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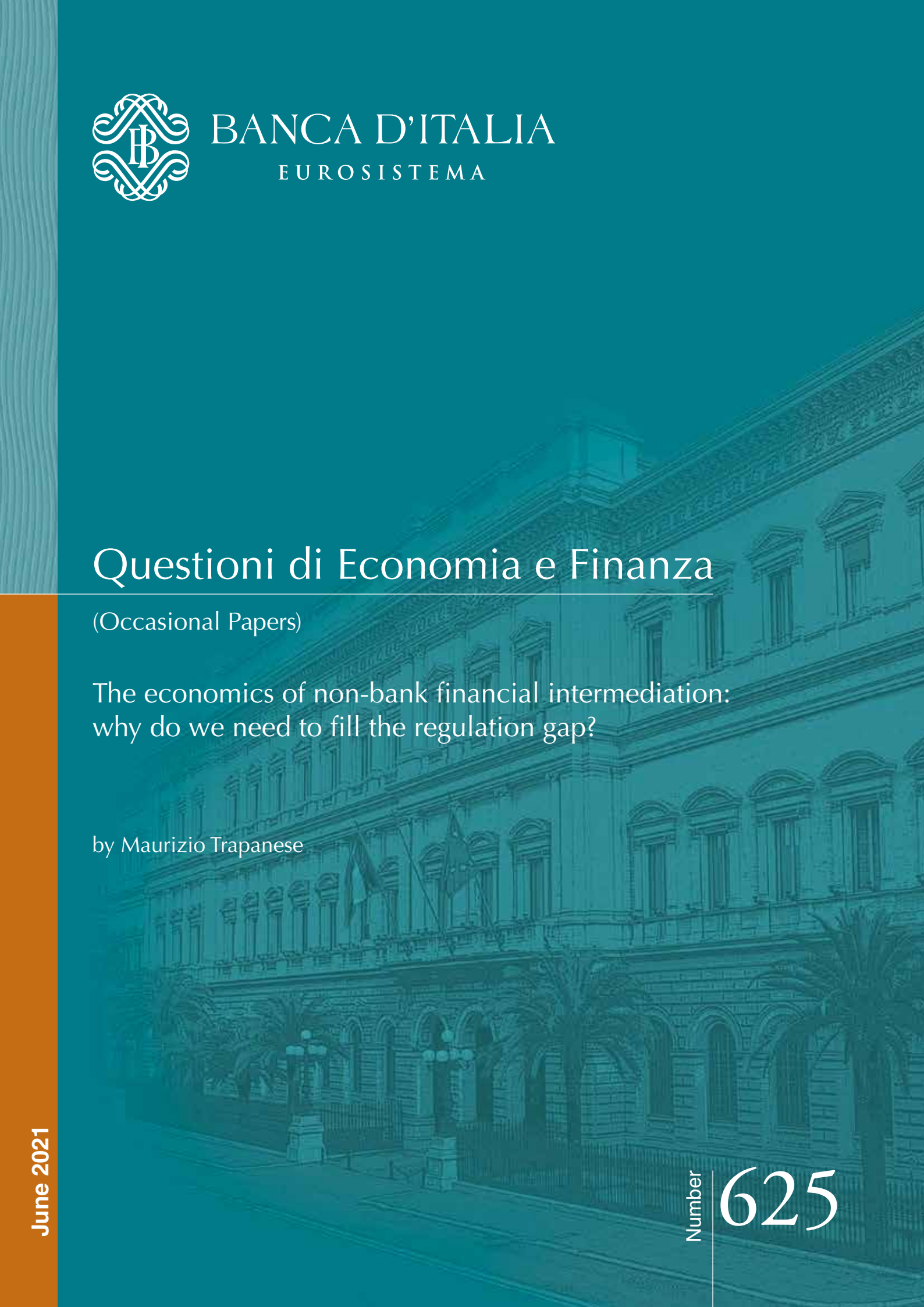

Questioni di Economia e Finanza

(Occasional Papers)

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THE ECONOMICS OF NON-BANK FINANCIAL INTERMEDIATION: WHY DO WE NEED TO FILL THE REGULATION GAP?

by Maurizio Trapanese*

Abstract

This paper presents an overall analysis of the economics of non-bank financial intermediation, and argues that the financial stability concerns stemming from this sector support the need to fill the regulation gap that exists with respect to other segments. It examines the structure of markets, the economic incentives of the agents involved, and the institutional aspects characterizing this form of intermediation as compared with that performed by banks. The policy framework developed so far has been based mainly on micro-prudential tools, looking at individual institutions and activities. The focus of the regulatory actions should not be (or should not only be) the stability of individual entities. Financial regulators should pay more attention to the effects that the collective actions and activities of non-bank financial entities may have on the financial system as a whole and on the real economy. I find that the effectiveness of micro-prudential tools is strengthened if they are accompanied by a framework containing policy measures to address systemic risk.

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Contents

Executive Summary[1]

The non-bank financial intermediation (NBFI) sector has grown considerably over the past decade, and today plays a key role in the financing of the real economy, as well as in the management of the financial assets of households and corporates. The financial assets held by NBFI entities accounted for 49.5 per cent of the global financial system at the end of 2019, compared to 42 per cent in 2008; their credit activities have been increasing at a faster pace than those of banks, and in 2019 represented almost 40 per cent of global credit assets.[2]

Because of the growing role of NBFI, credit risk is increasingly borne by investors and intermediated through financial markets (hence held outside the traditional and fully regulated banking system). As a result, financial stability tends to rely increasingly on the markets' ability to manage risks rather than on the capital positions of the individual banks. Moreover, the growing importance of NBFI in the supply of credit has increased the degree of interconnectedness among the different components of the financial sector (including banks), in longer and more complex chains of intermediation. All these developments tend to alter the potential speed and diffusion of shocks in the global financial system. Moreover, NBFI entities do not benefit from official forms of backstop (i.e. access to lender-of-last-resort or deposit insurance).

The March 2020 turmoil has highlighted how certain NBFI entities/activities can amplify shocks, both directly and through their interconnectedness with the other parts of the financial system (particularly banks).[3] According to the Financial Stability Board (FSB), the strongest concerns stem from certain types of funds that do not adequately manage their liquidity positions and experience unexpected redemption requests from their investors. This can increase their susceptibility to runs during adverse market episodes, contributing to price dislocations and fire sale spirals.[4] Vulnerabilities may also result from the increased leverage of certain investment vehicles, more sensitive to movements in asset prices in short-term funding markets when under stress. All these events have highlighted the need to strengthen the resilience of the NBFI sector.

In order to avoid repeating the errors of the (recent) past, one should not neglect the role that NBFI entities played prior to and during the global financial crisis (GFC). It was largely through NBFI entities that financial activities involving a significant degree of maturity/liquidity transformation and credit risk transfer were pushed outside the regulated banking system, via a long and opaque chain of intermediation.[5] The collapse of the NBFI sector during the crisis brought to light the large amount of liquidity and credit tail risks hidden in the system. In fact, the originate to distribute model (OTD), through

[1] I wish to thank Gabriele Bernardini, Francesco Cannata, Pietro Antonio Catte, Bernardo D'Alessandro Tavani, Riccardo De Bonis, Alessio De Vincenzo, Michele Lanotte, Sebastiano Laviola, Andrea Pilati, Valeria Rolli, Gianluca Sisinni, Raffaele Tartaglia Polcini, and Silvia Vori, for their very useful comments and suggestions on earlier versions of this paper. Any errors and omissions remain my own responsibility. The opinions expressed in this paper are those of the author and do not necessarily represent the views of the Bank of Italy.

[2] See FSB (2020d).
[3] See FSB (2020c).
[4] See Shleifer and Vishny (2011).
[5] See Adrian and Ashcraft (2012).

which loans are sold after origination and securitized into asset-backed securities (ABS), has helped to increase the links between intermediaries and capital markets, with important implications for financial stability. Even if a higher degree of interconnectedness may improve risk diversification and markets' resilience, a more interlinked financial system heightens the risk that contagion may spread more widely across the different segments of intermediation.

In the context of the post-GFC regulation repair, the FSB has coordinated the development of policies to reduce systemic risk in the NBFI sector in the following key areas: mitigating risks in banks' interactions with NBFI entities; reducing the susceptibility of money market funds (MMFs) to runs; improving transparency and aligning incentives in securitization; dampening pro-cyclicality in securities financing transactions.[6] Moreover, the FSB has developed a structured approach to monitoring risks arising from those NBFI entities that are involved in activities that could generate bank-like risks for the financial system (i.e. credit intermediation with maturity/liquidity transformation, imperfect transfer of credit risk and/or leverage) and/or can be a source of regulatory arbitrage.

The FSB policy toolkit has been the centrepiece of the post-GFC response to strengthen the regulation and supervision of NBFI entities and activities. However, as acknowledged in recent analyses from the FSB and the IMF,[7] the implementation of the NBFI reforms continues but at an earlier stage than other reforms. The adoption of the recommendations to reduce the risk of runs on MMFs is not equally advanced in all FSB jurisdictions. Consequently, there is significant diversity of MMF types, making comparisons difficult between one jurisdiction and another. Progress remains mixed in implementing the recommendations for incentive alignment for securitisation, as well as for those on securities financing transactions, which continue to face significant delays. The implementation of measures to address structural vulnerabilities from liquidity and leverage in asset management is still ongoing.

In the years after the GFC, persistently low and declining yields on fixed-income instruments have prompted institutional investors to seek higher returns by using leverage and investing in riskier and less liquid assets.[8] This search for yield has the potential to introduce additional risks throughout the financial system. The low-yield environment may promote higher conformity in investment strategies among NBFI entities, exacerbating a structural trend driven by benchmarking and compensation, increasing herd behaviour and pro-cyclicality among asset managers. This greater degree of similarity in portfolio decisions may amplify market sell-offs in the event of an adverse shock. In fact, NBFI activities show a higher degree of vulnerability (with respect to traditional banking) since they do not benefit from explicit official sector-driven backstops, while performing liquidity, maturity and credit transformations.

This increased risk-taking among investment funds, pension funds, and life insurers may have severe implications for financial stability. The current period of lower interest rates, given the expectations of further monetary easing to counter the COVID-19 induced recession, may promote a further build-up of vulnerabilities, providing additional incentives for NBFIs to increase their holdings of illiquid assets. In the case of an abrupt need to dispose of these illiquid assets, the similarity in portfolios and rapidly falling prices could transmit the shock quickly through the entire financial system.

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[6] For the details of the FSB overall policy approach, see FSB (2011), FSB (2013a), FSB (2013b), FSB (2019a), FSB (2020d).

[7] See FSB (2019d, and 2020b), IMF (2018).

[8] See IMF (2019), CGFS (2018b).

The NBFI policy framework developed so far has been based mainly on micro-prudential tools, looking at individual institutions and activities. However, as pointed out by Signorini (2018), the focus of the regulatory action for NBFI should not be (or should not only be) the stability of individual entities. Since the risks stemming from the assets under management are borne almost entirely by the final investors, the failure of a large asset manager may aggravate frictions in financial markets, for example through fire sales of assets. These externalities have the potential to impair the liquidity and the capital positions of the other financial institutions and are likely to be aggravated depending on the size of the defaulting entity and on the level of concentration in the asset management markets. Pro-cyclicality, herding behaviour and highly correlated assets create the scope for bubbles and high volatility, as prices may become disconnected from the underlying economic fundamentals.

The nature of these externalities, coupled with the growing importance of financial markets (rather than individual institutions) in the allocation of risks, tend to reduce the desirability, as well as the effectiveness, of policy measures centred exclusively on micro-prudential tools. Regulators should pay more attention to the effects on the financial system as a whole (and on the real economy) of the collective actions and activities of the NBFI entities.[9] This could be considered as an input for the incoming debate among regulators on the costs and benefits of a transition from an 'entity-based' to an 'activity-based' model of supervision. Given the relevance of direct and indirect links between NBFIs and banks, it should be recognised that preserving the resilience of NBFIs is a key element for the stability of the banking system itself.

This wider approach is also at the centre of the work programme established by the FSB based upon the lessons of the March 2020 turmoil, which have stressed the importance to enhance the understanding of systemic risks in NBFI and the need to adopt a holistic approach to the various policies aimed at addressing NBFI externalities.

A key lesson from the GFC is that the effectiveness of micro-prudential tools could be strengthened only if they are accompanied by a comprehensive framework to assess systemic risk, including policy measures to address market failures arising from the NBFI sector. An essential pre-condition for a fully-fledged regulatory and supervisory framework for the NBFI sector relates to the need for high-quality, internationally comparable and granular data, including on the links between intermediaries active on different markets and instruments, in order to establish a regular and far-reaching monitoring of the underlying risks and to propose policy tools specifically oriented to mitigate them.

The definition of a framework to assess systemic risk could benefit from a different use and orientation of existing supervisory tools. A useful term of reference could be the more widespread use of stress testing techniques in bank supervision, which since the GFC have been included in the regulatory toolkit in many jurisdictions. In this context, there is the need to enhance the ability of supervisors to assess the relative importance of the different transmission mechanisms.

As to the main building blocks of a new framework, the paper draws attention to the need to enlarge the scope of the regulatory perimeter on NBFIs through policy measures calibrated to the specificities of the various NBFI entities and products. These individual policy measures should be framed within an overall framework to assess systemic risk. On balance, the implied costs of this regulatory action could be considered lower than the medium-term advantages. In fact, once the lower incidence of

[9] See Signorini (2018).

financial crises and the reduced potential for systemic risk are factored in, the benefits in terms of financial resilience and economic growth could be substantial when evaluated over a long time horizon. Among the regulatory areas where progress is most needed are MMFs, which were at the centre of the March 2020 turmoil. In this respect, there is the need to reduce reliance on the constant net-asset-value (NAV) model, introducing a mandatory variable NAV. Moreover, in the field of rules affecting incentive alignment in securitization, there is the need to ensure a common approach in the various jurisdictions at the global level, limiting the scope for delays in their implementation, above all in the jurisdictions predominantly involved in these transactions.

Since risks tend to arise during periods of low interest rates such as the current one, and can migrate from one area to others, there are compelling reasons to act to bridge the regulation gap now. Fatigue associated with the implementation of the approved reforms is rising; pressures for a rollback of the post-GFC reform agenda are materializing (in part, motivated by the need to respond to the consequences of COVID-19). These tendencies should be resisted, since they could undermine the important progress made so far in improving financial stability.

1. The objective of this research

In the last ten years, the global financial system has undergone structural changes that have affected the intermediation channels between savers and investors, the functioning of markets and the configuration of systemic risks. Determinants for these changes include the evolution of the non-bank financial intermediation (NBFI) sector, [10] which has increased considerably over the past decade and plays today a key role in the financing of the real economy, as well as in the management of the financial assets of households and corporates.[11]

The NBFI sector is likely to expand even more in the years to come. Among the driving forces, one can recall the long-term increasing trends of the ratio of global wealth to income, of the size of global

[10] This paper follows the definitions adopted by the Financial Stability Board (FSB). In particular, the FSB defines the non-bank financial intermediation (NBFI) sector as a broad aggregate consisting of all non-bank financial entities that are not central banks, banks, or public financial institutions. It comprises mainly pension funds, insurance companies, and other financial intermediaries (OFIs). In turn, the OFIs include mainly investment funds, captive financial institutions and money lenders, central counterparties, broker-dealers, finance companies, trust companies, and structured finance vehicles. In addition, the FSB methodology includes the so-called 'narrow measure of NBFI', designed to draw the attention on the intermediaries/activities potentially posing bank-like risks to financial stability. Paragraph 6 *infra* offers a more detailed explanation of the FSB NBFI monitoring aggregates. In the FSB terminology, the term NBFI has replaced – since October 2018 - the term 'shadow banking', which referred to "credit intermediation involving entities and activities (fully or partly) outside of the regular banking system". This change has not affected the substance of the economic factors under investigation. McCulley (2007) first coined the term 'shadow banking'. For an overview of the FSB methodology and definitions, see FSB (2019a, 2020c and 2020d).

[11] See CGFS (2018) and FSB (2020c), which include as drivers for these changes other equally important factors, such as technological innovations, developments in the US dollar funding markets, and post-global financial crisis (GFC) market adjustments as well as prudential regulation reforms. Rajan (2005) offers a detailed analysis of the main developments that have changed the risk bearing capacity of the global financial and economic systems.

population and of the average life expectancy.[12] In addition, also important macro-financial factors are currently pushing in this direction (the accommodative monetary policies designed to deal with the COVID-19 induced recession, the search for yield on a global scale, as well as the increased relative cost of banks' lending caused by the post-global financial crisis (GFC) reforms). The rise of the asset management industry will receive further impulse in the near future, if we consider the high rates of growth of wealth, income, population, and ageing in the emerging market economies (EMEs), where at this stage the NBFI sector appears to be still below the levels of advanced economies (AEs).[13]

Because of the growing role of NBFI, credit risk is increasingly borne by investors and intermediated through financial markets (hence held outside the traditional and fully regulated banking system). As a result, financial stability tends to rely progressively more on the markets' ability to manage risks rather than on the capital positions of the individual banks. The shift of credit intermediation towards markets has made market liquidity an essential factor to ensure resilience. Moreover, the increased importance of NBFI in the supply of credit has determined higher degrees of interconnectedness among financial sectors and longer and more complex chains of intermediation. All these developments tend to alter the speed and diffusion of shocks in the global financial system.[14]

The latest available quantitative evidence confirms these trends. According to the 2020 monitoring report by the Financial Stability Board (FSB), the financial assets of the non-bank financial intermediaries (NBFIs) have risen to account for almost half (49.5 per cent) of the global financial system at the end of 2019, compared to 42 per cent in 2008. Following a trend lasting over a decade, at a global level in 2019 the rate of growth of NBFI (8.9 per cent) has outpaced that of the banking sector (5.1 per cent).[15] This expansion has been mainly driven by the collective investment vehicles (CIVs), which include a variety of institutions (for example, hedge funds, money market funds (MMFs), fixed income funds) engaged in activities involving significant liquidity and maturity transformations that may create bank-like risks to financial stability, whose assets have more than doubled from 2008 to 2018.

Since the GFC, there have been changes in the degree of interconnectedness among the NBFIs and banks, with non-secondary effects on the patterns of potential contagion within and across borders. FSB data document an increasing use of repo transactions as a source of funding. In 2019, the other financial intermediaries (OFIs) were net providers of cash to the financial system through reverse repos, while banks remained net recipients.[16] Particularly in jurisdictions that serve as hubs for international capital

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[12] Haldane (2014) estimates that its assets under management could reach $400 trillion by 2050.

[13] These trends are confirmed by the FSB 2019 figures, where the NBFI comprises on average 56 per cent of total financial assets in AEs against 27 per cent in EMEs. See FSB (2020d).

[14] See Visco (2013), FSB (2020c).

[15] At the end of 2019, the outstanding stocks of the assets of the NBFIs amounted to $200,2 trillion, compared to USD 155,4 trillion for banks and USD 30,5 trillion for central banks, within a grand total of USD 404,1 trillion for the financial system as a whole on a global scale. The growth of the NBFI sector was higher than banks in 25 out of 29 FSB monitoring jurisdictions in 2019. The credit activities of the NBFIs increased at faster pace than those of banks in 2019 and now account for almost 40 per cent of the total credit assets in the global financial system. Banks remain the largest single sector of the financial system in 22 FSB jurisdictions, while in the US, Canada, Netherlands, Luxemburg, Ireland, Switzerland, and Cayman Islands the largest single sectors are the OFIs, or pension funds. See FSB (2020d).

[16] OFIs repo assets and liabilities increased by 9.6 per cent and 8.5 per cent in 2019 to reach USD 4.6 and USD 4 billion respectively. Among OFIs, MMFs, trust companies, investment funds and structured finance vehicles (SFVs) are net providers of cash through repos, whereas broker-dealers, hedge funds and finance companies

flows, there are high levels of cross-border exposures of OFIs, which are in aggregate larger than for banks, with the highest figures in investment funds.

In March 2020, the COVID-19 shock has hit a financial system where the NBFI sector has become increasingly central in financing higher and growing levels of debt accumulation on a global scale.[17] The FSB "Holistic Review" of this market turmoil outlines that while core parts of the financial system (particularly, banks and market infrastructures) were able to withstand the shock, certain pre-existing vulnerabilities may have amplified the financial markets' reaction to the shock, prompting public authorities to step-in with a wide range of measures.[18] Important funding markets were severely affected and the demand for liquidity increased, given that there were sustained redemption requests (and outflows) from non-government MMFs and other open-ended funds, particularly those that offer redemptions on a daily basis and invest in less liquid and riskier assets (such as property, high yield corporate bonds, and bonds issued in emerging market economies - EMEs). The dislocation of prices from fundamentals was exacerbated by the difficulties faced by the broker-dealers in absorbing large sales of assets, including in core government bond markets (for example, in the case of the US Treasuries disposed of by leveraged NBFIs).

The March 2020 turmoil has highlighted how certain NBFI entities/activities can amplify shocks, both directly and through their interconnectedness with the other parts of the financial system (particularly banks). According to FSB (2020c), the major concerns stem from certain types of funds that do not adequately manage their liquidity positions and experience unexpected redemption requests from their investors. This can increase their susceptibility to runs during adverse market episodes, contributing to price dislocations and fire sale spirals.[19] Vulnerabilities may also result from increased leverage by certain investment vehicles (for example, hedge funds), which become more sensitive to movements in

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are net recipients. Banks' repo assets continued to increase in 2019 but at a slower pace than in the previous years. Measured as a percentage of banks assets, banks' use of funding from OFIs and banks' exposures to OFIs have remained stable in recent years, even though these links have increased in aggregate, while their use of funding from insurance companies corporations and pension funds have continued to decrease. In aggregate, banks' funding from the OFIs has exceeded their exposures to such entities. See FSB (2020d). See *infra* Box no. 1 for the technical aspects of the repo (and reverse repo) operations.

[17] FSB (2020c) delivers a detailed analysis (and timeline) of the financial developments that occurred during the March 2020 market turmoil. In particular, this report describes the two phases of the stress episode: in the first phase (flight to safety), from late February to early March, investors sold riskier assets and bought less risky ones; in the second, more severe phase (dash for cash), in mid-March, investors sold risky and safe assets to obtain cash or cash-like instruments. Finally, it illustrates the late March interventions by authorities, which allowed markets to progressively return to orderly conditions. On March 2020 turmoil, see also Schrimpf et al. (2020), Eren et al. (2020a and 2020b), and ECB (2020), Falato et al. (2020).

[18] Pre-existing financial vulnerabilities include: relatively easy financial conditions; higher debt accumulation; declining asset quality; stretched valuations in some asset classes; compressed risk premia; large amount of sovereign debt with negative yields; increasing search for higher returns; higher levels of leveraged loans (mainly via securitisation/collateralized loan obligations); greater reliance on dollar funding in EMEs. See FSB (2020c).

[19] A market dislocation is a circumstance where financial markets, operating under stressful conditions, cease to price assets correctly either on an absolute, relative or intrinsic basis. The term fire sale has been used extensively since the nineteenth century to describe a situation where firms tend to dispose of smoke-damaged goods at very low prices in the aftermath of a fire. In the financial markets, it refers to a forced sale of an asset at a dislocated price. See Shleifer and Vishny (2011).

asset prices in short-term funding markets during stress, thus further propagating risks across the system. The measures taken by central banks and financial regulators succeeded in restoring markets' functioning.

The underlying structural weaknesses that have amplified the March 2020 turmoil have not been fully addressed, meaning that the global financial system may still be subject to future shocks. All these events have highlighted the need to strengthen the resilience of the NBFI sector. Two factors have contributed to increase the policy attention by the FSB and the other international standard-setting bodies (SSBs) towards this sector:[20] 1) the post-GFC reforms affecting banks are essentially over, with a limited number of exceptions. The only issues remaining for the next few years will be the implementation of reforms and the evaluation of their effects over time; 2) given the increasing role of the NBFI, any delays in the implementation of the post-GFC NBFI reforms proposed by the FSB would raise significant risks for financial stability at the global level.

The relevance of these issues should not be underestimated. To this end, in order to avoid repeating the errors of the (recent) past, one should not overlook the role that the NBFIs played in the run-up to and during the GFC. The collapse of the NBFI sector during the crisis brought to the light the large amount of liquidity and credit tail risks that were hidden in the system. This under-pricing of tail risks fuelled the credit boom, but in the end, the collapse of the NBFI sector spread distress across the whole financial system and into the real economy. The operations of the NBFIs were interconnected with traditional banks and insurance companies, creating new channels for contagion and systemic risk. A key lesson emerging from the GFC is that the non-bank based intermediation should be re-designed with less leverage, less risky assets and maturity transformations to be able to survive periods of stress in the future.[21]

According to Signorini (2018), the focus of the regulatory action for NBFI should not be (or should not be only) the stability of individual entities (i.e. taking on a micro-prudential perspective). Since the risks stemming from the assets under management are borne almost entirely by the final investors, the failure of a large asset manager may aggravate frictions in financial markets, for example through fire sales of assets. These externalities have the potential to reduce the liquidity and the capital positions of the other financial institutions and are likely to be aggravated depending on the size of the defaulting entity and on the level of concentration in the asset management markets. Pro-cyclicality, herding behaviour and highly correlated assets could create the scope for bubbles and high volatility, even when these events occur away from the underlying economic fundamentals.

In this context, regulators should pay attention to the effects on the financial system (and on the real economy) of the collective actions of the NBFIs (i.e. adopting a macro-prudential perspective).[22]A key lesson from GFC makes it clear that the effectiveness of micro-prudential tools could be strengthened only if they are accompanied by a macro-prudential framework, containing policy measures to address the market failures arising from the NBFI sector.

Moreover, given the relevance of direct and indirect links between NBFIs and banks, it should be recognised that preserving the resilience of NBFI is a key element for the stability of the banking system

[20] See Signorini (2018).
[21] See Adrian and Ashcraft (2012), Lysandrou and Nesvetaiolova (2014), Abad et al. (2017), Aldasoro et al. (2020).
[22] See Signorini (2018).

itself. Since NBFIs are increasingly engaged in activities posing bank-like risks, the need to enlarge the perimeter of regulation may open the issue of the adequacy of the current scope of supervision (based on the so-called 'entity-based' approach) to control the entire spectrum of risks stemming from banking activities (no matter the entity providing them). In this regard, there is the need to investigate in detail how the alternative 'activity-based' approach could work in practice and to what extent this could trigger changes in the mandate of central banks and banking supervisors.

This wider approach is also at the centre of the work programme established by the FSB based upon the lessons from the March 2020 turmoil, which have stressed the importance to enhance the understanding of the systemic risks in NBFI and of the policies needed to address them.[23] While those features of the NBFI sector that contributed most to the GFC have been significantly reduced,[24] the implementation of the post-GFC regulation reforms is still at an early stage in important NBFI areas, [25] implying that NBFIs are still subject to divergent regulatory frameworks and adopt different structures and business models. These factors call for an urgent action to fill the regulation gap between the NBFI sector and the other parts of the financial system (banks and market infrastructures).

2. Outline of the paper

In this paper, I do not go through the details of the post-GFC regulatory response on the NBFI sector, as finalized by the FSB and the other international SSBs.[26] An in-depth analysis of this regulation is beyond the scope of this research.[27] Rather, I draw the attention to the economics of the non-bank based intermediation, the underlying mechanisms in some core functions, and the prevailing incentives structures of the intermediaries playing an active role in the sector.

The paper highlights the economic forces that account for the growth of the NBFI sector and the risks it involves for the financial markets and the system as a whole. In doing so, I examine the activities performed by the NBFI specialized institutions aimed at channelling credit from the original savers to the final borrowers through a long and complex intermediation chain.

Moreover, the paper focuses key macro-stability concerns that are still (in the post-GFC scenario) associated with the asset management industry, which should deserve greater attention when filling the regulation gap that still exists between the NBFI sector and the other segments of the financial intermediation (particularly banks). Finally, I go through the economic rationale underlying the case for a

[23] See infra Annex 1 for the details of the FSB initiatives to strengthen the resilience of the NBFI. In particular, the FSB work programme is organized along three main areas: i) analytical and policy work on specific issues (MMF resilience, liquidity risk management in open-ended funds, margining practices, liquidity and structure of core bond markets); ii) system-wide assessments (reinforced monitoring of NBFI risks, interconnectedness and systemic risks in the NBFI); iii) policies to address systemic risks in NBFI.
[24] See FSB (2020c).
[25] Box No. 4 *infra* provides the latest evidence on the implementation of the FSB NBFI reforms agenda. See also FSB (2020d).
[26] The main elements of the post-GFC NBFI financial repair are in: FSB (2011, 2013a, 2013b, 2013c, 2017c, 2017d, 2020b), and IOSCO (2012, 2019b, 2020).
[27] Moreover, this paper does not deal with the issues stemming from the involvement of the FinTech industry in the activities that can be associated to the NBFI sector and their implications for global financial stability.

comprehensive financial stability framework to address the NBFI risks and externalities, also outlining the main policy priorities.

In particular, I have organized this paper as follows.

- **Paragraph 3** provides the key elements of the economics of the non-bank credit intermediation, including the institutional features of this form of intermediation with respect to traditional banking, and the economic mechanisms underpinning the two most relevant functions of this sector (i.e. securitization and collateral intermediation);
- **Paragraph 4** presents the typical structure, drawn from the US experience, of the non-bank financial system, with a focus on the different categories of intermediaries performing its core functions (government-sponsored enterprises, bank holding companies, external or independent institutions);
- **Paragraph 5** reviews the main economic motivations that justify the existence (and growth) of the non-bank financial system, as identified by the academic literature with respect to the following themes: innovations in the supply of private money, agency problems in financial markets, fragility in funding markets and regulatory arbitrage, market failures in assessing tail risks;
- **Paragraph 6** details the economic function-based approach developed by the FSB to detect risks in this system and the economic rationale behind the main post-GFC policy measures;
- **Paragraph 7** draws the attention on important macro-stability concerns associated with the non-bank financial system (fire sales of financial assets, asset correlation, and pro-cyclicality and herding behavior of asset managers). These macro-stability issues are still operating in the years that have followed the GFC;
- **Paragraph 8** provides the economic rationale underlying the case for a comprehensive framework to address systemic risk in NBFI. This new framework should be seen as a tool to complement the micro-prudential approaches developed so far;
- **Paragraph 9** outlines the main building blocks of the new framework. They can be the following: determining the correct pricing of backstops; resolving the potential trade-off between systemic risk and intermediation costs; mitigating the risk of runs on MMFs; resolving the agency problems present in some NBFI transactions; regulating dealer banks.
- **Paragraph 10** concludes on the need to fill the regulation gap now.

3. The economics of non-bank credit intermediation

In the traditional (and regulated) banking system, savers give their money to banks in the forms of deposits that the banks use to fund loans to borrowers; in addition, banks issue debt instruments and

equity to support their lending activities[28]. This credit intermediation, which occurs under a single balance sheet, implies credit, maturity and liquidity transformation activities.[29]

Since banks' failures can have adverse consequences on the economy, in order to minimize the risk of runs in the banking system, governments protect banks by providing them with liquidity (through access to the lender of last resort function of central banks) or credit guarantees (via the activation of deposit insurance companies systems by public agencies). Moreover, the incentives to excessive risk-taking and leverage stemming from these transformation activities motivate the adoption of forms of prudential regulation and supervision within a range of socially-accepted levels of stringency. This traditional form of financial intermediation has been predominant in the modern financial systems from the Great Depression of the 1930s up to the 1990s.

Over the years, financial intermediation activities involving maturity and liquidity transformation and credit risk transfer taking place outside of the institutions having direct access to public backstops have grown significantly. The majority of these activities are conducted mainly by entities outside the regular banking system. However, some of them are conducted by regulated financial institutions (such as banks and insurance companies), thus creating the conditions for a higher degree of interconnectedness between the different sectors of the financial system.

3.1 An institutional framework for non-bank credit intermediation

Pozsar et al. (2013) have developed a framework to analyze the modern system of the financial intermediation through the variety of enhancements supporting the individual types of activities performed by banks or by 'other intermediaries'.[30] Their starting point refers to the fact that credit intermediation is usually enhanced by liquid and credit guarantees (in the forms of liquidity and credit put

[28] Savers that hold banks' deposits do not have to monitor the credit quality of the bank's borrowers, because this monitoring activity is delegated to banks. Moreover, they do not have to worry about the availability of their money when needed, or about the solvency of their banks, because public policies and authorities (central banks and regulators) play a role in taking care of the liquidity and the soundness of banks liabilities and activities. See Diamond (1984), Ciocca (1984).

[29] Credit intermediation refers to the enhancement of the credit quality of the debt issued by the intermediary through the use of priority of claims (for example, the credit quality of senior deposits is better than that of the underlying loans due to the presence of junior equity). Maturity transformation implies the use of short-term liabilities (e.g. deposits) to fund long-term activities (e.g. loans), which creates liquidity for the savers but exposes the intermediary to rollover risks. Liquidity transformation involves the use of liquid instruments to fund illiquid assets (for example, a pool of illiquid loans might trade at a lower price than a liquid rated security secured by the same loan pool, as the assessment of the latter by rating agencies would reduce information asymmetries between borrowers and savers). For these definitions and mechanisms, see Adrian and Ashcraft (2012), Pozsar et al. (2013).

[30] This approach is still valid in its main founding components and derives from the analytical contribution originally developed by Merton (1977), which applies the option pricing theory to the functioning of deposit insurance companies and the pricing of loan guarantees. Merton and Bodie (1993) elaborated a functional approach to financial intermediation, which tries to explain the role of financial intermediaries through the amount of risk sharing they are able to produce via guarantees. Levitin and Wachter (2011) have provided a quantitative assessment of the supply of mortgages depending on implicit guarantees in the US in the years prior to the GFC.

options) provided by third parties, which can be public or private. When these guarantees stem from the public authorities, credit intermediation is said to be 'officially enhanced'.

In the US, for example, the public backstops available to banks take the form of the Federal Reserve's discount window or the deposit insurance companies provided by the Federal Deposit Insurance Corporation (FDIC). For the other intermediaries, private liquidity put options are in the form of contingent (off-balance sheet) credit lines by commercial banks, whereas private credit put options consist of guarantees or credit default swaps (CDS) provided by insurance companies or banks. These puts underpin the perceived risk-free and the highly liquid nature of most of the assets that are used as collateral for the liabilities issued by these 'other intermediaries'.

In this framework, the official enhancements (i.e. those provided by public authorities) are classified in the following four categories (depending on whether they are *direct or indirect, explicit or implicit*) measuring their respective level of strength:

1. **Activities with *direct and explicit* official enhancement** include the on-balance sheet funding of banks (e.g. deposits), liabilities of pension funds, debt guaranteed by public lending programs.
2. **Activities with *direct and implicit* official enhancement** include debt issued or guaranteed by the government-sponsored enterprises (GSEs),[31] which imply an implicit credit put to the taxpayers.
3. **Activities with *indirect* official enhancement** include off-balance sheet activities of banks (e.g. lines of credit to conduits, unfunded credit card loan commitments).[32]
4. **Activities with *indirect and implicit* official enhancement** include asset management activities (e.g. hedge funds, money market mutual funds (MMMFs), securities lending activities by custodian banks).

It is important to say that activities with an explicit enhancement benefit from public puts, while implicit enhancements might not work ex post. If credit intermediation activities take place without any form of official enhancement, they are labelled in this model as 'unenhanced' (for example, guarantees by monoline insurers, securities lending activities by insurers or pension funds). According to these authors, non-bank credit intermediation (NBCI) includes those activities that are *implicitly enhanced, indirectly enhanced, or unenhanced* by official guarantees established on an ex ante basis.[33] For example, the securities lending activities of insurance companies, pension funds and some asset managers do not

[31] See *infra* paragraph 3 for more details on the structure of the non-bank financial system and the role of the government-sponsored enterprises (GSEs).

[32] Because of reasons pertaining to regulatory capital arbitrage, these activities have been on an increasing path, above all in the years before the financial crisis of 2007-09.

[33] In particular, activities with direct implicit official enhancement include agency debt issued by GSEs. Activities with indirect explicit enhancement include credit lines to NBFIs by depository institutions, agency mortgage-backed securities (MBS) issued by GSEs, commercial papers issued by diversified broker-dealers, investment bank holding companies, finance companies, bilateral repos by credit hedge funds and money market intermediaries. Activities with indirect implicit enhancement include asset management and affiliate borrowing from depository institutions and tri-party repos by diversified broker-dealers. Finally activities unenhanced include securities lending by insurers and pension funds, financial guarantees by mortgage and monoline insurers, short-term liabilities (typically USD 1 NAV, see for this *infra* Box no. 1) of money market mutual funds (MMMFs), asset-backed commercial papers (ABCPs) issued by single or multiple-seller conduits, structured investment vehicles (SIVs). For an overview of the complete topology of the NBFI activities falling in the four categories, see the table No. 1 in Pozsar et al. (2013).

have access to official liquidity put. In other words, non-bank credit intermediation is defined as credit intermediation taking place without explicit public liquidity and credit guarantees.[34]

The main risk transformation activities performed by the non-bank credit intermediation are executed by specialized institutions, which are linked together along an intermediation chain, via collateral or guarantees, and may involve the balance sheets of many entities.[35] The stylized example of such a chain refers to loans originated by a finance company, pooled and warehoused by broker-dealers, whose syndicate desks structure them into asset-backed securities, which receive ratings by external agencies and are funded by mutual money funds.[36]

The following table offers a stylized view of the most relevant structural features (categories of intermediaries, transformation activities, number of institutions, backstops, funding sources) that distinguish the different models of credit intermediation explained so far (traditional banking, non-bank credit intermediation, and direct market-based intermediation.[37]

Table No. 1: The structural features of the credit intermediation models

Models of credit Intermediation	Traditional Banking	Non-Bank Credit Intermediation (NBCI)	Direct Market-Based Intermediation
Intermediaries	Commercial banks	Structured Investment Vehicles (SIVs), Asset-backed Commercial Paper (ABCP) Conduits, Money Market Funds (MMFs), etc.	Direct lending from pension /private equity/long-term asset funds
Transformation activities	Credit, Maturity and Liquidity	Maturity, Liquidity, Credit risk transfer, Credit enhancement	Less enhancement and less opaque than NBCI
Institutions	Single entity	Can be many entities, interconnected via collateral chains, guarantees, economic functions	Single o very few
Official enhancement (discount window or deposit insurance companies)	Yes	No, only indirect access, via credit enhancement or implicit guarantees by traditional banks	No
Implicit or indirect enhancement	No	Yes	No
Funding	Deposits (retail or wholesale) and other forms of debt	Highly runnable short-term liabilities (mainly wholesale)	Long-term liabilities less runnable than NBCI

[34] See Adrian and Ashcraft (2012).

[35] Gertler and Boyd (1993**)** and Corrigan (2000) are first examples of analysis of the respective roles of commercial banks and market-based financial system in credit intermediation.

[36] See *infra* paragraph 3.2 for an overview of the underlying economic mechanisms of the non-bank credit intermediation.

[37] For more details on this table, see Adrian and Jones (2018). The reference to the direct market-based lending is for completeness, since the model is not dealt with in this paper.

Before the GFC, the non-bank financial institutions (NBFIs) were assessed to be safe and viable because of liquidity backstops and tail-risk insurance companies provided by the private sector (namely commercial banks and insurance companies).[38] As the solvency of these private backstop providers was called into question, NBFIs underwent severe stress and many of them failed. The failure of the private sector guarantees to keep the NBFI sector safe was due to the underestimation of the aggregate risk and asset prices correlations by most of the actors involved in the intermediation process (credit rating agencies, risk managers, investors, and regulators).

This underestimation allowed financial institutions "to hold insufficient amount of capital against the puts that underpinned the stability of the shadow banking system which made these puts unduly cheap to sell. As investors also overestimated the value of private credit and liquidity enhancement purchased through these puts, the result was an excess supply of credit. In addition, the likely under-pricing of public sector liquidity and credit puts would have provided further incentives to risk-taking behavior".[39] These actors did not take into consideration that – especially in periods of stress – the prices of highly rated structured securities tend to be much more correlated.[40]

Acharya et al. (2011) show that the majority of these guarantees were structured as liquidity-enhancing guarantees aimed at minimizing regulatory capital instead of credit guarantees and that most of the conduits were supported by commercial banks subject to most stringent prudential requirements. It was only with the activation of a series of official liquidity facilities and guarantees – direct reaction to the liquidity and capital shortfalls of the NBFIs - that the financial system was eventually stabilized.[41] These

[38] These private backstops allowed NBFIs to issue highly rated and liquid short-term liabilities. However, they act as a transfer of systemic risk from banks to NBFIs.

[39] See Pozsar et al. (2013).

[40] Coval et al. (2009) show how, in the case of a systemic crisis, the price behaviour of different assets move together as investors and leveraged institutions are compelled to shed assets in order to create the liquidity necessary to meet margin calls.

[41] I refer here to the following programs finalized by the Federal Reserve during the crisis.

1) The *Term Auction Facility (TAF)*, which provided term funding for commercial banks, replacing the term funding of the ABCP markets (see for the details of this program Armantier et al. (2008)).

2) The *Primary Dealer Credit Facility (PDCF)*, which allowed primary dealers to obtain funds from the Federal Reserve against their tri-party repo collateral, thus permitting the dealer sector to have access to the last-resort lending just like depository institutions and preventing the fire sale of the underlying collateral of the tri-party repo markets (see Adrian et al. (2009)).

3) The *Term Securities Lending Facility (TSLF)*, which allowed dealers to exchange mortgage collateral against Treasury collateral. This facility provided a backstop for asset types that were experiencing illiquidity by permitting dealers to swap those less liquid asset types for Treasuries to be used to obtain secured funding (see Fleming et al. (2010)).

4) The *Commercial Paper Funding Facility (CPFF)* and the *Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF)*, which offered funding source to commercial paper issuers that replaced money market funding after the collapse of Lehman. The former acted as a backstop for commercial paper issuers and the latter as an explicit backstop to money market mutual funds (see Adrian et al. (2011)).

5) The *Term Asset-Backed Securities Loan Facility (TALF)*, which helped market participants to meet the demand of credit of households and small firms, by supporting the issuance of asset-backed securities (ABS) collateralized by several categories of loans (such as auto loans, student loans, credit cards loans or commercial mortgage loans (see Ashcraft et al. (2012), Campbell et al. (2011)).

facilities have the common feature to widen access to the lending of last resort function by central banks to the entities of the NBFI sector.

3.2 The economic mechanisms of securitization and collateral intermediation

In this paragraph, I examine in detail the economic mechanisms underpinning the two NBCI functions that have a larger role and are most relevant in terms of financial stability: securitization and collateral intermediation. Similar to traditional banking, these functions transform risky, long-term assets into short-term, money-like instruments.[42] However, these activities are often executed outside of the traditional banking system and involve a wide array of specialized financial institutions.[43] These NBFIs intermediate credit to the economy through several securitization and secured funding techniques, including asset-backed commercial paper (ABCP), asset-backed securities (ABS), collateralized debt obligations (CDOs), and repurchase agreements (repos).[44]

In this process, credit, maturity and liquidity transformations are ensured by an economic mechanism substantially different from traditional banking. In particular, the transfer of credit risks takes place through the tranching of cash flows from the loans into equity, mezzanine and long-term AAA rated securities. The transfer of maturity risks requires that the long-term AAA securities are sold to an external vehicle funded in short-term money market (mainly through ABCP in the years before the GFC), thus transforming a long-term asset into a short-term one.

The transfer of liquidity risks occurs when the short-term instrument is made liquid through puts - the obligation from banks to provide liquid support to the vehicle - and by having the money market funds holding the assets to issue stable net asset value claims to their investors.[45]

Box No. 1: A categorization of non-bank financial intermediation

Asset-backed commercial paper (ABCP) and special purpose vehicles (SPVs)

ABCP is a short-term commercial paper collateralized by a pool of financial assets to fund long-term assets. They have provided funding flexibility to borrowers and investment flexibility to investors

[42] This issue has been materially mitigated in jurisdictions that have adopted the new Basel Committee for Banking Supervision (BCBS) rules of 2014 (as amended in 2016, 2018 and 2020). These rules, with the precise scope of reducing the liquidity risk inherent in securitization transactions, have introduced clear restrictions on differences in maturity between the tranches issued by the SPV and the securitized portfolio. In the EU, for instance, the framework envisages that the security issued in the context of short term securitizations (i.e. ABCP programme) shall have a maximum maturity of one year and that the pool of underlying exposures shall have a remaining weighted average life of not more than one year (and none of the underlying exposures shall have a residual maturity of more than three years).

[43] While it is true that securities and tranches issued by SPVs and conduits are often bought by NBFIs, banks continue in any case to be involved in the transactions. Indeed, in long-term securitizations (i.e. non-ABCP), originating banks often maintain positions towards the securitizations (mainly the senior tranche) well beyond the retention requirement. Also, in short-term securitizations (i.e. ABCP programme) sponsoring banks provide liquidity and credit support to the conduit, thus continuing to be exposed to the risk of the transaction.

[44] See infra Box No. 1 for the technical details of these operations.

[45] See Claessens et al. (2012).

since the 1980s and became a common source of warehousing for asset-backed securities (ABS) collateral since the late 1990s. ABCPs are issued by special-purpose vehicles (SPVs), such as ABCP conduits or special investment vehicles (SIVs). These are specialized financial institutions performing maturity transformation activities, issuing ABCPs, medium-term notes (MTNs), and long-term notes (LTNs), to fund securitized assets (see infra in this box).

In order to obtain better credit ratings on their liabilities, the SPVs receive support (in the forms of backup lines of credit/liquidity) from commercial banks or other non-bank financial institutions (NBFIs), acting as sponsors. These sponsors cover rollover risks and the credit risk (in full or in part) of the underlying assets. SPVs are bankruptcy-remote institutions, in the sense that the collateral supporting the ABCP is not affected by the possible failure of the institution providing backups. While some SPVs operate independently of any other institution, some SPVs are closely associated with financial or banking groups.46 In this latter case, the SPVs are in the condition to get higher ratings (or low interest rates), since they benefit from the so-called implicit support from the associated banking group.

The maturity of ABCP is usually less than 6 months, exposing the issuer to rollover risks. Over the years, the ABCP conduits expanded from the financing of short-term receivables as collateral to a wider array of loans (credit cards, auto loans, student loans, and commercial mortgages), thus performing larger amounts of maturity transformation. Covitz et al. (2012) study in depth the collapse of the ABCP market during the GFC and the cases of runs that occurred for more than 100 programs (representing one third of the market at that time).

Asset-backed securities (ABS)

Securitization is the centerpiece of the NBFI system, as credit originators manage to sell pools of credits to other institutions, transferring the credit risk embedded in these positions. It represents the major form of financial innovation in the last decades. Adrian and Ashcraft (2012) outline that asset-backed securities (ABS) are collateralized claims on pools of loans (such as credit cards, auto loans), mortgages or other receivables (such as aircraft leases). A crucial aspect of this mechanism is the 'tranching'. An ABS is tranched into different levels of subordination (e.g. senior, mezzanine, equity tranches), which are characterized by an increasing risk profile. It receives differentiated credit ratings (even if equity tranches are very rarely rated) and guides the absorbency of losses in the collateral pool or the distribution of the income flows from the underlying assets according to the specified and fixed order of priority, giving preference to the higher tranches.

Securitized products such as ABS are sold to banks and to other NBFIs and perform credit and liquidity transformation. A special form of ABS is the collateralized debt obligation (CDO), which is an obligation collateralized upon a limited number of underlying assets. When the collateral of a CDO is ABS, it is called ABS CDO; when the collateral is a pool of residential or commercial mortgage-backed securities (R- or C-MBS), the CDO is called collateralized mortgage obligation (CMO). Collateralized loan obligations (CLOs) are CDOs with syndicated loans as collateral.

Repurchase agreements (repos) and securities financing transactions (SFTs)

Repos consist of the sale of assets (typically securities) with an agreement that the seller will buy back the securities at a specified price, at a future date (normally within 3 months) or on demand.

[46] See for details, Adrian and Ashcraft (2012), Gola et al. (2017).

The same transaction is a reverse repo from the point of view of the buyer of the securities. In this contract, the party buying the collateral (i.e. the securities) acts as a lender. This explains why repos are typically over-collateralized, that is the difference between the value of the collateral and the sale price is positive (the repo haircut) and the repurchase price is higher than the sale price (this difference is the repo rate, acting as an interest rate for the lender). The collateral received in repos can be used to collateralize other types of transactions. For example, it can be used as margins in connection with over-the-counter (OTC) derivatives transactions. These typologies of contacts are also named bilateral repos.

SFTs are transactions in which an institution lends securities against appropriate collateral, subject to a commitment that the borrower will return equivalent securities at a future date or on demand. This contract is driven by the demand of specific securities and is used for short selling or settlement purposes. The STFs are a key channel of transmission of monetary policy and is also used for market making activities. These transactions are used by NBFIs to increase their leverage and to perform liquidity and maturity transformations.

A tri-party repo is when a clearing institution (usually a bank) stands between the two original parties, managing the accord (and holding the collateral). This structure ensures that both the borrower and the lender are each protected against the default of the other, as the collateral resides with the third party.

Adrian and Shin (2009) study the growth of the sector since the 1980s. They find that investors in tri-party repos are typically MMFs, while the borrowers are securities dealers with inventories of securities to finance. Moreover, they show the high degree of pro-cyclicality embedded in the balance sheets of these institutions. Adrian et al. (2013) examine the details of the various forms of repos and securities lending and the roles of these transactions in directly funding the NBFI system before and during the GFC. Copeland and al. (2011) document that during the GFC several hundred billion dollars of collateral in the tri-repos were equities, private ABS, and corporate securities with no eligibility for public backstops.

Money Market-Mutual Funds (MMMFs)

Money market-mutual funds (MMMFs) are open-ended mutual funds that invest in short term securities (e.g. Treasury bills, ABCPs, repos). The MMMFs were created in response to the US Regulation Q in 1971, which provided a ceiling for the interest on banks' deposit accounts and have represented since then a more profitable alternative to banks' deposits (their market share on savings rose constantly in the years prior to the GFC).

MMMFs typically offer immediate redemptions of their shares at a defined price, while investing in long-term assets that may prove difficult to liquidate. In a crisis, the risk profile of such entities can deteriorate quickly, as they may not be able to reassure investors of their liquidity and safety. As a result, confidence shocks can generate massive and rapid requests for redemptions from MMMFs shareholders, creating large-scale sales of assets to meet the demand for redemptions with the potential to trigger a systemic event.

MMMFs that are able to stabilize the net asset value (NAV) are said C (Constant)-NAV MMMFs, meaning that they are able to maintain a negligible difference between the market prices of their assets and the value of the fund's shares. MMMFs use the daily market price of their securities to track the price of their shares. The deviation between the two values must be less than USD 0,005

per share that is their objective is to ensure a stable NAV at USD 1. If the deviation is larger, the fund's NAV goes below this threshold and the fund is said to 'break the buck'.

C-NAV MMMFs are more exposed to runs than V (variable)-NAV MMMFs, because investors attend to react strongly if the fund breaks the buck: in the case of a crisis, they have a strong incentive to redeem before the other investors do (the so-called first-mover advantage).

However, V-NAV MMMFs as well can be exposed to huge redemptions; the phenomenon is smoothed since investors are confronted in a transparent way with the daily change of fund's assets prices. In the event of a tail-risk materializing, as it was the case in September 2008, the US Reserve Primary Fund - a MMMF with substantial exposures to Lehman - broke the buck, after the collapse of Lehman, triggering a run on the market of MMMFs and fire sales on the other securities. In such an event, MMMF investors and managers internalized the consequences of the absence of guaranteed credit and liquidity supports from the official sector for their activities.

These transformation activities require the 'vertical slicing' of the traditional (i.e., undertaken by banks) financial intermediation and includes the following seven economic steps:

1. **Loan origination,** performed by finance companies, mainly including auto loans and leases, mortgages, which are funded through commercial paper (CP) or medium term notes (MTNs);
2. **Loan warehousing,** performed by single- or multi-seller conduits and funded by asset-backed commercial papers (ABCPs);
3. **Pooling and structuring of loans into asset-backed securities (ABS),** issued by broker-dealers through syndicate desks;
4. **ABS warehousing,** facilitated through trading books and funded mainly by repurchase agreements (repos);
5. **Pooling and structuring of ABS into collateralized debt obligations (CDOs),** conducted by broker-dealers;
6. **ABS intermediation,** performed by limited-purpose finance companies, structured investment vehicles (SIVs), credit hedge funds, and funded mainly by repos, ABCPs, MTNs;
7. **Wholesale funding.** The funding of all the above activities and entities is conducted in wholesale markets by regulated and unregulated institutions (for example, MMMFs, securities lenders, pension funds, insurance companies).[47]

Each of these steps requires a specific specialized institution, in some cases also with the involvement of traditional commercial banks or insurance companies.[48] Not all intermediation chains involve all these seven steps. In general, the poorer the quality of the underlying loan pool at the start of the process, the longer the chain will be. The story always begins with the origination of loans and always ends with wholesale funding. Moreover, each NBFI appears only once in the process. Historically, the

[47] For this order in the seven economic steps, see Pozsar et al. (2013) and Adrian (2014).

[48] In the case of the traditional banking, credit, maturity and liquidity risks are transformed within a single balance sheet, involving one entity (i.e. the bank itself). In the case of the non-bank credit intermediation, the long chain obscures sensitive information to investors about the creditworthiness of the underlying collateral. The transformation of loans into securities, securities into repos, and repos into private money market funds makes it difficult for investors to understand the ultimate risk of their exposure.

securitization-based intermediation has accommodated the fast growing (above all in the years prior to the GFC) demand from (large) corporations, asset managers, and institutional investors for safe, short-term, liquid 'money-like' claims where to invest their (sizeable) cash balances.[49]

According to Adrian and Shin (2009), in the run up to GFC, securitization increased the fragility of the entire financial system by allowing banks and other intermediaries to leverage up by buying one another's securities. They document the increasing importance of market-based finance since the 1980s and find that typically peaks of leverage by financial institutions were associated with the onset of financial crises (as was the case in 1987Q2, 1998Q3, 2008Q3). This trend was most pronounced in the US, but it became common also to other jurisdictions. Securitization rather than transferring risks to the other parts of the economy and diversifying them had the effect to concentrate the risks within the banking (and financial) system, given the strong incentives banks (and the other institutions) had to buy others' securities with borrowed money to increase their short-term profits. In aggregate, this higher leverage allowed banks to make more loans, also by lowering lending standards, although this ultimately occurred at the final cost of more losses given that the resulting bad loans were held on their balance sheets rather than being passed them on to other investors (as in the sub-prime mortgage episode in the US).[50]

Another factor explaining the growth of this type of intermediation in the years preceding the GFC was the demand from banks for securitized long-term AAA securities to be used as collateral to attract repo funding. Doing so, banks were in a position to increase their leverage (and profitability) at better conditions and in larger volumes than with traditional liabilities (deposits, unsecured funding).[51] Over the years, these collateral-based transactions, including secured funding, securities lending, and hedging (including with OTC derivatives), used as collateral a wide range of assets of varying quality (from Treasuries to CCC-rated bonds or equity).

This collateral-based intermediation process involves the intensive re-use of collateral, where the same asset is able to support a larger volume of financial transactions and is dominated by a small number of large dealer banks.[52] According to Singh (2012a), the collateral intermediation function benefits the

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[49] Global level evidence suggest that a large share of the demand for savings instruments comes from corporations and institutional investors and the GFC has not reversed this trend. In this way, a significant portion of households' long-term savings is transformed into short-term claims. Many authors refer to this case as a 'reverse maturity transformation'; see Claessens et al. (2012).

[50] The evidences described in the paragraph have been mitigated in jurisdictions that have implemented the new BBCS rules of 2014 (as amended in 2016, 2018 and 2020).

[51] Prior to the GFC, banks increased their holdings of the senior securitization tranches also for regulatory arbitrage reasons. Securitization allowed banks to keep less capital if the securitized debt was held via affiliated investment vehicles that were funded in short-term money markets and relied upon both implicit (thus not bringing capital charges) and explicit credit and liquidity support from banks. Claessens et al. (2012) outline how in this way banks can contribute to pro-cyclicality, as they accumulate debt in booms and can fire sale assets in busts, while reducing the degree of risk transfer outside the banking system. However, it should be recalled here that the post-GFC financial repair has contributed to modify the regulatory incentives for securitization. Basel III has raised the cost to provide liquidity or off-balance sheet lines of credit to SPVs; accounting rules now require SPVs and conduits to be consolidated into balance sheets of banks; retention requirements are more stringent; disclosure provisions have been widened.

[52] The process begins with the dealer banks acting as sources of collateral. They receive this collateral from parties that require funding, or from agents willing to increase their returns, or by their direct acquiring treasuries. Then this collateral is pledged to other parties to obtain funding or support other contracts. This establishes a chain of repeated re-use of the same collateral to support multiple transactions. Other most

real economy, to the extent it facilitates financial transactions, offering higher returns to savers, and lowering funding costs to borrowers. However, the stock of the available collateral and the intensity of its use (the velocity) can change very rapidly, as higher concerns on counterparty risks or increased general risk aversion reduce investors' propensity to undertake securities lending or borrowing.

The NBFIs perform such activities without the direct and explicit access to the discount window of central banks or the protection of the deposit insurance system. Since the paper by Diamond and Dybvig (1983), a large amount of literature identifies reliance on short-term liabilities to support long-term (and often illiquid and opaque) assets as an inherently fragile activity that has the potential to expose the intermediaries performing such a transformation to runs.

In the years prior to the GFC, the NBFIs greatly contributed to the increase of credit availability, the reduction of funding costs, and the appreciation of real asset prices. Based upon Adrian (2014), traditional bank liabilities have been constant around 70 per cent of GDP in the years 1960-2014. NBCI activities have grown from less than one per cent of GDP in 1960 to over 70 per cent at the end of the observed period, with a peak close to 80 per cent in mid-2007, just before the GFC.[53] When the system collapsed, the essential components of this intermediation chain contributed to exacerbate the costs of the crisis.

4. The structure of the non-bank financial system (the US case)

The NBFI involves entities and activities that are outside the regulated banking system and with a lower degree of regulation and supervision, which follow divergent patterns and business models across jurisdictions. This feature does not imply that traditional banks are not active in this segment of intermediation. A better understanding of the structure of the NBFI system and the close links between bank and non-banks is a central issue in this context. The institutional approach has outlined how banks or banking groups extend backup lines of credit that allow independent or off-balance sheets entities to issue short-term liabilities or house money market funds or the different types of entities related to securitization.

With reference to the US financial system, this paragraph identifies three different categories of intermediaries that perform NBFI activities: government-sponsored enterprises (GSEs); banking holding companies (BHCs); and external or independent institutions.[54]

4.1 Government-sponsored enterprises (GSEs)

The modern NBFI system has many drivers stemming from the securitization activities performed by the government-sponsored enterprises (GSEs) that go back for decades in the history of the US financial system. In the US, the GSEs include the Federal Home Loan Bank (FHLB) system established in 1932, the Federal National Mortgage Association (Fannie Mae), created in 1938, the Government National

common sources of collateral include hedge funds, insurers, pension funds, and sovereign wealth funds, money market funds, which can act also as new pledgers within the chain.

[53] These figures are based on US Flow of Funds data (published by the Federal Reserve), and data by the US Bureau of Economic Analysis. For more details, see Adrian (2014).

[54] See Adrian and Ashcraft (2012), and Pozsar et al. (2013).

Mortgage Association (Ginnie Mae), established in 1968, and the Federal Home Loan Mortgage Corporation (Freddie Mac), created in 1970. [55]

Like banks, GSEs fund their assets with a maturity mismatch; unlike banks, GSEs are funded not by deposits but through capital markets, by issuing short and long-term securities. GSEs are classified as NBFIs according to the four-category framework explained above: markets have constantly perceived their liabilities as being implicitly guaranteed by the US taxpayers; they have never had access to the lender of last resort function of the Federal Reserve and the federal authorities have not insured their liabilities explicitly. GSEs have performed: intermediation techniques, such as term loan warehousing (provided to banks by the FHLBs);[56] credit risk transfer and transformation through credit insurance companies (provided by Fannie Mae and Freddie Mac); originate-to-distribute securitizations (provided by Fannie Mae and Freddie Mac); maturity transformations; pass-through mortgage-backed securities (MBS) funding of mortgage credit.[57]

Over the years, banks and other specialized institutions have adopted these techniques, making the case for a model-change for the whole credit process: from the traditional bank-centered, originate-to-hold (OTH) to the securitized-based, originate-to-distribute (OTD) model of intermediation. 58 In this respect, Box No. 2 infra provides the details of this model change, stressing its role among the determinants of the GFC.

4.2 Bank holding companies (BHCs)[59]

BHCs typically perform off-balance sheet NBFI activities through their subsidiaries.[60] Taking into account the seven economic steps in which the securitization process has been divided in paragraph 3.2, it is possible to verify the degrees of the likely involvement of the BHCs (and possibly their subsidiaries) in the entire process.

BHCs may originate loans in their subsidiaries and warehouse loans in off-balance sheet conduits, which may be managed by their broker-dealer subsidiaries (BDS), with funding through wholesale

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[55] Fannie Mae was privatized in 1968 in order to reduce the government debt. However, it continued to benefit from an implicit public guarantee.

[56] The GSEs have not been involved in loan origination, but only in loan processing and funding.

[57] The GSEs have securitized their loan and mortgage portfolios in pools of mortgage-backed securities (MBS). These MBS pass through interest and principal payments to the MBS holder, but the credit risk (and the default risk) remains with the GSEs. Freddie Mac issued the first pass-through MBS in 1971, Ginnie Mac in 1970, and Fannie Mae in 1981.

[58] See Bord and Santos (2012) for quantitative evidence of the involvement of banks in the OTD model of credit intermediation.

[59] The organizational complexity of BHCs in the US gives a proxy for their involvement in NBFI activities. Avraham et al. (2012) signal that – at that reference date - each of the five largest US BHCs had more than 1.500 subsidiaries (the largest one more than 3.000). Most of these subsidiaries are non-bank specialized financial institutions (MMMFs, hedge funds, finance companies, broker-dealers, trusts, asset management units, financial vehicles) operating in the US that do not have direct and explicit access to the Federal Reserve discount window or to the FDIC deposit insurance companies. According to Copeland (2012), these activities undertaken through subsidiaries explain a substantial share of the BHCs levels of profitability (calculated on a consolidated basis).

[60] Examples of these firms in the US include Citigroup and JP Morgan Chase.

markets. Moreover, BHCs may securitize loans through their BDS and transfer them from the conduit to bankruptcy-remote special purpose vehicles (SPVs). The safest tranches of the structured credit assets may be funded in off-balance sheet ABS special investment vehicles (SIVs), which are typically managed by the asset management subsidiary of the BHC, with backstops provided by the BHC subsidiary.[61]

Box No. 2: The roots of the global financial crisis: from the originate-to-hold (OTH) to the originate-to-distribute (OTD) model of intermediation

The economic literature has outlined the role of innovation, competition and regulation in reshaping – at least since the late 1980s - the traditional model of credit intermediation and in fostering the emergence of the OTD model of banking.[62] Under the traditional model, short-term funding and long-term lending occurred on banks' balance sheets (i.e. 'under a single roof'), and loans were held on (up to maturity) as investments; risks were hedged through reserves of liquid and safe assets to be used as buffers during downturns.

In the OTD model, loans are sold after origination and securitized into ABS. The senior tranches of the securitization are held by banks as investments in off-balance-sheet SIVs, which rely on short-term funding in the ABCP market, where funds are provided by MMFs. This pooling and tranching of loans has allowed banks to sell credit risk outside, using equity tranches and to set up a much smaller amount of capital against the underlying loans. As a direct implication, credit risk was increasingly absorbed by the capital markets and less by the banks' balance sheets, contributing to the observed increase in the aggregated risks across the financial system. Although the first MBSs were issued in the late 1970s, the securitization of increasingly more risky loans has generated a much more complex and opaque system in the following two decades.

The accumulation of large amounts of CDO tranches in SIVs and the build-up of securitization through conduits formed a network of highly levered off-balance-sheet vehicles that constituted the NBFI system. Unlike traditional banks, SIVs, ABCP conduits (and the other NBFIs) were funded by investors in the wholesale funding markets. Maturity transformation did not occur on banks' balance sheets but through capital markets in off-balance sheets vehicles, which are outside of the control of regulators and with no access to the safety nets of central banks.

Adrian and Ashcraft (2012) report that the first CMO was issued by Salomon Brothers and First Boston in 1983 for Freddie Mac, while the first CDO was from Drexel Burnham Lambert for Imperial Savings Association in 1987; CDOs and CMOs issuances peaked in 2007 and then totally collapsed afterwards. Prior to the GFC, R-MBSs and especially sub-prime R-MBSs and ABSs were increasingly recycled into ABS CDOs. High-grade CDOs recycled the senior tranches of R-MBSs and ABSs, while mezzanine CDOs recycled mezzanine tranches of the same structures.

[61] The use of off-balance-sheet securitization and asset management techniques has allowed BHCs and banks to hold less capital with respect to a situation where loans would continue to be on their balance sheet. Mandel et al. (2012) give an in-depth overview of sponsorships of NBFI activities by commercial banks.

[62] See Adrian and Ashcraft (2013), Pozsar (2008), Mian et al. (2010), Mishkin (2011), and Claessens et al. (2012).

To function properly the OTD model constantly needs liquid monetary and securities markets to intermediate credit through the wide array of assets originators (finance companies, commercial banks), asset packagers (broker-dealers) and asset managers (hedge fuds, SIVs, pension and insurance companies funds). In particular, the smooth functioning of the system relies upon the ability of the NBFIs to roll over their ABCPs, crucially depending on the quality of the structured underlying assets. If something in this long chain goes wrong, the whole NBFI system is at risk of collapsing, with effects spreading also on the regulated segments.

Pozsar (2008) describes the different stages of the crisis of OTD model in 2007. At the beginning, because of the rising delinquencies on sub-prime mortgages and the associated decay in the value of R-MBSs, SIVs and other conduits holding such structures were denied short-term funding in the ABCP and repo markets. As a consequence, they had to exercise their options (to protect themselves from losses) to sell defaulted loans back to their originators, while stopping from buying new mortgages, thus freezing the securitization market. Even that shield was soon broken, given that finance companies ran out of cash to buy back loans, determining the bankruptcy of some of them.[63]

In the US, during the second half of 2007 the FHLB system had to step in, funded by federally guaranteed debt, to buy all the mortgages that banks (and finance companies) originated to sell (but could no longer sell in the changed circumstances). Delinquencies and defaults also started in the RMBSs and ABS CDOs, causing the demise of Dillon Read Capital Management at UBS and two other hedge funds at Bear Stearns in the summer of 2007. As these funds were forced to unwind their positions, their assets were sold at fire-sale prices, reinforced by massive downgrades of the securitization structures, causing a further loss of confidence in the markets of structured products. MMFs quickly dumped all their ABCP holdings, triggering runs on the NBFI system as a whole.

This began in the summer of 2007 and peaked following the failure of Lehman Brothers in September 2008.Banks' capital ratios began being severely affected, as funding from ABCP dried up and the credit risk previously allocated to off-balance sheet vehicles returned on regulated banks' balance sheet, mainly because of the liquidity backstops provided to conduits and the reputational risks associated with the possible collapse of the SIVs. This forced banks to reduce lending, leading to important strains in the interbank markets.

Overall, these trends led to an increase in correlation across asset classes and increased volatility, causing prime brokers to raise margins and haircuts on repo markets. This dynamic culminated with the crises of the major stand-alone investment banks in 2008. This chain of events prompted the Federal Reserve to activate a number of facilities to provide liquidity against less liquid collateral, thus allowing the deleveraging to proceed in an orderly way and shielding the entire financial system.[64]

[63] This has been the case for New Century Financial.

[64] See footnote 39 *supra* for extensive references to the facilities activated by the Federal Reserve during the crisis.

Some lessons can be drawn from the above developments. Through the OTD model, the regulated banks created an outstanding amount of credit and liquidity guarantees out of proportion to their capital base (and a large part of this credit creation was not on the banks' balance sheet, since it was within the potential of the implicit support). Moreover, the OTD model encouraged the underwriting of some loans that would never have been made if the banks had to hold on to them up to maturity. Finally, the GFC has ascertained that the OTD model empowered NBFIs to grow very large relative to regulated banks, but without access to a safety net in times of crisis.

According to Visco (2013), the OTD model has contributed to increase the links between intermediaries and capital markets, with important consequences for financial stability. Even if a higher degree of interlinkages improves risk diversification and markets' resilient, a more interlinked financial system heightens the risk that contagion may spread more widely.

In this way the lending process no longer relies upon a single intermediary (the bank), but depends on a network of different entities, of which only the bank subsidiary of a BHC has access to the Federal Reserve discount window and to the deposit insurance companies of the FDIC. This intermediation chain has created the conditions for higher degrees of implicit (that is, off-balance sheet) leverage and interconnectedness within the financial system, thus raising the bar for systemic risk. In particular, the involvement of BHCs in NBFI activities directly related to securitization is substantial. According to Cetorelli and Peristani (2012), the market share of BHCs in ABS markets was in the years up to 2012 between 35 and 75 per cent for underwriting, issuance, and servicing and close to 100 per cent for trust services.

The GFC had led to a financial system where the BHCs owned a larger share of non-bank financial subsidiaries. For example, the largest independent broker-dealers prior of the crisis were all absorbed by BHCs; similarly for the largest independent issuers, originators, and servicers of mortgages.[65] However, in the years, another trend has emerged, partially reversing the previous one. Because of the effects of the post GFC tighter prudential requirements on BHCs, some NBCI activities have tended to migrate out of BHCs.

4.3 External or independent institutions

External or independent NBFI entities are institutions that are independent of any entities with direct and explicit public credit or liquidity puts, while performing also non-bank financial activities. This category consists of stand-alone broker-dealers, independent wealth managements that run MMMFs, credit hedge funds, finance companies affiliated with industrial companies (auto loan subsidiaries of car firms). Some of them – for example, non-bank affiliated SIVs, stand-alone MMMFs, independent issuers of securitized assets - do not have non-NBFI activities in their balance and off-balance sheets, given that they specialize only in NBFI activities.[66]

[65] Cetorelli and Peristiani (2012) show that, as of 2011, BHCs controlled almost 40 per cent of the assets of the largest insurance companies and MMMFs, and more than 90 per cent of the assets of the largest brokers and dealers.

[66] See Adrian and Ashcraft (2012).

While the 'internal' sub-system has been put in place by the BHCs for profitability reasons, the '*external' sub-system* has been the result of vertical integration and specialization by stand-alone entities. According to Poszar et al. (2013), this external subsystem is characterized by: 1) the credit intermediation process of diversified broker-dealers (DBDs); 2) the credit intermediation of independent non-bank specialist intermediaries; 3) the credit puts provided by private credit-risk repositories.

The first segment includes some of the largest stand-alone investment banks (as those operating in the US prior to the GFC, such as Goldman Sachs, Morgan Stanley, Lehman Brothers, Merrill Lynch)[67], which vertically integrated their securitization activities (from origination to funding), lending platforms, and asset management units. The independent-specialists-based credit intermediation process includes stand-alone finance companies on the loan origination side (examples of such firms in the US prior to the GFC included New Century Financial, Thornburg Mortgage, Capital One), independent multi-seller conduits on loan warehousing, and limited-purpose finance companies, independent SIVs and credit hedge funds on the ABS intermediation side.

Independent specialists, BHCs and DBDs rely heavily on private credit-risk repositories, which provide credit transformation services and include mortgage insurers, monolines, diversified insurance companies and credit hedge funds. These entities facilitate the securitization process by providing tail-risk insurance companies for structured credit products.[68] The various credit put options provided by these repositories absorb risks from loans and turn the enhanced securities into securities that do not bear credit risk. These credit puts of private credit risk repositories are similar in function to the forms of insurance companies provided by the GSEs (Fannie Mae and Freddie Mac) on their mortgage pools. This means that - at least prior to the GFC - any liability issued against these assets is perceived as being free of credit risk, just as it is insured by the FDIC.

5. The economic drivers of non-bank financial intermediation: an overview of the academic literature

From the above it is clear that most of the NBFI activities are performed outside the traditional (and regulated) banking system, since they do not enter the scope of the consolidated banking supervision. In this respect, I have outlined how banks may support – in the forms of contingent lines of credit or implicit potential support - independent or off-balance firms in issuing short-term liabilities. Moreover, BHCs own MMMFs and other NBFI entities and perform several types of securitization

[67] As a consequences of the GFC, two (Goldman Sachs and Morgan Stanley) of the formerly independent major investment banks have been transformed into bank holding companies, and one (Merrill Lynch) has merged with a bank holding company (Bank of America). Lehman went bankrupt and the dealer subsidiary was acquired by foreign banks. As a result, these investments banks are now regulated on a consolidated basis by the Federal Reserve, and are subject to the internationally agreed capital and liquidity standards. See Hoening and Morris (2013). For an overview of the rules affecting these large banking organizations, which have undergone significant changes through the years after the finalization of the Dodd-Frank Act in 2010 see Trapanese (2020).

[68] Different credit risk repositories correspond to specific stages of the NBFI intermediation process. Mortgage insurers specialize in ensuring whole mortgage loans. Monolines specialize in ensuring ABS tranches. Large insurance companies, credit hedge funds specialize in taking on the risks stemming from ABS CDOs tranches through CDS.

activities. This makes it clear that the close links between bank and non-bank credit intermediation should not be not overlooked while designing the appropriate policy response.

In the previous paragraphs, the economics of the NBFI has been framed within a framework based upon the embedded degree of liquidity and credit guarantees. The economic literature has identified a number of other explanations for the development of the NBFI system. In this paragraph, I briefly review the main strands of the academic debate with reference to the following issues: 1) innovation in the composition of money supply; 2) agency problems in financial markets; 3) market failures in assessing tail risks; 4) funding fragility and regulatory arbitrage.

5.1 Innovations in the supply of private money

In the economic literature the analysis of the role and functions of the financial institutions has been traditionally framed within a theoretical approach (the Walrasian paradigm), which points towards an economic system characterized by information symmetry and perfect equilibrium. Within the so-called "Old View", the attention is drawn solely upon banks, the specificities of which are identified in their contribution to the process of money creation, given the high degree of substitutability between banks' liabilities (i.e. deposits) and legal money issued by the central bank. In this context, the creation of money by the banking system is potentially unlimited, with severe repercussions on the stability of the economy. This calls for the introduction of controls on banks based on the reserve requirements for macro-economic stabilization purposes.

Tobin (1963) has introduced a "New View", where it is outlined the high substitutability of money not only with banks' deposits but also with other financial liabilities, within a more general theory on the portfolio's choices. According to Tobin, there are no substantial differences between the banks and the other financial intermediaries, given that both institutions create deposits (i.e. liabilities with a different degree of liquidity but all representing purchasing power). La "New View" underlines that the special role of banks in the financial system is due to their special regulation (especially in terms of reserve requirements and interest rate ceilings). Tobin stresses the need to extend the scope of regulation to the other financial intermediaries as well, in order to strengthen the effectiveness of monetary policy.[69]

An important strand of the economic literature outlines how the NBFI system creates additional money. This creation occurs primarily in the markets for commercial papers and repos and is funded by money market funds. Private money has the potential to compete as a substitute with the official money from central banks as well as with the current accounts issued by commercial banks. This happens because the credit support lines to NBFIs - deriving from traditional banks that have access to the official backstops - have the potential to reduce the cost of the non-bank liabilities, giving investors the presumption that they behave like money.

Gorton and Metrick (2011) have interpreted the non-bank credit intermediation as a financial innovation that has produced a change in the private money supply, thus complementing the high-powered money created by central banks (and the other broader forms of private money issued by commercial banks, such as checking and savings accounts). They stress the importance of supply side factors, where a series of innovations and regulatory changes have eroded the competitive advantage of

[69]See Laviola and Trapanese (1995).

banks (for example, the MMMFs were a response to the interest rate ceilings on demand deposits imposed by the Regulation Q at the beginning of the 1970s),[70] and demand side factors, where demand for collateral for financial transactions brought to the development of securitization and the use of repos as a money-like instrument.[71] In particular, according to these authors, non-bank money creation occurs primarily in the markets for commercial papers and repos funded by MMMFs, which have transformed their uninsured liabilities into instruments that look like insured deposits.

An important feature of MMMFs that makes the difference with other mutual funds is that they seek to keep a net asset value of USD 1 per share (for more details on this see Box. No 1). It is this feature that enables MMMFs to compete with insured demand deposits, while offering expectations for higher returns. The maintenance of this target was successful in the decades leading up to the crisis. This contributed to create in investors a sense of security, taking this implicit promise by MMMFs themselves to be equivalent to the explicit insurance companies offered by deposit accounts. These innovations in the composition of the aggregate money supply have made the financial system more exposed to a loss of confidence and runs by the holders of these money-like instruments. Schmidt et al. (2016) find that institutional investors (such as the MMMFs) behave as channels of transmission of contagion much more than retail investors.

The role of the non-bank liabilities as a money-like claim in the asset allocation decisions by the private sector has been analyzed by Sunderam (2015). He did so by documenting detailed evidence for the years 2001-2007 of the tight interlinkages between the markets for Treasury bills, central bank reserves, and short-term non-bank debt. The results of the model suggest that the demand for money-like claims was a significant driver of the growth of non-bank liabilities in the pre-crisis period, thus substantiating the basic premise of many explanations for the growth of the NBFI system. In particular, his estimates suggest that a substantial increase in demand for money can explain up to 50 per cent of the growth in ABCP in the years before the financial crisis.

Kacperczyk and Schnabl (2011) have examined the different patterns in risk taking of MMMFs depending on their organizational structure. In particular, they find material divergences between stand-alone funds and those belonging to larger holding companies, such as bank holding companies, which provide them with implicit liquidity or credit puts. According to their findings, during the financial crisis of 2007-09, stand-alone funds increased risk taking relatively more when systemic risk increased and holding companies were more exposed. By contrast in the years before the crisis, with low levels of systemic risk, MMMFs belonging to holding companies took on relatively more risk.

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[70] Gorton and Metrick (2011) outline how MMMFs took off in the mid-1980s, their assets growing from USD 76,4 billion in 1980 to USD 1,8 trillion by 2000, an increase of over 2.000 per cent. Assets of MMMFs represent one of the most significant financial product innovations in the last 50 years.

[71] The repo contract allows either party to unilaterally enforce the termination provisions of the agreement as a result of a bankruptcy filing by the other party. For example, a depositor can unilaterally terminate its repo with a bank when the bank becomes insolvent and sell the collateral. Without this protection, a party to a repo would have to act as any other creditor who must wait for the end of the failure proceedings in order to be repaid. For large depositors, like institutional investors, pension funds, mutual funds, states and municipalities, repos can thus act as a substitute for insured demand deposits. See for more details on this Gorton and Metrick (2012).

Moreira and Savos (2017) examine the impact of the non-bank private money instruments on macro-economic fluctuations. They build a dynamic macro-finance model of non-bank activities as fragile liquidity transformation. In the boom years, non-banks transformed risky loans into short-term money-like instruments held by households, firms, and institutional investors. These instruments traded at low spreads over traditional money-like instruments such as Treasury Bills, indicating a high level of liquidity. This liquidity evaporated, however, with the onset of the financial crisis when spreads opened up and non- banks collapsed, causing both liquidity and credit to contract sharply. The degree of financial fragility increases as in a situation of uncertainty there is a flight to quality from non-bank liabilities to safe assets. A liquidity crisis in the non-bank financial system has real effects via the pricing of credit and generates prolonged slumps in the economy. Under this view, the NBFI presents us with a trade-off between stability and growth.

5.2 Agency problems in financial markets

Since the contribution by Akerlof (1970) on the asymmetric distribution of information in the 'markets for lemons', the economic theory has acknowledged the importance of the agency problems in financial markets. Securitization-based intermediation has the potential to increase the efficiency of the intermediation process. However, it can generate agency problems, which do not emerge when these activities are performed under a single bank. If these agency problems are not adequately mitigated, the financial system can be put under strain by the lowering of the underwriting standards of loans, which are ten reflected on the structured products based upon underlying assets with poor credit quality.

In non-bank financial (credit) intermediation agency problems are exacerbated due to the high degree of complexity, specialization and opaqueness of the transactions. In a paper written few months after the collapse of the sub-prime market in the US, Ashcraft and Schuermann (2008) define seven key information frictions in the subprime mortgage securitization process, potentially applicable to all securitization transactions and involving the following actors: the mortgagor (i.e. the borrower), the originator, the arranger, the asset manager, the credit rating agencies, the investor. These frictions can help to explain the breakdown in the sub-prime market.

The first friction is between the mortgagor (i.e. the borrower) and the originator, where the mortgagor might be unable to choose, among alternative financial options, the one that is in his own best interest, leading to the possibility of predatory lending and to a welfare-reducing provision of credit. The second friction involves an information problem between the originator and the arranger, where the originator has an information advantage with regard to the quality of the borrower. Adverse selection problems exist between the arranger and the third parties concerning the quality of the mortgage loan: the arranger can securitize bad loans (the lemons) and keep the good ones (or securitize them elsewhere); this third friction affects the relationships that the arranger has with the warehouse lender[72], the credit rating agency (CRA), and the asset manager.[73]

[72] A warehouse credit is a credit line from mortgage bankers. It is a short-term facility extended by a financial institution to a mortgage loan originator for the funding of mortgage loans.
[73] See for more details on this third friction Ashcraft and Schuermann (2008).

In particular, mono-line arrangers typically require funding from a third party lender for loans kept in the 'warehouse' until they are sold. Since the lender is uncertain about the value of the mortgage loans, it must take steps to protect itself against overvaluing their worth as collateral. The pool of mortgages is sold by the arranger to a bankruptcy-remote SPV that issues debt to investors. This is an essential operation of the credit risk transfer, since it protects investors from the failure of the originator or the arranger. The arranger underwrites the sale of securities secured by the mortgages pool to an asset manager, who is an agent for the ultimate investor. In this case, the information advantage of the arranger creates a standard lemon problem. The same applies with reference to the opinion (ratings) expressed by the CRAs, since the arranger still knows more, because typically CRAs conduct limited due diligence on the arranger and the originator.

Because of the high level of complexity embedded in these transactions, typically investors outsource the due diligence process, by relying on external credit ratings assessments. Issuers rather the investors are the effective employers of the services of the CRAs, and agencies have a strong incentive to modulate ratings in a manner that maximise their capacity to attract business from issuers, which is particularly remunerative in these structured markets. This behaviour has had a bearing in the amplification of the GFC.

Moral hazard problems can surface between the servicer and the borrower,[74] as well as between the servicer and the third parties (asset managers and CRAs).[75] The sixth friction arises between the (usually financially unsophisticated) investor and the asset manager, typically determining a principal (investor)-agent (manager) problem.[76] The last friction pertains to the relations between the investor and the CRAs, which are paid by the arranger and not by the investors for their opinion, thus creating a potential conflict of interest.[77] The authors stress that these frictions taken together are responsible for the breakdown of the subprime market in the US in the years 2000s.

Overreliance on credit ratings in ABCP markets stems from the very limited capacity of investors to perform credit quality analysis. In these markets, the ratings on the ABCP programs are driven by the strength of the liquidity provider and not by the quality of the underlying receivables. Given the degree of complexity and opaqueness of these sponsors, investors can only rely on the assessments made by the CRAs, since they have greater access to sensitive information about conduits and sponsors balance sheets.

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[74] The trust employs a servicer for the collection and remittance of loan payments, making advances of unpaid interest by borrowers. In order to maintain the value of the underlying asset (the house) the mortgagor has to pay insurance companies and taxes. In the approach to and during delinquency, the mortgagor has little incentive to do so. In this case, the servicer is typically required to make these payments.

[75] According to this paper, the income of the servicer increases depending upon the time the loan is serviced. Thus, the servicer has an incentive to keep the loan on its book for as long as possible and therefore has a strong preference to modify the terms of a delinquent loan and to delay foreclosure.

[76] In this case, the investor provides the funding for the MBS purchase, but he is typically not financially sophisticated enough to formulate an investment strategy, conduct due diligence on potential investments and find the best price for trades. This service is provided by an asset manager (the agent), who may not invest sufficient effort on behalf of the investor (the principal).

[77] The opinions of the CRAs are formulated in part by using models (on the details and mechanics of which the CRAs are naturally more informed than investors). These models are susceptible to both honest and dishonest errors.

Adrian and Ashcraft (2012) believe that the most important frictions to have played a relevant role in the credit bubble and the subsequent crisis include the asymmetric information between investors and issuers, resulting in risk-insensitive cost of funding, and the over-reliance on credit ratings by investors. Ashcraft et al. (2011) document that subprime MBS prices are more sensitive to ratings than ex post performance, suggesting that funding can depend more on credit ratings. According to Adrian (2014), over-reliance on the opinions of the CRAs has the potential to exacerbate problems in a situation in which the same CRAs face their own agency problems.

Empirical studies have documented inflated credit ratings assigned to mortgage-backed securities before the financial crisis of 2007-09. For example, Mathis et al. (2009) find evidence that - within a dynamic model of ratings assuming reputation as an endogenous variable – ratings issued by CRAs can be less accurate in the good years if compared with what happens in a recession. According to Xia and Strobl (2012) inflated and non-accurate credit ratings on corporates are more common with the adoption of the issuer-pays rating model as compared to the investor-pays model.

5.3 Market failures in assessing tail risks

The economic literature has documented how in the events leading to the GFC NBFIs systematically under-priced tail risks (that is, risks that can generate severe adverse impacts with low probability, but offering high returns in the very short-term), determining the build-up of risk at the aggregate level. These tail risks may be under-estimated under rational or irrational types of behaviour. Academic contributions interpret these neglected risks as the rationalization for the accumulated credit risks in the debts securities (such as ABS and CDOs) issued in the NBFI sector during the boom years (first in the subprime mortgage markets and afterwards in all the securitization-driven transactions). They serve also as an explanation of the severity of the crisis itself, given the huge amount of credit losses incurred by market participants during the busts.

Concerns for the under-estimation of tail risks by the financial sector were raised by Rajan (2005), who analysed the (then) latest developments in the financial markets, finding evidence of increased fragility throughout the system caused by financial innovations, like those (then) prevailing in the subprime markets. Gennaioli et al. (2012 and 2013) apply a 'behavioural' explanation - based upon the psychological observation that market participants are fundamentally not able to perform a rational assessment of tail risks - to the economics of the non-bank intermediation. They find that NBFIs accumulate assets that are sensitive to tail events, because these institutions systematically ignore the worst states of the world, thus contributing to the excessive fluctuations of asset prices in booms and busts.

Neglected risks are used to explain why the highly rated structured credit products, such as the AAA tranches of ABS, are perceived as being risk free. Coval et al. (2009) point out that neglected tail risks explain the wrong perception of the credit risk embedded in the securitization tranches[78] and the under-estimation of correlation in assets prices witnessed during the crisis. According to these authors, AAA tranches behave like catastrophe bonds that load on a systemic risk state, in which asset prices tend to

[78] This evidence pertains above all for highly rated structured credit products, such as the AAA tranches of ABS transactions, more likely to be retained on the balance sheets of the banks and NBFIs.

move together. The under-estimation of correlations among assets has enabled financial institutions (and banks) to hold less than needed capital and liquidity against the puts that underpinned the NBFI system, which made these puts easily available. Since market participants tend to overestimate the value of these private forms of enhancements, the result is an excess of aggregate supply of cheap credit.[79]

The issue of neglected risks brings us to the pro-cyclicality of the financial system. Adrian and Shin (2010) have stressed how financial institutions tend to be more leveraged when the volatility in the markets is low. The result is an increased level of systemic risk, since low volatility allows an expansion of balance sheets, which in turn means a build-up of tail risks on aggregate.[80]

Neglected risks materialize also in the case investors rely excessively on the opinions of the CRAs. In this context, Aschcraft et al. (2011) show that the prevailing market prices of mortgage-backed securities (prior to the GFC) depended more on CRAs' ratings rather than on ex-post performance. The evidence offered by the GFC is consistent with such a theory: the agency problems existing at the different layers of the securitization process coupled with the distorted incentives of the CRAs led to excessive risk taking in good times and to subsequent excessive credit losses in times of crisis. Moreover, the systematic under-estimation of risks can also be put in relation with the NBFIs indirect and implicit access to public backstops via credit and liquidity puts stemming from BHCs and insurance companiess.

Dang et al. (2009) have proposed a different theory for the mechanism that generates neglected risks within a model of rational conduct, with a focus on the information opacity of debt contracts, presented as an explanation to categorize the credit problems arising in non-bank transactions. According to these authors, debt contracts are optimal just because they generate opacity, which in good times minimizes adverse selection and provides very few incentives to collect information on the credit quality of the underlying assets. These informationally opaque debt structures are more exposed to shocks, since in that case the demand for information increases simultaneously, with the effect to amplify adverse selection and exacerbate systemic risk.

5.4 Fragility in funding markets and regulatory arbitrage

The structural weaknesses embedded in the debt contracts of the NBFIs outlined so far interact with the elements of fragility derived by the nature of their sources of funding, which are unsecured and therefore fragile in times of crisis.

According to the institutional framework developed by Pozsar et al. (2013), the liabilities of the NBFIs do not benefit from a direct and explicit insurance companies system, as it is the case in the US for banks' deposits after the establishment of the FDIC in the 1930s. Adrian and Aschcraft (2012) stress that for this reason the NBFIs are potentially exposed to runs given that their assets have longer maturities and are less liquid than their liabilities. They say that this creates a strong incentive for investors to

[79] Further evidence on the close links between the pricing of risks and the fluctuations in balance sheets of NBFIs can be found in Adrian et al. (2009) and in Ashcraft et al. (2011).

[80] These authors study the role of repos for security broker-dealer and find that their leverage is highly pro-cyclical. Balance sheets expansions tend to coincide with periods of expansions in broker-dealers leverage, while balance sheet contractions are achieved via deleveraging. In this context, repos play a crucial role, since the majority of these adjustments are realized through changes in the size of the repos book.

withdraw funds from the NBFIs before other investors do the same (trying to gain from the so-called first-mover advantage).

The academic literature differentiates the runs on NBFIs from the runs on traditional banks, given that the liabilities of NBFIs come from the wholesale money markets (i.e. they are mainly commercial papers and repos and not demand deposits).[81] Martin et al. (2014) have developed a model to study the conditions under which runs can occur in the several US short-term funding markets. The starting point is the observation that the collapses of Bear Stearns and Lehman Brothers were caused by a sudden decrease in funding from the repo markets. The model outlines in particular the differences between the tri-party repo market and the bilateral repo market,[82] and studies the relative fragility of these markets, clarifying the distinction between increasing margins, which is a potentially equilibrating phenomenon, and runs, which can happen if margins do not increase sufficiently to provide protection to investors.[83] The primary application of this model is to large securities dealers who use the repo markets as a main source of financing from institutional investors, such as MMFs, against collateral.[84]

A general lesson of the analysis is that the market microstructure of the NBFI sector plays a critical role for the system's fragility. This theory predicts under what conditions individual institutions are subject to potential self-fulfilling runs, and when they are immune to such expectations. In this model, repo borrowers face a number of individual constraints due to the scarcity of liquidity and collateral. The equilibrium is therefore consistent with the observations of some institutions failing and others surviving in cases of changing market expectations. In particular, this model finds that the effects of the run on repos seem most important for few dealer banks who were heavily reliant on funding against private collateral in the repo market.

Empirical studies have shown that the different segments of the US repo markets behaved very differently during the GFC. In particular, runs occurred in both tri-party and bilateral repo markets.[85] However, these runs were of different nature. Gorton and Metrick (2012) have documented that the runs in the bilateral markets were characterized by a sharp increase in haircuts; Copeland et al. (2011) and

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[81] The main elements of the runs on traditional banks have been modelled in Diamond and Dybvig (1983).

[82] See Box No. 1 above for the technical details on bilateral and tri-party repo transactions.

[83] Lehman Brothers, which depended heavily on funding from the tri-party repo market, was almost completely cut off from such funding within a few days, while margins did not move. The available evidence suggest that Bear Stearns experienced similar stress.

[84] According to Martin et al. (2014), dealers' borrowing in the tri-party repo market, which is a special segment of the repo market, reached over $2.8 trillion outstanding in aggregate at its peak in 2008; individual dealer borrowing reached $400 billion, most of it with overnight maturity. Copeland et al. (2011) estimate the size of the segments of the US repo market as of May 2012 and find that the value of all repos was about $3 trillion, with approximately two-thirds from the tri-party market and one-third from the bilateral market. The value of reverse repos was about $2.5 trillion, with almost $2 trillion coming from the bilateral repo market. Total repos represented USD 6.1 trillion at the time, with bilateral repos representing almost 60 percent of the value. The value of reverse repos was about USD 4 trillion, with the bilateral market accounting for close to USD 3.7 trillion.

[85] During the 1980s and early 1990s, the tri-party market was limited to highly liquid collateral such as US Treasury. The type of collateral that was financed in the tri-party markets changed significantly during the housing market bubble in the early 2000s, with investors becoming willing to accept even illiquid collateral like whole loans and non-investment grade securities. Copeland et al. (2011) document that at the peak of the crisis in 2008-2009, the vast majority of collateral in the tri-party markets consisted in equities, private label ABS, and corporate credit securities without any eligibility to public sources of liquidity or credit backstops.

Krishnamurthy et al. (2011) have shown that the runs in the tri-party markets occur through a withdrawal of funds with a limited impact on the level of the haircuts. Covitz et al. (2012) find evidence that runs in the ABCP markets were equally characterized by a withdrawal of funds.[86] These runs invested more than 100 programs, that is more than the 30 per cent of the entire market, above all programs that were perceived as having greater exposure to the subprime mortgages, weaker liquidity support from banks and lower credit ratings.[87] Gallin (2013) estimates the impact of the runs on repo markets on the real economy. This author finds that a large fraction of the observed reduction in the supply of credit provided to the non-financial sectors by the NBFIs was due to the decline in the short-term funding affecting these intermediaries during the crisis.

The economic literature has highlighted that one of the main drivers of excesses in the ABCP markets was due to capital arbitrage, in which liquidity puts provided to banks by the official sector are maximized by transferring such guarantees to off-balance sheet vehicles. The key frictions in the ABCP markets are interpreted by Adrian and Ashcraft (2012) in terms of the mispricing of the credit and liquidity put options given by banks to sponsors via risk insensitive capital regulation of the backup lines of credit and in terms of the mispricing of the credit and liquidity risks by investors. These elements are created by the existing information asymmetries between investors and asset managers, which result in an overreliance on credit ratings.

Acharya et al. (2011) document that the rapid surge in ABCP in 2004 seems to be in relation to the changes in capital regulation, especially with reference to the Basel II agreement. According to these authors, the majority of these guarantees were structured as liquidity enhancing guarantees with the objective of reducing the regulatory driven capital charge, instead of being framed as credit guarantees. Moreover, the majority of conduits were supported by commercial banks subject to the most stringent capital requirements but at the same time showing low levels of economic capital. Adrian and Ashcraft (2012) say that the motivation for capital arbitrage is consistent with the mispricing of explicit credit and liquidity put options associated with deposit insurance companies and access to official liquidity, as well the presence of a perception that large banks are to-big-to-fail, permitting banks to engage in excessive leverage maturity transformation.

Stein (2010) underlines the driving forces of the markets for securitization (especially those for ABS structures) in terms of risk-sharing and regulatory arbitrage. According to Acharya et al. (2010), prior to the GFC banks established conduits to securitize assets using credit guarantees structured in such a way to reduce bank capital requirements. At the end of the crisis, the huge losses generated by these conduits mostly remained within the banks' balance sheets.

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[86] Adrian and Ashcraft (2012) say that the run on ABCP began in the summer of 2007, when the sponsor of a single-seller mortgage conduit, American Home, declared bankruptcy, and three mortgage programs extended the maturity of their paper. On August 7, BNP Paribas halted redemptions at two affiliated money market mutual funds when it was unable to value ABCP holdings.

[87] The significant amount of ABCP sponsorship by European banks – explaining more than 30 per cent of the total programs - implied that the runs on these programs resulted in significant demand for term dollar funding by foreign banks. This situation prompted the Federal Reserve to intervene with a swap line with other central banks, in order to facilitate the provision of short-term US dollar funding to foreign banks. See Covitz et al (2012).

6. The post financial crisis reforms: the economic function-based approach of the FSB[88]

Within the post-GFC financial regulation repair, the FSB has coordinated the development of policies in five areas where oversight and regulation most needed to be strengthened to reduce systemic risk in the NBFI sector. These five areas are the following (with the associated main regulatory tools):

i) **Mitigating risks in banks' interactions with NBFI entities** (scope of consolidation, limits on banks' exposures to non-banks, treatment of reputational risks and implicit support, banks' investments in equity of funds);
ii) **Reducing the susceptibility of MMFs to runs** (mandatory move from C-NAV to V-NAV, MMF valuation and pricing, reduction of the importance of ratings, redemption gates);
iii) **Improving transparency and aligning incentives in securitization** (retention requirements, measures to enhance transparency, standardisation of securitization products);
iv) **Dampening pro-cyclicality and other sources of financial stability risks in securities financing transactions,** such as repos and securities lending (standards and processes for data collection, minimum standards on cash collateral and on collateral valuation/management, requirements on re-hypothecation, minimum standards on haircuts, framework for numerical haircut floors, central clearing);
v) **Assessing and mitigating financial stability risks posed by other NBFI entities and activities** (two-tier approach to detect risks, policy tools, information sharing).

An in-depth analysis of this very complex regulatory reform agenda is beyond the scope of this paper. In the following paragraphs, I explain the details of the FSB approach to identify and mitigate the main NBFI risks and the economic rationale of the main FSB policy measures.

6.1 The five economic functions to detect non-bank credit intermediation risks

The FSB has developed a two-tier approach to define and monitor the risks arising from the NBFI sector.[89] The first tier gives an overall aggregate measure of the financial assets of all non-bank financial entities that engage in NBFI.[90] Such entities include insurance companies, pension funds, the other financial intermediaries (OFIs),[91] and financial auxiliaries. The second tier has a narrower scope, since it is aimed at including only the subset of entities within the NBFI sector that are involved in NBCI activities that may give rise to bank-like risks for the financial system (i.e. credit intermediation with

[88] For the details of the FSB overall policy approach, see FSB (2011), FSB (2013a), FSB (2013b), FSB (2019a), FSB (2020d).
[89] This two-tier approach is the first building block of the overall policy framework finalized by the FSB after the GFC with the objective to strengthen oversight and regulation of the NBFI. For the other building blocks, see *infra* paragraph 6.2.
[90] See FSB (2013a), FSB (2020d), and FSB (2019a).
[91] OFIs are a subset of the NBFI sector. They comprise all financial institutions that are not central banks, banks, public financial institutions, insurance companies, pension funds, or financial auxiliaries. OFIs include for example investment funds, captive financial institutions and money lenders (CFIMLs), central counterparties (CCPs), broker-dealers, finance companies, trust companies, and structured finance vehicles.

maturity/liquidity transformation, imperfect transfer of credit risk and/or leverage) and/or can be a source of regulatory arbitrage.

Non-bank financial entities are included in this 'narrow measure' if they perform one of the five economic functions (EFs), or activities, that constitute the main building block of the FSB approach.[92] This economic function-based approach allows the assessment of the activities of NBCI entities through their underlying economic functions rather than their legal forms and is forward-looking since authorities can capture also additional types of entities performing such activities at or outside the boundaries of bank regulation or the regulatory perimeter.[93]

These EFs are aimed at addressing activities performed by non-bank financial entities that are close in nature to traditional banks (because of their maturity/liquidity transformation, leverage, and credit risk transfer), while excluding others that usually do not engage in such activities (for example, pension funds) and are not part of a credit intermediation chain. These EFs differ from other non-bank financial activities since they can create runs by their investors, creditors, counterparties due to their pro-cyclicality, and generate negative externalities (regulatory arbitrage) to the extent they are not subject to the same prudential requirements as banks. Box No. 3 provides the latest data on the risks and trends from the non-bank credit intermediation.

The economic functions included in the FSB approach are the following.

- **Management of collective investment vehicles (CIVs) with features that make them susceptible to runs (EF1).** CIVs have shock-absorbing capacities, since they are able to share losses (stemming from an entity's insolvency or a market stress) among a wide set of actors. In a situation of adverse market conditions, CIVs can be subject to large-scale redemption requests within a short time period and/or have to roll over their positions. This because their investors seek to redeem their shares to limit losses or engage in flight to quality,[94] in particular for CIVs involved in credit intermediation with significant maturity/liquidity transformation and/or leverage. Such a run can determine fire sales of assets that can affect other CIVs and have systemic consequences on the broader markets.[95] The negative consequences of a run on a CIV can be amplified by a number of factors, such as the tolerance for risk absorption of the CIV's investors, the liquidity of the CIV's portfolio, the amount of leverage, the concentration of the CIV's exposures, the correlation among the assets in a market and the assets held by the CIV. The typical categories of entity belonging to

[92] The narrow measure excludes insurance companies, pension funds, financial auxiliaries, OFIs not directly involved in one of the five EFs, and entities that are prudentially consolidated into a banking group.
[93] Authorities can classify an entity into more than one type of economic function that gives rise to NBCI risks if that entity undertakes multiple functions.
[94] FSB (2013a) provides two examples to illustrate how the management of CIVs can make them more susceptible to runs. They refer to the management of CIVs with a very low risk investment objective or relatively illiquid asset base (whereas they are fully redeemable upon demand or within a short timeframe). in times of stress where there are flights to quality or liquidity, and to the management of CIVs with substantial roll-over risks in their portfolios, especially when a CIV is invested in long-term and complex instruments or when counterparties could suddenly refuse to interact with the CIV.
[95] If the CIV is leveraged, runs can be determined by lenders in order to pull their money back if they become concerned about the creditworthiness of the CIV.

this EF1 are MMFs, fixed income funds, mixed funds, credit hedge funds, real estate funds, and non-equity exchange-traded funds (ETFs).

- **Loan provision that is dependent on short-term funding (EF2).** This EF includes lending (consumer/auto/equipment finance, retail mortgage, commercial property, commitment of credit lines) from by entities that are not traditional banks and are funded with short-term liabilities.[96] These activities can be conducted on a secured or unsecured basis and can imply significant maturity/liquidity transformation risks and/or excessive leverage. This can create significant risks given that the typical borrowing sectors (real estate, construction, shipping, automobile, retail) are cyclical in nature. The entities in this EF2 can be finance companies, leasing/factoring firms, consumer credit companies.
- **Intermediation of market activities dependent on short-term funding or on secured funding of client assets (EF3).** These intermediation activities include the buying/selling of securities/derivatives (also as market makers) and prime brokerage services to hedge funds.[97] The non-bank financial entities performing EF3 activities may face liquidity risks depending on the funding model adopted. To the extent that these activities are funded via clients assets (for example repos), they are economically similar to the transformation of banks' deposits into long-term assets (i.e. they are bank-like activities). This EF3 includes broker-dealers, securities finance companies.
- **Facilitation of credit creation (EF4).** This EF4 recognises the role of credit enhancements (for example guarantees) in promoting higher levels of credit expansion from banks and non-bank financial entities.[98] These activities can have a role in the cyclicality of lending patterns and increase financial instability, because this credit creation is often not commensurate with the actual risk profile of the borrowers. In this regard, the insurance (or the guarantee) can contribute to the build-up of excessive leverage in the system with the expansion of certain products, such as structured finance products, by lowering the cost of the issuance and providing capital relief for bank counterparties through smaller capital charges for insured structures than for non-insured structures. The typical entities falling in EF4 are credit insurance companies, financial guarantors, and monolines.
- **Securitization-based intermediation and funding of financial entities (EF5).** Securitization can facilitate the creation of excessive maturity/liquidity transformation, leverage and regulatory

[96] Activities falling in the EF2 are: deposit-taking by entities that provide credit, while not being subject to prudential requirements as banks; credit provision with funding derived mainly from wholesale markets or short-term commitment lines from banks; credit provision by non-bank financial entities that depend on funding by parent companies active in cyclical economic sectors; credit provision by non-bank financial entities funded by banks that use these entities as a means to circumvent regulation.

[97] Examples of the EF3 activities are the types of market intermediation that are heavily dependent on wholesale funding markets, such as CPs, repos, or short-term commitment lines from banks, and market intermediation that is dependent on secured funding of client assets.

[98] EF4 includes the following examples: facilitation of credit creation through insurance on financial products (e.g. structured finance products, such as ABS, credit default swaps); facilitation of credit creation by non-bank financial entities whose funding is heavily dependent on wholesale markets (for example ABCPs, CPs, repos) or short-term commitment lines from banks; facilitation of credit creation through providing credit enhancements to mortgages.

arbitrage across the financial markets.[99] Specialized financial institutions purchase or provide credit enhancements to a pool of loans provided by banks (or by other financial institutions) and issue ABCPs that are backed by such loan pools. These activities tend to increase interconnectedness between banks and non-bank financial entities, as well as systemic risk. . EF5 includes securitization vehicles, structured finance vehicles, asset-backed securities.

Box No. 3: Non-bank credit intermediation: current trends and risks [100]

During 2019, for the FSB 29-Group sample the entities classified in the narrow scope of the FSB approach increased their total financial assets by 11.1 per cent to USD 57.1 trn, well above the average annual growth rate (7.1 per cent) over the years 2013-18. [101] They represent 28.4 per cent of the assets of the first tier (NBFI) and 14.2 per cent of the total global financial assets.[102]

The main explanations for this growth remain in the countries classified as advanced economies; however, strong trends have occurred also in emerging markets. The US continues - although on a decreasing pattern since 2006 - to be the jurisdiction with the largest share of NBCI (around 30 per cent), followed by the eight euro-area participating countries (23.8 per cent), China (14.1 per cent), Cayman Islands (11.2 per cent), and Japan (5.6 per cent).

All EFs increased at a faster pace than they had on average in the previous five years. EF1 remained the largest component in the aggregate (72.9 per cent) and in almost all jurisdictions.[103] These assets have increased by 13.5 per cent to USD 41.7 trn, mainly driven by the largest three entity types (fixed

[99] EF5 consists of: securitization that is used to fund long-term illiquid assets by raising shorter term funds; funding by banks (or non-bank financial entities) through investment funds or other similar structures to finance illiquid assets by raising finds from the markets.

[100] This box derives from the 2020 FSB monitoring exercise and presents the latest available figures on the trends and risks in NBFI. It covers 29 individual jurisdictions, consisting of advanced economies (Belgium, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain, Australia, Canada, Cayman Islands, Hong Kong, Japan, Korea, Singapore, Switzerland, United Kingdom, United States) and emerging market economies (Argentina, Brazil, Chile, China, India, Indonesia, Mexico, Russia, Saudi Arabia, South Africa, Turkey). These jurisdictions account for 80 per cent of global GDP. This exercise represents the main outcome of the FSB system-wide monitoring framework to track developments in the global NBFI sector, with a view to identifying systemic risks and initiating corrective actions. For this, see FSB (2020c). The IMF as well has intensified its supervision under the bilateral Financial Sector Assessment Programs and Article IV Consultations, in addition to its multilateral surveillance work referred to in its Global Financial Stability Reports. In the EU, the European Systemic Risk Board (ESRB) undertakes an annual mapping of the EU NBFI sector, which feeds into the ESRB's Risk Dashboard, with the objective to help the formulation and implementation of the related macro-prudential policy initiatives. See ESRB (2020).

[101] For the first tier (i.e. for the NBFI as a whole) the rate of increase was 8.9 per cent.

[102] In the FSB monitoring exercise, total global financial assets (TGFAs) refer to the largest aggregate measure of financial activities, including those issued by central banks, banks, public financial institutions, and from the NBFI sector. As a share of this measure, NBCI has increased slightly in the course of the last ten years, given that it represented 12.0 per cent of TGFAs at the end of 2010.

[103] Since the GFC, growth of the narrow measure has been driven mainly by investment funds, whereas in the pre-GFC years the largest rates were for structured finance vehicles and broker-dealers, often with the support from banks.

income funds, mixed funds, MMFs). The share of EF1 assets held by entities domiciled in the US increased in 2019 (especially in the case of MMFs).[104]

Funds offering C-NAV accounted 79 per cent of global MMF assets and represent the largest type of MMFs in nine jurisdictions. Credit intermediation (credit assets over total financial assets) for MMFs increased and remained high for fixed income funds, in line with their investment strategies with most credit assets being debt securities. Maturity transformation (long-term assets minus long-term liabilities over total financial assets) decreased for MMFs (but increased for fixed income and mixed funds), while liquidity transformation (less-liquid assets funded by short-term liabilities) remained substantially unchanged, with high values of this metrics for the first three EF1 entity types. Leverage (total liabilities over equity) continues to be reported low across the largest EF1 entity types.[105] As in the previous years, concentration levels in MMFs are higher than for other funds and with significant variation across jurisdictions.

EF2 assets have increased by 6.1 per cent to USD 3.9 trn, representing 6.8 per cent of the NBCI, with finance companies continuing to be the largest entity type. They grew in most jurisdictions; in Germany, Hong Kong and Turkey, FSB data have shown significant percent reductions. The largest share of global EF2 assets are in the US (29 per cent), followed by Japan (17 per cent), India (13 per cent) and Canada (9 per cent). Finance companies show stable levels of credit intermediation (loans representing more than 70 per cent of their total assets), low and broadly unchanged maturity and liquidity transformations (the median value of the ratio of short-term liabilities to short-term assets is around 0.9 per cent), while the degree of their leverage varies across jurisdictions (with the median leverage ratio at around 5 per cent).

EF3 assets have increased (across the majority of jurisdictions) by 5.4 per cent to USD 4.7 trn, representing 8.2 per cent of the narrow measure. Broker-dealers, which represent more than 80 per cent of the EF3 aggregate, followed by custodial accounts and securities finance companies, are the main drivers of this growth. The largest share of EF3 assets are located in the US, Japan and China. Credit intermediation (via debt securities and reverse repos) by broker-dealers was unchanged in 2019, while maturity and liquidity transformations decreased. The degree of leverage of broker-dealers increased in most jurisdictions.

EF4 has represented the EF with the highest growth rate in 2019 (16.6 per cent); however, this EF is the smallest within the NBCI, since it is 0.8 per cent (USD 468 bn) of the narrow measure. The main drivers of the growth are with investment funds domiciled in Ireland and broker-dealers in Korea. The majority (60 per cent) of the EF4 assets were held by investment funds in 2019. However, across the FSB sample the most common entity type is the credit insurer. The role of EF4 in contributing to boom-bust cycles may be underestimated, given the difficulty of adequately capturing the off-balance sheet exposures of EF4 entities. Risk metrics are not available for this EF4 given the scarcity and heterogeneity of data across jurisdictions.

EF5 assets have grown by 2.5 per cent to USD 4.5 trn. EF5 is composed of primarily structured finance vehicles (SFVs) and trust companies, representing 82 and 18 per cent of EF5 assets respectively. SFVs continue to expand their assets since 2017, but still below prior-GFC levels. Brazil, South Africa and India have experienced very high rates of growth (albeit from a lower base if compared to average

[104] Following the US, the major domiciles for EF1 assets include China, Cayman Islands, and Luxembourg.
[105] The leverage measure in EF1 entities provides only a partial view, since off-balance sheet transactions are not included in the calculation.

values in the FSB sample). SFVs continue to show a significant credit intermediation activity, mainly through debt securities backed by loans (the median ratio of loans to total financial assets is around 0.8 per cent). Maturity transformation of SFVs has remained at low levels in most jurisdictions (the median ratio of short-term liabilities to short-term assets is above 1), while the degree of leverage has increased in some cases.

6.2 The economic rationale behind the main FSB policy measures

The other two building blocks of the overall FSB policy framework consist of: 1) a policy toolkit, which includes a number of overarching principles and a menu of regulatory tools calibrated to the specificities of each of the five EFs, from which authorities can draw to mitigate financial stability risks;[106] 2) a structured process for sharing information among authorities, which is designated to maintain consistency and minimize regulation gaps across jurisdictions at the global level. Annex 2 provides a detailed overview of the policy tools associated to the five EFs.

The FSB policy toolkit has been the centrepiece of the post-GFC response to strengthen regulation and supervision of the NBFI entities and activities.[107] In this paragraph, I review the economic rationale behind the main FSB policy measures designed to mitigate the potential for systemic risk stemming from the NBFI sector.

However, it is important to stress here that - as acknowledged in a recent FSB and IMF analyses[108] - the implementation of the FSB overall policy framework for NBFI remains at a relatively early stage, given that the pace of the implementation of the agreed reforms is lagging behind the schedule. In this respect, Box No. 4 provides an update picture of the FSB NBFI reforms' implementation across the main regulatory areas and jurisdictions.

Important reforms have affected some of the NBFI activities that were considered to be at the roots of the GFC. This is the case for example for reforms affecting MMFs and securitizations.[109] C-NAV MMFs have been addressed as a matter of priority, since they exhibit two structural features that exacerbated the effects of the crisis. First, they issued runnable bank-like liabilities - that were redeemable at par on demand - to fund portfolios of long-term assets. Second, MMFs were highly connected to banks, through implicit insurance lines and through repo exposures and their holdings of banks' commercial papers and deposits.

[106] In particular, the FSB recommends that the supervisory authorities should: keep up to date the regulatory perimeter; collect the necessary information to assess the risks posed by the NBCI; enhance disclosure to increase among by market participants the awareness on the existing and emerging vulnerabilities; take the necessary action to assign each EF with the relevant policy tools. In order to facilitate a consistent implementation of such a framework, the FSB recommends that the tools should be calibrated proportionately to the effective degree of risks posed by each EF.
[107] See FSB (2013a, 2013b, 2017d), and Tucker (2012).
[108] See FSB (2019d, and 2020b), IMF (2018).
[109] See Adrian and Jones (2018).

In the US, which accounts for about 60 percent of global MMF assets, prime institutional MMFs are now required to "float their NAV" (that is, to no longer guarantee investors redemption requests at par); non-government MMF boards have been provided with new tools (liquidity fees and redemption gates) to more effectively deal with the first-mover-advantage problem; financial disclosure requirements have been strengthened to reduce investor uncertainty; and bank sponsors are now required to more heavily capitalize their MMF support lines. In the EU, similar regulations have been finalized. These measures include variable NAV pricing for some (non-sovereign) MMFs, new redemption fee and gating provisions, increased liquidity and diversification requirements, and a prohibition on MMF sponsor support.[110]

The so-called Basel III reforms have been designed to ensure better recognition and more stringent application of capital charges to the banks' exposures to NBFI entities.[111] Consolidated supervision has also helped reduce the leverage of some nonbank financial institutions, but it has not been fully implemented in many jurisdictions, thereby facilitating regulatory arbitrage within financial groups.[112]

Incentives to move bank activities to off-balance sheet vehicles to benefit from regulatory arbitrage have been reduced. The loopholes used by banks to game the Basel I and II rules by moving items off the balance sheet and setting aside only moderate resources for potential liquidity support have been closed in Basel III.[113] New rules on the treatment of special purpose vehicles reduced the profitability of using them as conduits for capital arbitrage and made them less attractive. Off-balance-sheet exposures are now captured on a more rigorous basis by the capital framework. Establishing a liquidity framework that considers the volatility of different funding sources has thrown a spotlight on bank use of nonbank financing bringing this previously largely unmonitored risk within the regulatory perimeter.

These regulatory developments have resulted in a decline of the off-balance sheet implicit support by deposit-taking institutions, thus reversing the pre-GFC trends that had produced an increased level of interconnectedness among the regulated and the unregulated sectors of the financial system. Nonetheless, measurement of leverage in asset managers is difficult and information is limited, with some evidence pointing to its increase.[114]

Other important pieces of the FSB reform agenda have tried to reduce the risks associated with securities financing transactions and over-the-counter derivatives. In this respect, the adopted measures have been aimed at reducing liquidity mismatches arising from nonbanks' use of securities financing transactions, constraining excessive build-up of non-bank leverage with the imposition of haircuts on non-

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[110] See Adrian and Jones (2018).

[111] The definition of 'Basel III standards' includes the several reforms of the prudential rules adopted by the BCBS after the GFC and addressed to the large internationally active banks. These reforms refer to the prudential standards pertaining to the various aspects of the banking management issued since 2010 (also adapting and modifying the standards already in force at that time). In particular, the notion of '2010 Basel III standards' refers to the interventions in the field of capital adequacy, liquidity and leverage; they include also the enhanced prudential requirements for the large banks systemically relevant on a global scale. The '2017 Basel III standards' represent the last part of the post-GFC financial repair, finalized in December 2017 by the BCBS and aimed at addressing the excessive volatility of the risk-weighted assets of the international banks.

[112] In the United States, the movement of investment banks toward traditional banking licenses after the global financial crisis also brought more institutions within the more tightly regulated part of the regulatory perimeter.

[113] See IMF (2018), FSB (2017a), Irani et al. (2019).

[114] See IMF (2018).

centrally-cleared securities financing transactions, and reducing risks in over-the-counter derivatives and triparty repo markets through market infrastructure reforms. Securities financing has been constrained by the FSB's 2014 framework for haircuts on non–centrally cleared securities-financing transactions, and final or draft rules have been issued in many jurisdictions.

Box No. 4:The FSB regulatory agenda for non-bank financial intermediation: the latest evidence on implementation

According to the December 2020 FSB report and the chapter 2 of the October 2018 IMF Global Financial Stability Report, the implementation of the NBFI reforms continues but it is at an earlier stage than other reforms.[115]

The adoption of the IOSCO recommendations to reduce the risk of runs on MMFs is most advanced in 16 FSB jurisdictions (out of 24).[116] The fair value approach for valuation of MMF portfolios has been adopted in 23 jurisdictions (two more since 2019). Progress in liquidity management is less advanced, with 16 jurisdictions having reforms in place (two more since 2019).

A similar picture can be derived from the IOSCO thematic review – published in November 2020 - on the implementation - by 9 member jurisdictions[117] - of 7 key recommendations (out of the 15 issued by IOSCO in 2012) related to the following areas: valuation, liquidity management, and MMFs that offer a stable net asset value.[118] The review finds that in these 9 jurisdictions the policy measures put in place are in line with the IOSCO recommendations. However, the report stresses that the two general objectives of reinforcing the safety of MMFs as well as reducing their potential to create or amplify systemic risks should continue to be the main drivers of reforms in the MMFs area in all jurisdictions also in the near future.

In particular, it is confirmed that the in these 9 jurisdictions there is no uniform definition of MMF,[119] meaning that MMFs show a range of characteristics dependent on their structure. Consequently, there

[115] See FSB (2020b).

[116] In 2012 the IOSCO issued 15 recommendations aimed at strengthening the resilience of MMFs globally and reducing their susceptibility to runs, with a focus on MMFs that feature a constant net asset value (C-NAV MMFs). These recommendations covered eight areas. 1) Scope of the regulatory reform (explicit definition of MMFs and appropriate inclusion of other investment products presenting features and investment objectives similar to MMFs). 2) Limitations to the types of assets of, and risks taken by, MMFs. 3) Valuation. 4) Liquidity management. 5) MMFs that offer a stable net asset value (NAV). 6) Use of ratings. 7) Disclosure to investors. 8) Repos. For more details, see IOSCO (2012).

[117] The participating jurisdictions are Brazil, China, France, India, Ireland, Japan, Luxembourg, United Kingdom, and US, representing 95 per cent of the assets managed by MMFs worldwide. This IOSCO review is based upon the information available at August 2019, followed by interaction with participating countries until April 2020. See IOSCO (2020).

[118] In particular, the following recommendations have been assessed: Recommendation 4 - Use of fair value and amortized cost method; Recommendation 5 - Third parties to review MMFs' valuation practices; Recommendation 6 - MMFs' policies and procedures to know their investors; Recommendation 7 - Minimum level of liquid assets; Recommendation 8 - Stress testing; Recommendation 9 - Tools to deal with exceptional market conditions, substantial redemption pressure; Recommendation 10 - Safeguards towards stable NAV MMF or conversion to variable NAV.

[119] The 2012 Policy Recommendations do not impose a definition of a MMF, but Recommendation 1 states that money market funds should be explicitly defined in regulation.

is an important diversity of types of MMFs, implying difficult comparisons from one jurisdiction to another. Since 2012, the MMF markets have continued to grow, significantly in some jurisdictions (US and China) and less in others (EU). In addition, there have been material changes in the industry, in some cases driven by the post-2012 reforms. For example, in the EU, the MMF Regulation has introduced 3 types of MMF – constant net asset value (C-NAV), low volatility net asset value (LV-NAV) and variable net asset value (V-NAV) MMFs. In the US, the reforms enacted in 2014 have introduced a clear split between notably prime and tax-exempt institutional MMFs (required to operate as V-NAV MMFs) and government MMFs as well as retail MMFs (permitted to operate as C-NAV MMFs).

As to the recommendation on the use of fair value, the review has assessed that only 3 out of the 9 participating jurisdictions are fully consistent. A better outcome has been reached for the recommendation on the third parties to review MMFs' valuation practices, where 8 jurisdictions have been rated as fully consistent. In relation to the requirement for MMFs to hold a minimum amount of liquid assets to strengthen their ability to face redemptions and prevent fire sales, it appears from the review that the type of eligible assets and their amount can vary significantly, even if all of the participating jurisdictions foresee liquidity requirements in line with the recommendation.

In relation to the specific aspect of stable NAV MMFs, none of the jurisdictions that had stable NAV MMFs prior to 2012, had at the time of the review put in place a mandatory move from V-NAV for all C-NAV MMFs. The notable exception is the US, which has required its prime institutional MMF to float their NAV, whereas China has indicated that it may mandate such conversion in the near future. Although the review has confirmed that the participating jurisdictions have all put in place safeguards to take into account IOSCO Recommendation 10, the IOSCO stresses the need to continue to monitor stable NAV MMF for the periods to come.[120]

The adoption of the IOSCO recommendations on incentive alignment approaches and disclosure requirements for securitisation appears to be uneven across the FSB jurisdictions, since they have been implemented by 15 FSB jurisdictions (representing however the largest markets). Based upon a 2019 IOSCO report, [121] progress remains mixed across the 24 FSB jurisdictions in implementing the recommendations for incentive alignment for securitisation. Only half of them have final adoption measures in place for incentive alignment (Reform Area 1), and less than half for disclosure (Reform Area 2). In 2018, the EU member jurisdictions (France, Italy, Germany, the Netherlands, Spain), and the United Kingdom changed their implementation status in both Reform Areas. The review also found that reforms were underway in Argentina, Australia, Brazil, China, Indonesia, Russia and Saudi Arabia, without however a change in implementation status. Brazil reports having implemented its first risk retention requirements (previously relying on disclosure only as an incentive alignment measure) for one sector of its market, with plans to expand these to other sectors in the future. Of the three participating jurisdictions that report having completed reforms in the two Reform Areas since 2016, two (US and Republic of Korea) account for approximately 79% of the global market.

[120] Recommendation 10 focuses on the risks associated with C-NAV funds and provides that MMFs that offer a C-NAV are subject to measures designed to reduce the specific risks associated with the stable NAV features and to internalize the costs arising from those risks. Further, Recommendation 10 provides that regulators should require, where workable, a conversion to V-NAV. Alternatively, Recommendation 10 provides that safeguards should be introduced to reinforce stable NAV MMFs' resilience and ability to face significant redemptions.

[121] See IOSCO (2019b).

According to the 2020 FSB report, the implementation of the FSB policy recommendations for securities financing transactions continues to face significant delays in some jurisdictions. Work is underway to adopt standards and processes on global securities financing data collection and aggregation. The implementation of the FSB and IOSCO recommendations to address structural vulnerabilities from liquidity and leverage in asset management activities is still ongoing.

In response to the extraordinary circumstances determined by the COVID-19, the FSB and the standard-setting bodies (SSBs) have allowed authorities and firms to extend deadlines for the implementation of the agreed reforms (in a way consistent with the reforms' underlying objectives). In the case of the NBFI, they have extended the implementation timelines for minimum haircut standards for non-centrally cleared securities financing transactions.

The 2020 FSB report says that authorities have taken a number of measures relating to funds to respond to COVID-19. Jurisdictions report enhanced monitoring of investment funds' liquidity and redemptions; issuance of additional guidance; relaxation of certain regulatory thresholds (e.g. liquidity thresholds, borrowing limits and disclosure requirements); use of stress testing; and requirements for notification on the use of certain liquidity management tools.

Regulators have focused on securitization activities, given that some aspects of their underlying economic mechanisms (imperfect credit risk transformation, regulatory arbitrage, misaligned incentives, originate-to-distribute behaviour, and neglected tail risks) produced devastating effects during the crisis.[122] The regulatory framework for securitization has been overhauled.[123] The direction of intervention stressed the need that institutions participating in the securitization market should show greater transparency, reduce complexity, and engage in less mechanistic reliance on the ratings from credit agencies. Also, more rigorous and risk sensitive approaches for the calculation of capital requirements for exposures to securitisations have been envisaged at international level.[124]

Implementation of the revised securitization framework is still in progress, with the rules for these standards yet to be finalized and not yet in force in many jurisdictions (in the EU, the new securitisation framework is applicable since 2019). Other incentive-related issues in structured finance have proven similarly difficult to be addressed, implying the persistence of the incentives for regulatory arbitrage, also at the cross-border level. Under the new standards, banks originating securitizations must also retain part of the original structure. Many countries outside the EU and the US still have to put into effect retention requirements or have maintained exemptions that can reduce their effectiveness.[125]

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[122] Loan underwriting standards have been strengthened; the scope of prudential consolidation has been expanded to require banks that sponsor securitization vehicles to hold regulatory capital against these exposures; information disclosure requirements have increased; and credit retention requirements have been introduced to better align the incentives of originators and investors. Reforms have also been directed to increasing the transparency and standardization of securitization products. See BCBS (2018), BCBS (2019b), and BCBS (2020).

[123] See IMF (2018).

[124] The new rules developed by the BCBS in 2014 have introduced in particular the concept of non-neutrality of the framework. The non-neutrality implies that the total capital required for all the tranches of a given securitization is greater than the amount of capital required for the underlying assets.

[125] See IOSCO (2015).

There has been important progress in the migration of OTC derivative trading to central counterparties (CCPs) and reporting to trade repositories. The crisis demonstrated that financial market infrastructures (FMIs) such as CCPs played a critical role in underpinning stability by reducing uncollateralized counterparty exposures across the financial system, thereby significantly attenuating the contagion of losses from spreading. Consequently, the post GFC reforms supported the development of FMIs. OTC contracts were to be reported to trade repositories and all standardized OTC contracts were to be cleared on CCPs by end-2012.

Not all the regulatory efforts have produced the desired outcomes. For example, CRAs are still operating under the "issuer pays" model, in which incentives work to assign more favourable ratings than warranted in order to attract orders. Notwithstanding recent reforms, the potential for conflicts of interest remains acute for structured finance products where information asymmetries and barriers still remain high.[126] In addition, while many countries have taken steps to reduce the mechanistic reliance of investors on CRA ratings, some elements of the Basel III capital rules continue to be based on them.

7. Macro-stability concerns from asset management in the post-crisis years

In the years after the GFC, persistently low and declining yields on fixed-income instruments have prompted institutional investors (particularly those constrained by nominal return targets or binding investment mandates) to raise returns by using leverage and investing in riskier and less liquid assets.[127] This search for yields has the potential to introduce additional risks throughout the financial system.

The analysis of the 2019 IMF Global Financial Stability Report shows that the low-yield environment may promote higher conformity in investment strategies among NBFIs, exacerbating a structural trend driven by benchmarking and compensation, increasing herding behaviour and pro-cyclicality among asset managers. This higher degree of similarity in portfolio decisions may amplify market sell-offs in the event of an adverse shock. In addition, the increased demand for risky assets by NBFIs may further boost asset prices and could encourage more borrowing by nonfinancial firms.

Rising balance sheet vulnerabilities may force institutional investors to react to shocks in a way that could amplify their impact on markets and on the broader economy given their growing importance as a

[126] Another crucial component of the post-GFC regulatory repair was the reform of the practices of the credit rating agencies (CRAs). In the case of the US, which is home to the major CRAs, the US Securities and Exchange Commission (SEC) adopted in 2014 a range of reforms aimed at addressing internal controls, conflicts of interest, disclosure of credit rating performance statistics, procedures to protect the integrity and transparency of rating methodologies, disclosures to promote the transparency of credit ratings, and standards for training, experience, and competence of credit analysts. The Commission also adopted requirements for issuers, underwriters, and third-party due-diligence services to promote the transparency of the findings and conclusions of third party due diligence regarding asset-backed securities. See Adrian and Jones (2018).

[127] According to IMF (2019), fixed-income investment funds have reacted to declines in interest rates by shifting the composition of their portfolios toward assets of lower or even unrated credit quality and increased their effective average portfolio maturities. Pension funds have increased their exposure to long-duration assets, taking greater illiquidity risk in exchange for higher returns. This has implied that they have increased investments in alternative asset classes, such as private equity, real estate, and infrastructure, which often involve long-term lockup periods and significant embedded leverage. On the same patterns, life insurers have increased their holdings of lower-rated and long-duration bond investments (and in some cases of foreign investments). Similar findings are in CGFS (2018b).

source of funding. As institutional investors increase duration and credit risks, they become more susceptible to a repricing of risks. With rising mismatches between illiquid asset holdings and the promise of daily liquidity to investors, investment funds may be facing increasing pressure to sell into an illiquid market in response to investor redemptions, which could exacerbate declines in asset prices.[128]

This increased risk-taking among investment funds, pension funds, and life insurers may have severe implications for financial stability. A prolonged period of lower interest rates, given the expectations of further monetary easing to withstand the COVID-19 induced recession, may promote a further build-up of vulnerabilities, providing further incentives for NBFIs to increase their holdings of illiquid assets. In the case of an abrupt need to dispose of these illiquid assets, the similarity in portfolios and rapidly falling prices could transmit the shock quickly through the entire financial system.[129]

These underlying vulnerabilities of the NBFI sector should be closely monitored. According to Signorini (2018), the focus of attention by regulators about NBFI should not be (or should not be only) the stability of individual entities (as it would be in a micro-prudential perspective). This because in the case of a NBFI entity the risks stemming from the assets under management are borne almost entirely by the final investors, rather than by the asset manager itself.[130] Moreover, the failure of a large asset manager is likely to be different from the failure of banks. In particular, distress at such an entity may aggravate frictions in financial markets, mainly in the markets for liquidity, for example through fire sales of assets and their impact on other asset managers.

These externalities have also the potential to reduce the liquidity and the capital positions of other financial institutions (for example, banks or insurance companies to the extent they provide implicit/explicit support to these entities) and are likely to be aggravated by the size of the defaulting NBFI entity or by the level of concentration in the markets for asset management. Herding behaviour and highly correlated assets could create the scope for bubbles and high volatility even when the underlying economic fundamentals do not justify such developments.

Regulators should pay attention to the effects on the financial system of the collective actions of the NBCI entities (i.e. taking on a macro-prudential perspective).[131] There are key macro-stability issues associated to NBCI that should deserve greater attention when filling the regulation gap that still exists between the NBCI and other areas, including banking. In this paragraph, I concentrate on the following macro-stability issues: fire sales in financial markets, asset correlation, and pro-cyclicality. They are all still operating in the current economic and financial environment.

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[128] See IMF (2019).

[129] See Di Maggio and Kacpercyk (2017). They document how asset managers react to the low-yield environment by increasing the degree of the risk incorporated in their portfolios (they can also shift their business from MMFs to other fixed-income funds with riskier portfolios).

[130] According to Haldane (2014), as an agency function, asset managers do not bear credit, market and liquidity risks on their portfolios. In this respect, he makes the example of BlackRock, the largest asset management firm in the world, which at the time of his speech (2014) had over $4 trillion of assets under management, but only $9 billion of assets of its own. This means that fluctuations in asset values tend not to affect the solvency of an asset manager, as it is the case for banks.

[131] See Signorini (2018), Itzhak et al. (2020).

7.1 Fire sales of financial assets

In the modern financial systems, the collective behaviour of institutional investors (MMFs, pension funds, insurers, asset managers, and banks) can lead to undue amplifications of market volatility. During downturns, institutional investors entering a situation of financial stress may turn into asset 'fire sales',[132] and these temporary price effects may be amplified, with huge effects on the conditions of markets' liquidity.[133]

In this respect, one of the key lessons from the GFC has outlined the role of asset 'fire sales' in aggravating the fragility of the entire financial system.[134] When a fire sale by a financial entity leads to a substantial reduction in the price of an asset, similar assets that are held in the portfolios of other market participants tend to follow the same declining pattern, with the potential to widen the areas of distress, thus producing further fire sales of assets (also of different nature). This self-reinforcing process can lead to downward spirals in asset prices and net worth of financial institutions raising risk at the aggregate level.

Fire sales of securities have much broader effects than fire sales of real assets, because NBFIs show balance sheets with high vulnerability to an unexpected stop in short-term financing.) In the years prior to the GFC MMFs, hedge funds, and dealer banks had financed their activities through short-term liabilities (such as repos, which are loans at very short maturity collateralized by longer-term securities, or commercial paper, a debt instrument with a duration between one day and several months), and are typically heavily leveraged.[135] Such funding requires renewal on a continuous time basis. This extreme vulnerability can lead to self-reinforcing and massive liquidation of assets in the case of adverse market conditions (and this precisely occurred in the GFC).

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[132] The GFC is not the first episode where this terminology has been used. For example, in 1998 the then Chairman of the Federal Reserve A. Greenspan utilized this expression to describe the markets events stemming from the collapse and the rescue of the Long-Term Capital Management Fund (LTCM). See for this Shleifer and Vishny (2011). These authors had provided in a 1992 paper (Shleifer and Vishny (1992)) a theoretical framework to frame asset fire sales; they argue that asset prices fall because potential buyers are resource constrained since they have suffered a common industry shock. Empirical research has applied this framework to study the prices of used airplanes (Pulvino (1998)); MMFs industry withdrawals (Coval and Stafford (2007)); divestment decisions by insurers (Ellul et al. (2011)).

[133] See Signorini (2018).

[134] Many explanations of the causes of the GFC stressed the role of an initial shock occurred in a particular market (the house property in the US) in generating losses for leveraged financial institutions, including banks. Because of the need to reduce losses, a wide scale deleveraging in these markets has produced fire sales of assets. Others point towards the fact that when other market participants have to value their assets at market prices that have become very low for an initial sale, this first sale has determined a cascade of fire sales of assets that created increasing losses on a large number of financial institutions. In describing the role of the Federal Reserve, it is emphasized that its purchase of the disposed assets permitted an orderly management of the withdrawals from the MMFs industry, preventing massive liquidations of assets at depressed prices, thus stabilizing the system. See for these analyses Carlson et al. (2009), Pozsar et al. (2013). According to IMF estimates, the $500 billion of losses registered on sub-prime mortgages turned into $4 trillion of write-downs on financial assets at global level through the network of the NBCI entities and their funding techniques. See IMF (2009).

[135] See Adrian and Shin (2010).

In economic theory, the issue of fire sales of assets is analysed in the context of models of limited arbitrage leading to market inefficiency. Arbitrageurs can be considered financial actors that typically 'lean against the wind' to try to correct the mispricing of financial assets (doing so, they behave essentially as market stabilizers). MMFs and hedge funds fall in this category. However, it can happen that arbitrageurs take losses on the assets they manage (and this reduces their ability to go against the wind) precisely when prices move away from their fundamental levels and the opportunity for arbitrage improves. In this case, it is likely that they choose to exit their positions when prices are dislocated and to sell assets. When an arbitrageur and its competitors all face funds' withdrawals, they all start liquidating their positions, which causes the dislocation in prices to widen further. This feedback effect moves prices increasingly away from their long-term values. Such a sequence of events can lead to a complete collapse of the market, or can be halted with the entrance of an outsider (i.e. the central bank) to purchase assets and support the market.[136]

These mechanisms are analysed by Brunnermeier and Pedersen (2009) in a model that studies the simultaneous determination of securities prices and margins.[137] In the case of a fall in the prices of collateralized securities, margins rise because volatility increases. This determines a situation of decline in funding liquidity. Unable to meet margin calls, arbitrageurs are forced to sell securities in a fire sale, making markets illiquid. The two spirals reinforce each other: as prices fall, margins rise, arbitrageurs sell, and prices fall further, leading to the collapse of both prices and liquidity in the market.

Some empirical researchers have documented the link between limited arbitrage and fire sales in the course of the GFC, which allowed deviations of prices from their fundamental values. Mitchell and Pulvino (2012) present some episodes that occurred during the GFC as cases of arbitrage failures, by referring to a range of common arbitrage strategies involving corporate securities. They show that arbitrage spreads (i.e. the difference in the value of securities with similar characteristics) reached very high levels. Coval and Stafford (2007) paid attention to the behaviour of MMFs, by developing a model to predict the stocks of securities that will be sold when investors liquidate their positions in poorly performing funds.

Fire sales can lead to reduction of real investment and output. The idea of strong correlation between massive disposals of assets and real economic activity is present in the macroeconomic literature since at least the contribution of I. Fisher in 1933.[138] For some authors (Bernanke and Gertler (1989)),

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[136] The collapse of the LTCM in 1998 is a good example of application of such models. LTCM was a heavily leveraged hedge fund suffering losses from the Russian crisis in the summer 1998. To protect their positions from further losses, LTCM investors and short-term lenders called for the withdrawal of their funds or more collateral. LTCM had to liquidate its positions in a fire sale, which caused huge price dislocations among other market participants. The process was stopped when the Federal Reserve Bank of New York organized a consortium of financial institutions to take over the LTCM. See Shleifer and Vishny (2011).

[137] In debt contracts collateralized by securities, margins (called sometimes haircuts) represent the amount that lenders require borrowers to post. This implies that lenders give less than the 100 per cent of the price of the collateral. This practice is used in order to protect lenders from the default of the borrower. If the price of the collateral falls, lenders require more collateral from the borrower (or more cash back). In the case of a negative answer, the lender liquidates the collateral already in his hands. This mechanism can precipitate a fire sale. Increases in margins force traders to reduce their positions, which can further deepen dislocations in prices.

[138] Fischer (1933) studies the rise in the real value of debt denominated in nominal terms due to deflation mechanism produced by massive liquidations of corporate assets, leading to a vicious debt-deflation cycle.

shocks to corporate net worth reduce the ability of firms to post collateral and borrow, and as such undermine corporate real investments. For others (Shleifer and Vishny (1997)), price dislocations determined by fire sales of financial assets influence the decisions of the NBFI entities and banks on whether to lend to real investments, to hold cash, or undergo other financial projects. In this respect, fire sales can increase the desirability of alternatives to the financing of the real economy, given that financial investors may hoard cash if the possibility of mispricing and arbitrage opportunities increase. Other authors have emphasized the macroeconomic implications of cash hoarding. For example, He et al. (2010) find that financial institutions increased their holdings of cash in 2009 at the expense of lending flows.

As to the appropriate policy responses aimed at reducing the impact of price dislocations, it is worth noting that some policies tend to reduce the probability of such events (for example, increases in the capital requirements of financial institutions, stringent rules on haircuts, margins and central clearing for derivatives), while other policies are designed to contain the effects of delivering and fire sales when they occur.[139] In this last context, two distinct actions from public authorities are considered viable solutions: the public authority lends to banks against risky collateral; the public authority purchases assets directly or provide subsidies targeted at the purchasers of certain assets.

The US government intervention in response to the financial crisis in 2008-09 and to fire sales took these various forms. The government or the central bank bailed out some financial institutions, lent money against risky collateral and bought some assets. The distinctive feature emerging from the analysis of fire sales and policy responses points towards the complementarity of both preventive policies (aimed at reducing the risk of fire sales through the establishment of appropriate safeguards) and active intervention policies to be conducted quickly when a dislocation process is underway. In the case of failures in these two elements, asset fire sales can cause severe damage to the financial system and the real economy.

7.2 Asset correlation in financial markets

The portfolios of the NBFIs (for example, asset managers, insurers, pension funds) are highly diversified, because of the diversification strategies pursued at the global level. However, as outlined by Signorini (2018), they are also less diverse across individual investors, with holdings of bonds largely overlapping, implying that global asset managers may represent an important channel for the transmission of financial shocks across financial markets. Significant levels of asset correlation in the portfolio's allocation decisions of NBFIs can make the transmission of stress events easier across financial markets.[140] A significant asset correlation among insurers can impose negative externalities on other bond investors (for example, MMFS, banks, bond dealers).

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[139] See Diamond and Rajan (2010).

[140] With reference to the US corporate bond market and for the 2002-2011 period, the combination of commonality in investment decisions of insurers and their collective role as investors had the potential to cause system-wide instability, since they ended up being exposed to the same risks. The tendency for insurers to hold similar types of assets can be attributed to a number of factors, since they face similar regulatory constraints and follow similar business models (for example, they hold long term bonds to mitigate potential asset-liability mismatch, or chase liquidity premium by investing in illiquid bonds, or search for yield).

Some regulatory constraints can force insurers, above all the less capitalized ones, to engage in collective fire sale of bonds, causing their price to go significantly below the fundamental value for an undefined period of time with detrimental effects on other market participants.[141] Credit downgrades and regulation-determined fire sales are more likely to occur during a weak economic cycle, which all together tend to create additional stress to the MMFs industry and the other investors in the markets and exacerbate the spillover costs of the fire sales of bonds.[142] The combined negative effects of such events is higher when the correlation (i.e. the combined holding) of such bonds held by insurers is greater. This is an additional source of systemic risk in the corporate bond markets. Regulators should pay attention to the risks originating from the collective investment decisions of insurers in addition to the risks from individual too-big-to-fail firms.[143]

The role played by non-bank institutional investors (MMFs, insurance companies, pension funds) with high liquidity needs (and high exposures to the securitized bonds) has been studied within a transmission mechanism explaining the contagion of the crisis from the securitized bond market to the seemingly unrelated corporate bond market.[144] The specific purpose is to study how one asset class (securitized bonds) in a situation of adverse market conditions impacts the portfolio decisions of institutional investors holding also other asset classes. This study derives a transmission mechanism based on the effects of liquidity shocks on open-ended institutional investors investing in securitized bonds.

When the sub-prime mortgage crisis caused the collapse of the securitized assets markets, in order to face their redemption claims, MMFs did not sell massively the securitized bonds in their portfolios that had become illiquid, but instead reduced sharply their holdings of corporate bonds.[145] This was because MMFs were reluctant to sell the more illiquid assets and book losses at fire sales prices. Moreover, the MMFs that experienced the largest negative flows at the beginning of the crisis had to sell more than other MMFs.

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[141] Nanda et al. (2017) refer to a prohibition or larger capital requirements for bonds' holdings in the case these bonds are downgraded (for example from investment to speculative grade).

[142] For example, to the extent that investors, such as MMFs and bond dealers, mark their portfolios to market value, they have to recognise fair value losses even in the case these bonds are not sold. Moreover, fund outflows (withdrawals) can be triggered if the NAV of MMFs declines because of fire sale of bonds. Bond dealers, relying on repos to finance their bonds that in turn are collateralized, can be forced to post additional collateral in the case of fire sale of bonds reducing the value of their collateral.

[143] See Schwarcz and Schwarcz (2015).

[144] See Manconi et al. (2012). The evidence collected in this paper shows how in the pre-crisis years institutional investors (insurers, pension funds, asset managers, broker-dealers) with large liquidity needs heavily invested in the markets for securitized bonds (especially in the AAA-rated segment). These assets were considered to be safer and more liquid with respect to corporate bonds, which were assessed to depend more on the external economic environment, and as such suffering from higher credit risk. In the period 1998-2007 the holdings of securitized bonds held by these institutional investors increased fourfold to nearly $2 trillion. MMFs holdings grew particularly rapid if compared with insures and pension funds.

[145] According to Manconi et al. (2012), in the last quarter of 2007, MMFs collectively reduced their holdings of corporate bonds by 15 per cent (6 per cent of their total holdings), while they reduced their holdings of securitized assets by 9 per cent (1.9 per cent of their total holdings). During the same quarter, insurance companies were net purchasers, increasing their holdings of corporate bond and securitized assets by 1.9 and 0.3 per cent respectively.

In addition, MMFs sold first and to a greater extent junk bonds rather than investment-grade ones. In contrast, the insurance companies sold neither class of assets.[146] These authors find that yield spreads and bond sales increased more for corporate bonds held by MMFs exposed to the securitized markets, compared to the same bonds held by unexposed MMFs. This effect has been sharper for lower-rated bonds, partly due to the contagion of the shock from the AAA-rated segment of the securitized bond market to the lower-rated corporate bond market via the ownership of both securities by MMFs.

Asset correlation plays a significant role also in the international transmission of funding shocks. In this respect, both economic theory and empirical research have pointed towards the role of financial intermediaries in explaining the often-observed co-movement in the returns on assets located in different countries and the underlying economic drivers (in these analysis, the correlated changes in the macroeconomic variables are not deemed to be sufficient to explain the full story). The objective is to predict how crises can be transmitted across markets and to assess the benefits of the diversification in the portfolio allocation of the international asset managers. More importantly, this issue is of relevance, given that the magnitude of this co-movement in returns increases in periods of market stress.

Following the literature on fire sales mentioned in the previous paragraph,[147] Jotikasthira et al. (2012) study a new channel through which shocks spread across international markets. It refers to investor flows to MMFs domiciled in advanced economies that determine large changes in these MMFs' portfolio decisions in emerging markets. They show how MMFs redeem investments because of funding shocks originated from their investor base and how these forced redemptions impact asset prices. Their analysis covers over a thousand of MMFs domiciled in advanced economies, which collectively held between 6 and 17 per cent of the market capitalization of 25 emerging markets in the years 1996-2009.

The results of this study outline that these global MMFs alter substantially their portfolio allocation in emerging markets in response to a shock that comes from their investor base. The impact of the potential re-allocation on the market capitalization in the emerging markets represents a large portion of the overall domestic trade volumes. Fire sale re-allocations cause large initial shock price effects in the affected emerging markets. Finally and most importantly for our purpose, this paper shows that the most affected countries are those whose bond markets that are more highly correlated with one another and with those of the advanced markets where the global MMFs have their domicile.

7.3 Pro-cyclicality and herding behaviour of asset managers

The GFC has shown that asset managers may take on risks that are excessive in relation to the interest of other stakeholders (for example, small shareholders, and counterparties). Panetta et al. (2009) show how this behaviour may be partly due to the incentive structure incorporated in the relevant remuneration schemes, which may encourage managers to assign too much importance to short-term returns, at the expense of sound management and long-term results, and consequently underestimate the risks and potential future losses. Excessive risk-taking induces pro-cyclicality, as risk is more easily taken in upturns and tends to aggravate downturns. The asymmetry of remuneration schemes (managers

[146] Insurance companies and pension funds would be less forced to sell than MMFs, especially in the event of temporary deviations of asset prices from their fundamentals.
[147] Particularly Shleiter and Vishny (2011), Coval and Stafford (2007).

are paid if they make profits but are not penalized for losses) turns to be a powerful accelerator of the degree of pro-cyclicality of the entire financial system. These considerations have led to the recognition that incentives have been one of the driving forces of the GFC. In that case, investment strategies that were thought to determine extra-performance were *de facto* only apparent, meaning that profits turned negative once the risks materialized.

Adverse market developments are more likely to occur in the case where NBFIs behave in a synchronized manner. Haldane (2014) identifies a number of channels that are able to determine common patterns across asset managers and their investors, which have the potential to turn idiosyncratic frictions into system-wide failures. This author focuses the attention on insurance companies and pension funds, and refers the possibility for the collective behaviour of these institutions to generate pro-cyclicality due to some market-wide conventions.

In this respect, it is outlined how the reliance on common metrics used to benchmark the performance of the funds can create the conditions for collective behaviour (herding) among asset managers that amplify pro-cyclical movements in asset prices and investment flows.[148] This increases the potential for mispricing in the markets of financial assets.[149] For example, asset managers who are evaluated against a common benchmark have an incentive to buy the stocks included in the index as a form of insurance companies, since only severe underperformance can determine their dismissal. Only very few asset managers would go against the enormous mass of funds pursuing all together the same trend, even if the trend is a deviation from fundamental values.[150]

Other market conventions may generate pro-cyclicality in the asset management industry. For example, index-tracking strategies will tend to increase asset correlations and herding in investment flows.[151] The main findings point towards the circumstance that the indices' composition criteria can implicitly create important behavioural distortions in portfolio asset allocation. These analyses, mainly focused on the corporate bonds market, offer proof of investment decisions made during market overreaction phases, which end up disrupting the main purpose of value creation.[152] Moreover, the use

[148] The economic literature has identified the use of benchmarking as a tool to overcome the information asymmetries within the NBFI sector. See Rajan (2005), Bolognesi and Zuccheri (2008).

[149] There is increasing evidence that funds base their portfolio decisions on the metrics performing as benchmarks. For example, during upward movements of the markets prices of the financial assets, managers are likely to try to increase returns by searching for yield in order to perform better than the accepted benchmark. The opposite happens in a situation of declining asset prices, since in such a situation there is a search for safe assets to boost returns. The outcome of these developments is typically expected in terms of increasing pro-cyclical pressures on asset prices, which contributes to rising prices in an upswing and to reducing prices in a downswing. See for details Haldane (2014).

[150] Bank of England (2014) shows that there are few contrarian investors in the market, or that investors traditionally considered as contrarian may behave pro-cyclically in episodes of severe market stress. See also Gerding (2014).

[151] See Haldane (2014).

[152] Bolognesi and Zuccheri (2008) document that the market representation of the most used benchmarks in the industry for asset management is often based on criteria that refer to market capitalization. Their evidence suggests a need to overcome the cap-weighted indices in favour of metrics with more efficient criteria and able to guarantee both investors' protection and a portfolio asset allocation. For these reasons, benchmarks' selection should then be one of the most important strategic-organizational choices for an asset management company. Benchmarks should overcome the index composition rules based exclusively on market capitalization. In the case of equity mutual funds, for example, it would be advisable the adoption of equally

by asset managers of a small pool of consultancies may also generate correlated investment strategies. In the same direction, the use of short-term performance mandates for fund managers is also likely to amplify pro-cyclical swings in asset allocation and asset prices.

Merrill et al (2012) find that mark-to-market accounting rules may have had a role in the massive selling of structured finance securities in the US subprime mortgage market during the years 2007-09.[153] They consider a pension fund or insurance companies company operating close to its risk-based capital and whose bond portfolio is affected by a downgrade. This has the effect of both reducing measured solvency due to marking to market and raising required risk-based capital requirements. In response to this, these institutions may have an incentive to sell their downgraded assets to de-risk their portfolio. This will tend to further depress asset prices in a pro-cyclical spiral.

Forced sales of corporate bonds by insurance companies occurred between 2001 and 2005 because of the downgrading of bonds to non-investment grade ratings. Such forced sales have an adverse transitory impact when made by firms that have weaker capital ratios. Moreover, fair value accounting motivates higher rates of selling of asset-backed securities among firms, whereas historical cost accounting for life insurance companies incentives them to hold downgraded asset-backed securities, selling corporate bonds instead.[154]

Such a pro-cyclical behaviour is embedded in the relevant data. A research by the Bank of England (2014) suggests that portfolio allocation decisions by insurance companies and pension funds have a very significant impact on asset prices, long-term real yields, and hence on incentives to hedge further, in a pro-cyclical spiral.[155] According to this evidence, there are indications of correlated, pro-cyclical swings in asset allocation and asset prices induced by asset managers' and their clients' behaviour. Other signs of increased pro-cyclicality come from the adoption of new technologies and innovative financial products across a number of business areas, which have made intermediaries quicker to react to market news.

More generally, the NBFI sector incentives to take tail risks and to adopt herd behaviour (and consequently move prices away from fundamentals) increased in the years prior to the GFC. Asset managers may behave differently (the young and unproven are likely to take more tail risk, while the established ones are likely to herd more), but these distorted incentives can create a self-reinforcing pattern. If the herd behaviour dislocates asset prices far from their underlying economic values, the likelihood of large opposite movements – precisely the event in the markets that creates huge tail losses – increases. Moreover, this combination of factors can even be exacerbated in a situation of low interest

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weighted market indices or baskets based on a mix of parameters such as corporate earnings, sales or cash flows. This could offset the biases connected to the market-cap allocation.

[153] According to these authors, the mechanism through which fair value accounting may trigger the forced sale of a financial asset is as follows. First, losses in the value of securities may reduce an institution's capital through the impact of losses on earnings through fair value changes for assets held for sale. Second, the decreased credit quality of assets increases the regulatory capital charge that must be applied to the assets. The increased regulatory charge has the effect of lowering the ratio of risk-adjusted assets to capital. If this ratio threatens to fall below regulatory levels, institutions have one out of three exit strategies: exit the market, search new equity capital, or sell risky assets (replacing them with safer assets). Given that the market for raising new capital can be limited, selling risky assets can be the firm's only choice, especially in the presence of accounting rules that may have already forced the recognition of losses.

[154] See Ellul et al. (2015).

[155] See Haldane (2014).

rates following a period of high rates, because of financial liberalization or because of extremely accommodative monetary policy.[156]

8. The economic reasons to fill the regulation gap

The analysis presented in this paper has outlined the 'economic characters' of the activities performed by the NBFI sector, which consist of market-based (in contrast to bank-centred) forms of intermediation between ultimate savers and borrowers based upon a network of specialized financial intermediaries, or represent a response to specific regulation and/or to market failures in key financial segments.[157] In part due to its complexity, the linkages with the fully regulated sectors (i.e. banks), and the long and opaque chains of intermediation, the exact size of the NBFI sector is still under investigation.[158]

These activities show a higher degree of vulnerability (with respect to traditional banking) since they do not benefit from explicit official sector-driven backstops, while performing liquidity, maturity and credit transformations. Moreover, they have the potential to create macro-stability concerns due to the externalities that the collective behaviour of the asset managers can transmit to the financial system. This paper has documented how pro-cyclicality characterizes the behaviour of NBFIs and how this may have adverse consequences for the financial system and the real economy. There are various elements that lead to pro-cyclicality in the NBFI sector, including mark-to-market rules, the evolution of margin requirements and lending standards relative to collateral values, and the design of compensation packages.

NBFI activities and products determine more interconnectedness across sectors, which helps reduce idiosyncratic risk through diversification but at the cost of negative spillovers in the event of large shocks. This means that also those financial systems that still experience a predominant role of banks within the intermediation process cannot be isolated from adverse events coming from the NBFI sector. In this respect, bank supervisors should pay greater attention to monitor NBFI developments more closely in order to better assess the relevance of the interconnectedness channels with the banking system.

The underlying rationale should recognise that preserving the resilience of NBFI is a key element for the safety and soundness of the banking system itself. As a result, regulators should adopt a holistic approach, considering both the need to increase the resilience of non-bank financial entities and other market-related objectives, while also safeguarding the safety and soundness of the global banking system.

Additional risks stem from delays in the implementation of the post-GFC FSB reforms affecting the NBFI sector. As I have documented in the paragraph 7 above, the nature of these externalities, coupled

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[156] See Rajan (2005).

[157] A recent research conducted at the BIS provides evidence that one determinant of the NBFI growth in both AEs and EMEs is the implementation of macro-prudential policies in the banking sector. This research uses data from the FSB monitoring exercises over the period 2002–17 and information collected by several academic studies. Its results suggest that financial intermediaries in the NBFI sector react to regulations aimed at banks. It also show that this is not limited to domestic markets: financial intermediaries in a jurisdiction react to foreign jurisdictions' policy choices. See Claessens at al. (2021).

[158] See Harutyunyan et al. (2015), Hahm et al. (2012).

with the growing importance of financial markets (rather than individual institutions) in the allocation of risks, tend to reduce the desirability as well as the effectiveness of policy measures centred exclusively on micro-prudential tools.

By contrast, the NBFI policy framework developed so far has been driven mainly by micro-prudential considerations, looking at individual institutions and activities. In this respect, what is needed is the definition of a macro-prudential framework, which implies policy measures aimed at addressing the market failures and the externalities arising from the NBFI sector, also with the objective to take into account the macroeconomic implications of these activities. Policy makers should face the challenge to fill the still existing regulation gap affecting the NBFI sector and at the same time modify the underlying orientation of such measures, by enhancing the understanding of the different potential channels for contagion arising from NBFI activities.

A fully-fledged regulatory and supervisory framework on the NBFI sector should consist of both micro- and macro-prudential tools. Only the appropriate combination of the two approaches has the potential to address the risks stemming from this segment of the financial intermediation.

In the event of a crisis, NBFIs may require public support, leading to fiscal implications. During the GFC, the Federal Reserve had to support dealer banks and MMFs. In other countries, banks also had to be supported, in part also because of their NBFI operations, sometimes at a significant cost to taxpayers. While in some cases the ultimate fiscal implications were limited, the contingent liabilities and risks of such operations were not marginal. Unless the systemic risks in the NBFI sector are properly addressed, these contingent liabilities remain in place, implying larger costs in case of future crises.

In the following section, I outline the economic rationale underlying the case for a fully- fledged financial stability framework for the NBFI sector.

8.1 The case for a framework to assess systemic risk for non-bank financial intermediation

The increased reliance of the modern economies on market-based financial transactions has led to more integrated financial systems and has determined significant benefits (reduction in transaction costs, expanded access to capital markets, lower cost of funding, and wider diversification of risks), thus contributing to raise the capacity of the financial system to withstand (limited) shocks.[159] However, the augmented variety of market participants has altered the nature and the allocation of risks in the system and the incentives structure of the financial agents, leaving room for potential distortions and downsides in the case of systemic shocks.[160]

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[159] Since the GFC, the FSB policy response has been guided by the need to address the weaknesses in regulation put forward by the crisis, while avoiding to eliminate the economic benefits stemming from the core functions performed by the NBFI. In doing so, the FSB has recognised that many NBFI activities are grounded upon valid economic and financial rationales. See paragraph 6 above for an overview of the FSB approach and Claessens et al. (2012).

[160] According to Rajan (2005), the increased vulnerability of the global financial system is due to these market-based transactions that depend on reliable and timely dissemination of public information, on reliable counterparties' performance, on smooth functioning of the payments and settlements systems, and above all on the availability of the liquidity when needed. It is interesting to note that Rajan's paper, which was written

Some examples can help to explain such developments. The first refers to the incentive of asset managers to take on growing levels of tail risks. Some NBFIs (i.e. insurance companies or pension funds) take on tail risks when entering the credit derivatives markets to sell guarantees against a default. Their asset managers have the incentive to load up on them, since these investment strategies seem to produce high returns. According to Rajan (2005), in normal times, they can believe that the correlations between the different instruments are close to zero. With the materialization of a tail event, these correlations can turn to one overnight.[161] In this case, hedged positions become unhedged, inflicting huge losses. This underestimation of tail risks allows balance sheets of NBFIs to expand excessively, creating systemic risk.[162] These developments were exacerbated in the years leading to the GFC, given the absence of a prudential requirement specifically tailored to limit this balance sheets' expansion. This drawback of the prudential framework has been addressed via the relevance assigned to the leverage ratio within the post-GFC financial regulatory repair.

The second example relates to the incentives to herd with other asset managers on investment decisions, since herding is a form of collective insurance, but with the potential to generate price dislocations. If herd behaviour moves prices, the probability of opposite movements triggering huge tail losses increases. This combination of events can be exacerbated in a prolonged period of low interest rates, as it is currently the case because of the extremely accommodative monetary policies prevailing across the borders.

These adverse developments get worse in the case of a shortage in the markets for liquidity.[163] The demand for liquidity has increased even in normal conditions. Moreover, the risk of liquidity shortages has increased, since the growing number of specialized financial intermediaries and the complex and opaque intermediation chains tend to mask the concentration of tail risks. In this context, the role of traditional banks as liquidity providers seems to face significant challenges, aggravating the difficulties in a situation of stress.[164]

Further financial stability concerns refer to the increasing interconnectedness between the NBFI and the banking sectors. In particular, the role of MMFs as providers of funds (to banks and governments) is a central element from a macro-stability perspective: any stress in the MMFs industry could determine

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before the GFC, outlines that these changes may create more financial-sector induced pro-cyclicality (for example, in the case market participants focus excessively on some readily available sources of information that they believe everyone else is focusing on) than in the recent past, thus contributing to increase the probability of a catastrophic meltdown. Rajan stresses the role of securitization that allows specialization in financial markets and a much larger distribution of risks across the system.

[161] This has been the case in the 1990s with the default of Russia or the Asian countries debt, or in the 2000s with the GFC.

[162] See Gennaioli et al. (2012), Lombardi and Siklos (2017).

[163] Even a perception of too little aggregate liquidity in the system can create contagion. For example, this has occurred during the March 2020 market turmoil. See FSB (2020c).

[164] Banks could not attract the liquidity flying from other markets, given their increased role as first loss absorber in the securitization process and/or as providers of implicit backstops. In a downturn, when credit losses hits banks' balance sheets and there is uncertainty about where those losses are allocated, banks may not act as providers of next-to-last resort liquidity. They could be in a position to demand liquidity from the market precisely when it has little liquidity to offer, thus increasing their initial losses. See Gatev and Strahan (2004), Rajan (2005).

liquidity pressure on banks and possibly generate instability.[165] Moreover, negative spillover effects from MMFs to banks (and in the opposite direction) can occur through either direct or indirect channels.[166]

The build-up of vulnerabilities in the NBFI entities and products should feature within a macro-prudential framework, tailored to deal with leverage, maturity and liquidity mismatches, and other financial stability concerns stemming from the NBFI sector.

An essential pre-condition to address these externalities relates to the need for high-quality, internationally comparable, and granular data, including on the links between intermediaries active on different markets and instruments, in order to establish a regular and far-reaching monitoring exercise of the underlying risks and to propose policy tools specifically oriented to mitigate them. This is particularly true for the so-called neglected or tail risks that can give rise to the build-up of excessive hidden risks in the system.[167]

The definition of a macro-prudential framework could benefit from a different use and orientation of already existing supervisory tools. According to Signorini (2018), a reference can be made to the changed attitude towards stress testing techniques in bank supervision. Before the GFC, stress test methodologies were not advanced and were used only for micro-prudential purposes. The financial crisis has highlighted the importance of forward-looking capital adequacy assessment. Stress tests have been effectively employed as a supervisory tool in that perspective since the crisis and have subsequently been included in the regular macro-prudential toolkit in many jurisdictions.

There is a need to enhance the ability to assess the relative importance of the different transmission mechanisms, using more appropriately designed stress test tools, such as macro or systemic stress tests. More specifically, the adoption of a cross-sector approach could be helpful in this direction. This would allow to focus on the links between banks and non-bank financial institutions and would enable an assessment of the extent to which vulnerabilities in the various sectors could interact in a downturn and generate negative feedback loops. The most urgent analytical priorities in this field include a better modelling of second-round effects when carrying out such analyses, as well as of (direct and indirect) interlinkages between banks, insurance companies, pension funds, and investment funds through common asset holdings and fire sales, and of the risks of international spillovers.

The calibration and effectiveness of macro-prudential tools applying to the non-bank financial sector requires further analysis (that goes beyond the scope of this paper). In particular, this is needed for measures aimed at limiting vulnerabilities: a deeper analysis (and knowledge) of the risks related to the

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[165] See Bengtsson (2012).

[166] The direct channels include banks acting as counterparties in securities financing or derivative transactions; fund deposits into banks; banks granting loans to funds; bank holdings of investment funds shares as well as fund holdings of bank-issued debt. The indirect channels comprise of fund holdings of banks' shares and common exposures by funds and banks. As an example, in the euro area, 14 percent of bank equities are held by investment funds, which could make banks vulnerable to tensions in the non-bank financial sector. See IMF (2017).

[167] For example, despite the relevance of the interlinkages between banks and MMFs, monitoring faces limitations deriving from the limited availability (and knowledge) of data on MMFs. In particular, data gaps remain on the individual exposures of MMFs to banks, and on the exposures with non-banks entities and their sources of funding, as well as on liquidity mismatches especially at the macro-level. For more details on these data gaps, see FSB (2017a).

non-bank financial sector (including market infrastructures) could help enrich the design of macro-prudential policies, which are still characterized by tools that are mainly tailored for the banking sector.

9. Some building blocks of a new approach

The individual policy tools to be included in a macro-prudential framework are not obvious and a debate is still under way among regulators and academic scholars. Annex No. 2 provides a mapping exercise between the main regulatory and policy tools and the associated risks arising from the NBFI sector (i.e. from the economic functions as defined within the FSB framework). In this paragraph, I focus the attention on some building blocks of a new framework: 1) determining the correct pricing of backstops; 2) resolving the potential trade-off between systemic risk and intermediation costs; 3) mitigating run risks in MMFs; 4) resolving the agency problems in some NBFI transactions; 5) regulating the dealer banks.

Determining the correct pricing of backstops. The first building block relates to the calculation of an economically sound price of the backstops needed to keep the NBFI entities safe and viable. In doing so, one should not forget that in the case of the traditional banks, public backstops (in the forms of liquidity and credit guarantees) are established with the objective to reduce the likelihood of bank runs and to stop the spread of contagion potentially stemming from the insolvency of individual banks. In order to deal with the moral hazard induced in banks' behaviour, these backstops go hand in hand with prudential regulations specifically tailored to encompass the entire range of banking activities/risks.

As shown in paragraph 3, NBFIs benefit from indirect or implicit forms of guarantees/backstops, mainly through banks' off-balance sheet support lines of credit or through their direct affiliation to fully regulated BHCs. This implies that authorities face two, not necessarily alternative, policy options: 1) the determination of an upward adjustment in the price of such implicit backstops; 2) the definition of a larger scope of regulation to include the entire spectrum of the NBFIs.

Since GFC, the FSB and the international SSBs have pursued, in a sequential order, both options. Ten years later, the requirements affecting banks derived by the post-GFC reforms have increased the price for the backstops that are transferred to NBFI activities through banks. Prudential requirements on banks have been strengthened in a sensible manner, and are being consistently implemented across the vast majority of FSB jurisdictions. Banks' capital rules have been significantly tightened to reflect size, interconnectedness and complexity (including the exposures to the new risks).[168]

At the same time, the other option is lagging behind the schedule.[169] This also for reasons that relate to the specificities of the asset management industry that should be dealt with through ad hoc rules (mostly to be issued by the securities regulators), given that these intermediaries cannot be simply put

[168] The finalization of the 2017 Basel III package has closed a number of opportunities for regulatory arbitrage by NBFIs. However, it is to be noted that the final picture on regulatory arbitrage can be drawn only when the new banking rules are fully implemented. This will occur in 2028, because in April 2020 the original phase-in period was extended by an additional one year, as response to alleviate the difficulties of the financial industry brought about by the COVID-19 emergence. See BCBS (2010a, 2010b, 2017a, 2017b, 2019b, and 2020).

[169] See Box No. 4 above, and more extensively FSB (2019d, 2020d).

under the banking consolidated prudential rules. As a result, significant externalities – in terms of potential runs, leveraged positions, inadequate risk management - can still be generated along the (long and opaque) intermediation chains by the specialized NBFIs that can pass market failures from one part of the chain to the other. This situation highlights a need to fill this existing regulation gap to address these externalities through policy measures calibrated to the specificities of the various NBFI entities and products. These individual measures should be framed within an overall framework to assess systemic risk.

Resolving the potential trade-off between systemic risk and intermediation costs. The enlargement of the scope of the regulatory perimeter may raise the cost of financial intermediation. In doing so, these policies may contribute to establish a potential trade-off between the level of systemic risk and the cost of financial intermediation. Many theoretical models have related financial shocks, vulnerabilities/externalities and the pricing of risk.[170] Vulnerabilities such as high leverage, maturity transformation, and interconnectedness - characterising elements of the NBFI sector - make it more likely that shocks will trigger externalities, which in turn may cause the market price of risk to rise sharply. More vulnerable financial systems produce a lower price of risk in periods of low volatility (meaning that financial intermediation is cheaper) and generate a higher price of risk in the case of large adverse shocks (implying an increase in the intermediation cost). Macro-prudential tools should be aimed at reducing the sensitivity of the price of risk to adverse shocks, so that in the event of a large and adverse shock the increase in the price of risk is less pronounced.[171]

A policy framework addressing vulnerabilities in the NBFI sector will likely impose costs in terms of a higher pricing of risk in 'normal times', raising the costs of funding and intermediation. For example, higher capital and liquidity requirements would make it more likely that financial intermediaries are able to absorb rather than amplify sudden shocks. In the case of an NBFI entity, these requirements could reduce the likelihood of fire sales of assets in the financial markets. Similarly, policies that tend to avoid an increase in asset prices, such as those that tighten credit underwriting standards, or raise risk weights on exposures or margins, might also reduce the probability of sharp falls in markets' valuations and the corresponding fire sales. There is also the problem to ensure an international coordination in the definition/implementation of such measures. [172]

The above considerations imply that the policy decisions are not neutral, and their consequences need to be fully understood by regulators and explained to the public. If for some authors raising prudential requirements for financial institutions can deliver augmented costs of intermediation, other scholars, for example Admati et al. (2013), argue that higher equity for financial institutions does not

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[170] See Adrian el al. (2014b).

[171] The tools eligible to promote financial stability can be diverse. Most are micro-prudential tools used within a macro-prudential orientation, meaning that the micro-prudential objectives (that is the safety and soundness of individual institutions) can be overruled for the benefits of the system as a whole. The most important regulations refer to higher capital and liquidity requirements for systemic financial institutions, a new resolution regime for the largest intermediaries, greater centralization of derivatives trades.

[172] Claessens et al. (2021) find that a net tightening of domestic macro-prudential policies leads to an increase of 10 percentage points in the share of domestic NBFI assets in total financial assets. This is driven by both an increase in NBFI assets and a reduction in bank assets. At the same time, tightening macro-prudential policies in foreign jurisdictions reduce the share of NBFI assets in total domestic financial assets. This evidence shows that financial regulations spill over to other sectors that were not targeted, both within and across borders.

necessarily cause a higher cost of credit intermediation. As a result, macro-prudential policies addressing vulnerabilities could not raise the pricing of credit. Research at the BIS on the effects of the 2010 Basel III standards finds that the implied costs are lower if compared with their medium-term advantages, and possible costs can be internalized once the new regime comes into effect. [173]

More research is needed to fully assess the benefits and the associated costs of each individual policy choice. On balance, once the lower incidence of financial crises and the reduced potential for systemic risk are taken into account, the net benefits of increased prudential requirements (or in the case of NBFI the wider scope of the regulatory perimeter) in terms of financial resilience and economic growth are substantial when evaluated over a long time horizon.

Mitigating the risk of runs on* money *market funds. Among the regulatory areas where progress is most needed are MMFs.[174] The markets for wholesale short-term funding exhibit elements of fragility, since they allow maturity transformation in the absence of official backstops. In a run, NBFIs (for example MMFs) have to sell assets at a discount, depressing market prices. This creates an incentive for seeking the first-mover advantage, given that NBFIs are particularly vulnerable to this mechanism, since they do not offer demand deposits but obtain their funding mainly on the wholesale money markets, via ABCPs or repos.

The bulk of the post-GFC policy repair has been directed towards the objective to prevent runs in these markets.[175] International standards on MMFs have been strengthened, through more stringent requirements on valuation, maturity and liquidity risk management.[176] However, the MMF industry is still heterogeneous, showing diverging structural elements depending upon the types of funds, the funds' structure, and the investors' base across jurisdictions.

One important strand of the post-GFC reforms has been aimed at reducing the reliance on the constant or stable net asset value (C-NAV) and introducing a variable or floating NAV (V-NAV). This is a particularly sensible policy option, because the C-NAV portfolios induce investors to treat MMFs' liabilities as equivalent to demand deposits. However, once the fund breaks the buck, there is no public backstop, exposing the funds to runs. Notwithstanding the finalization of the post-GFC reforms, the configuration of the MMF industry still shows a large variety across jurisdictions, implying that the risk of runs on MMFs, exacerbated in the case of C-NAV portfolio configuration, still exists.

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[173] See Fender and Lewrick (2016), Angelini et al. (2011).

[174] According to the latest FSB data, MMF industry is sizeable, accounting approximately US$ 7 trillion of assets under management at the end of 2019. The sector plays a key role in supporting the real economy and acts a source of funding for governments and financial and non-financial corporates. Triparty repos and ABCPs are two main sources of wholesale short-term secured funding; financial commercial papers and uninsured certificates of deposits are sources of unsecured funding. Primary investors in these markets are the C-NAV MMFs. See FSB (2020d).

[175] The systemic impact stemming from these markets has been illustrated by the collapse of Lehman Brothers in September 2008. The Reserve Primary Fund had large exposures to Lehman and could no longer maintain a stable NAV, which triggered a run on large scale with nearly 1.5 trillion dollars flowing out of the prime MMFs to Treasury MMFs by the end of October 2008. This run generated large shortages for commercial paper and repos issuers. In response, the Federal Reserve had to arrange a number of facilities to provide backstops through commercial banks to ABCP and commercial paper issuers. In addition, these runs were addressed more directly by the public guarantee provided by the US Treasury to the MMFs. See Adrian et al. (2013).

[176] See IOSCO (2020).

For example, in the US there are three types of MMFs subject to different rules: government, prime and tax exempt (the last two include both institutional and retail funds).[177] Government and retail funds (both prime and tax-exempt) have a stable NAV, while institutional funds have a floating NAV. In the EU, government funds, denominated Public Debt MMFs, are allowed to have a stable NAV. In addition, there are other types of short term (i.e. with maturity less than one year) funds, which are allowed to use a rounded NAV of 1.00, if their mark-to-market NAV remains within a range of 20bps, otherwise they need to convert to mark-to-market NAV. Finally, there are longer-term V-NAV MMFs, which have a maturity of less than two years. This heterogeneity contributes to explain the substantial outflows occurred during the March 2020 turmoil, both in the US and in the EU.[178]

Other strands of regulatory interventions have been directed towards the lowering of the average asset maturity, greater and more frequent reporting requirements, and liquidity requirements, which include liquidity buffers so as to reduce maturity transformation and to minimize incentives for runs.

The debate on the finalization of the reforms affecting the MMFs is still on-ongoing. In this respect, the following considerations should be properly balanced. For example, it appears difficult to fully remove the risk of runs on MMFs while preserving their role in the system (and for the investors) and their current size. Along the same line of argument, imposing capital requirements can make default less likely; however, it would transform MMFs into quasi-banks and move intermediation to even less regulated entities, such as crypto- assets and related intermediaries. Removing the C-NAV could substantially reduce the size of the MMFs sector, since investors would shift funds to banks deposits or elsewhere. The shortcomings of the MMFs, as outlined during the March 2020 stress event, could be addressed through increase liquidity buffers to withstand adverse events in the markets.

Moreover, while the shorter maturities reduce the risk that an individual MMF would have to liquidate assets to meet redemptions, the shortening of asset maturities increases the rollover risks to issuers. A specific issue that will play an important role in future policy assessments relates to the liquidity shortage situations and how to address them. According to the IMF (2019), minimum eligibility criteria (based on credit quality and liquidity) for the inclusion of assets in fixed-income funds' portfolios could be introduced to help lessen credit risks and liquidity mismatches.[179] Requiring funds to better match

[177] In the US, non-government funds must be able to introduce liquidity fees and gate redemptions, while government funds have only the option to introduce these requirements. Government funds must invest at least 99.5 per cent of their assets in cash, treasuries, and fully collateralized repos. Prime funds have both daily and weekly liquidity requirements, while tax-exempt only have a weekly liquidity requirements. All funds are required to invest in securities with very low credit risk. In the EU, all types of funds have minimum daily and weekly requirements and can introduce liquidity fees and gates. See FSB (2020c).

[178] While government MMFs experienced record inflows in the US and in the EU, prime MMFs in the US and USD-denominated MMFs in the EU experienced the most significant redemptions. In the US, prime MMFs recorded outflows of USD 125 billion, representing 11 per cent of their assets, with some of them having difficulties to maintain their weekly liquidity buffers. In the EU, although MMFs experienced outflows in March, there has been large variation across currencies and regulatory fund types. USD denominated low volatility funds recorded significant outflows, representing more than 25 per cent of their assets in Ireland and Luxembourg. Euro-denominated MMFs in the EU also recorder significant outflows (approximately 15 per cent of their assets). See FSB (2020c).

[179] In the case of money market funds, rules on credit quality and liquidity of portfolio assets have been introduced in recent years in the United States (Securities and Exchange Commission's money market funds reform) and Europe (EU regulation on money market funds).

redemption periods to the liquidity profiles of their portfolios would mitigate the potential for fire sales; enhanced guidance for frequent and rigorous stress testing and appropriate disclosures of risks would also help ensure a minimum standard for funds' liquidity risk management.

If the liquidity condition of a large asset manager puts the correct functioning of markets at risk, there is the need to identify the step-in actor (for example, the central bank), the recipient of this additional liquidity (the individual stressed entity or the market as a whole), and the conditions under which the interventions would be possible. The experience during the GFC, when a number of central banks de facto expanded the scope of their lender of last resort coverage, should be a starting point for a systematic approach to these issues.[180]

Resolving the agency problems in some non-bank financial transactions. Since the GFC, many reforms have been aimed at addressing the agency problems arising from certain NBFI activities (particularly in the case of securitization and CRAs). The assessment of the risk embedded in structured products is a difficult task, given the complexity and variety of the structures and assets involved. Key elements in determining the level of risk include the extent of subordination, the payment waterfalls, the nature of liquidity or credit backstops from banks or insurance companies, and the quality of the underlying collateral. Efforts to make more data about the collateral and the structure of these products available to investors are key to reduce the potential for contagion. More information is also needed in order to detect whether the new products entering the market are intended to arbitrage new capital or liquidity regulations.

In this context, the status of implementation of the internationally agreed rules on risk retention could be considered. These rules tend to impact the incentives of underwriters to adequately monitor the underwriting standards, reducing the moral hazard stemming from securitized mortgages and loans sold on the markets. Originators are obliged to retain at least a certain percentage (for example, 5 per cent) of the credit risk of any asset they sell through an ABS. Appropriate disclosure requirements protect investors in ABS. If the originator of securitised assets is a bank, the capital requirement applied to the retained risk is a key consideration for the economic rationale of the securitization. All these considerations point towards the need to ensure a common approach in the various jurisdictions at the global level, limiting the scope for delays in their implementation above all in the jurisdictions largely involved in these transactions. [181]

The experience of inadequate ratings provided by CRAs in the structured markets indicates that the assessment of risks in this segment is much more complex and multi-dimensional than in the case of corporate debts. The reform of CRAs has aimed at limiting conflicts of interest.[182] However, as long as CRAs are chosen and paid by the issuer, it seems difficult for them to work in the exclusive interest of

[180] For these considerations, see Signorini (2018).
[181] See FSB (2020b).
[182] For example, CRAs are prohibited from structuring the same product they rate; they are required to publish statistics about the performance of their ratings for some years; they have to provide more granular information about their ratings methodologies; they have been subjected to new internal governance and compensation rules.

investors. A number of solutions are still under discussion; however, the adequate model seems to be a form of risk retention also for the CRAs.[183]

Regulating dealer banks. Securities broker-dealers play a crucial role within market-based intermediation. Even more than others, this segment needs to be established under a comprehensive regulatory approach. According to Duffie (2010) and Singh (2012b), the business models of such intermediaries are inherently fragile, since they combine high leverage, a pro-cyclical business, and unstable and uninsured wholesale funding. These banks have incentives to take tail risks (much more than commercial banks), through tradable assets generating high returns in the very short-term. Unlike banks, broker-dealers are highly leveraged. Their lower capital ratios reflect the fact that the assets are largely invested in liquid and relatively low-risk securities and the share of assets invested in (less liquid and more risky) loans is relatively small. Moreover, their liabilities are primarily wholesale short-term secured funding, which is much less reliable in times of stress than insured deposits.

The leverage of broker-dealers tends to be more pro-cyclical than that of banks and is a potential amplification channel. Data on broker-dealer subsidiaries in the US show a dramatic decline in capital ratios in the years prior to the GFC, as perceived risk fell to low levels. In a crisis, deleveraging by broker-dealers is sharper if they are more leveraged and perform larger maturity and liquidity transformation, which can generate fire sales especially in the case of massive assumption of tail risks.[184]

These intermediaries are subject to a fully-fledged regulatory system in most jurisdictions. However, some recent regulatory actions in the US on the largest financial institutions have raised some concerns. In the case of a trend towards this approach also in other jurisdictions, there could be the risk of lowering the effectiveness of supervisory standards, introducing forms of deregulation in the financial system Moreover, these regulatory choices also have the potential to introduce significant deviations from the internationally agreed reforms, calling into question the effort to maintain a global level playing field.[185]

10. Conclusions

This paper has highlighted the economic reasons justifying the need to fill the regulation gap that still exists between non-bank financial intermediation and other parts of the financial system (for example, banks and market infrastructures). As I have documented in the previous paragraphs, despite significant improvements, many aspects of the post-GFC reform agenda for NBFIs are still in progress and in need of completion.

According to the FSB, the features of the NBFI sector that had contributed most to the GFC have generally become less prominent at the global level, also as a result of post-GFC regulatory reforms.

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[183] This issue has been mitigated in jurisdictions that have implemented the new BCBS rules of 2014. Indeed, in the perspective of banks calculating capital requirements for their exposures to securitizations, a specific hierarchy of approaches applies based on which formulae-based methods have to be used before the approach based on external ratings.

[184] See Adrian et al. (2014b); Claessens et al. (2012).

[185] Concerns have been raised by the approach of the Trump Administration, which has softened many of the Dodd-Frank Act requirements affecting the largest banks. For more details, Gelzinis (2019a and 2019b), and Trapanese (2020).

However, the growth of NBFIs in the last ten years should act as a reminder that the financial system is permanently evolving. The March 2020 turmoil has documented that concerns about the NBFIs' resilience and liquidity have the potential to cause fire sale losses, with possible spillovers to other intermediaries (including banks). Moreover, in a number of countries, including many emerging markets, systemic risks associated with the NBFIs that are outside the regulatory perimeter may be accumulating and could lead to renewed negative spillovers on banks.[186]

The NBFI regulatory framework developed so far has been based mainly upon micro-prudential instruments, aimed at dealing with the risks posed by individual institutions and activities. However, the nature of the externalities associated with NBFIs and the importance of markets (rather than single entities) in the allocation/distribution of risks, tend to reduce the effectiveness of micro-prudential measures.

A key lesson from the GFC is that micro-prudential tools could be reinforced if they are accompanied by a framework containing policy measures to address systemic risk arising from NBFIs. Only the appropriate combination of the micro- and macro-prudential approaches has the potential to control and mitigate the risks stemming from NBFIs. In this respect, there is a greater need for bank supervisors to monitor NBFI developments more closely in order to assess the degree of interconnectedness with banks, given that safeguarding the resilience of NBFIs is a vital element for the stability of the banking system itself.

Risks tend to rise during periods of low interest rates such as the current one, and those risks can migrate from one area to others. These are compelling reasons to act now to bridge the regulation gap. It is more than ten years since the GFC, and the memory of its effects is fading. Fatigue associated with the implementation of the approved reforms is rising and warnings about new risks are less likely to be heeded. Pressures for a rollback of the post-GFC reform agenda are materializing, motivated in part by the need to respond more effectively to the consequences of COVID-19. These tendencies should be resisted, since they could undermine the important progress made so far in improving financial stability.

[186] See IMF (2018).

Annex No. 1: The main policy areas of ongoing FSB work on non-bank financial intermediation[187]

Analytical and policy work on specific issues	**In the short-term addressing individual risk factors and specific markets that contributed to amplification of the 2020 March turmoil.**
Factors to analyse	Liquidity risks, core functions and aspects of the structure or regulations in non-government MMFs. The role of other types of open-ended funds invested in illiquid assets in amplifying liquidity stress, recognising the variety of fund structures, underlying assets and the availability and use of liquidity management tools across different jurisdictions. The preparedness of market participants for the margin calls they experienced, their ability to liquidate assets to meet margin calls under stressed conditions, and the role of margining practices both in centrally cleared and bilateral markets in amplifying funding strains. The role of leveraged investors in core government bond markets, to assess whether excessive leverage could be a cause for concern in future episodes. The structure of core funding markets for both governments and corporates, including the drivers of market-making capacity and the role of banks and non-banks in the provision of liquidity, also in times of stress. The analysis of the adequacy of the post-GFC reforms and assessment of the progress in their implementation.
Systemic risk assessments	**Enhancing the understanding of systemic risks in NBFI and the financial system as a whole, including the interactions between banks and non-banks, the resilience of the NBFI sector and cross-border spillovers.**
Factors to analyse	The interconnections between banks and NBFIs, and their implications for financial resilience. The desired level of resilience of the system, with a focus on financial markets (government and corporate bonds, foreign exchange and derivatives). The role of public policy in ensuring system resilience and the provision of financial service to the real economy.
Policies to address systemic risks in NBFI	**Assessing policies to address systemic risks in NBFI, including the adequacy of policy tools and the desired level of resilience in NBFI.**
Factors to analyse	Addressing the question of whether and how those tools should be embedded in a framework that take account of their impact on the system as a whole. Clarifying the role of mechanisms to strengthen resilience ex ante (including effective structural risk mitigants, such as central clearing and avoidance of pro-cyclicality), in order to minimise the need for exceptional ex-post interventions (e.g. through system-wide liquidity backstops provided by central banks).

[187] This Annex is based upon the FSB Holistic Review of the 2020 March turmoil (FSB 2020c).

Annex No. 2: The risks/economic functions of non-bank financial intermediation and the associated regulatory tools[188]

Economic Function 1	**Management of collective investment vehicles with features that make them susceptible to runs**
Tools for managing redemption pressures in stressed market conditions	**Redemption gates.** They allow collective investment vehicles (CIVs) to constrain redemption requests to a maximum amount per day. In this way, CIVs can manage maturity/liquidity mismatches, by prolonging the term of their liabilities. They can ease redemption pressures and restrain runs. However, these gates can give negative market signals triggering runs. **Suspension of redemptions.** It achieves the same objectives as 1, but in a stronger way. It is an exceptional measure to enable the CIVs managers to assess the situation. It places a significant liquidity restriction on CIVs investors. It can create incentives for runs once CIVs are reopened. **Redemption fees.** They impose liquidity costs on investors in times of stress. They offer the choice over whether to redeem immediately (at a cost) or remain invested in the CIVs (avoiding the fee). In the case of trigger-based redemptions fees, there is a risk the fear of a fee can send negative signals and trigger runs. **Side pockets.** They allow to legally separating the impaired or illiquid portions of an investment portfolio (above all when it cannot be properly evaluated in stressed market conditions) to prevent them from affecting CIV's returns. Once the markets stabilize, the side pockets can be valued and liquidated. Side pockets can immobilize investors' assets for a long and thus exacerbate the risk of runs.
Tools to manage liquidity risk	**Limits on investments in illiquid assets**. Quantitative limits on the proportions of portfolio to invest in illiquid assets (with no observable market prices) may lessen 'fire sales' risks and the related runs, reducing the first-mover advantage for early redeemers. **Liquidity buffers.** Requirements to meet liquidity buffers (composed of high liquid assets) can mitigate the impact of increased redemptions. The calibration of such buffers should depend upon the characteristics of the CIVs portfolios (for example, appropriate for very illiquid portfolios) and the types of stress they face. Liquidity buffers can affect negatively the CIVs' profitability. **Limits on asset concentration.** These quantitative limits are aimed at reducing the exposure of a CIV to a particular holding or sector and the cost of liquidating positions to meet redemptions. These restrictions could lessen the risk of large runs in times of stress. Like buffers, they can impact CIVs' risk-return profile.

[188] This Annex is mainly based upon the FSB policy framework published in August 2013 (FSB 2013a).

Tools on Leverage	**Limits on leverage.** By limiting the amount of leverage of the CIVs, these measures could mitigate the pro-cyclicality of adverse market developments and reduce the need to implicit support from the public safety net. They could affect the flexibility of the CIVs' investment strategy.
Tools on maturity of portfolio assets	**Limits on maturity of assets.** These measurers can take the form of limits on the duration/ weighted average maturity of the assets in portfolio or on the residual maturity of its securities. They are aimed at mitigating the risks from maturity and liquidity transformations posed by CIVs' activities.
Economic Function 2	**Loan provision that is dependent on short term funding**
Tools on deposit-taking non-bank loan providers	**Bank-like prudential regulatory regime.** Non-bank financial firms that provide loans using funds raised by collecting deposits create the same maturity/liquidity transformation and leverage as banks. Such firms should be subject to the bank-like prudential framework or alternatively they should not be allowed to take deposits.
Capital	**Capital ratios.** These requirements should be designed and calibrated to be countercyclical. Their calibration and the quality of the capital instruments should depend upon the sectoral and jurisdictional specificities of these entities.
Liquidity	**Liquidity buffers.** The size and composition of the liquidity buffers should be calibrated and tailored to the effective characteristics of these entities, which may differ from banks, above all in the case they do not collect deposits.
Leverage	**Limits on leverage.** These constraints should follow the specificities of the entities (for example, markets in which they operate, retail or wholesale, size of the firm, interconnectedness with other financial sectors).
Large exposures	**Limits on large exposures.** These measures should be tailored to an entity's specific business model or operations, also allowing a proportional impact, especially for smaller specialized lenders.
Liabilities	**Restrictions on types of liabilities.** These constraints are aimed at reducing the risks (for example a run) associated with particular liabilities and mitigating the risks from maturity/liquidity transformation. For example, such restrictions may include prohibiting the use of ABCPs in cases where entities do not have appropriate securitization and risk management processes in place.
Economic Function 3	**Intermediation of market activities that is dependent on short-term funding or on secured funding of client assets**
Regulatory regime	**Bank-like prudential regulatory regime.** These non-bank market intermediaries may perform the same maturity/liquidity transformation (and leverage) as banks, contributing to the same concerns to financial

	stability. For such entities, authorities should impose prudential regimes functionally equivalent to banks.
Liquidity	**Liquidity requirements.** These measures should mitigate the risks associated with liquidity transformation. Such liquidity measures should be grounded on the approach of the Basel III liquidity requirements for banks, although they should reflect the specificities of these entities.
Capital	**Capital requirements.** Such requirements may take the form of a minimum capital ratio (including risk-adjusted capital ratios) or minimum levels of liquid net capital. They can increase broker-dealers' resilience to counterparty defaults, mark-to-market write-downs on assets.
Client assets	**Restrictions on the use of client assets.** Non-bank market intermediaries (e.g. prime brokers) use client assets to fund their own longer-term assets, thus carrying out maturity/liquidity transformation similar to banks. To mitigate the run risks arising from such activities, client monies and unencumbered assets should not be used to finance the entities' own account activities.
Economic Function 4	**Facilitation of credit creation**
Capital	**Capital requirements.** Credit insurers and guarantors create credit through financial guarantees and credit insurance companies, especially in boom times. For this reason, they should be subject to capital requirements to cover potential losses from the risks taken. These measures should act counter-cyclically.
Business	**Restrictions on scale and scope of business.** These restrictions should help these intermediaries to price and manage the risks associated to their credit creation activities (even prohibiting their involvement in a particular business). Appropriate limits for exposure to various types of covered risks relative to the capital/surplus funds would avoid losses and defaults.
Liquidity	**Liquidity buffers**. In the case of short-term funding, these entities can be vulnerable to creditor runs. For this reason, they should be imposed liquidity requirements to ensure that these entities keep sufficient buffers to survive in both normal and stresses situations.
Tail-risk management	**Enhanced risk management practices.** Appropriate stress testing practices are to be introduced to assess the potential losses these entities may incur in downturns or in an isolated adverse event.
Risk sharing	**Mandatory risk sharing requirements.** The amount of credit risk transfer, and thus the risk of imperfect credit risk transfer, can be reduced if the insured (or guaranteed) entities retain some of the credit risk. This can be done through a deductible, where the initial loss remains with the insured/guaranteed, or a co-payment, where losses are proportionately shared between the insured/guaranteed and the insurer/guarantor.
Economic Function 5	**Securitization-based credit intermediation and funding of financial entities**

Maturity/liquidity transformation	**Restrictions on maturity/liquidity transformation.** Restrictions on differences in maturity between the securities issued by the securitization vehicle and the underlying asset pool are aimed at limiting the risks arising from the maturity/liquidity transformation through securitization. Appropriate liquidity rules enhance their resilience and help mitigate the risks arising from the liquidity transformation. These limits may further reduce the roll-over risk of the asset-backed securities (ABS) issued and excessive reliance on support from sponsors (e.g. banks).
Eligible collateral	**Restrictions on eligible collateral.** Non-bank financial entities may be used by banks to fund an illiquid portfolio on their balance sheet that cannot otherwise be financed in the wholesale market. To mitigate the risk of an excessive build-up of leverage in the financial system from such activities, authorities may impose restrictions on the quality of collateral that may be accepted.
Exposures/funding	**Restrictions on exposures or funding.** Authorities can impose limits on non-bank entities' overall exposure to (or funding from) banking counterparties (including intra-group), as well as diversification limits to single counterparties. The benefits of such restrictions are in terms of reducing the degree of leverage in the overall financial system.

Glossary

- Advanced Economies (AEs)
- Asset-Backed Securities (ABS)
- Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF)
- Asset-Backed Commercial Papers (ABCPs)
- Banking Holding Companies (BHCs).
- Bank for International Settlements (BIS).
- Basel Committee on Banking Supervision (BCBS).
- Captive Financial Institutions and Money Lenders (CFIMLs)
- Collateralized Debt Obligations (CDOs)
- Collateralized Loan Obligations (CLOs)
- Collateralized Mortgage Obligations (CMOs)
- Collective Investment Vehicles (CIVs)
- Commercial Paper (CP)
- Committee on Global Financial System (CGFS)
- Commercial Paper Funding Facility (CPFF)
- Commercial Mortgage-Backed Securities (C-MBSs)
- Constant Net Asset Value (C-NAV)
- Credit Default Swaps (CDS)
- Credit Rating Agencies (CRAs)
- Diversified Broker-Dealers (DBDs)
- Economic Functions (EFs)
- Economic Function 1 (EF1)
- Economic Function 2 (EF2)
- Economic Function 3 (EF3)
- Economic Function 4 (EF4)
- Economic Function 5 (EF5)
- Emerging Market Economies (EMEs)
- European Union (EU).
- European Systemic Risk Board (ESRB)
- Federal Deposit Insurance companies Corporation (FDIC).
- Federal Home Loan Bank (FHLB)
- Federal Home Loan Mortgage Corporation (Freddie Mac)
- Federal National Mortgage Association (Fannie Mae)
- Federal Reserve Board (FRB).
- Financial Stability Board (FSB).
- Fundamental Review of the Trading Book (FRTB).
- Global Financial Crisis (GFC).
- Global Systemically Important Banks (G-SIBs).
- Government-Sponsored Enterprises (GSEs).
- Government National Mortgage Association (Ginnie Mae)
- Gross Domestic Product (GDP).
- Group of Twenty (G20).
- International Monetary Fund (IMF).

- International Organization of Securities Commission (IOSCO)
- Low Volatility Net Asset Value (LV-NAV)
- Long Term Capital Management (LTCM)
- Long Term Notes (LTNs)
- Medium Term Notes (MTNs)
- Money Market Funds (MMFs)
- Money Market Mutual Funds (MMMFs)
- Monitoring Universe of the Non-Bank Financial Intermediation (MUNFI)
- Mortgage-Backed Securities (MBS)
- Net Asset Value (NAV)
- Non-Bank Credit Intermediation (NBCI)
- Non-Bank Credit Intermediaries (NBCIs)
- Non-Bank Financial Intermediation (NBFI)
- Non-Bank Financial Intermediaries (NBFIs)
- Originate-To-Distribute (OTD)
- Originate-To-Hold (OTH)
- Other Financial Intermediaries (OFIs)
- Over-The-Counter (OTC).
- Primary Dealer Credit Facility (PDCF)
- Repurchase Agreements (Repos)
- Residential Mortgage-Backed Securities (R-MBSs)
- Securities Financing Transactions (STFs)
- Securities Exchange Commission (SEC)
- Shadow Banking (SB)
- Special Investment Vehicles (SPVs)
- Special Purpose Vehicles (SPVs)
- Standard-Setting Bodies (SSBs)
- Structured Investment Vehicles (SIVs)
- Systemically Important Financial Institution (SIFI).
- Term Asset-Backed Securities Loan Facility (TALF)
- Term Auction Facility (TAF)
- Term Securities Lending Facility (TSLF)
- Total Global Financial Assets (TGFAs)
- Total Loss-Absorbing Capacity (TLAC).
- United States (US)
- Variable Net Asset Value (V-NAV)

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