assets (column (7)). The remaining variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

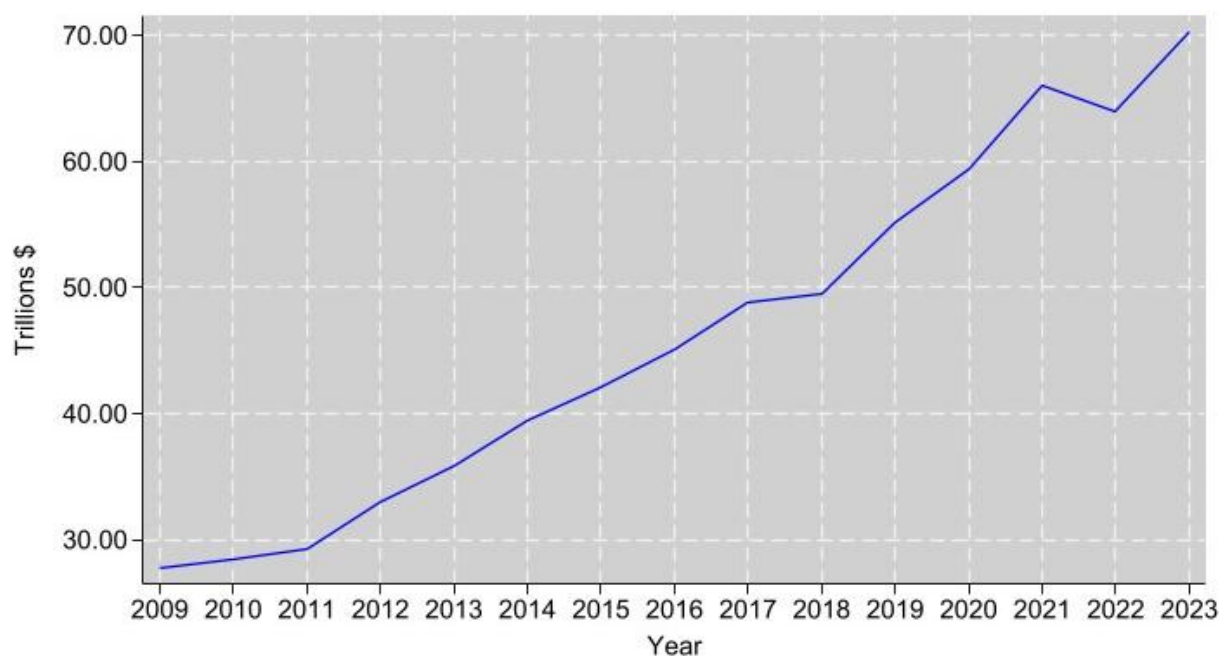
PANEL A: Alternative Dependent Variable						PANEL B: Alternative SB Variable	
Dependent variable:	ZSCORE4	ZSCORE_CET1	ZSCORE_NIM	SHARPE	IMPAIRMENT	ZSCORE	ZSCORE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>SB_GDP</i>	-0.403*** (-3.463)	-0.460*** (-5.471)	-0.525*** (-4.914)	-0.222*** (-2.779)	0.002** (2.297)		
<i>SB_FINASSETS</i>						-0.395*** (-2.812)	
<i>SB_BANKASSETS</i>							-0.328*** (-2.919)
Bank and macroec. controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	36,272	40,030	39,500	42,041	39,976	42,050	42,050
Number of banks	5,114	5,407	5,356	5,558	5,460	5,559	5,559
R-squared	0.755	0.700	0.665	0.625	0.676	0.706	0.706

Table B10. Shadow banking and bank stability: robustness (II)

This table shows the results for the robustness checks. The dependent variable is the bank Z-score. Panel A shows the results obtained for different subsample analyses. Column (1) shows the results obtained when non-high-income countries are excluded. Column (2) shows the results obtained when excluding those countries with the value of SB to GDP is above 100% (Luxembourg and Ireland). Column (3) shows the results for the subsample of banks from countries with values for all 5 SB functions. Column (4) reports the results for the subsample of commercial banks. Column (5) shows the results when the sample is restricted to the largest banks only. Panel B shows the results obtained for alternative specifications. Column (6) shows the results when country and year fixed effects are considered. Column (7) shows the results when standard errors are clustered at the bank-level. All the variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. ** and *** indicate significance at the 5% and 1% levels, respectively.

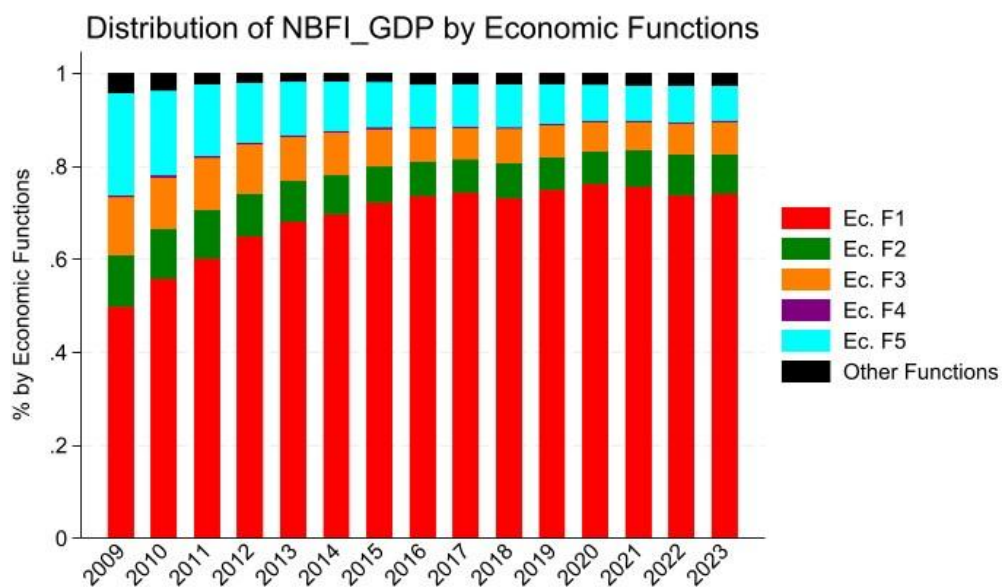
PANEL A: Subsample analyses						PANEL B: Alternative Specifications	
	Excluding Non-High-Income Countries	Excluding countries $SB_GDP > 100\%$	Subsample of countries with values for all 5 SB functions	Subsample of Commercial Banks	Subsample of Largest Banks	Country and Year FE	Cluster at Bank-level
Dependent variable:	ZSCORE	ZSCORE	ZSCORE	ZSCORE	ZSCORE	ZSCORE	ZSCORE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SB_GDP	-0.249*** (-3.478)	-0.317*** (-2.976)	-0.563** (-2.930)	-0.341*** (-4.827)	-0.274** (-2.207)	-0.264* (-1.929)	-0.321*** (-8.664)
Bank and macroec.controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Country	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level	Bank-level
Observations	36,327	41,363	18,940	18,863	4,448	42,308	42,050
Number of banks	4,710	5,472	2,270	2,164	614	5,817	5,559
R-squared	0.700	0.707	0.663	0.661	0.665	0.350	0.706

Figure 1. Evolution of shadow banking activity (tr. \$) (2009-2023)



Source: Own elaboration with data retrieved from the *FSB's Global Monitoring Report on Non-Bank Financial Intermediation*.

Figure 2. Distribution of shadow banking activity by economic functions (2009-2023)



Source: Own elaboration with data retrieved from the *FSB's Global Monitoring Report on Non-Bank Financial Intermediation*.

Table 1. Descriptive statistics

This table shows the main descriptive statistics (mean, standard deviation, median, 25th, 50th, 75th, 1st, and 99th percentiles) of the main variables of interest. All the variables are defined in Table B3 of the Appendix.

	Obs.	Mean	St. Dev.	25%	Median	75%	1%	99%
<i>SB_GDP</i>	42050	4	0.84	3.83	4.02	4.35	1.61	8.4
<i>SB_F1_GDP</i>	41948	3.52	1.02	2.91	3.85	3.97	0.74	8.32
<i>SB_F2_GDP</i>	40676	1.61	0.77	0.91	1.63	2.4	0.05	2.78
<i>SB_F3_GDP</i>	40251	1.25	1.22	0.06	0.85	2.44	0	3.39
<i>SB_F4_GDP</i>	22602	0.35	0.3	0.17	0.24	0.44	0	1.23
<i>SB_F5_GDP</i>	38832	1.7	0.92	0.98	1.67	2.19	0.01	5.43
<i>ZSCORE</i>	42050	4.33	1.22	3.55	4.38	5.13	1.29	7.14
<i>Size</i>	42050	14.7	1.84	13.44	14.49	15.8	10.95	19.57
<i>Cost-to-Income</i>	42050	0.67	0.2	0.57	0.67	0.77	0.21	1.36
<i>ΔProfits</i>	42050	0.02	1.71	-0.19	0.03	0.26	-7.12	6.4
<i>ΔLoans</i>	42050	0.02	0.17	-0.03	0	0.04	-0.47	0.89
<i>Liquidity</i>	42050	0.15	0.14	0.06	0.11	0.19	0.01	0.75
<i>Traditional</i>	42050	0.03	0.03	0.02	0.03	0.04	0.01	0.17
<i>ΔGDPpc</i>	42050	1863.57	2083.18	831.03	1458.92	2396.04	-2129.42	7876.09
<i>Inflation</i>	42050	1.97	2.32	0.49	1.38	2.5	-0.72	10.88
<i>Private Credit</i>	42050	89.68	38.4	59.48	82.09	103.06	15.38	213.8
<i>Institutional Quality</i>	42050	1.04	0.61	0.83	1.26	1.46	-0.51	1.76
<i>Financial Freedom</i>	42050	65.32	14.72	60	70	70	20	90
<i>ΔMacprud Banking Reg</i>	42050	1.52	2.35	0	2	3	-6	7
<i>ΔInterest Rates</i>	42050	0.24	2.24	-0.1	0	0.19	-2.75	4.5
<i>log(roa+equity/assets)</i>	42049	-2.4	0.55	-2.65	-2.34	-2.11	-3.91	-0.96
<i>log(sd(roa))</i>	42050	0.003	0.009	0.001	0.001	0.003	0.000	0.032
<i>ΔBank Loans</i>	42015	0.07	0.25	0	0.06	0.12	-0.63	0.77
<i>Price of Loans</i>	37161	0.04	0.07	0.02	0.03	0.05	0.01	0.23
<i>ΔCustomer Deposits</i>	41731	0.07	0.26	0.01	0.06	0.12	-0.43	0.73
<i>Cost of Deposits</i>	25604	0.02	0.18	0	0.01	0.02	0	0.19
<i>ROA</i>	42050	0.76	1.66	0.25	0.49	1.04	-2.05	5.37
<i>Net interest margin</i>	25552	0.01	1.01	0.01	0.02	0.04	-0.1	0.19
<i>ΔNet fees and commissions income</i>	40970	0.05	0.4	-0.04	0.04	0.13	-1.13	1.25
<i>Lerner</i>	34369	0.45	0.16	0.35	0.47	0.56	0.04	0.77
<i>Concentration</i>	39656	70.23	15.92	55.81	72.81	85.42	43.16	96.06
<i>ΔIntangible assets</i>	32514	-0.07	0.72	-0.31	-0.08	0.09	-1.84	2.41

Table 2. Shadow banking and bank stability

This table shows the results for the relationship between shadow banking activity and bank stability. The dependent variable is the bank Z-score. Columns (2) to (6) show the results for the relationship of each SB economic function (EF1-EF5) and bank stability. All the variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	ZSCORE					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SB_GDP</i>	-0.222** (-2.303)					
<i>SB_F1_GDP</i>		-0.274** (-2.640)				
<i>SB_F2_GDP</i>			0.004 (0.035)			
<i>SB_F3_GDP</i>				0.080 (1.586)		
<i>SB_F4_GDP</i>					0.012 (0.067)	
<i>SB_F5_GDP</i>						-0.156** (-2.207)
<i>Size</i>	0.012 (0.353)	0.024 (0.737)	0.017 (0.462)	0.068*** (3.254)	0.089*** (5.157)	-0.004 (-0.099)
<i>Cost-to-Income</i>	-0.416*** (-3.958)	-0.419*** (-3.963)	-0.440*** (-4.033)	-0.406*** (-3.627)	-0.539*** (-4.365)	-0.380*** (-3.777)
Δ <i>Profits</i>	0.033*** (3.134)	0.033*** (3.095)	0.035*** (3.141)	0.034*** (3.082)	0.023*** (5.025)	0.035*** (3.173)
Δ <i>Loans</i>	0.114*** (4.113)	0.108*** (3.892)	0.118*** (4.397)	0.109*** (3.905)	0.096* (1.958)	0.110*** (4.001)
<i>Liquidity</i>	-0.193 (-1.250)	-0.227 (-1.328)	-0.241 (-1.477)	-0.239 (-1.422)	-0.190 (-1.073)	-0.218 (-1.331)
<i>Traditional</i>	-1.628 (-1.619)	-1.620 (-1.556)	-1.723 (-1.648)	-1.024 (-0.956)	-0.895 (-1.519)	-1.596* (-1.789)
<i>Inflation</i>	-0.041** (-2.360)	-0.045** (-2.497)	-0.040** (-2.171)	-0.040* (-2.001)	-0.055*** (-4.394)	-0.041*** (-3.275)
<i>Institutional Quality</i>	1.231*** (3.161)	1.167*** (3.334)	1.128*** (3.382)	1.308*** (3.945)	0.980* (1.962)	1.266*** (3.417)
<i>Financial Freedom</i>	-0.007 (-0.963)	-0.008 (-1.142)	-0.005 (-0.735)	-0.003 (-0.476)	-0.009* (-1.894)	-0.007 (-1.065)
<i>Private Credit_GDP</i>	0.005* (1.879)	0.005* (2.051)	0.003 (1.323)	0.003 (1.224)	0.002 (0.854)	0.002 (0.908)
Δ <i>MacropriuReg</i>	-0.001 (-0.106)	-0.003 (-0.553)	0.001 (0.160)	0.000 (0.064)	-0.009 (-1.184)	0.006 (0.689)
Δ <i>Interest Rates</i>	0.014* (1.747)	0.014* (1.729)	0.014 (1.593)	0.013 (1.312)	0.012 (1.107)	0.013 (1.427)
Δ <i>GDPpc</i>	-0.000 (-0.778)	-0.000 (-0.609)	-0.000 (-0.787)	-0.000 (-0.734)	-0.000 (-0.197)	-0.000* (-2.040)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	42,050	41,946	40,664	40,236	22,593	38,782
Number of banks	5,559	5,556	5,376	5,345	2,748	5,106
R-squared	0.632	0.633	0.633	0.633	0.642	0.619

Figure 2. Economic impact of shadow banking activity on bank stability across economic functions

This figure shows the estimated economic impact on bank stability (*ZSCORE*) associated with an increase in shadow banking activity from the 25th percentile (low shadow banking activity) to the 75th percentile (high shadow banking activity). The analysis is based on the estimated coefficients from the baseline regressions reported in Table 2, and is presented for the aggregate measure of shadow banking (*SB_GDP*) as well as for each of the five economic functions (EF1–EF5).

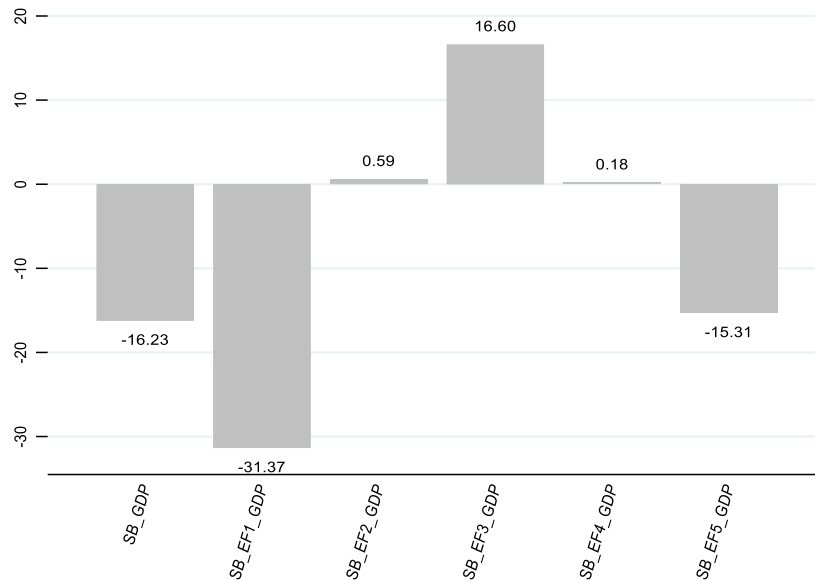


Table 3. Shadow banking and bank stability: Z-Score decomposition (the numerator)

This table shows the results for the relationship between shadow banking activity and bank stability. The dependent variable is the bank Z-score. Columns (2) to (6) show the results for the relationship of each SB economic function (EF1-EF5) and bank stability. All the variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	log(roa+equity/assets)					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SB_GDP</i>	0.007 (0.126)					
<i>SB_F1_GDP</i>		0.048 (0.691)				
<i>SB_F2_GDP</i>			-0.023 (-0.413)			
<i>SB_F3_GDP</i>				0.013 (0.462)		
<i>SB_F4_GDP</i>					0.148* (1.829)	
<i>SB_F5_GDP</i>						-0.053* (-1.765)
Bank and macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	42,049	41,945	40,663	40,235	22,592	38,781
Number of banks	5,559	5,556	5,376	5,345	2,748	5,106
R-squared	0.879	0.879	0.883	0.880	0.863	0.870

Table 4. Shadow banking and bank stability: Z-Score decomposition (the denominator)

This table shows the results for the relationship between shadow banking activity and bank stability. The dependent variable is the bank Z-score. Columns (2) to (6) show the results for the relationship of each SB economic function (EF1-EF5) and bank stability. All the variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	log(sd(roa))					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SB_GDP</i>	0.002*** (3.052)					
<i>SB_F1_GDP</i>		0.002*** (2.505)				
<i>SB_F2_GDP</i>			-0.000 (-0.013)			
<i>SB_F3_GDP</i>				-0.000 (-1.151)		
<i>SB_F4_GDP</i>					0.000 (0.573)	
<i>SB_F5_GDP</i>						0.001* (2.036)
Bank and macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	42,050	41,946	40,664	40,236	22,593	38,782
Number of banks	5,559	5,556	5,376	5,345	2,748	5,106
R-squared	0.615	0.613	0.624	0.611	0.578	0.597

Table 5. Shadow banking and bank loans: volume

This table shows the results for the relationship between shadow banking activity and growth in bank loans. The dependent variable is the natural logarithm of the annual growth rate of bank loans over total assets. Columns (2) to (6) show the results for the relationship of each SB economic function (EF1-EF5) and the growth in bank loans. All the variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *** indicate significance at the 1% level.

Dependent variable:	Δ Bank Loans					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SB_GDP</i>	-0.113** (-2.281)					
<i>SB_F1_GDP</i>		-0.034 (-0.859)				
<i>SB_F2_GDP</i>			0.011 (0.347)			
<i>SB_F3_GDP</i>				-0.054* (-1.720)		
<i>SB_F4_GDP</i>					0.060 (1.069)	
<i>SB_F5_GDP</i>						-0.079** (-2.455)
Bank and macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	41,908	41,908	40,522	40,198	22,558	38,642
Number of banks	5,552	5,552	5,369	5,341	2,744	5,099
R-squared	0.257	0.255	0.252	0.258	0.274	0.263

Table 6. Shadow banking and bank loans: pricing

This table shows the results for the relationship between shadow banking activity and the price of bank loans. The dependent variable is the natural logarithm of the annual ratio of interest on loans over total loans. Columns (2) to (6) show the results for the relationship of each SB economic function (EF1-EF5) and the price of loans. All the variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *** indicates significance at the 1% level.

Dependent variable:	Price of Loans					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SB_GDP</i>	0.005 (0.784)					
<i>SB_F1_GDP</i>		0.008 (0.811)				
<i>SB_F2_GDP</i>			-0.005* (-1.711)			
<i>SB_F3_GDP</i>				0.002 (0.769)		
<i>SB_F4_GDP</i>					0.005 (0.490)	
<i>SB_F5_GDP</i>						0.000 (0.096)
Bank and macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	37,128	37,055	36,236	35,780	18,548	36,333
Number of banks	5,004	5,001	4,878	4,824	2,268	4,865
R-squared	0.756	0.757	0.766	0.753	0.768	0.778

Table 7. Shadow banking and bank customer deposits: volume

This table shows the results for the relationship between shadow banking activity and the growth of customers' deposits. The dependent variable is the natural logarithm of the annual growth rate of time deposits over total liabilities. Columns (2) to (6) show the results for the relationship of each SB economic function (EF1-EF5) and the growth of time deposits. All the variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *** indicates significance at the 1% level.

Dependent variable:	Δ Customer Deposits					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SB_GDP</i>	-0.057* (-1.916)					
<i>SB_F1_GDP</i>		-0.021 (-0.982)				
<i>SB_F2_GDP</i>			-0.054* (-1.753)			
<i>SB_F3_GDP</i>				-0.049** (-2.519)		
<i>SB_F4_GDP</i>					-0.005 (-0.080)	
<i>SB_F5_GDP</i>						-0.041** (-2.582)
Bank and macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	41,725	41,621	40,348	39,913	22,338	38,514
Number of banks	5,496	5,493	5,315	5,282	2,706	5,057
R-squared	0.229	0.226	0.237	0.227	0.207	0.232

Table 8. Shadow banking and the cost of customer deposits

This table shows the results for the relationship between shadow banking activity and the cost of bank deposits. The dependent variable is the annual ratio between the amount of interest paid on deposits over the total amount of customer deposits. Columns (2) to (6) show the results for the relationship of each SB economic function (EF1-EF5) and the cost of deposits. All the variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses.

Dependent variable:	Cost of Customer Deposits					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SB_GDP</i>	0.006 (0.980)					
<i>SB_F1_GDP</i>		0.009 (1.025)				
<i>SB_F2_GDP</i>			0.008 (0.907)			
<i>SB_F3_GDP</i>				0.005* (1.884)		
<i>SB_F4_GDP</i>					-0.003 (-0.236)	
<i>SB_F5_GDP</i>						-0.004 (-0.897)
Bank and macroeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level	Country-level	Country-level	Country-level
Observations	25,552	25,479	24,798	24,331	16,298	24,834
Number of banks	3,336	3,333	3,217	3,165	2,005	3,205
R-squared	0.683	0.683	0.695	0.686	0.684	0.684

Table 9. Shadow banking and banks' performance

This table shows the results for the relationship between shadow banking activity and performance. In column (1), the dependent variable is the return on assets. In column (2), the dependent variable is the ratio of net interest revenue to total loans. In column, (3), the dependent variable is the natural logarithm of the annual growth rate of net fees and commission income. All the variables are defined in Table B3 of the Appendix. In all the estimates, bank and year fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. ** and *** indicate significance at the 5% and 1% levels, respectively.

Dependent variable:	Performance		
	(1) ROA	(2) Net interest margin	(3) Δ Net fees and commissions income
<i>SB_GDP</i>	-0.189** (-2.161)	-0.036** (-2.366)	-0.056*** (-3.850)
Bank and macroeconomic controls	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Clustered Standard Errors	Country-level	Country-level	Country-level
Observations	42,050	25,500	40,950
Number of banks	5,559	3,341	5,490
R-squared	0.570	0.194	0.177

Table 10. Market power as a mechanism

This table shows the results for the 2SLS estimator testing the role of bank market power as the mechanism through which *shadow banking* activity affects bank stability. Column (1) shows the first-stage results for the Lerner index indicator. Column (2) shows the results for the second stage explaining the Z-Score indicator. *Concentration* is the five-bank assets concentration ratio. *ΔIntangible assets* is the logarithm of the Growth of Intangible assets over total assets. *SB_GDP* is the ratio of total assets from the SB sector to GDP. In all the estimates bank- and country-level controls and bank- and year-fixed effects are included (not reported). T-statistics for the clustered standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	1 st Stage	2 nd Stage
	LERNER	Z-SCORE
	(1)	(2)
<i>Concentration</i>	0.0021*** (12.31)	
<i>ΔIntangible assets</i>	0.0017*** (2.67)	
<i>SB_GDP</i>	-0.0099** (-2.02)	-0.13096*** (-2.84)
<i>LERNER</i>		4.9877*** (6.88)
Controls	Yes	Yes
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	Yes	Yes
Observations	25,060	25,060
Number of banks	3,978	3,978
Sargan-Hansen (p-value)		0.2864
Kleibergen-Paap weak identification F-Test		79.98***
Kleibergen-Paap underidentification F-Test		158.11***