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Abstract

Global liquidity flows are largely channeled through banks and nonbank financial institutions. The common drivers of global liquidity flows include monetary policy in advanced economies and risk conditions. At the same time, the sensitivities of liquidity flows to changes in these drivers differ across institutions and have been evolving over time. Microprudential regulation of banks plays a role, influencing leverage and capitalization, changing sensitivities to shocks, and also driving risk migration from banks to nonbank financial institutions. Risk sensitivities and flightiness of global liquidity are now strongest in more leveraged nonbank financial institutions, raising challenges in stress episodes. Current policy initiatives target linkages across different types of financial institutions and associated risks. Meanwhile, significant gaps remain. This paper concludes by discussing policy options for addressing systemic risk in banks and nonbanks.

JEL classification: F3, G21, G23, G28

Key words: international bank, nonbank financial institution, global liquidity, regulation, prudential policy

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1 Motivation

Global financial markets have grown over the past decades. In the early 2000s, global financial assets stood at about 400% of world GDP and the financial sector has expanded to more than 600% of global GDP since then (Financial Stability Board 2022c.) Both bank and non-bank financial flows have increased rapidly over the past decades. Non-bank financial intermediation (NBFIs) has gained ground in relative terms since the global financial crisis in 2008, not least because of the tighter regulation of banking activities. Today, non-bank financial intermediaries hold about 50% of global financial assets, increasing from 42% in 2008 (Financial Stability Board 2022c).

This chapter considers consequences of these changes in the structure of finance for global liquidity flows and for the associated policy agenda around banks and non-bank financial intermediaries. This expansion of finance certainly has positive implications for the real economy. Global financial flows have expanded in parallel to the globalization of the real economy, thus facilitating the expansion of global value chains and insuring against associated risks. But financial markets are also prone to exuberance and fragility with regard to adverse shocks. Such fragilities can have severe negative implications for the real economy. Reversals of capital flows and high volatility can adversely affect investment and thus growth, as evidenced by a long history of financial crises in advanced and emerging market economies. Crisis identification has thus received considerable analytical attention, as surveyed by Sufi and Taylor (2021), as have the broad social and political ramifications that inevitably follow, often with policy regime shifts.

The importance of having stronger prudential regulation and supervision of banks was among the many lessons of the global financial crisis of 2007 to 2008. Policymakers focused on tightening prudential regulation of banks, enhancing supervision, and closing gaps in the regulatory framework. Special attention has been paid to systemic risk in the banking sector: Banks that are too large and too connected to fail can take on excessive risks and impose negative externalities on the financial system. Similarly, exposure of many smaller financial institutions to the same macroeconomic risk factor can lead to systemic risk: there can be “too many” institutions that may fail if macroeconomic conditions take a negative turn, thus forcing authorities to intervene to support these institutions.

Yet, the types of institutions engaging in international and domestic financial markets are much broader than banks. Nonbank financial institutions (NBFIs) have increased in importance and represent many distinct business models under sometimes distinct supervisory and regulatory frameworks. In addition to their domestic presence, these diverse institutions play significant and sometimes dominant roles in global liquidity flows, as discussed in this chapter. Types of institutions face distinct balance sheet constraints and funding needs, and each stress episode

highlights new forms of inter-connectedness, including with banks.

Accordingly, the post global financial crisis (GFC) reforms have not just focused on banks and are far from being complete. The NBFIs reform agenda has focused on mitigating spillovers between banks and the NBFIs sector, and on distinguishing entity- versus activity-based approaches to regulation. The regulatory reforms agenda of the past 15 years has aimed to address systemic risks while continued monitoring of reform effects and of newly emerging risks remain priorities.

The debates on implications of the changing patterns of global finance are characterized by two dichotomies. The first dichotomy is the distinction made between banks and non-banks. The channels through which systemic risk for the financial system can arise are very similar for banks and non-banks. Yet, regulations of banks and non-banks are often discussed separately, thus potentially overlooking important channels of interaction between bank and non-bank financial flows. As we discuss, recent evidence shows that tighter regulation of banks affects the market shares of non-banks, and shows that risks potentially migrate to other parts of the financial system (see Irani, Iyer, Meisenzahl, and Peydró 2021, Financial Stability Board 2021a, Kim, Pence, Stanton, Walden, and Wallace 2022, Claessens, Cornelli, Gambacorta, Manaresi, and Shiina 2023, and Goldberg 2023). Moreover, different sectors of the financial system are closely related through balance sheet and contractual linkages as well as through exposure to similar funding and investment markets. Hence, we discuss the importance of a more systemic approach that considers these linkages.

The second dichotomy that characterizes many debates is that between the micro- and the macro-level insights that inform policy approaches to financial institution activities. Empirical research on the micro-level or on bank-specific effects of prudential regulation has flourished over the past decades. This body of analytics grew in parallel to methodological advances in empirical and macroeconomic modelling of bank activities. Increasingly, granular data on NBFIs is also available and used for policy insights. Meanwhile, macroeconomic and global factors, along with systemic considerations, are increasingly understood. Some considerations are the consequences of policies for domestic and international funding flows. However, bringing together the micro and the macro side of domestic and global liquidity flows, also in the context of understanding monetary policy transmission and financial stability challenges, remains difficult. Hence, this chapter highlights lessons from analyses using country-level series, as well as the rich evidence using bank- or loan- level data as conducted by researchers in the International Banking Research Network (IBRN) to analyse the implications of macroeconomic shocks and implications of prudential regulation.

This chapter is structured to overview the research and policy agenda related to bank and non-bank financial intermediation in the international flows context. Section 2 starts with the topic of the role of banks and non-banks in global liquidity, providing insights on the drivers of flows and

magnitudes of responsiveness over time. Section 3 summarizes the regulatory approach taken with regard to bank and non-bank financial intermediation since the global financial crisis. Section 4 discusses interlinkages between banks and non-banks using the examples of recent stress episodes on financial markets and describes current policy initiatives addressing associated risks. Section 5 concludes. We emphasize that further research and policy work on linkages between bank- and non-bank financial flows can be very fruitful. Methodologies that have been applied to analyse the international activities of banks, their response to macroeconomic shocks, and the impact of prudential regulation can be a useful template to analyse non-bank financial flows. Still, when comparing banks and non-banks, the availability of banking data has improved significantly over the past decades, while the availability and quality of data on non-banks certainly lags behind. We also emphasize that regulating financial activities, addressing risks to financial stability, and acknowledging linkages of financial institutions remains a priority.

2 Global Liquidity: Bank and Non-Bank Financial Flows

Credit provision is a key function of many financial intermediaries, with some having a significant international focus. The Committee on the Global Financial System defines the concept of global liquidity as corresponding to the volumes of financial flows - largely intermediated through global banks and non-bank financial institutions – that can be reallocated at relatively high frequencies, such as intra-day or intra-month (CGFS 2011).¹ Such international flows through these institutions respond to both global drivers and to the more idiosyncratic or regional conditions in the destination countries that receive associated funding. Global factors behind these flows include the monetary policy of some advanced economies, particularly the United States, global risk sentiment and uncertainty, and global growth conditions. Standard local drivers include country risk, political, and macroeconomic indicators.

A basic schematic from Goldberg (2023), provided as Figure 1, shows the channels through which banks and NBFIs engage in global liquidity flows. This schematic also sets the stage for characterizing the changes over time in international banking flows and issuance of international debt securities. Global liquidity flows to borrowers in Country A can be intermediated through both bank and non-bank financial institutions located outside of its borders. Global banks engage in three categories of cross-border lending as shown by the arrowed lines in the left side of Figure 1. Inter-bank lending flows from foreign banks are transactions with the unrelated domestic banks, for example in the form of loans. The intra-bank lending flows are those with counterparties as the global bank’s branches and subsidiaries that are located in Country A. Also described

¹This section closely follows Linda S. Goldberg’s International Monetary Fund, 23rd Annual Mundell Fleming Lecture and the associated published article Goldberg (2023).

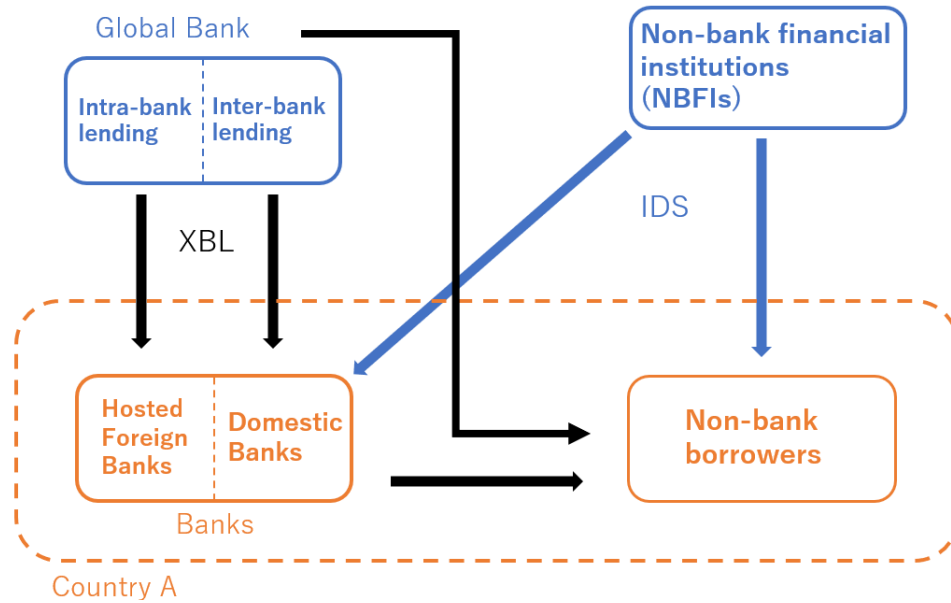


Figure 1: **Bank and Non-bank Global Liquidity Channels**
 Source: Goldberg (2023).

as inter-office lending or internal capital market flows, these flows arise as global banks manage liquidity across the parts of their organizations located around the world. Along with loans to non-bank borrowers, these flows are subsumed within the broad category of cross-border bank loans (*XBL*). The non-bank borrower group consists of non-bank financial firms, corporations and governments. Those that are issuers in the syndicated cross-border loan markets tend to be large non-financial corporations, exporting and importing firms, and leveraged non-bank financial firms.

Foreign non-bank financial institutions (NBFI) also provide cross-border funding to domestic banks and to non-bank borrowers within Country A, as shown by the arrowed lines on the right side of Figure 1. Flows from non-bank financial institutions are sometimes described as market-based finance, and can be categorized as the purchases of the international debt securities (IDS) issued by banks or by non-banks. The NBFI entities that are purchasers of such securities tend to be pension funds, insurance companies, money market funds, and hedge funds.

A historical perspective on the evolution of global liquidity is gained when the period from the early 1980s through 2020 is divided into three subperiods subsumed by Figure 1 (Goldberg (2023)). The early 1980s through the early 1990s corresponds to when banks were the dominant source of funds in the supply of global liquidity. The relevant arrows are concentrated on the left side of Figure 1. The next period, starting in the mid-1990s, is characterized by the expanded roles of global banks within host countries, in particular following financial liberalizations in countries that had experienced banking and or currency crises. Global banking expanded in those foreign

locations by establishing hosted branches and subsidiaries. Direct lending from these affiliated banks within the host country to other non-bank customers increased, as did their provision of other banking services. Supporting local claims by the affiliated banks, parent global banks provided cross-border intra-bank funding flows to affiliates and liquidity management across the global banks gained importance.

The third period follows the GFC, when weaknesses in banking institutions and related externalities were broadly displayed. Post-GFC efforts concentrated on international and systemically important banks, with the attention of regulators and supervisors focused on risk frameworks and risk absorbing capacities within the banking organizations. Substantial changes occurred in the risk-absorbing capacity of banks as reflected in generally higher levels of bank capitalization, reduced leverage, and improved liquidity management frameworks. Spurred also by technological developments, the post-GFC period saw a rapid expansion of global liquidity directly flowing to non-bank borrowers, an increasing role for NBFIs as global liquidity providers, and interconnect-edness with banks.

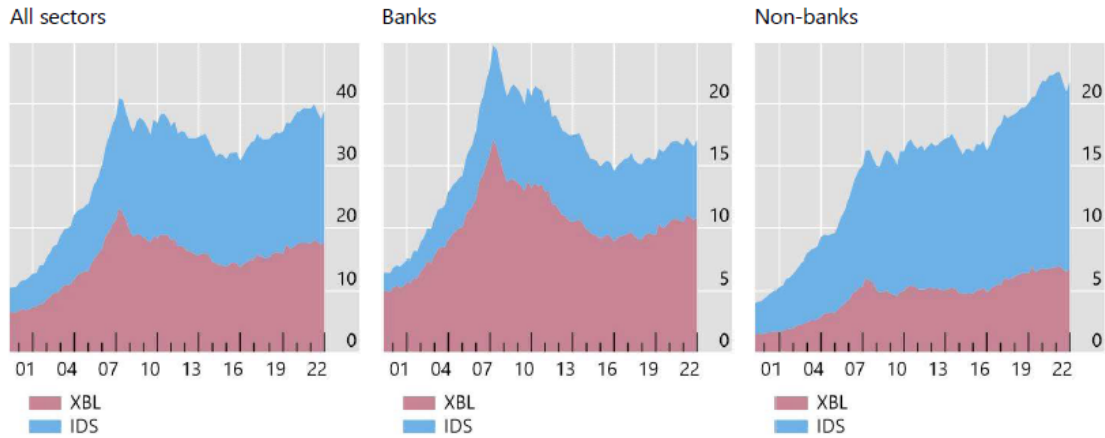
The scope of the dramatic changes in the composition of players and flows is illustrated in Figure 2 using summed flows across countries using BIS data series and from the borrowing country’s perspective. The types of borrowers are banks (middle panels) and non-banks (right panels). This exhibit shows that banks both in advanced economies (upper row of graphics) and in emerging markets (lower row of graphics) have had relatively steady outstanding volumes of total global funding in recent years.

Cross-border loans (represented in red) are the largest form of international funding for banks. About two-thirds of this bank-to-bank funding is associated with internal capital market transfers that are part of the liquidity management within global banks; the other one third represents the more typical interbank positions, with flows that are often short maturity and relatively volatile. The post-GFC period is characterized by some bank funding also in the form of international debt securities issuance. The most dramatic shifts in the composition of global liquidity are for non-bank borrowers within both advanced and emerging market economies. The relative size of the blue areas in the right panels of Figure 2 shows the now dominant positions in the total volumes of outstanding positions. Indeed, while banks have experienced moderate shifts in funding sources, nonbanks have tilted sharply toward market-based finance.

2.1 Risk Sensitivity of Global Liquidity Subcomponents

Policy frameworks covering prudential instruments and supervisory regimes benefit from a keen understanding of the interlinkages between institutions and their sensitivities to different shocks. Before turning to a detailed discussion of policy, this subsection presents specific evidence of sensitivities of global liquidity to risk sentiment, risk off shocks, and monetary policy, and the role

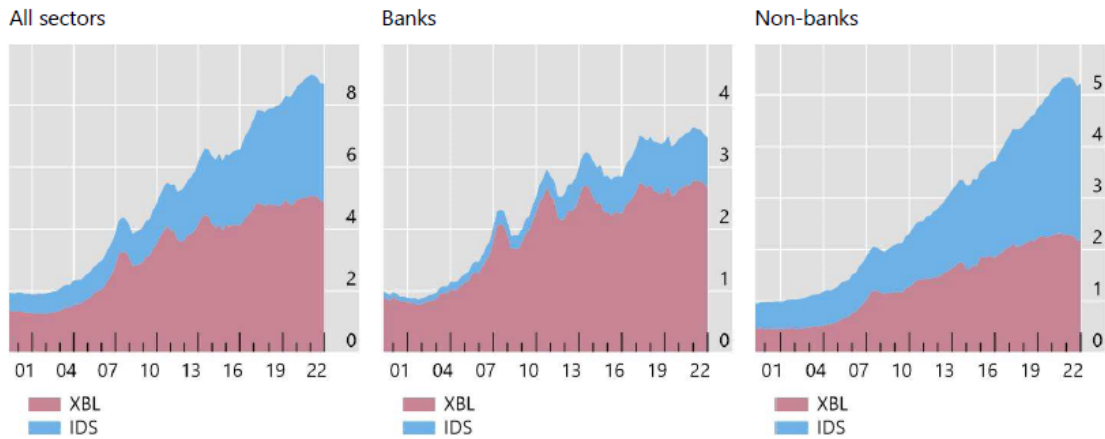
Advanced Economies



XBL = Cross-border loans; IDS = International Debt Securities.

Sources: BIS Locational Banking Statistics by residence; BIS International Debt Securities Statistics.

Emerging Markets and Developing Economies



XBL = Cross-border loans; IDS = International Debt Securities.

Sources: BIS Locational Banking Statistics by residence; BIS International Debt Securities Statistics.

Figure 2: **Volumes of External Debt Flows – Amount Outstanding in Trillions of USD**
 Source: Avdjiev, Gambacorta, Goldberg, and Schiaffi (2023) using BIS Locational Banking Statistics.

of institution-specific characteristics in influencing related outcomes. The subsequent subsection considers evidence on sensitivity to the policy toolkit. Advances in data availability and analytical studies have been critically important for generating insights, even as substantial gaps remain.

Rey 2015 elevated the importance of a focus on the global factor in international flows. Yet, it also is evident that the sensitivities to risk and foreign monetary policy of different types of flows vis-a-vis specific borrower types have changed dramatically. Looking across a large sample of both advanced and emerging market economies using data through 2019, Avdjiev, Gambacorta, Goldberg, and Schiaffi (2020) estimate the respective effects for cross-border loans and market-based finance, also separating borrowers according to institutional type (total, banks, non-banks). Pre-GFC, interbank lending sensitivity was more volatile than cross border lending to nonbank borrowers. Post-GFC cross-border lending sensitivity to risk sentiment declined for all borrower types. Bank lending no longer contracts sharply on average as risk sentiment worsens. Having better capitalized banks in global liquidity flows reduced shock sensitivity. Moreover, part of the explanation may reside with the characteristics of borrowers. Risk migration occurred, with funding flows from global banks less likely to be to riskier categories of borrowers. Risk migration occurred on multiple levels, as the composition of lending changed to represent a larger share of interbank lending to affiliated branches and subsidiaries, with a smaller footprint of the interbank market in bank funding . Moreover, stronger capitalization and higher liquidity buffers in banks are associated with more stable international liquidity provision in the form of cross-border lending. The amplitude of risk transmission across borders is magnified through lower capitalized banks, and diminished when these banks lose market share. In the aftermath of the GFC, lower capitalized banks lost market share in providing global liquidity.

New data makes it feasible to discuss the balance sheet features of both banks and NBFIs that influence sensitivities. For NBFIs, newly available data from the Financial Stability Board at the country-year level inform the leverage and liquidity transformation capacity of the types of NBFIs involved in country- and time-specific global liquidity flows. Avdjiev, Gambacorta, Goldberg, and Schiaffi (2023) establish that leverage - whether found in banks or in aggregate measures associated with NBFIs - serves as an amplifier of risk shocks for both types of institutions. Still, the types of NBFIs involved in flows differ substantially across countries and over time. Accordingly, this reduces the generality of some results, and the sensitivity of funding flows to finance banks' issuance of international debt securities sometimes is not precisely estimated over time or across countries. Providers have distinct vulnerabilities and balance-sheet constraints that continue to be insufficiently understood.

2.2 Prudential Spillovers Using Bank-Specific Data

More granular data analytics reinforce how prudential policy works in domestic markets and spills over across borders into global liquidity. Researchers working with either bank-specific, credit registry, or other transaction-type databases show drivers of prudential spillovers across borders, and interactions between prudential policies and monetary policy. Examples include the results of initiatives of the International Banking Research Network (IBRN), a network of researchers across about 30 central banks and international organizations. The core objectives of the IBRN are to conduct rigid policy relevant experiments based on micro-level banking data, to replicate and customize analyses and experiment design across countries, to draw broader lessons from these studies in overview papers and meta analyses.

In one IBRN initiative summarized in Buch and Goldberg (2017) 15 country teams examined the domestic effects and international spillovers of prudential instruments using confidential micro-banking data. Teams seeking evidence for international policy spillovers considered multiple channels through banks. Inward transmission addresses how foreign regulations affect the domestic activities of domestic banks or foreign affiliates (bank branches or subsidiaries) located in the host country. Outward transmission to foreign economies addresses the effects of foreign policies on the foreign activities of a reporting country's global banks. All country teams implemented the same baseline regression models for analyzing inward or outward transmission. In addition, country teams addressed issues specific to their banking markets or banks' business models. In some cases, teams differentiated the adjustment of lending by their global banks' branches (which are subject to the capital requirements of their parents) versus subsidiaries (which are, in addition, subject to regulations in the host country).

Some countries observe that specific prudential instruments spill over internationally and through banks via lending growth. Heterogeneity in spillovers through lending across countries, time, and prudential instruments is common. This heterogeneity is at the bank level, where the effects of prudential instruments on lending differ with the ex ante balance-sheet characteristics and business models of the banks participating in international lending. For example, foreign affiliates with higher shares of illiquid assets and with stronger reliance on deposit funding tend to have loan growth that responds more to loan-to-value ratio limits and sector-specific capital buffer changes in the foreign parent's location. Degrees of internal liquidity management via internal capital markets can significantly differentiate how general capital requirements imposed in the parent's country spill over into lending by affiliated banks in the host market. These same characteristics do not appear to be as important for the inward transmission of foreign policies into the domestic lending of global banks.

The economic magnitudes of international spillovers of changes in prudential policy instru-

ments through the intensive margins of adjustment were not large on average. Yet the extensive margin of adjustment also kicked in. Banks with higher initial capital were poised to increase lending internationally, and sometimes pivoting from domestic loan growth, when foreign countries tightened their capital requirements. For example, Dutch banks increased lending in countries that tightened prudential regulation and decreased lending when regulation is relaxed, but to different degrees. The effects were more significant in larger banks, in lending to advanced economies, and in the post-crisis period. Changes in some prudential instruments may thus spur the repositioning of market share across banks and foreign countries.

Studies using data from Germany and from the U.S. analyzed both inward and outward transmission of prudential policies through loan growth of global banks, and contrast inward transmission through domestic global banks and hosted foreign affiliates (Berrospide, Correa, Goldberg, and Niepmann, 2016; Ohls, Pramor, and Tonzer, 2016). When foreign capital requirements tightened, global banks from both countries expanded loan growth at home. German global banks also tended to contract loan growth externally.

The outward transmission channel analyzed in studies using regulatory data for, respectively, Canada, France, Italy, and the Netherlands confirm positive prudential spillover effects: as domestic prudential instruments tightened, foreign lending growth tended to increase (Bussière, Schmidt, and Vinas, 2016; Caccavaio, Carpinelli, and Marinelli, 2018; Damar and Mordel, 2016; Frost, de Haan, and Van Horen, 2017). In the case of Italy, inward transmission through hosted branches was observed specifically in response to changes in local reserve requirements and sector-specific capital buffers. United Kingdom evidence shows the specific impacts of instruments may mainly appear in even more granular and sectorally disaggregated data (Hills, Reinhardt, Sowerbutts, and Wieladek, 2018). For example, tighter LTV ratios in the home market of parent banks outside the U.K. increased lending to private non-financials and household borrowers in the U.K. However, when the home country tightened foreign reserve requirements, lending decreased. In Korea, inward spillover effects were relatively weak, explained by low levels of foreign bank activity in the retail market and by regulations of cross-border capital flows (Park and Lee, 2018). The issue of intensity of bilateral linkages was an important factor in the economic effects of spillovers for Mexico. The main banks from the U.S. and Canada were those with more significant spillovers of prudential policies into domestic retail lending (Levin-Konigsberg, Lopez, Lopez-Gallo, and Martínez-Jaramillo, 2018). In Turkey, prudential spillovers occurred both on lending and borrowing (Baskaya, Binici, and Kenc, 2018), with tightening abroad in loan-to-value limits leading to higher cross-border borrowing by banks in Turkey.

This evidence shows the importance of heterogeneity and of the specific frictions in each country. There was no one-size-fits-all channel or even direction of transmission that dominated spillovers of changes across prudential policy instruments. Balance-sheet characteristics

and business models of banks matter. Almost all prudential instruments have been associated with positive and negative spillovers, within and across transmission channels.

Prudential policies also interact with monetary policy in spillovers (Bussière, Cao, de Haan, Hills, Lloyd, Meunier, Pedrono, Reinhardt, Sinha, Sowerbutts, and Stylin, 2021). Stress tests impacted the cross-border transmission of monetary policy via the U.S. banking sector and U.S. banks' new loan originations (Niepmann, Schmidt-Eisenlohr, and Liu, 2021). The results are consistent with a more accommodative U.S. monetary policy stance during the zero-lower-bound period leading to more bank lending to emerging market economies. A truly novel finding is that the magnitude of this international spillover effect depends on how banks fared in the Federal Reserve's annual Comprehensive Capital Analysis and Review (CCAR). Only banks that comfortably passed the CCAR stress tests issued more loans to borrowers in emerging market economies. Banks also shifted their lending to safer borrowers within emerging markets in response to monetary easing, leaving the risk of their overall loan books unchanged. This type of evidence implies banks confront different constraints when hit by shocks and differentiate across borrowers.

Bush, Gómez, Jara, Moreno, Stylin, and Ushakova (2020) focus on three EMEs – Chile, Mexico, and Russia – to measure how macroprudential policy in these countries interacts with monetary shocks in core countries. The overall results were mixed, with some evidence that the strength of international monetary policy transmission into loans by foreign banks depends on the stance of the domestic macroprudential policy. A similar exercise using data for Norway and Sweden, by Cao, Dinger, Grodecka-Messi, Juelsrud, and Zhang (2021), found that domestic macroprudential policy helped mitigate the effects of foreign monetary surprises. Important differences reflect the structure of the banking sectors in the two countries. In Sweden, weak evidence of an international bank lending channel perhaps reflected foreign exchange mismatches, with a significant role for domestic macroprudential policies in shielding the economy against decreases in bank loan supply associated with foreign monetary surprises. In Norway, domestic monetary policy and accounting for foreign exchange differentials seem to be more important for understanding banks' lending.

Another study, using data from Ireland and the Netherlands, found that restrictive euro-area monetary policy shocks reduced the growth of mortgage lending (Everett, de Haan, Jansen, McQuade, and Samarina, 2020). Stricter domestic prudential regulation mitigated this effect in Ireland, but not so in the Netherlands. Macroprudential policies in 12 Asia-Pacific economies, investigated by Bruno, Shim, and Shin (2017), were particularly effective when complementing monetary policy by reinforcing monetary tightening. ? evaluate the effectiveness of macroprudential policies in five Asia-Pacific countries (Australia, Indonesia, New Zealand, the Philippines and Thailand) and find that a tightening in macroprudential policy has a stronger effect on house-

hold credit growth than an easing, that banks' size and liquidity influence the effects, and that macroprudential policy is effective in reducing bank risk as measured by the non-performing loan ratio.

Also relevant for global liquidity flows are the dynamics of internal capital market lending within global banks. Recall from the discussion of Figure 1 that global banks use their internal capital markets to move global liquidity to and from locations served by affiliates within their banking organizations. The affiliate locations engage in banking activities with local customers, and analytics show that flows of credit from such hosted banks are more insulated from global factors compared with cross-border lending. While this form of financing for activity could be preferable for local borrowers, at times host countries resist foreign entry out of concern for lost market share and reduced profitability of entrenched domestic financiers. Moreover, a darker side of such globalization is that multinational banks may also employ bank acquisitions and internal capital markets to avoid regulatory scrutiny or to exploit regulatory arbitrage, which could be problematic from financial stability perspective. Karolyi and Taboada (2015) find that acquisition flows involve acquirers from countries with stronger regulations than their targets. Houston, Lin, and Ma (2012) conclude that banks tend to transfer funds to markets with fewer regulations.

Still, not all locations are treated analogously by foreign parent banks. Global banks may prioritize across affiliate locations when their balance sheets are shocked. When U.S. parent banks were hit by funding shocks in the Great Recession, Cetorelli and Goldberg (2012) showed that global bank reallocated liquidity in their organizations according to their own locational pecking order. Flows to affiliate locations that are core - that is, locations that are important for the specific parent bank's revenue streams or funding - are relatively protected. Accordingly, despite the general message of the relative stability of local lending through global bank affiliates, locations that are overall less important to that global parent (periphery) nonetheless may experience sharper changes in available local liquidity. In general, affiliate locations that are more peripheral are less protected from foreign shocks. The response of foreign banks to domestic shocks can provide more credit stability. De Haas and Van Lelyveld (2010) analyse the structure of internal capital markets and emphasising that, as a result of parental support, foreign bank subsidiaries may not have to cut credit supply during crisis times. Frey and Kerl (2015) argue that the more an affiliate located abroad relies on intra-bank funding during the crisis, the greater its dependence on its parent bank having a stable deposit base and long-term wholesale funding position.

Combining such insights with the evidence about banks' risk management and risk-absorption capacity emphasizes the importance of using granular data and recognizing the heterogeneity of experiences in understanding the consequences of changes in risk sentiment or in funding

conditions. Global liquidity responds more to risk shocks when banks are less well capitalized and have more binding restrictions on their balance sheets. These banks contract cross-border lending to a greater degree. At the same time, internal capital market flows vis-a-vis affiliates may respond to a greater degree for the foreign locations that are not part of the core business of the banking organization. In this case, more of the risk-sentiment shock would pass through into the lending to local borrowers by hosted foreign banks, even while we more generally observe relatively stable lending by the hosted foreign banks. The observations also underscore the importance of appropriate prudential policies, and hint at the challenges in crafting frameworks. Moreover, similar mechanisms are likely to be at play for non-banks – but this part of the financial system remains under-researched in comparison to global banks. Next, we turn to another area where banks and non-banks share similarity – their importance for the stability of the financial system.

3 Financial Stability Regulation: The Role of Banks and Non-Banks

The global financial crisis has been a watershed for the regulation of banking markets and for efforts to address financial stability risks beyond banking. This section starts with a brief description of the post-global financial crisis reform agenda for banks and discusses the implications for non-banks.² The rationale underlying financial stability regulation is summarized and this reasoning is applied to banks and non-banks. Evidence gathered by the too-big-to-fail evaluation project of the Financial Stability Board on the implications of banking regulation for the evolution of NBFIs also is overviewed.

3.1 Why Regulate? The Post Financial Crisis Reform Agenda for Banks and Non-Banks

It has long been understood that banks and financial markets need to be regulated. Banks provide important services by lending to the real economy and providing deposit services. Banks also take on risks, and small, uninformed depositors are insured against these risks through deposit insurance. As any insurance, this can lead to frictions like moral hazard and the exploitation of information asymmetries between banks and their customers. Banking regulation and, in particular, capital regulation can be seen as a direct response to these frictions (Dewatripont and Tirole, 1994).

With the increasing integration of global banking markets and volumes of global liquidity flows that we have documented, however, national supervision is not sufficient to address banking

²This section is partly based on Buch (2023).

risks. Historically, global coordination of banking regulation was indeed triggered by instabilities on global financial markets. The Basel Committee on Banking Supervision (BCBS) was founded in 1974 by the central bank governors of the 10 largest industrialized countries in response to the Herstatt crisis with the objective to strengthen global financial stability. Shortly before that, the German Herstatt bank had become insolvent as a result of speculation in foreign exchange markets (Bank for International Settlements, 2023).

Coordination of international banking regulation took several steps. The Basel Concordat in 1975 provided a basic framework for internationally active banks. An 8% minimum capital requirement for these banks was established (Basel I) in 1988 and market risks were incorporated in 1996. In 2004, the framework was extended to a three-pillar approach (Basel II) with minimum capital requirements, a qualitative approach, and enhanced transparency and market discipline.

This approach, however, did not sufficiently address excessive risk-taking and, in particular, did not address systemic risk. During the global financial crisis, it became clear that the use of banks' internal models to calculate capital requirements created opportunities for banks to understate risks, including systemic risks. This contributed to an undercapitalization of the banking system and an excessive amplification of external shocks. This type of amplification is in line with the evidence that we have presented.

Perhaps one of the most important innovations in the reform package passed after the global financial crisis has been the explicit acknowledgement of systemic risk. Owners and managers of banks with limited liability may lose sight of risks to the banks' own depositors, but they may also take on too much risk that could negatively affect uninvolved parties. This might put the functioning of the financial system at risk and thereby have negative implications for the real economy. Following the global financial crisis, "financial stability" has thus been designated as an explicit policy objective.

Contributing to financial stability has always been a core function of central banks and is, indeed, a key element of the Basel Core Principles for supervision. Yet, designated macroprudential functions and institutions have been established in many jurisdictions only after the financial crisis. In essence, the aim of financial stability policies is to protect the functioning of the financial system: to enable the safe investment of savings, the financing of investments and innovations, as well as the smooth processing of payment transactions. At the national level, macroprudential policy is typically the shared responsibility of central banks, microprudential supervisors, and Ministries of Finance, while the division of labor and the institutional set up varies across countries. International and supra-national institutions like the European Systemic Risk Board (ESRB) and the Financial Stability Board (FSB), which essentially comprises G20 jurisdictions and international organizations, have been established to coordinate macroprudential policy and analyse risks to financial stability.

Generally, the post-crisis reforms had four objectives.^{footnote}Financial Stability Board (2020); Basel Committee on Banking Supervision (2017). This and the following section are partly based on Buch (2021). The first objective has been enhancing resilience by improving the capitalization of banks qualitatively and quantitatively. Higher capital requirements that address structural and cyclical risks not only strengthen individual banks but also have positive implications for financial stability. If individual banks experience losses but can absorb these losses by drawing down their capital buffers, they have to liquidate fewer assets. Price pressure on asset markets is mitigated which, in turn, reduces pressure on other financial institutions that have invested in the same types of assets. The “fire sale” channel of financial crises becomes less important, damping amplification and an important transmission channel also between banks and non-banks.

The second and related objective of post crisis reforms has been to address the “too-big-to-fail” problem. Large, systemically important institutions have to meet higher capital requirements than small banks, whose failure would have more limited repercussions on the financial system. New regimes and institutions for the recovery and resolution of banks make it possible to deal with systemically important banks that become distressed. In addition, instruments to strengthen loss-absorption by private creditors were strengthened (the bail-in approach) in order to mitigate the burden imposed on taxpayers and society in case of widespread bank failures (Lewrick, Serena, and Turner, 2019).

A third reform area addressed risks to financial stability beyond banking. Contagion effects during the global financial crisis were amplified by a high degree of opacity in derivative markets, which were largely organized “over-the-counter”. Also, governance mechanisms of contracts were deficient by allowing the originator of securitized assets to completely shift risks on to third parties, thereby creating disincentives to monitor risks. These issues have been addressed by the reforms. Incentives to centrally clear derivatives have been strengthened and incentives of originators and investors in securitized assets have become better aligned.

A few short-term fixes were made in 2009 in response to the global financial crisis. The Basel Committee decided to fundamentally review the Basel framework by splitting this work into two packages. The first package was finalised and published in 2011. Among other things, it enhanced the quality and quantity of capital by introducing both a stricter definition of bank capital and capital buffers. These buffers reduce the pro-cyclicality of bank capital regulation and address systemic risks. New liquidity requirements also were introduced.

The second package was finalized in 2017. It aims at increasing the comparability of risk-weighted assets among banks by amending and recalibrating the two approaches that are used to calculate risk weights – the standardised and the internal model approach. The output floor has been introduced to reduce differences between the two approaches. The European Union (EU) implemented the first package in 2014. The legislative parties in the EU agreed in June 2023 on

the final implementation of the second packages as well, with the new rules becoming effective on 1 January 2025 and including some transitional arrangements so that the full set of rules are applicable by the end of 2032.

Finally, financial institutions outside the banking sector are today more tightly regulated and monitored. The FSB issues regular monitoring reports on NBFIs (Financial Stability Board, 2022c). This work started off by focusing on “shadow banking”, but was later on made more specific by differentiating between three measures of non-bank financial intermediaries, for which various risk metrics are collected and analysed. First, the entire NBFIs sector consists of all financial institutions that are not central banks, banks, or public financial institutions, with total financial assets of this aggregate amounting to 239 trillion USD or 49% of total global financial assets at the end of 2021. A second measure of NBFIs is the group of Other Financial Intermediaries (OFIs) that comprises all intermediaries that are not banks, central banks, insurance companies, pension funds, or financial auxiliaries. This group accounts for 64% of the NBFIs sector and includes hedge funds, money market funds, other investment funds, central counterparties, broker-dealers, and structured financial vehicles, among others. Third, a narrow measure of NBFIs accounts for about one quarter of the total NBFIs sector and comprises credit-intermediation activities that can create similar risks as bank lending due to liquidity risk, maturity transformation, or leverage.

3.2 Reform Evaluation

Since the inception of these reforms, the financial system has been changing, market shares have shifted, and digitalization has been changing the way in which many financial services are provided. Hence, assessing the effects of the reforms and the implications for financial stability is an on-going process. In order to analyze the effects, including potential negative side effects of the reforms, in 2017 the Financial Stability Board (FSB) established a designated framework for reform evaluation (Financial Stability Board, 2017).

Several reform elements have already been evaluated using this framework. By and large, the results of these evaluations are quite encouraging. Essentially, the reforms have achieved their objectives of making the financial system more resilient, without significant negative side effects. For example, one concern has been that higher capital requirements could have negative effects on the financing of relatively opaque firms such as small and medium-sized enterprises or that large investments into infrastructure finance could be affected negatively. Such unintended negative side effects of tighter regulation have not materialized (Financial Stability Board, 2018a, 2019).

Meanwhile, reforms have increased the transparency of markets for derivatives through higher collateralisation and improvements in transparency and standardisation, thereby reducing systemic risk and expanding some protections against market abuse. In particular, central counterparty (CCP) clearing obligations as well as higher capital and margin requirements for non-

centrally cleared derivatives help to protect against counterparty credit risk. However, an increase in liquidity risk can occur as sudden large changes in margin requirements can be destabilising (Financial Stability Board, 2018b).

As regards the “too-big-to-fail” issue, evaluations point to both important achievements, but also remaining gaps that still need to be closed (Financial Stability Board, 2021a). In terms of achievements, banks now have higher loss-absorbing capacity, resolution reforms have been implemented, and the pricing of different sources of bank funding better reflects the likelihood that certain financial instruments will contribute to covering losses of distressed banks. Progress in this area continues to be important, as demonstrated by bank strains in 2023. Resolution reforms that ensure dealing with banks in the gone concern case operate through the incentives in the going concern: The more likely it is that investors lose money in the gone concern, the higher the risk premium they demand in the going concern, and the better aligned are the incentives of bank managers to reduce risk. Prior to the TBTF reforms, the risk of failure was not properly priced. Bond holders could bet on fiscal support in times of distress, demand lower risk premia, and banks enjoyed “implicit funding subsidies”. These funding advantages compared to less systemically important banks have declined, but have not disappeared.

The fact that implicit funding subsidies have not been eliminated points to the gaps in the TBTF reforms that reduce the credibility of resolution regimes. It is, for example, difficult to obtain transparent and consistent information on the investors that hold the total loss absorbing capital (TLAC) in banks. These investors are often non-banks, hence more transparency about these financial linkages between banks and non-banks are important to understand channels of spill-overs. Similarly, there is no internationally consistent information on the nature and regulation of domestic systemically important banks (D-SIBs) – although recent stress episodes in banking markets have shown that even stress of relatively small, regional banks may have broader market repercussions. Finally, resolution regimes in many countries remain complex, and not all reforms have been fully implemented.

Overall, better regulation and tighter supervision of banks since the global financial crisis have been accompanied by an expansion of market share by non-banks. Risks may thus have been shifted to better-capitalized institutions – but the shift in market shares can also be destabilizing if it ultimately reflects arbitrage and the evasion of regulation (Goldberg, 2023). Indeed, there has been a large increase in nonbank incorporations in low regulation countries (Pogliani, von Peter, and Wooldridge, 2022). Within bank holding company structures, some evidence points to bank subsidiaries expanding internal dividends paid to the parent organisation regardless of their income stream while non-bank subsidiaries enjoy a protection from such pressures (Pogach and Unal, 2019).

Summing up, this section has argued that reforms to the regulatory framework of banks

and non-banks cannot be seen in isolation. Tighter regulation of banks shifts, *ceteris paribus*, activities to non-banks who gain market shares. Non-banks provide funding to banks, and banks and non-banks invest into similar assets and markets. This increases common exposure to risks. In the next section, recent stress episodes demonstrate some of the interlinkages between banks and non-banks.

4 Feedback Channels between Banks and Non-Banks

Banks and non-banks differ in terms of their role in the financial system. Banks have privileged access to liquidity through the central bank, they are an integral part of the process of money creation, and their liabilities are protected by deposit insurance. Thus, there is a fundamental societal interest in a functioning banking system – but also in limiting moral hazard and systemic risk. Non-banks provide funds to finance the real economy and perform important functions: they enable the intermediation of long-term risks and the diversification of investments. They are typically less dependent on very short-term debt financing than banks. Nonetheless, non-banks face significant liquidity risks as well.

4.1 Structural change and the role of the financial sector

Although the international reform agenda largely treats banks and non-banks as being distinct, the two sectors are closely interlinked. They are interlinked not only via balance sheet linkages and similar portfolios, but also because of complementarities when it comes to the provision of credit to the real economy. Both, bank and non-bank financial intermediation have specific roles to play in financing transitions in the real economy and in global liquidity provision. The need for such financing and for the risk sharing properties of flows are underscored by the rich pattern of structural changes underway. These can arise from changing patterns of globalization, the energy transition, demographic change, and digitalization, all of which require adjustment in the real economy and associated financial flows. External finance is particularly important for new market entrants and *de novo* firms that cannot finance their expansion from internal sources. Different forms of finance complement each other. Bank and other forms of debt finance may not be the most suitable forms of funding when it comes to investment projects with a long time horizon and subject to a high degree of uncertainty. Many investments will require types of equity finance provided through markets and start-up finance. In some instances, high uncertainty and externalities that are insufficiently internalized by the private sector may also require a combination of private and public funding. Hence, bank and non-bank, market-based finance both play their distinct roles in financing the real economy.

4.2 Banks and non-banks during stress episodes

Apart from their roles in financing the real economy, non-banks have often come under pressure during periods of stress on international financial markets – with repercussions also on the banking sector. In March 2020, for example, at the start of the COVID-19 pandemic, stress and uncertainty abruptly increased in financial markets worldwide. The pandemic gave rise to a high degree of fundamental uncertainty (Lagarde, 2020). Prices of stocks and corporate bonds plummeted, demand for liquidity increased, investors fled to safer assets, and highly liquid assets were needed to meet margin calls on collateralized transactions. Effects were felt across many financial institutions and many attempted to liquidate securities simultaneously (Financial Stability Board, 2020). Some of the consequences were reflected in the Dash for Cash episode documented for US Treasuries (Barone, Chaboud, Copeland, Kavoussi, Keane, and Searls, 2022). Dollar funding market strains and potential contractionary effects on bank credit provision at home and abroad were partially addressed through the network of standing swap lines across central banks and temporary facilities that were activated (Goldberg and Ravazzolo, 2022).

Beyond a litany of official sector interventions activated to address financial strains, across countries differences in business models across financial institutions provided both risk-sharing opportunities and some stabilizing effects on the financial system. In Germany, for example, well-capitalized life insurers, which tend to have long-term liabilities, tended to invest countercyclically by buying up bonds that had fallen in price. Less well-capitalized life insurers, however, acted procyclically (Deutsche Bundesbank, 2020, 2021). Across countries, sufficient liquidity and a good capitalization in the financial system were demonstrated to be crucial for the functioning of banks and non-banks alike in periods of stress (Financial Stability Board, 2020).

In March 2021, another stress episode associated with the failure of the U.S.-based hedge fund Archegos Capital had repercussions quickly felt across many banks and non-banks (European Systemic Risk Board, 2022a). Using highly leveraged derivatives, Archegos had built up relatively large and concentrated positions based on a relatively weak capital position, exposing the fund to fluctuations of stock prices. The counterparts on many of these trades were internationally active banks (Federal Reserve Board, 2021). When share prices fell, Archegos was unable to meet its margin calls; several banks had to sell shares held to hedge their derivatives at substantial discounts. This resulted in high losses for the banks concerned. The applicable form and degree of supervision and regulation influenced this dynamic. As Archegos was registered as a family office in the USA, weaker reporting and disclosure requirements applied compared with those for some other market participants (Financial Stability Board, 2022b; Deutsche Bundesbank, 2021).

In March 2022, the new structure for derivatives markets was tested when market participants on European power exchanges, especially energy suppliers, came under severe pressure following

the Russian invasion of Ukraine and emerging disruptions to energy markets. Energy suppliers were faced with higher margin requirements to satisfy their hedging transactions on the derivatives market. Several governments stepped in with guarantees and lending programs to ease bottlenecks in terms of liquidity (Deutsche Bundesbank, 2022). Stress clearly originated in the real economy and spilled into the financial system, despite improved robustness due to the central counterparties (CCPs) for derivatives which have grown in importance due to the reforms of the derivatives markets.

Then, over the course of 2022, higher interest rates and a more volatile macroeconomic environment contributed to tighter liquidity overall, with liquidity problems arising in some UK pension funds. A sudden increase in interest rates on UK government bonds led to a drop in the price of long-dated gilts and margin calls on interest rate derivatives. Pension funds had to post additional collateral related to their repo market activities and sold UK government bonds into an illiquid market, thereby triggering a self-reinforcing downward spiral. A purchase program launched by the Bank of England stopped the downward price spiral (Breedon, 2022; Deutsche Bundesbank, 2022). As liability-driven investments (LDI) have been an important amplifier of the initial shock, the Bank of England later published a review and regulatory recommendations for these markets (Bank of England, 2023).

All these stress episodes differ in their causes and the channels of transmission between banks and non-banks. Yet, they have in common that tensions were triggered by unexpectedly large shocks. While both microprudential and macroprudential stress testing models for non-banks do exist, some models had not taken such large shocks into account. As early as in 2018, for example, the Bank of England's Financial Policy Committee (FPC) had examined vulnerabilities in the pension fund sector. However, market volatility in the fall of 2022 far exceeded the assumptions of these models. For example, while a 100 basis point increase in gilt yields was assumed by the Bank of England in a stress scenario, the actual increase in the fall of 2022 was much higher at around 160 basis points (Bank of England, 2018). Moreover, existing macroprudential NBFIs stress tests tended to focus on individual non-bank segments, rather than on system-wide demand and supply of liquidity (Aikman, Beale, Brinley Codd, Covi, Hüser, and Lepore, 2023). More generally, while vulnerabilities in the financial system are often known before stress episodes actually happen. Yet, it is can be difficult to predict the diverse sources of shocks, assess the impact of risk events quantitatively, and take preventive action sufficiently fast and decisively. International policy fora are currently looking into the question of what conclusions can be drawn from past stress episodes and how the resilience of non-banks can be increased (Financial Stability Board, 2023b,c).

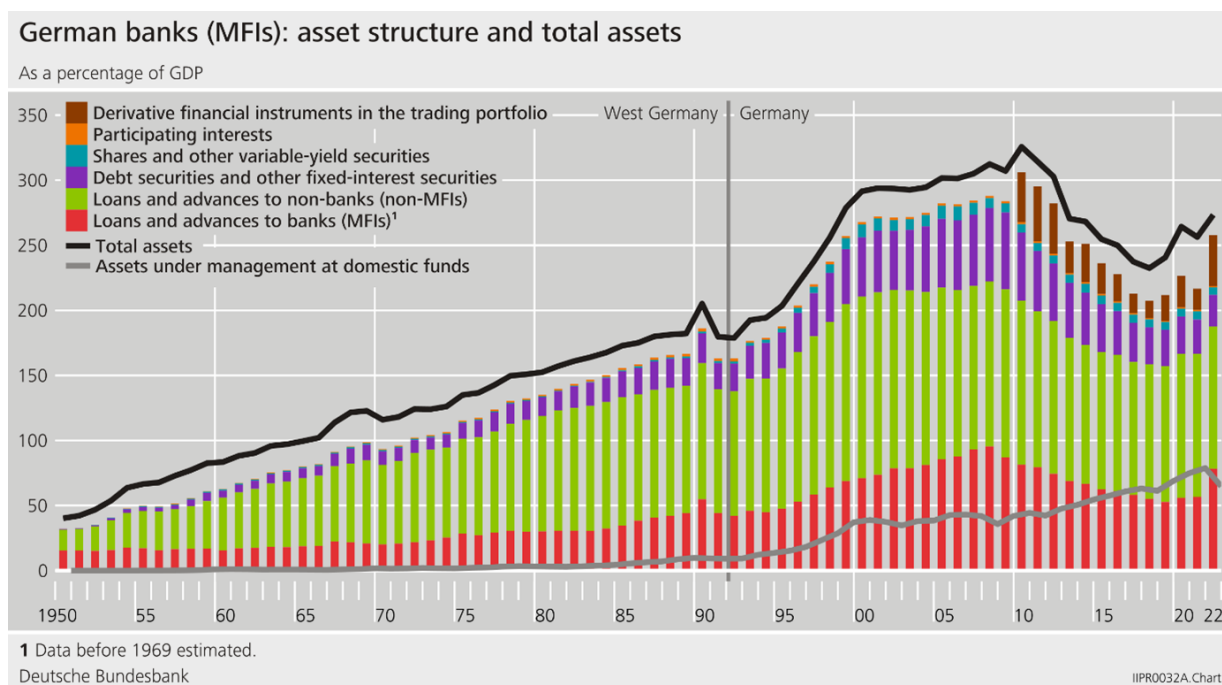
4.3 Exposure of Non-Banks to Liquidity Risk

Liquidity risk is certainly one important area of attention. The global economy has gone through a long period of low interest rates and ample liquidity provision by central banks. This period was followed by a sometimes steep increases in interest rates and withdrawal of quantitative easing. Changing liquidity conditions affect banks and non-banks differently, reflecting differences in business models.

Take the adjustment in the German financial system as an example. In Germany, insurers hold around 11% of financial assets and life insurers, in turn, account for a significant share of these assets.³ Life-insurers typically have very long-term liabilities and invest a large part of their funds in long-term bonds. Rising interest rates thus generally improve the solvency of life-insurers. However, insurers are also exposed to liquidity risks in the form of lapse risks and margin calls from derivatives (European Systemic Risk Board, 2020). As long-term interest rates rise, alternative investments become more attractive from the customer's perspective, and lapse risks may increase. Liquidity risks may also arise from interest rate derivatives, which life-insurers use to hedge against falling long-term interest rates (Deutsche Bundesbank, 2022).

³In the third quarter of 2022, life insurers accounted for around 50% of the balance sheet of the German insurance sector (Versicherungen | Deutsche Bundesbank).

Figure 3: German banks asset structure



The possibility of fire sales shows that systemic risks of banks and non-banks cannot be considered in isolation. Liquidity risks at non-banks can lead to contagion effects throughout the financial system. Insurers and pension institutions are strongly intertwined directly with funds through their investments (Figure 4). If the value of fund shares falls, this is directly reflected in insurers' balance sheets. However, contagion effects can also arise via indirect linkages. If banks, insurers and funds hold similar securities, forced asset sales by one intermediary can affect the balance sheets of other intermediaries.

Open-ended investment funds account for 12% of financial assets in Germany. They issue fund shares and invest in a wide range of assets, including in securities such as shares or bonds. The duration of bonds held by funds increased markedly during the period of low interest rates. Rising interest rates such as those seen in 2022 therefore lead to significant losses in the valuation of bonds in the portfolios of investment funds. While this has not led to significant redemptions by fund investors, duration risk may amplify outflows in the presence of currency risk.

Cross-border linkages harbor additional risks, in addition to the well-documented opportunities (Buch and Goldberg, 2020). German banks, for example, are strongly linked internationally. Moreover, two-thirds of the claims of investment funds are held vis-à-vis foreign counterparts (Figure 4). Globally, beyond the contributions to global liquidity increasing, the cross-border interlinkages of non-banks and banks have risen sharply worldwide in recent years (Aldasoro,

Huang, and Kemp, 2020). Hence, foreign exchange risks and geopolitical risks tend to rise as non-banks are increasingly investing outside the euro area (Deutsche Bundesbank, 2021). For example, investigating flows into emerging market bonds, Bertaut, Bruno, and Shin (2023) confirm that when the duration of bonds held by funds is high, the risk of procyclical behaviour by funds is exacerbated. When investors react to losses by abruptly redeeming fund shares, funds may be forced to sell assets. This may lead to further price declines, particularly in less liquid market segments. Sales of illiquid assets can then lead to spirals in which the liquidity of entire market segments declines, thus also affecting other financial institutions (Brunnermeier and Pedersen, 2009).

4.4 Systemic Risk and the Regulation of Non-Banks

Systemic risks that may emanate from the NBFIs sector require appropriate regulation. Like banks, non-banks need sufficient resilience to reduce the likelihood of distress and prevent the amplification of shocks domestically, and internationally through global liquidity flows and disruptions of market functioning. Potential negative externalities weigh towards regulation that, similar to banks, looks not only at the individual institution but also at the financial system as a whole.

As previously discussed, liquidation of assets held by investment funds can lead to a decline in asset prices that affects the entire financial system. From the perspective of an individual fund, it may make sense to sell securities as funds are being withdrawn. However, this can trigger negative price spirals and international spillovers. Buffers in the form of liquid assets or designated instruments that limit withdrawals can limit such systemic risks (Di Iasio and Kryczka, 2021; Chernenko and Sunderam, 2020).

Contagion through increased liquidity demand due to margin calls should, in principle, be reduced with clearing via CCPs if trades are sufficiently collateralized. In exceptionally volatile market phases, however, collateral requirements may increase abruptly and unexpectedly, thus triggering destabilizing feedback effects among market participants. In the examples presented for Fall 2022, when margin calls led to a sudden need for liquidity among British pension funds, which in turn sold government bonds and withdrew funds from money market funds (European Securities and Markets Authority, 2023b), the distress at money market funds spilled-over to money markets. In March 2020, investors withdrew funds from money market funds, thus severely impacting funding on money markets (Financial Stability Board, 2020). In both cases, central banks intervened and provided liquidity to markets. Such interventions may be needed in times of unexpected and extreme market stress, but they also create the risk of financial dominance (Brunnermeier, 2023). Hence, these episodes have also reinforced the urgency of discussions about the appropriate liquidity regulation of non-bank financial intermediaries that ensures suffi-

Figure 4: Structure of the German financial system

Direct financial linkages between sectors in Germany											
Quarter-end figures as a percentage of GDP, as at Q1 2023											
Debtor		Creditor									
		Domestic financial sector					Domestic real economy		Domestic general government	Rest of the world	Total
		Credit institutions and money market funds	Bundesbank	Investment funds	Other financial institutions	Insurance companies and pension funds	Households	Non-financial corporations			
Domestic financial sector	Credit institutions and money market funds	32.1	9.8	4.0	4.4	5.8	71.5	19.5	10.3	77.1	234.6
	Bundesbank	32.1	0	0	0.8	0	0	0	2.1	20.2	55.4
	Investment funds	6.6	0	9.0	4.0	26.1	12.4	4.3	2.1	5.2	69.7
	Other financial institutions	5.4	0.1	0.4	0.2	0.2	0.8	2.4	0	13.7	23.2
	Insurance companies and pension funds	0.1	0	0.4	0	3.8	51.1	1.3	0.1	4.2	61.0
Domestic real economy	Households	51.7	0	0	0.8	1.6	0	0	0	0	54.1
	Non-financial corporations	26.4	1.0	3.0	4.8	1.4	13.9	40.3	5.2	58.3	154.3
Domestic general government		13.3	17.8	2.0	0.1	2.8	0.3	2.1	0.5	25.8	64.5
Rest of the world		58.2	32.6	40.5	9.0	19.1	21.8	20.7	6.3	0	208.0
Total		226.0	61.3	59.3	24.1	60.8	171.7	90.6	26.6	204.5	924.9

Sources: Financial accounts of the Bundesbank, Federal Statistical Office and Bundesbank calculations. Data on the following claims were taken into account: deposits, debt securities, loans, listed shares, investment fund shares, insurance technical reserve entitlements, and trade credits.
Deutsche Bundesbank F4IN0001C.Chart

cient resilience.⁴ These episodes also prompt an examination of the current regulatory approach that gives central counterparties a relatively large degree of freedom when calculating collateral requirements (Basel Committee on Banking Supervision and Committee on Payments and Market Infrastructures and Board of the International Organization of Securities Commissions, 2022). Regulatory discussions in Europe are focussing on the need to better mitigate the potential pro-cyclical effects of large scale margin changes as well as limit the spread of liquidity stress to other parts of the financial system (European Securities and Markets Authority, 2023a).

A number of current international initiatives aim at improving the regulation of liquidity risks incurred by non-banks. For example, improvements of instruments for managing liquidity risks of open-ended investment funds are under discussion (Financial Stability Board, 2022a,b). Depending on their design, these instruments limit the redemption of fund shares (quantity-based) or vary the price of fund shares in such a way as to reduce the risk of sharp withdrawals by investors (price-based). For example, “Swing Pricing”, a price-based instrument, adjusts the pricing of fund shares such that the costs of outflows of liquidity will be allocated to those fund investors that trigger the costs (Deutsche Bundesbank, 2021). This mitigates externalities, makes distress sales less likely, and limits contagion effects.

Recent empirical evidence looks at the effectiveness of instruments to manage liquidity risks. During the stress phase in March 2020, for example, Irish funds recorded large outflows. A study of Dunne, Emter, Fecht, Giuliana, and Peia (2022) shows that price-based liquidity management tools used by these funds helped limiting outflows. However, the availability and application of such instruments varies widely between jurisdictions. In Germany, fund managers have been able to use new instruments for liquidity management since 2020 (Bundesanstalt für Finanzdienstleistungsaufsicht, 2023). However, the majority of fund managers have not yet applied price-based tools (Bundesanstalt für Finanzdienstleistungsaufsicht, 2022). To ensure greater clarity on the redemption terms and to address systemic risks, funds could be divided into different groups depending on their liquidity (Financial Stability Board, 2022a, 2023a). Funds with low liquidity would then be subject to constraints with regard to the terms of fund share redemption or with regard to liquidity management instruments.

Another regulatory response currently being discussed is introducing provisions regarding liquidity risks within the ongoing review of the EU insurance regulation (Solvency II).⁵ Currently, Solvency II, does not contain any specific provisions on liquidity risk management. There are also no quantitative regulatory requirements under Solvency II to ensure that assets are sufficiently

⁴See Financial Stability Board (2021b), European Systemic Risk Board (2022b), Letter to Members of the Council Working Party on the Solvency II Review and Liquidity Risk Management (europa.eu), and Letter to Members of the European Parliament on the Solvency II Review and Liquidity Risk Management (europa.eu).

⁵See Letter to Members of the Council Working Party on the Solvency II Review and Liquidity Risk Management (europa.eu) and Letter to Members of the European Parliament on the Solvency II Review and Liquidity Risk Management (europa.eu)

liquid to meet the payment of surrender values and additional liquidity needs. An obligation for (re)insurers to conduct internal liquidity stress tests would be a clear improvement, e.g. within the framework of a mandatory liquidity risk management plan for insurance companies. Therefore, systematic reporting by insurers to supervisors could be introduced to better assess individual and systemic risks (European Commission, 2021).

Ultimately, however, good management of liquidity risks requires both appropriate regulation and sound risk management of individual institutions. By holding a sufficient amount of highly liquid assets, market participants can increase their resilience with regard to high margin calls during stress periods. Increasing the transparency of the margin model used by central counterparties, in turn, can help market participants in assessing the liquidity risk arising from central clearing. The EU Commission has published proposals how to enhance transparency (European Commission, 2022), and international regulators are also exploring how margin models can be made less procyclical (Basel Committee on Banking Supervision and Committee on Payments and Market Infrastructures and Board of the International Organization of Securities Commissions, 2022).

5 The Way Forward

Banks and non-banks have distinct functions in the economy and take different risks according to their respective business models. The close linkages between these sectors and the migration of activities across sectors warrants a holistic view of the functioning and stability of the financial system. We have reviewed the rich literature on the evolution of bank- and non-bank financial flows, the rationale for regulation, the behaviour of markets in times of stress, and the on-going regulatory debate. Our review of the literature shows that these flows are important in global liquidity and have real consequences. Both bank and non-bank financial intermediaries engage in credit provision but also can generate systemic risk effects through common exposures, leverage, and liquidity risks.

Our literature review also shows the advanced state of evidence on the response of banks to changes in the macroeconomic environment and to regulation. By contrast, the body of evidence on similar questions for non-bank financial intermediaries is newly emerging. One reason for this asymmetry has been differences in data availability and the higher degree of heterogeneity of the intermediaries in the non-bank financial sector. More work is needed in particular to understand the linkages between banks and non-banks. Understanding liquidity risk management within and across financial institutions is one priority. Also highly relevant is developing a better understanding of the frictions and constraints that can induce procyclicalities, and sharp responses in financial flows and pricing. More granular data is rapidly being accessed by researchers to explore

the effects of shocks on specific institutions, financial markets, and interconnectedness. Meanwhile and internationally, policy frameworks are continuing to evolve, including around macroprudential instruments and regulation and supervision. This evolution aims to appropriately address risks while accounting for the different functions of intermediaries, the related constraints associated with their business models, and the tendencies for activity to migrate across institutions and locations.

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