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Chapter 18

Shadow Banking and Non-Bank Financial Intermediation

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Abstract

Non-bank financial intermediation (NBFIs) has undergone substantial growth in recent years, driven by financial and technological innovation, asset accumulation, macroeconomic changes, and demographic trends, but also by the regulatory reforms which have impacted banks' ability to provide traditional intermediation services, from lending to deposit-taking, and the payment system. This chapter reviews the growth of NBFIs from different perspectives. First, we consider definitions based on activities, entities, and infrastructures. Non-bank financial intermediaries (NBFIs) differ from banks but are also closely linked to banks' activities and organisational structures. We then look at the role of NBFIs in the financial system, focusing on their role in lending markets. Finally, we consider the risks and vulnerabilities of the sector and potential spillover effects, as evidenced by recent episodes of turbulence.

Keywords: Non-bank financial intermediation, NBFIs, market-based funding, shadow banking, bank disintermediation, financial stability.

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18.1 Introduction

The term non-bank financial intermediaries (NBFIs) encompasses diverse financial institutions with varying business models, risk profiles, and governance structures. NBFIs have grown substantially since the early 2000s, accounting for approximately 50% of global financial sector assets, reaching \$230 trillion by the end of 2021 (Financial Stability Board, 2022). The key drivers for this growth are associated with asset accumulation, long-term demographic trends, macroeconomic policies (such as low-for-long interest rates and quantitative easing (QE)), but also the post-global financial crisis (GFC) regulatory reforms, which have affected the ability of traditional banks to fulfil their role in credit markets. Banks no longer dominate the financial sector, representing around 37.8% of total global financial assets in 2021 (down from approximately 50% in 2008). This trend has reversed more recently, as rising interest rates have resulted in a decrease of 5.5% in NBFIs total financial assets – the first decline since 2009 – as shown in Figure 1 (Financial Stability Board, 2023).

[Insert Figure 1: The growth of NBFIs]

The growth of NBFIs is often seen as a form of disintermediation of banks. An alternative view, put forward by Acharya, Cetorelli and Tuckman (2023), is that banks have been shifting activities or assets to NBFIs, thus providing funds to NBFIs rather than being direct providers of intermediation services. Banks and NBFIs are connected via funding channels operating in both directions. Acharya et al. (2023) argue that banks and NBFIs are intertwined rather than substitutes, and their growth and riskiness depend on changing economic, financial, and regulatory environments. In other words, the expansion of NBFIs is facilitated by banks as they shift risks and optimise their activities within the regulatory perimeter. This view seems supported by recent data showing a contraction in NBFI assets, mainly driven by falling asset prices and increasing interest rates. In addition, the Financial Stability Board (2023) shows that the interconnectedness between the banking sector and NBFIs had decreased for banks but increased for NBFIs as these entities increasingly use bank funding.

This chapter aims to provide a review of the growth of NBFI from different perspectives. Section 18.2 discusses the sector's evolution from shadow banking to non-bank financial intermediation – the change in terminology was made by the Financial Stability Board in October 2018¹ – to emphasise the renewed focus on the resilience of non-bank financial intermediaries. Despite

¹ <https://www.fsb.org/2018/10/fsb-reviews-financial-vulnerabilities-and-deliverables-for-g20-summit/>

the different classifications, a clear picture of the relevance of NBFIs emerges as central actors in a modern financial intermediation system.

Non-banks contribute positively to the global financial system and the real economy. As their activities are often uncorrelated to those of banks, they might be able to ‘step in’ and provide specific intermediation activities in areas where banks have withdrawn. NBFIs can help firms diversify funding sources, potentially improving access to finance as they can extend credit to a broader spectrum of borrowers, including small and medium-sized enterprises (SMEs) and individuals with limited access to traditional bank loans (consumer lending). NBFIs often cater to specific sectors or industries supporting large-scale projects, such as real estate and infrastructure. Diverse funding sources allow NBFIs to tap into specialised pools of capital interested in financing these sectors, thereby supporting targeted economic development. NBFIs’ participation can complement bank lending when traditional banks may be more risk-averse or face capital constraints.

NBFIs can also facilitate the management of savings for households and corporations and are now part of a set of intermediaries channelling funds and facilitating trade. Their involvement fosters competition in the financial service industry, reducing funding costs and offering more favourable borrowing terms. By focusing on niche markets, they can provide more tailored financing solutions that traditional banks may overlook. This specialisation can result in cost savings for borrowers who would otherwise have to seek more generic financing options. NBFIs are generally subject to different regulatory requirements compared to traditional banks. Sometimes, these regulations may be less stringent, resulting in lower operating costs. Again, these cost savings can be passed on to borrowers through lower interest rates or fees.

On a global scale, NBFIs play a vital role in capital markets by facilitating the sharing of risks across borders, which can enhance the efficiency and resilience of financial markets. Some NBFIs have become integral to cross-border lending activities, particularly in the syndicated lending markets, providing loans to foreign borrowers or investing in foreign debt securities. By participating in international lending, NBFIs help distribute credit risk across borders. Finally, NBFIs can play a significant role in financing the green transition, which involves shifting towards a more sustainable and environmentally responsible economy. NBFIs, such as asset management companies, can establish dedicated green investment funds. These funds allocate capital to environmentally sustainable projects and initiatives, including renewable energy, energy efficiency, sustainable agriculture, and clean technology development. NBFIs issue or invest in green bonds and sustainability-linked bonds. These financial instruments raise funds specifically for low-carbon projects and activities. NBFIs also act as intermediaries, helping companies and governments access capital markets to issue green bonds. NBFIs might also have a more direct lending role by co-financing green loans, thus allowing banks to decarbonise their portfolios. In Section 18.3, we discuss the growth

of NBFIs while Section 18.4 focuses on their role in lending markets and review the emerging literature that considers their role in corporate lending, mortgage lending and direct lending.

The expanding market share of NBFIs also implies that risk exposures are more frequently managed and retained beyond the traditional banking system. The conventional approach where banks bear the burden of storing liquidity and credit risks on their balance sheets is progressively being replaced by a model in which these risks are delegated to NBFIs. They also pose systemic risk, particularly when their activities involve maturity and liquidity transformation (similarly to banks) or lead to the build-up of leverage in the sector. Additionally, NBFIs may be more exposed to market volatility, which can impact the value of their assets and portfolios, mainly when they participate in lending activities, either in partnership with banks or directly. Given the intrinsic illiquidity of these assets, concerns are increasingly arising about the effect of high interest rates on their valuations in the NBFIs' portfolios. In Section 18.5, we consider the risks and vulnerabilities of the sector and potential spillover effects, as evidenced by recent episodes of turbulence.

18.2 In Search of a Definition for NBFIs

Despite increased awareness of NBFIs by policymakers and market participants, consistent definitions continue to evolve. The NBFIs landscape is diverse, as are attempts to classify them. The distinctions between the activities that fall under “banking” and those of non-bank financial intermediation can sometimes be unclear. NBFIs are interconnected, to a varying degree, with other entities in the system, particularly with banks. Unlike banks, NBFIs have traditionally lacked access to statutory public backstops and, in many cases, have only had limited or no access to the central bank balance sheet. Finally, clear boundaries between different types of NBFIs can also be challenging, mainly when different entities belong to the same financial conglomerate.

The earlier definitions emerged post-GFC when the “shadow banking” sector was broadly described as “*credit intermediation involving entities and activities outside the regular banking system*”.² The Financial Stability Board (FSB) offers an NBFIs definition to include all non-bank financial entities except central banks, banks, or public financial institutions. A subset of the NBFIs sector is labelled Other Financial Intermediaries (OFIs), excluding insurance companies and pension funds. The OFI sector includes money market funds (MMFs), hedge funds, other investment funds, captive financial institutions and money lenders, central counterparties (CCPs), broker-dealers, finance companies, trust companies, and structured finance vehicles (SFVs). The FSB then focuses

² The FSB set out its initial recommendations to enhance the oversight and regulation of the shadow banking system in its report to the G20 in October 2011. The shadow banking system grew rapidly before the GFC, from an estimated \$27 trillion in 2002 to \$60 trillion in 2007, and remained at around the same level until 2010, then increasing steadily since.

on the “*narrow measure*” defining NBFIs as entities involved in credit intermediation activities that may pose bank-like financial stability risks, such as maturity and liquidity transformation, leverage, and imperfect credit risk transfer, or engage in regulatory arbitrage. This “narrow measure” definition has replaced the term “shadow banking” in the annual monitoring exercises carried out by the FSB, partly because the aspects of the shadow banking activities that made the financial system vulnerable in the pre-GFC period had declined and were no longer considered to pose financial stability risks, and partly because of global regulatory reforms and the widespread awareness of the increased importance of NBFIs. Regulators were keen to move away from the connotations of the word “shadow” in case it implied insufficient regulatory oversight.

[Insert Table 18.1 - Non-bank financial intermediaries: definitions and size]

A broader categorisation focuses on financial intermediation excluding banks and encompasses institutional investors (asset managers, pension funds, hedge funds, money market funds), market intermediaries (broker-dealers, trading firms), and financial market infrastructures (exchanges, platforms, central counterparties) (Aramonte, Schimpf, and Shin, 2022).

[Insert Figure 18.2: A stylised intermediation system]

This categorisation places financial market infrastructures (FMIs) and exchanges, rather than banks, at the heart of the financial intermediation system. FMIs provide channels through which payments, securities, derivatives, or other financial transactions are cleared, settled, or recorded. This view recognises the growing importance of central counterparties (CCPs); these are financial market infrastructures that intermediate exposures between market participants, guaranteeing that financial obligations are met. In derivative trading, but also on the foreign exchange and repo markets, a CCP interposes itself between the two parties in a trade and becomes the buyer to every seller and the seller to every buyer. The increase in the proportion of trades cleared via CCPs follows from the regulatory reforms mandated after the GFC by the G20 leaders to increase the transparency and resilience of the OTC market.³

³ At the Pittsburgh summit in 2009, G20 leaders pledged to reform over-the-counter derivatives markets to improve their transparency, increase their resilience, prevent market abuse and reduce systemic risks (Declaration of the Summit on Financial Markets on the World Economy, available at: https://www.fsb.org/wp-content/uploads/pr_151108.pdf). Regulatory initiatives such as Dodd-Frank Wall Street Reform and Consumer Protection Act in the US and the European

Resilience standards and macroprudential policy have been designed to mitigate systemic risk that can lead to disruption to the provision of financial services. These standards have been traditionally focused on banks. However, in recent years, the relevance of non-banks to the safety and stability of the global financial system has become increasingly scrutinised.

A key characteristic in the search for a definition is that NBFIs are described by what they are not: banks. In the remainder of this Chapter, we will consider a range of non-banks operating in financial and credit markets. We will not cover intermediation activities related to crypto-asset markets or Fintech and BigTech, which are covered elsewhere in this Handbook. Box 1 illustrates the NBFIs we review in this chapter, but the landscape is vast, and we do not include all different entities.

BOX 1: Non-Bank Financial Intermediaries

Asset Management Companies: These firms manage investment portfolios on behalf of clients, offering products like mutual funds, exchange-traded funds (ETFs), and pension funds.

Broker-Dealers: A financial firm that acts as an intermediary between buyers and sellers in the securities markets; it buys and sells investments as a broker (on behalf of customers) or trades in its own account as a dealer, or both. Most broker-dealers are affiliated with banks and are integral to the investment banking industry.

Central Counterparties (CCPs): Central counterparties, or clearing houses, are financial market infrastructures that intermediate exposures between market participants, guaranteeing that financial obligations are met.

Collateralised Loan Obligations (CLOs): A CLO operates as a legal entity, typically a special purpose vehicle (SPV), created to acquire and manage a pool of (mostly highly leveraged) corporate loans.

Derivatives and Commodity Trading Firms: NBFIs engaged in derivatives and commodity trading activities, including options, futures, and swaps.

Factoring Companies: Factoring companies purchase accounts receivable from businesses, providing immediate cash and managing the collection process.

Finance Companies: These companies provide consumer and business loans, including auto loans, personal loans, and small business loans.

Market Infrastructure Regulation (EMIR) Directive in the EU, as well as similar initiatives in other countries, led to a substantial increase in the volume of cleared transaction.

Fintech Companies: Financial technology companies use technology to offer innovative financial services and products, including digital wallets, peer-to-peer payment applications, and online lending platforms.

Hedge Funds: Hedge funds are investment funds that employ various strategies to generate returns for their investors. They often target high-net-worth individuals and institutional investors.

Insurance Companies: Insurance companies provide coverage for various risks, including life insurance, property and casualty insurance, health insurance, and more.

Leasing Companies: Leasing companies offer equipment leasing and financing services, allowing businesses to acquire assets without outright purchases.

Microfinance Institutions: These entities provide financial services to low-income individuals and small businesses, promoting financial inclusion.

Money Market Funds (MMFs): Money market funds invest in short-term, low-risk securities and offer stability and liquidity to investors.

Payment Processing Companies: Entities facilitating electronic payments, money transfers, and payment processing services.

Peer-to-Peer Lending Platforms: These online platforms connect borrowers with individual or institutional lenders, facilitating loans for various purposes.

Principal Trading Firms (PTFs): PTFs employ automated, high-frequency trading strategies in electronic trading venues. These NBFIs are important liquidity providers in financial markets, particularly in some more liquid government bond markets.

Real Estate Investment Trusts (REITs): REITs are investment vehicles that own, operate, or finance income-producing real estate properties, offering a way for investors to access real estate markets.

Special Purpose Vehicles (SPVs): SPVs are entities established for specific financial purposes, often used in securitisation and structured finance transactions.

Venture Capital and Private Equity Firms: These NBFIs invest in start-ups and businesses, providing equity capital in exchange for ownership stakes.

18.2.1 Banks and NBFIs: Key Features

NBFIs and banks differ in several key features: (i) sources of funds, (ii) regulation and resilience to shocks, (iii) loan portfolio and risk aversion, (iv) systemic importance, and (v) screening and monitoring. We briefly review the key differences below.

(i) *Sources of Funds*

Perhaps the key difference between NBFIs and traditional banks relates to their funding sources. Banks primarily rely on customer deposits as a source of funds. They also have access to central bank funds and interbank markets. NBFIs typically raise funds from investors - often through the issuance of bonds and commercial paper - or by attracting investment from private equity firms and other institutional investors. NBFIs are also referred to as market-based financial intermediaries, emphasising their reliance on market-based sources of short-term funding.

(ii) *Regulation and Resilience to Shocks*

Banks are subject to extensive regulatory oversight and must adhere to a wide range of prudential regulations and capital adequacy requirements to ensure the safety and stability of the financial system. NBFIs are subject to varying degrees of regulation depending on the jurisdiction and specific entity type. Given that NBFIs' primary source of funds is not retail deposits, their investors are not protected by deposit insurance, making NBFIs more susceptible to the rapid withdrawal of funds in times of uncertainty. In most cases, NBFIs do not have the same capital adequacy requirements as banks, affecting their ability to absorb losses and respond to financial stress. Notably, the lighter regulation gives NBFIs a competitive advantage as they often have more flexibility in their activities, such as lending practices.

(iii) *Loan Portfolio and Risk Aversion*

Banks are usually more risk-averse, partly due to the role of capital requirements. Depending on the lending cycle, banks have stringent credit underwriting processes and may be thus more cautious in their lending decisions. Given the long time horizon of their loan portfolios (e.g., mortgages), they are less adaptable to changing macroeconomic conditions than NBFIs, whose investment horizon is much shorter. NBFIs may have a higher risk tolerance and may be willing to take on riskier lending activities or borrowers, which can lead to more innovative lending practices but also potentially higher levels of risk. In addition, banks have a diversified portfolio of products, as they typically offer a wide range of lending products and serve a variety of borrowers. NBFIs tend to be more specialised in specific lending niches, such as syndicate lending, mortgage lending, consumer finance, or small business loans (private debt).

(iv) *Systemic Importance*

Many banks are (globally or domestically) systemically important institutions due to their central role in the financial system. Their failure can have far-reaching consequences. While some NBFIs can be systemically important, they are generally considered to pose less systemic risk compared to large, global banks. However, policymakers highlight the growing interconnectedness

between NBFIs and traditional banks (see, for example, Basel Committee for Banking Supervision (2022)).

(v) *Screening and Monitoring*

Banking theory (Diamond, 1984; Ramakrishnan and Thakor, 1984; Holmström and Tirole, 1993) has long argued that banks have a comparative advantage in screening and monitoring borrowers due to their ability to collect information. This informational advantage allows banks to identify good borrowers and monitor them to prevent opportunistic behaviour during project development or to discipline them when they fail to meet contractual obligations. As non-banks operate with a much shorter investment horizon, their screening and monitoring efforts could be impaired, even assuming they develop a similar ability to banks to screen and monitor. This inefficiency might lead to sub-optimal credit allocation and increased risk.

18.2.2 NBFIs' Vulnerabilities

The vulnerabilities of NBFIs derive from their transformation function, which is similar to banks, and their market activities. In the years following the global financial crisis, NBFIs' activities in lending and financial markets have steadily increased amid low-interest rates and ample liquidity. However, in the current (2023) environment of high inflation and tighter financial conditions, NBFIs' vulnerabilities related to leverage, liquidity, and interconnectedness, particularly their interplay, can amplify and spread shocks across the financial system (IMF, 2023).

Leverage is used by NBFIs to facilitate trading, investing, and arbitraging price discrepancies, thereby improving the liquidity and efficiency of financial markets in normal times (Cunliffe, 2020; Breeden, 2023). However, in stress times, the build-up of leverage can create a vulnerability in the NBFIs' sector and act as an amplifier of adverse market movements. It can do so via the position liquidation channel where leveraged NBFIs have to sell assets to meet large or unexpected liquidity demands from collateral or margin calls in a market that may already be under stress and subsequently create an adverse feedback loop by further depressing prices in the affected market and potentially transmit stress to other markets (Financial Stability Board, 2023). In this scenario, "dash for cash" emerges as the flip side of deleveraging, as an increase in margins leads to the reallocation of capital toward cash-like assets with low margins (Aramonte et al., 2021). Leverage can also amplify shocks via the counterparty channel, where a default of a leveraged NBFIs' can transmit the shock to its counterparties and, even more broadly, to the financial system via the liquidation of the failed NBFIs' assets (Financial Stability Board, 2023).

Liquidity mismatches are another source of vulnerability in the NBFIs' sector that can propagate shocks to the broader financial system. Liquidity mismatches arising from holding relatively illiquid

assets funded by relatively liquid liabilities make NBFIs vulnerable to runs as investors are incentivised to redeem ahead of others (first-mover advantage), which can result in market volatility. Investor redemptions and ensuing fire sale of assets can lead to “liquidity spirals”, where deteriorating market liquidity impairs funding liquidity, exacerbating market liquidity (Brunnermeier and Pedersen, 2009). This feedback loop can be further intensified by the increased similarity of portfolios across investment funds and, hence, the increased risk of correlated liquidity shocks among funds (IMF, 2023). While investment funds tend to act procyclically and can amplify shocks, some NBFIs, such as insurance companies and pension funds, can act as stabilisers of price dynamics and important providers of liquidity in stress times as they tend to invest countercyclically, that is, buying securities when returns have been negative (Timmer, 2018).

Finally, interconnectedness is a source of vulnerability for the NBFIs sector, which can also become a crucial amplification mechanism for financial stress. This issue refers to linkages both within the NBFIs sector through NBFIs providing liquidity to or investing in assets issued or held by other NBFIs and with the banking sector directly through NBFIs being funded by banks or indirectly through NBFIs and banks having common risk exposures (IMF, 2023). Recent evidence points to increasing linkages among NBFIs through common asset ownership and cross-holdings, which may amplify within-segment fire sale vulnerabilities and have financial stability implications (Falato, Hortaçsu, Li, and Shin, 2020; Fricke and Wilke, 2023). Similarly, the linkages of NBFIs with the banking sector have been increasing and generating significant financial stability concerns (Basel Committee for Banking Supervision, 2022; Forbes, Friedrich, and Reinhard, 2023). While direct links between NBFIs and banks (in the form of loans, securities financing, and derivatives transactions) are of first-order importance, indirect links through common asset holdings have also been shown to expose the banking sector to spillovers originating from the NBFIs sector and act as a channel of shock transmission and amplification of the original financial distress (Cetorelli, Landoni and Lu, 2023).

While discussed on a standalone basis, these vulnerabilities can act as amplifiers for each other, and their interplay can propagate stress to the broader financial system.

18.3 The growth of NBFIs: a story of supply and demand

The growing involvement of NBFIs in markets and functions historically in the domain of traditional banks has significantly affected the financial system. The earlier literature focused on the securitisation market (see Casu and Sarkisyan, 2019). Between the early 1990s and the mid-2000s, there was a tremendous increase in the size of securitisation markets, driven by supply and demand factors. On the supply side, banks had been operating in increasingly competitive markets and, as such, had to take on more risks and seek out higher-margin activities. Securitisation facilitated this

quest for higher margin business by allowing banks to convert illiquid loans into marketable securities and release capital for other investment opportunities. The dynamics of the US housing market facilitated this expansion (Baily et al. 2008). On the demand side, the growth of securitisation was fuelled by the increase in the amount of money under management of institutional investors, which were looking to invest in safe assets (that is, high-quality AAA-rated debt instruments) (Acharya and Schnabl 2010). Because of their intrinsic characteristics, asset-backed securities were particularly suited to the investment needs of institutional cash pools seeking out deposit-like safe investments (Pozsar 2011, Claessens et al. 2012). Gorton and Metrick (2013) argue that the rise in demand for asset-backed securities was also linked to the growth in demand for collateral in the derivatives and repo markets.

After this prolonged period of rapid expansion, securitisation markets froze in late 2008, following the collapse of Lehman Brothers, as institutional investors and market participants lost confidence in asset-backed securities. The impact of the 2007-2009 financial crisis on securitisation markets has since been well documented (Brunnermeier 2009, Gorton 2010, BIS 2011).

Despite its controversial role during the financial crisis, the economic importance of securitisation is undeniable. This structured technique has fundamentally changed the role of banks as financial intermediaries by modifying the functioning of banking markets from the traditional 'originate-to-hold' model (whereby banks originated loans and then held them on their balance sheet till maturity) to the 'originate-to-distribute' model, where loans are bundled and sold to outside investors. In this respect, securitisation significantly changed banks' intermediation function by blurring the boundaries between loans and bonds and fragmenting banks' traditional role as intermediaries into several specific functions, increasingly outsourced to specialised non-bank financial entities. In addition, securitisation increased banks' reliance on capital markets as a source of finance. Starting in the late 1990s, banks began expanding their funding sources away from retail deposits, replacing them with bond, commercial, and repo financing. On the asset side of their balance sheet, banks started to distribute increasing portions of the loans they had originated, not only at the origination but also in the years after origination (Bord and Santos 2012). This trend not only led to the growth of financial intermediation outside the banking system (shadow banking) but also had important implications for the roles banks still perform in financial markets.

Almost two decades after the term shadow banking was first coined, the literature is still grappling with the understanding of the drivers of growth of non-bank activities. The earlier literature focused on regulation-related explanations for the emergence of market-based funding structures. Acharya et al. (2013) highlight the role of regulatory arbitrage in fuelling the growth of a specific shadow banking market, the Asset-Backed Commercial Paper (ABCP) market, that is, funding structures sponsored by banks but mostly based in offshore jurisdictions. Using shocks to capital requirements, Irani et al. (2021) find that less-capitalised banks reduce loans in their portfolio when

they attract higher capital requirements and at times when capital is scarce and show that non-banks take their role as loan originators.

Another stream of the literature has instead emphasised the role of the demand for safe assets. Safe assets, or monetary financial assets, can fulfil the traditional role of money in satisfying investors' needs for liquidity services and a store of value. According to this literature, while government debt has historically held the role of preferred safe asset, shortages of government bonds in recent decades have spurred the expansion of private production of safe assets, including money-like assets produced by shadow banking (Gorton, Lewellen, and Metrick, 2012; Krishnamurthy and Vissing-Jorgensen, 2015, Sunderam, 2015; Kacperczyk, Perignon, and Vuilleme, 2021). However, responding to such demand for safe assets can be costly for shadow banks when interest rates are increasing. Gallo and Casu (2023) confirm the role of the demand for safe assets in the growth of shadow banking and show that the interplay of demand for safe assets and increasing interest rates led to the accumulation of risks in ABCP conduits, with relevant implications for the transmission of monetary policy. As the growth of NBFIs has been substantial in China (with the largest shadow banking sector), Gallo et al. (2023) investigate the role of demand for safe assets in one of the largest shadow banking markets, the Wealth Management Product (WMPs) market. Consistent with the evidence for the US, they find that the demand for safe assets can somewhat explain the growth of shadow banking in China, as investors treated WMPs as money-like assets in response to a shortage of public safe assets.

Overall, supply and demand factors seem to play a role in fuelling the growth of the NBFIs sector, suggesting the need for closer collaboration between bank regulators and central banks in anticipating sources of vulnerabilities and spillovers from NBFIs to the banking sector and the real economy.

18.4 The Role of NBFIs in Lending Markets

The credit activities of NBFIs are of particular importance, as it is in the provision of credit to the real economy that both the benefits of these entities and the risks materialise. Maturity and liquidity transformation expose NBFIs to bank-like risks. If these intermediaries are not sufficiently resilient, they can transmit shocks, particularly during downturns. This section reviews the role of NBFIs in corporate lending, mortgage lending and direct lending (private credit market). In the corporate lending market, non-banks are particularly active in the syndicated loan market. In mortgage lending, in addition to more traditional securitisation activities, non-banks are also engaged in loan origination. Finally, new players such as Fintech lenders are extending credit to SMEs in private credit markets.

18.4.1 NBFIs and Corporate Lending

One of the most significant entries of NBFIs in lending markets has been in the syndicate lending market.⁴ The main enabler of this entry relates to the introduction of loan ratings by the major rating agencies in 1995. Since then, non-bank participation in this market has grown to about \$410 billion by the late 2020s (Aldasoro, Doerr and Zhou, 2022). In this context, the secondary loan market plays a relevant role, as it can provide additional liquidity and attract a growing number of institutional investors. Despite this, banks still dominate the market, particularly in lending via lines of credit and revolving facilities, in line with their role as primary liquidity providers. However, the increasing participation of NBFIs has brought structural changes in the syndicated lending market, and an emerging literature has started documenting them. The key change relates to NBFIs' primary and secondary loan market participation. This participation has implications for the conditions of the loans (loan spread, covenants) and the stability of lending relationships, as NBFIs are a more unstable source of funding than banks. There are also benefits to NBFIs participation, with empirical evidence pointing to non-banks' ability to lend during shock periods. Preliminary evidence also suggests a role for NBFIs in supporting firms' transition to a low-carbon economy.

Aldasoro et al. (2022) present a systematic overview of the role of banks in global syndicated lending markets and uncover insightful patterns in the allocation of credit. They show that NBFIs' participation in corporate loans is more geographically concentrated and volatile than bank lending. Loans arranged by non-banks charge higher spreads than those arranged by banks, as they serve a riskier pool of borrowers. While improving access to credit for financially constrained firms, non-bank credit provision contracts more during distress times and reduces more significantly for foreign borrowers. Fleckenstein, Gopal, Gutierrez Gallardo, and Hillenbrand (2021) also present evidence of the high cyclicity of non-bank lending and suggest that it is driven by their funding instability, ultimately linked to the collateralised debt obligation (CDO) market.

Irani, Iyer, Meisenzahl and Peydro (2021) provide a connection between bank capital and non-bank entry. Looking at the US syndicated lending market, their evidence suggests that the growth of the secondary market for corporate loans is intertwined with the ability of banks to provide loans. They find undercapitalised banks tend to remove loans from their balance sheet, especially during downturns, with non-banks taking up these loans. Notably, they highlight the adverse effects of this substitution in the provision of loans during times of uncertainty, such as higher volatility of loan prices and a substantial reduction in credit available for borrowers financed by non-banks. They conclude that these effects result from the more fragile funding structure of non-banks compared to banks. In documenting the entry of non-banks, they show an increasing diversity over time, with CLO

⁴ Chapter 21 in this Handbook presents a detailed overview of the syndicated loan market.

vehicles becoming the largest non-bank investors in tranches of syndicated loans on the secondary market, followed by hedge funds, private equity, and loan mutual funds. Their impact is more visible in the aftermath of the GFC when non-banks actively replaced banks and finance companies. As documented by Blickle, Fleckenstein, Hillenbrand, and Saunders (2020), syndicated term loans and institutional loans arranged by banks are sold to the market in 15% and 70% of the cases, often within days of the loan origination.

The role played by the secondary loan market, particularly by CLOs, in the rapid growth of corporate loans and leveraged loans is critical to understanding the participation of NBFIs. A Collateralised Loan Obligation (CLO) is a complex financial instrument characterised by its structured nature. CLOs are designed to pool and manage a diversified portfolio of loans efficiently, typically corporate loans or other debt instruments, and transform these assets into tranches of tradable securities. A CLO operates as a legal entity, typically a special purpose vehicle (SPV), created to acquire and manage the underlying loan assets. CLOs have similarities and differences with traditional securitisation. Like securitisation, the assets that back the issuance of various tranches represent a distinct level of risk and return. Investors purchase these tranches based on their risk appetite and yield preferences. The cash flows generated from the underlying loans, including principal and interest payments, are distributed among the various tranches in a specified order of priority. Unlike securitisation, CLOs are actively managed, with portfolio managers making decisions about buying, selling, and restructuring assets within the portfolio to enhance performance. CLOs employ a mechanism known as credit enhancement to safeguard the interests of investors in the higher-rated tranches. CLO management may involve subordination of lower-rated tranches, over-collateralisation, and excess spread, ensuring that losses on the underlying loans are absorbed first by the lowest-rated tranches. In contrast, the highest-rated tranches remain relatively insulated from credit risk.

Given the controversial role of securitisation in unfolding the GFC, early literature on CLOs has focused on the quality of assets in CLO portfolios. Benmelech, Dlugosz and Ivashina (2012) find that, before 2005, loans in CLO vehicles performed similarly to comparable loans from the same bank. They argue that, differently from loans backing other types of securitisation structures, CLO vehicles have mechanisms (e.g., lead shares of arrangers, syndicate structure) used to align incentives in a lending syndicate that are likely to reduce adverse selection. Their evidence is consistent with the resilience of the CLO market during the GFC, when only 1% of CLOs defaulted. Moreover, the market's resilience can partially explain the strong recovery of the CLO market after the financial crisis. In contrast, most of the ABS market has failed to regain investors' trust.

The literature has also documented the implications of non-bank entry on corporate loan conditions, such as loan spreads and covenants. A common finding is that firms have benefitted from growth in the CLO sector through lower spreads and improved credit availability (Shivdasani and

Wang, 2011; Nadauld and Weisbach, 2012; Bord and Santos, 2015). Ivashina and Sun (2011) show that the increasing demand pressure from non-banks for institutional tranches of corporate loans reduces their interest rates compared to bank-retained tranches. Covenants are contractual agreements or conditions that borrowers and lenders agree upon as part of the loan agreement. These covenants protect the interests of the borrowers and the syndicate of lenders and are negotiated between the parties during the loan origination process. The specific terms and conditions of the covenants can vary widely and will determine the ability of the lenders to monitor the borrowers (Rajan and Winton, 1995). Wang and Xia (2014) find that loans originated for trading on the CLO market, indirectly captured by banks' access to securitisation, have fewer covenants than other loans, arguing that banks exert less monitoring on those loans. Bozanic, Loumioti and Vasvari (2018) find that loans in CLOs have more standardised financial covenants. They suggest that this mechanism helps lower information costs derived from highly diversified portfolios, thus supporting monitoring activities. Li, Saunders and Shao (2015) propose a different economic mechanism that causes a decline in monitoring incentives for the originating banks, arguing that the greater liquidity of the loan portfolio held by securitising banks allows them to offload loans more efficiently, leading to the lower monitoring incentives. Haque, Mayer and Wang (2023) uncover a specific role of private equity (PE) in fuelling non-bank participation and discuss the role of PE sponsors as a substitute for bank monitoring.

Another stream of the literature has looked at the implications for banks originating loans depending on their ability to access the CLO market, as using these structures enables their "originate to distribute" approach to lending (Cetorelli and Peristiani, 2012). This literature also highlights the links (often affiliations) between banks and CLOs via asset management companies or finance companies that belong to the same financial conglomerate as the banks originating the loans. These entities often act as underwriters or collateral managers for the CLO vehicles. Peristiani and Santos (2019) study whether an affiliation with a bank active in the syndicated loan market is a private information source for the CLO manager. They find bank-affiliated managers sell significant portions of their pool of loans before defaults, arguing that this is possible due to their ability to gain access to private information given the role of their parent bank in the syndicate. Gallo and Park (2023a) study whether banks with access to the CLO market, that is, with an affiliated CLO vehicle, are more resilient when facing an idiosyncratic shock. They find that banks decrease their lending after the shock, but those with access to the CLO market originate more loans tailored for the secondary market and reduce their on-balance sheet lending. The potential implications for banks of the increasing relevance of the CLO market have been studied by Hinzen (2022). The author shows that CLO managers have significant market power as they can exploit an information monopoly similar to the

one incumbent banks enjoy in traditional lending. Notably, this market power makes it costly for banks to switch among CLO managers.

Examining the CLO market during the Covid-19 crisis and the resulting widespread rating downgrades, Griffin and Nickerson (2022) show that CLO managers actively adjusted their portfolio of loans toward shorter-maturing collateral between March and August 2020 and actively reduced credit risk through the sale of lower-rated collateral and purchase of safer collateral. Cordell, Roberts and Schwert (2023) also point to the market's resilience during the first year of the Covid pandemic. They provide evidence on the performance of the CLO market and show that CLO equity holders earned abnormal positive returns by exploiting risk-adjusted price differentials between the market for leveraged loans and CLO debt securities. The driver of such profitability is not in the superior ability to select loans but depends on their ability to access risk-bearing capital, i.e., investors' willingness to take on the equity tranche.

As the political agenda has encouraged banks to become greener, in line with the global efforts to lower carbon emissions, an emerging stream of the literature has considered the role of non-banks in supporting bank decarbonisation (reducing brown lending) and the financing of the green economy (increasing green lending). Mueller, Nguyen and Nguyen (2023) find that banks manage carbon risk by selling brown loans to CLO managers, while Hackenberg, Klaus and Sondershaus (2023) show that they increase exposure to brown loans to benefit from the lower prices when there is more public attention on climate change. Gallo and Park (2023b) show that non-bank demand for institutional tranches increases banks' origination of green loans and reduces their spreads and covenants, but only for private firms and when there is heightened policy attention. Despite the mixed early evidence, the shared perspective of these recent studies is that banks alone might not have the balance sheet capacity to support the large-scale investments required for a rapid transition to a green economy. Thus, the role of non-banks as an alternative funding source might also emerge in the context of climate finance.

Less investigated is who holds CLO securities and the related implications for financial stability. Liu and Schmidt-Eisenlohr (2019) find that US investors own most US CLOs. The leading investors are insurance companies, mutual funds, and depository institutions rather than hedge funds or investment vehicles. This finding is relevant in light of the policy concerns that the CLO market was fuelling the excessive leverage in the US economy, also sustained by the low-rate environments, and this might have come at the cost of significant losses in the new higher-than-before interest rate environment. Others argue that CLOs are resilient to changing economic cycles because of their design (assets and liabilities are linked to floating rates) and credit enhancement mechanisms.

18.4.2 NBFIs and Mortgage Lending

Non-Bank Financial Institutions also lend households as they play a significant role in mortgage markets, offering diverse financing options and contributing to mortgage credit availability. Their involvement in mortgage markets can provide borrowers with additional choices beyond traditional banks and support the overall functioning of the housing market. NBFIs play different roles in these markets. They operate as originators of the loans (e.g., non-bank mortgage lenders and mortgage brokers), often specialising in specific types of mortgages (such as subprime loans). In the run-up to the GFC, NBFIs played a substantial role in the origination of subprime mortgages. After the crisis, the number of mortgage companies (independent and affiliated with banks) halved (Kim, Laufer, Pence, Stanton, and Wallace, 2018). Recently, the market share of non-banks in mortgage origination nearly doubled to 50%, especially in the US market sponsored by the government, the Federal Housing Administration (FHA). As documented by Buchak, Matvos, Piskorski and Seru (2018), an important driver of such structural change is the technological change that has allowed Fintech companies to enter the market. Fuster, Plosser, Schnabl and Vickery (2019) attribute the increasing role of these non-bank lenders to their ability to process mortgage applications faster than traditional lenders. They also document that these lenders can better adjust their supply of loans in response to demand shock than banks.

According to HMDA data⁵, as of 2022, the two largest mortgage lenders in the US by dollar amount are Rocket Mortgage and United Shore Financial Services, both non-bank mortgage lenders. Gete and Reher (2021) document that non-banks originate around 89% of loans insured by FHA and more than 50% of all mortgages. They reveal the crucial role played by securitisation with significant policy implications. They point to the evidence that non-banks finance their mortgages through short-term warehoused debt that is collateralised by mortgages and repaid with the issuance of mortgage-backed securities (MBS). Non-banks profit from higher prices on MBS, which lowers their funding costs and incentivises them to extend more credit by relaxing their lending standards. This evidence aligns with the policymakers' concerns that non-banks fragile funding models could spark financial crises. In this vein, Cherry, Jiang, Matvos, Pitkorski, and Seru (2022) study non-banks' ability to provide household debt relief using the CARES Act in the US during the COVID-19 pandemic. They show that non-banks offered forbearance at a much lower rate than traditional banks, particularly in the immediate aftermath of the crisis. Eventually, they catch up with those serviced by conventional banks at a later time. Given the increasing relevance of non-banks in mortgage markets, this evidence bears important implications for the pass-through of government policy during macroeconomic stress.

⁵ Home Mortgage Disclosure Act, available at <https://ffiec.cfpb.gov>

18.4.3 NBF1 and Direct Lending (Private Credit Market)

Banks are the primary lenders to SMEs, given their ability to screen and monitor, particularly informationally opaque borrowers, and their efficiency in dealing with borrowers in distress (Berger, Klapper and Udell, 2001). Banks can also rely on their established infrastructure, extensive branch network and experience in providing a wide range of financial products and services. However, regional bank consolidation has impaired their ability to provide lending to this market segment and, more severely, by the GFC, which has led to a decline in SME lending.

New players such as Fintech lenders have filled this void recently (Eca, Ferreira, Porras Prado and Rizzo, 2022). More generally, non-bank financial intermediaries funded by institutional investors have increased their share of lending to small and medium firms. NBF1's interest in allocating into private credit markets is linked to its potential to enhance portfolio diversification, generate attractive risk-adjusted returns, and provide stable cash flows. Private credit is generally defined as debt financing extended to medium and small firms with a relatively high default risk. It is becoming a significant market segment, close to reaching a trillion dollars in assets (Aramonte and Avalos, 2021).

Attracted by the higher yields during the low-interest rates environment, non-banks, such as private equity firms and hedge funds, have started negotiating loan terms and agreements directly with borrowers, typically mid-size private firms. On the borrowers' side, NBF1 lending often comes with more flexible conditions regarding loan structure, covenants, and repayment schedules. According to Prequin (2023), non-bank private debt assets under management (AUM) reached \$ 172 billion in the first quarter of 2022.⁶ Private debt is emerging as one of the most rapidly expanding asset classes and is estimated to reach \$2.3 trillion by 2027. Academic research on direct lending is limited. Chernenko, Erel and Prilmeier (2022) analysed credit agreements for a sample of middle-market firms and found that non-banks finance one-third of the loans. They confirm that direct lending is a consequence of regulations limiting the ability of banks to lend to risky and more constrained borrowers.

Interestingly, over the most recent years, banks have tried to regain market share and reduce the disintermediation caused by direct lending. They set up their private debt funds, with banks acting as lead originators on senior secured loans to middle-market PE-backed companies. While potentially increasing the availability of funds to more constrained firms, this move could create increasing interconnectedness between banks and non-banks, which might be a source of contagion under stressed market conditions. The sector will have to prove its resilience as the re-assessment of NBF1s portfolios at the current (2023) market conditions, that is, the slowing down of the tech economy and

⁶ <https://www.prequin.com/insights/global-reports/2023-private-debt>

tightening of monetary policy to decrease inflation, are likely to have an adverse effect on the valuation of their assets.

18.4.4 The Role of NBFIs in Financial Markets

NBFIs have also increased their presence in financial markets, reflecting their growing importance in the global financial system. For example, non-banks hold a significant share of government bonds in many countries, including emerging economies. NBFIs that are active in government bond markets can be classified into: (i) end-investors, (ii) arbitrageurs, and (iii) liquidity providers. End investors include pension funds, insurance companies, open-ended mutual funds and ETFs. In addition, hedge funds and other investment vehicles are active players in government bond markets. Similar to the dynamics in credit markets, the increased participation of hedge funds and other NBFIs in government bond markets partly reflects the shift in bank activities away from proprietary trading and warehousing of securities and towards providing liquidity to non-banks. These changes in bank business models contributed to the increased market share of NBFIs but did not lessen the links between banks and markets.⁷

More recently, electronic trading and other technological innovations have supported the growth of a new set of smaller NBFIs known as principal trading firms (PTFs). These entities employ automated and often high-frequency trading strategies in electronic trading venues. They typically trade on their own account and have become important liquidity providers in financial markets, including in some more liquid government bond markets, such as US treasury markets (Erent and Wooldridge, 2021).

Fang, Hardy and Lewis (2023) studied investor composition on the sovereign debt market and found that private non-bank investors hold a substantial proportion of sovereign debt supply, increasing their share more than other investor groups, including private banks. This pattern holds for both foreign and domestically held debt and also holds both in advanced economies as well as in emerging economies. The authors conclude that when government debt increases, as has been the case in recent years, non-bank investors play a significantly larger role than banks in financing this expansion. The composition of the investor base matters as non-bank investors are more responsive to changes in yields and dislike inflation, rendering sovereigns more vulnerable to losing investors when market conditions change.

The growing presence of NBFIs has been beneficial and helped develop financial markets, particularly in emerging economies. Benefits range from deeper markets to a more diversified investor

⁷ Chapter 30 in this Handbook illustrates the interactions between banks and NBFIs in global financial markets and discusses the regulatory agenda focused on mitigating spillovers and system risk.

base, greater risk sharing and a more efficient capital allocation. The presence of foreign NBFIs investors can also help promote the implementation of international standards and best practices. However, it has also increased countries' vulnerability to cross-border spillovers, particularly liquidity shocks. Erent and Wooldridge (2021) review the cross-border activities of NBFIs and identify different channels of cross-border spillovers. Some channels are similar to those identified for banks, while others are unique to NBFIs. They find that the type of NBFIs and their involvement in cross-border activities varies substantially. For example, mutual funds and insurance companies have the largest holdings in the US. In contrast, in Europe, investment funds are the largest cross-border investors, and in Japan and other East Asian countries, insurance companies and pension funds are the largest buyers of foreign bonds. A large share of NBFIs' cross-border business is booked out of financial centres, such as Luxemburg, Ireland and the Cayman Islands.

The risk of cross-border spillovers is particularly high for NBFIs dollar positions, as these account for a dominant share of cross-border activities. Dollar funding can involve large and complex chains and several layers of intermediation across different jurisdictions and sectors, thus increasing the potential for contagion. Other potential sources of spillovers include currency and liquidity mismatches on NBFIs' balance sheets, which are not fully hedged. Unhedged FX exposures or maturity mismatches can generate distress when exchange rates move fast. While liquidity mismatches are also a potential source of contagion for banks, the risk for NBFIs is heightened because non-banks do not have access to central bank liquidity backstops. Less rigorous prudential regulation and risk management tools might also exacerbate problems for non-banks. Furthermore, NBFIs' use of leverage has the potential to amplify cross-border spillovers during stress periods. Finally, NBFIs managers tend to herd and move faster than banks, thus compounding volatility.

These channels of cross-border spillovers mark differences in the behaviour of banks and non-banks, particularly in emerging economies. Since the GFC, financial intermediation flows to emerging economies have been depending to an increasing extent on the expansion of NBFIs as global banks deleveraged. The greater reliance on non-bank financial institutions may have contributed to new challenges for emerging market economies, making them potentially more vulnerable to changing global financial conditions (FSB, 2022; Chari, 2023). For example, Chari et al. (2020) document that investment funds exited emerging markets in the initial months of the COVID-19 crisis.

In recent years, episodes of acute instability have become more common. The next section discusses some recent episodes of distress and their impact on NBFIs and the wider financial sector.

18.5 Recent Stress Episodes for NBFIs

18.5.1 The COVID-19 Pandemic and “Dash-for-Cash” in 2020

At the outset of the coronavirus pandemic, in February 2020, global financial markets experienced significant corrections as investors’ appetite shifted to safer and more liquid assets. This led to global sovereign bond yields declining substantially and liquidity conditions in more risky markets tightening (the flight to safety stage of the March market turmoil). Against the backdrop of the continued worsening of the economic outlook and increasing risk aversion among investors, this flight to safety turned into broad selling of financial assets in mid-March 2020 and increasing demand for cash and near-cash assets (the dash for cash stage of the March market turmoil) (Financial Stability Board, 2020). In the NBFi sector, the dash for cash episode led to major outflows from investment funds, necessitating large-scale central bank interventions to ease the pressure in the market. The interventions of central banks varied from standard tools, including asset purchases, such as the European Central Bank’s Pandemic Emergency Purchase Programme and Federal Reserve’s Secondary Market Corporate Credit Facility, to new tools allowing NBFIs access to central bank liquidity, such as the Federal Reserve’s Money Market Mutual Fund Liquidity Facility (Breckenfelder and Hoerova, 2023). The turmoil reinforced the notion that NBFIs can amplify stress in the financial system and underscored the need to strengthen resilience in the sector.

A growing body of literature investigates mutual fund runs during the COVID-19 crisis and explores sources of mutual fund fragility. Liquidity transformation by mutual funds has been identified as one of the main sources of their fragility during the stress episode. Ma, Xiao, and Zeng (2022) find that investor outflows during the COVID-19 crisis were more pronounced at bond mutual funds that engaged in more liquidity transformation. In particular, funds specialising in more illiquid asset classes, such as bank loans and high-yield corporate bond funds, experienced larger outflows than investment-grade and government bond funds. Furthermore, the authors suggest that bond funds meeting investor redemptions and following a pecking order of liquidation by selling their most liquid assets first contributed to the “*reverse flight to liquidity*” phenomenon witnessed during the crisis, in which high-quality liquid assets experienced net selling pressures. Falato, Goldstein, and Hortaçsu (2021) show that open-end corporate bond funds with illiquid assets and those vulnerable to fire sales and exposed to sectors affected by the COVID-19 crisis suffered more severe outflows during the crisis. This is consistent with Claessens and Lewrisk (2021), who find that, compared to normal times, during the Covid-19 crisis, lower asset liquidity was of great concern for investors in open-end bond funds, leading to large outflows from funds with less liquid portfolios.

Moreover, funds with lower returns, higher credit and market risks, a larger share of lower-rated securities and greater exposures to emerging market economies exhibited larger investor

outflows in March 2020 than their peers. The authors also find that a larger share of institutional investors was associated with a larger outflow, which they explain by institutional investors monitoring conditions more closely than retail investors. The latter finding is consistent with Cipriani and La Spada (2023) and Li, Li, Macchiavelli and Zhou (2021), who show that institutional money market funds with lower portfolio liquidity experienced significantly larger investor outflows during the run in March 2020, whereas retail funds did not. Interestingly, Cipriani and La Spada and Li et al. find evidence to suggest that liquidity restrictions on investors, such as the liquidity fees and redemption gates, introduced in the 2014 Securities and Exchange Commission money market fund reform (SEC, 2014) with the view to strengthen financial stability have exacerbated the run on prime money market funds during the Covid-19 crisis.⁸

While financial leverage plays a less important role for mutual funds (Aramote, Huang and Schrimpf, 2021), there is evidence that synthetic leverage has contributed to their fragility during the COVID-19 crisis. Specifically, Fricke (2021) finds, for a sample of equity funds, that the use of synthetic leverage (via derivatives trading and securities financing transactions, including repurchase agreements and securities lending) has increased in response to the macro-financial environment and that synthetically leveraged funds experienced larger investor outflows in March 2020. This corresponds with potentially larger margin calls during volatile market periods and is consistent with Aramonte et al. (2021), who argue that leverage fluctuations through margin changes were an important channel of propagating stress during the COVID-19 crisis. Specifically, the authors argue that the surge in margins against the increasing economic uncertainty in early 2020 forced investors to deleverage by selling large amounts of sovereign debt, drawing on money market fund investments and re-allocate capital toward near-cash assets with low margins, a scenario where a dash for cash emerges as the flipside of deleveraging.

The interconnectedness of mutual funds has also been found to contribute to their fragility during the Covid-19 crisis. In particular, Fricke and Wilke (2023) investigate the increasing connectedness in the mutual fund sector and highlight fund vulnerabilities arising from cross-fund holdings (or fund-to-fund connections). Using a sample of open-end investment funds, the authors show that cross-fund investments are becoming increasingly important, with diversification and liquidity management considerations at play, and were heavily liquidated during March 2020. Allaire, Breckenfelder and Hoerova (2023) find that bond mutual funds with higher ownership by other funds suffered larger outflows during the dash for cash episode in March 2020 than those with higher direct

⁸ One of the key regulatory changes introduced by the 2014 SEC money market fund reform (which became effective in 2016) is allowing all prime money market funds in times of stress to impose a liquidity fee of up to 2% or temporarily suspend (or “gate”) redemptions for up to 10 business days in a 90-day period, if the fund’s weekly liquid assets fall below 30% of its total assets and the fund’s board of directors determines that imposing a fee or gate is in the fund’s best interests (SEC, 2014).

household ownership. Their evidence suggests that the source of the mutual fund fragility during the episode was the fund sector itself. It highlights the importance of mutual fund cross-holdings as they can trigger widespread redemptions of fund shares coupled with the open-ended nature of funds.

Another strand of related literature examines the response of central banks to the liquidity crisis in the NBFIs sector in March 2020 and its effectiveness. Falato, Goldstein, and Hortaçsu (2021) examine the effectiveness of the Federal Reserve's asset purchase programme in reversing outflows from corporate bond funds in March 2020. They find that investment funds with higher holdings of bonds eligible for the Secondary Market Corporate Credit Facility experienced lower investor outflows during the crisis. The authors argue that by acting as a liquidity backstop or "market maker of last resort", the Fed effectively stabilised the bond fund sector during the crisis. Importantly, the authors find evidence suggesting that funds impacted by the facility became less fragile and generated positive spillovers to primary bond markets and peer funds, a novel transmission mechanism of unconventional monetary policy via NBFIs. Breckenfelder and Hoerova (2023) examine the effectiveness of the European Central Bank's asset purchases and additional liquidity provision to banks in easing the liquidity crisis faced by mutual funds in the euro area. They found that asset purchases via the Pandemic Emergency Purchase Programme were effective, where bond mutual funds holding more eligible bonds performed better and suffered lower investor outflows compared to funds with less eligible bond holdings. As for the additional liquidity provision via the Bridge Long-Term Refinancing Operations, the authors find that it was associated with an increased growth rate of repo lending to funds by banks, particularly those more exposed to the system-wide liquidity crisis. Overall, the results suggest that both central bank interventions were able to reach mutual funds during the liquidity crisis.

Anadu, Cipriani, Craver, and La Spada (2022) investigate the Money Market Mutual Fund Liquidity Facility established by the Federal Reserve to assist money market funds in meeting increased redemptions in March 2020. They found outflows decreased more for domestic (that is, eligible to participate in the programme) funds, funds that held more illiquid securities, and those held by institutional investors who were more concerned about the funds' liquidity. Overall, the authors argue that the facility was important in reducing runs on prime money market funds and stabilising the short-term funding markets.

The research in this strand of the literature provides important policy implications for the future of central bank intervention in alleviating liquidity strains in the financial system. Ma, Xiao, and Zeng (2022) suggest that as liquidity transformation is increasingly performed by NBFIs, central bank interventions targeting NBFIs may become essential for stabilising liquid asset markets. Breckenfelder and Hoerova (2023) suggest that, while allowing non-banks access to the lender of last resort is complex (with heterogeneity of non-banks being one of the underlying reasons) and given

that funds' leverage limits constrain repo lending, asset purchases by the central bank as the market maker of last resort could be an effective tool as many NBFIs hold marketable securities and could therefore benefit from such central bank interventions. However, the authors note that these interventions should be the last resort and not a substitute for adequate liquidity risk management by the NBFIs sector. This corresponds with the view of Falato, Goldstein, and Hortaçsu (2021), who argue that such central bank interventions should not become the norm and call for addressing the fragilities of investment funds that have played a role in the episode, for instance, by employing tools such as swing pricing (Jin, Kacperczyk, Kahraman, and Suntheim 2022). Falato, Goldstein, and Hortaçsu also draw attention to the issue of how investment funds manage their liquidity (Chernenko and Sunderam, 2016). This is echoed by Claessens and Lewrick (2021), who question the adequacy of open-end funds' liquidity management tools that are primarily designed for managing risks at the fund level and call for their comprehensive adjustment and introduction of new macroprudential measures, such as countercyclical liquidity buffers.

18.5.2 Liability-Driven Investment (LDI) Funds and Gilt Market Crisis in 2022

Another recent example of disruptions in the non-bank sector spreading to the broader financial system is the episode of the liability-driven investment (LDI) funds crisis in the UK in September 2022.

Liability-driven investment strategies are used by defined benefit pension schemes to manage volatility in their funding levels by matching the duration of assets to that of liabilities. Having exposure to long-term government bonds and derivatives through LDI (either by running these strategies in-house or by investing in 'pooled' LDI funds) is an effective way for pension funds to hedge interest rate and inflation risk (that is, when long-term interest rates fall and government bond prices rise, the present value of pension schemes' liabilities also rises, and vice versa) (Bank of England, 2022). Pension funds in deficit (that is, with the value of liabilities exceeding that of assets) use a leveraged LDI strategy that enables them to do this in a more capital-efficient way but have to post collateral to the counterparty (House of Commons Work and Pensions Committee, 2023).

The sharp rise in government bond yields caused by the fiscal ("mini-Budget") announcement on 23 September 2022 put significant pressure on LDI funds as the increasing prices of long-term bonds held by the funds pushed up their leverage and resulted in the funds having to post additional collateral on their secured borrowing or meet margin calls on derivatives. To rebalance their portfolios, LDI funds, and particularly pooled LDI funds that struggled to raise new finance from their investors and to do it quickly, were forced to sell large quantities of government bonds into an illiquid market, which in turn reinforced the downward pressure on gilt prices (House of Commons Work and Pensions Committee, 2023). As the Bank of England indicated, this self-reinforcing "downward spiral

risked spilling over to broader market dysfunction, leading to an unwarranted tightening of financing conditions for businesses and households” (Bank of England, 2023a).

In response to the risks posed to financial stability, the Bank of England introduced temporary purchases of long-term government bonds. The programme effectively restored market conditions and allowed LDI funds to deleverage, thereby strengthening their resilience (BOE, 2023b).

While the speed and scale of changes in government bond yields were unprecedented, poorly managed leverage at LDI funds has been identified as the root cause of their vulnerability to market changes and a potential amplification mechanism in the government bond market (Breedon, 2022). More broadly, the stress episode highlighted the importance of closely monitoring the vulnerabilities and enhancing the resilience of the NBFIs sector with the view of avoiding financial stability risks (Breedon, 2023; Hauser, 2023; Bank of England, 2023b; Bank of England, 2022).

In the aftermath of the liquidity crisis, the Bank of England recommended that LDI schemes maintain liquidity buffers sufficient to be resilient to shocks in gilt markets, including systemic and baseline resilience. This should allow funds “to remain resilient to severe but plausible systemic shocks without triggering forced deleveraging and feedback loops which threaten financial stability while continuing to operate and meet margin and collateral calls and remaining resilient to idiosyncratic risks throughout” (Bank of England, 2023a).

18.6 Concluding remarks

The term non-bank financial intermediaries describes a diverse and complex ecosystem of entities with diverse business models, covering many activities and involved in many aspects of financial markets. A broad definition of these entities can be loosely referred to as market-based finance to distinguish them from the regulated banking sector. The sector has benefited from the retrenchment of banks post-GFC, followed by years of low-interest rates and quantitative easing. Government and private debt market growth also increased NBFIs participation as debt markets became too large and complex for banks alone. Non-banks are estimated to represent around 50 per cent of global financial sector assets. However, the recent (2023) rise in interest rates has resulted in a contraction of the sector for the first time since 2009.

NBFIs span areas of traditional and economically valuable financial activities by providing financial services and credit that support the real economy. The growth of NBFIs has decreased businesses' reliance on banks and allowed them to diversify their sources of funding and access other financial services that banks no longer offer. However, the benefits of this diversification have come into question, as NBFIs seem less resilient to shock than banks. In addition, they seem to act as shock

amplifiers and catalysts for systemic risk. Their market share can also influence the transmission and effectiveness of monetary policy.

This chapter charts the dynamics of market-based finance, considering the evolving definitions, from shadow banks to non-bank financial intermediaries. NBFIs differ from banks but are also closely linked to banks' activities and organisational structures. One distinguishing feature of these entities is that they do not collect retail deposits. In addition, they do not benefit from regulatory backstops. Their business models involve liquidity and maturity mismatches and high leverage. These characteristics give rise to risks and vulnerabilities of the sector and potential spillover effects, as evidenced by recent episodes of turbulence. The threat to financial stability triggered unprecedented central bank interventions. Such occurrences suggest that a different regulatory approach to NBFIs is needed to reduce the need for emergency central bank support and address their strategic vulnerabilities.

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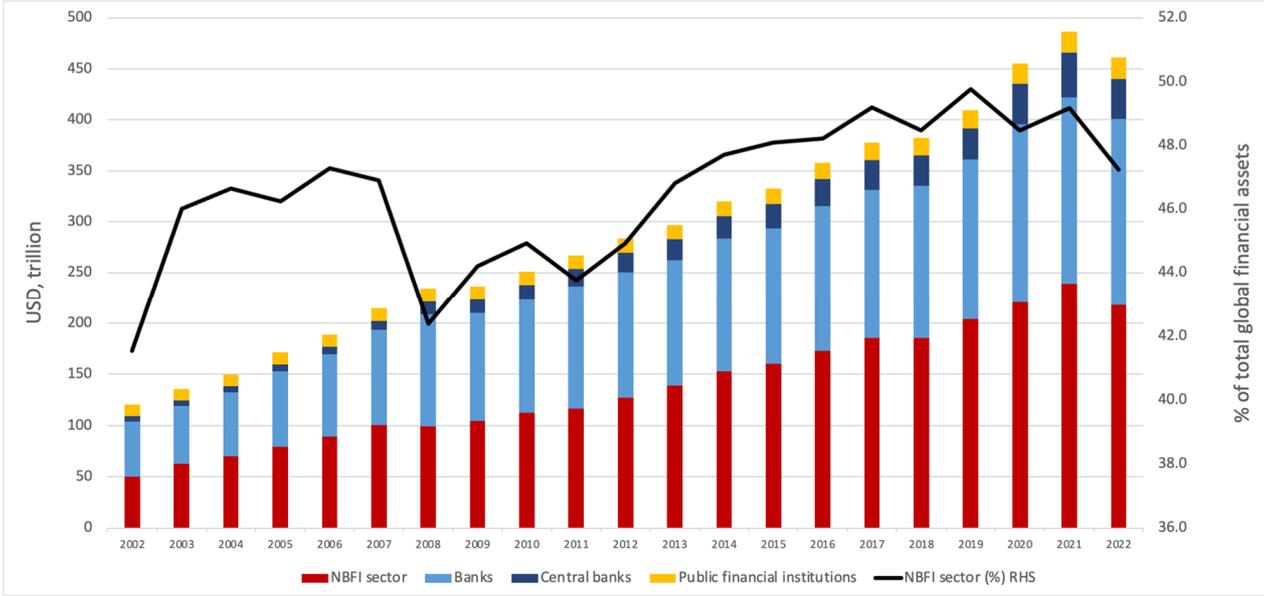
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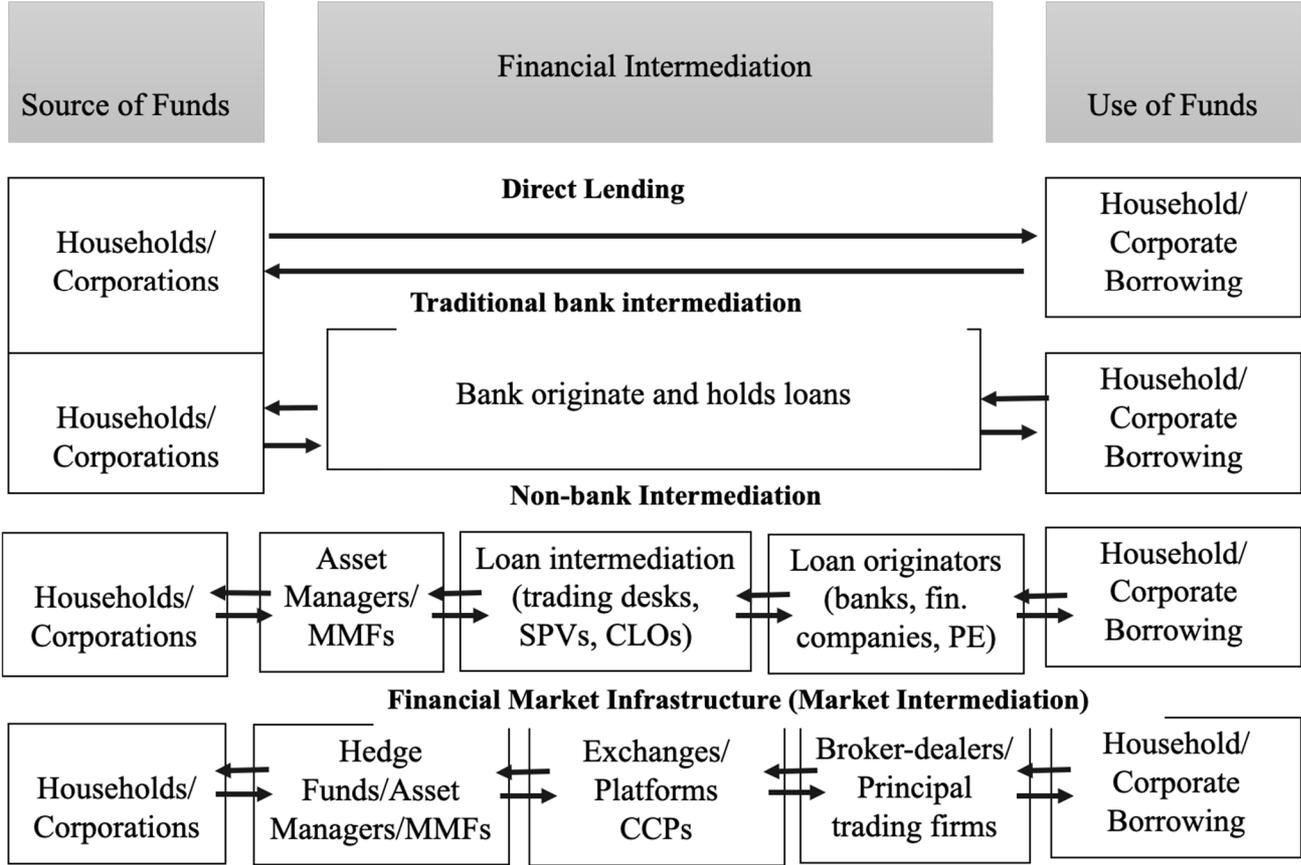
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Figure 18.1: The growth of NBFIs



Source: Authors’ elaborations, data from the Financial Stability Board.

Figure 18.2: A. Stylised intermediation system



Source: Authors' elaboration, adapted from Luttrell, Rosenblum and Thies (2012) and Aramonte, S, Schimpf, A, and HS. Shin, (2022).

Table 18.1: Non-bank financial intermediaries: definitions and size

Term	Definition	Total Financial Assets (\$ trillion) at end 2022	Share (%) of Total Global Financial Assets
Banks	Banks, Central Banks, and Public Financial Institutions	\$198.3	42.9%
NBFIs	All financial entities, except Central Banks, Banks, or Public Financial Institutions.	\$217.9	47.2%
OFIs	A subset of the NBFi sector that excludes insurance companies and pension funds.	\$139.4	30.2%
Narrow Measure	Entities involved in credit intermediation activities that may pose bank-like financial stability risks.	\$63.1	13.7

Source: Definitions and data from the Financial Stability Board, available at www.fsb.org