



Facultad de Ciencias Económicas y Empresariales
ICADE

Spillover on Financial Markets: Shadow Banking and Monetary Policy

Author: Elegido Ojanguren, Lucía
Director: Guenther Antoon Claeys, Peter

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Abstract

The emergence of new forms of credit intermediation has transformed the financial landscape and the traditional banking system. Specifically, the institutions that constitute the shadow banking sector have garnered significant research attention due to the risks they pose to economic stability. This paper aims to explore the behavior of these institutions in the context of monetary policy, as well as their interconnectedness with the traditional banking system. Our findings indicate that monetary policies, whether expansionary or restrictive, inadvertently foster the growth of shadow banking. This migration of assets underscores the necessity for enhanced regulatory oversight. Additionally, the strong interconnection between shadow banks and the traditional financial system poses systemic risks, highlighting the need for appropriate regulation to manage these risks and maintain financial stability. Improved data transparency is essential for more robust future analyses and effective policy implementation.

Keywords: Shadow Banking, Interconnectedness, Monetary Policy, Systemic Risk, Traditional Banking System

Resumen

La aparición de nuevas formas de intermediación crediticia ha transformado el panorama financiero y el sistema bancario tradicional. En particular, las instituciones que componen el sector de la banca en la sombra han captado una atención significativa por parte de la investigación debido a los riesgos que suponen para la estabilidad económica. Este artículo tiene como objetivo explorar el comportamiento de estas instituciones en el contexto de la política monetaria, así como su interconexión con el sistema bancario tradicional. Nuestros hallazgos indican que las políticas monetarias, sean expansivas o restrictivas, fomentan inadvertidamente el crecimiento de la banca en la sombra. Esta migración de activos subraya la necesidad de una mayor supervisión regulatoria. Además, la fuerte interconexión entre los bancos en la sombra y el sistema financiero tradicional plantea riesgos sistémicos, destacando la necesidad de una regulación adecuada para gestionar estos riesgos y mantener la estabilidad financiera. La mejora en la transparencia de los datos es esencial para análisis más sólidos en el futuro y una implementación eficaz de políticas.

Palabras clave: Banca en la Sombra, Interconexión, Política Monetaria, Riesgo Sistémico, Sistema Bancario Tradicional

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Acronyms

<i>CDO</i>	Collateralized Debt Obligation
<i>CCP</i>	Central Counterparties
<i>DeFi</i>	Decentralized Finance
<i>ECB</i>	European Central Bank
<i>ETF</i>	Exchange Traded Funds
<i>FSB</i>	Financial Stability Board
<i>GFC</i>	Global Financial Crisis
<i>ICPF</i>	Insurance Corporations and Pension Funds
<i>MFI</i>	Monetary Financial Institutions
<i>MMF</i>	Money Market Funds
<i>NBFI</i>	Non-bank financial intermediaries
<i>OBS</i>	Off-Balance Sheet
<i>OFI</i>	Other Financial Intermediaries
<i>OTC</i>	Over-the-Counter
<i>SVB</i>	Sillicon Valley Bank

Chapter 1

Introduction

1. Introduction

1.1. Introduction

In recent decades, the banking sector has gone through a series of changes that have ended up changing the traditional banking system and giving rise to the creation of new entities that have a decisive role in the global modern economy. Shadow banking emerges as a new form of credit intermediation outside the traditional system, exempt from regulation even though it engages in similar activities (Adrian & Ashcraft, 2012). Existing literature also refers to the set of institutions that lend private credit to firms and other agents as Non-Bank Financial Intermediaries (“NBFI”).

The growth and role of the Shadow Banking sector takes on even greater importance in the current context of restrictive monetary policy in response to the crisis induced by COVID-19 pandemic and the following war in Ukraine. The primary contribution of this paper is to demonstrate that conventional monetary policy, which involves adjusting interest rates to control factors such as inflation and economic growth, does not operate in the same manner within shadow banks as it does in traditional banks. The paradoxical effect of monetary policy on shadow banks is that, regardless of whether the policy is expansionary or restrictive, it leads to a migration of assets onto the balance sheets of these entities, thereby fostering their growth. In an environment of rising interest rates, Shadow Banking entities, subject to much looser regulatory restrictions, can adjust their strategies to minimize their financing costs, translating into a migration of assets out of the traditional banking system into the shadow one (Hodula & Libich, 2023). On the other hand, when interest rates are reduced, Shadow Banking expands, investors seeking higher returns gravitate towards this sector in search of more lucrative opportunities than those offered by the traditional banking system.

Additionally, the financial system composed of banks in the shadow tends to operate with greater flexibility and fewer restrictions compared to the conventional banking system, which allows entities to adapt more agilely to changes in market conditions and fluctuations in monetary policies, making it lose traction in stabilizing the financial

system and fostering systemic risk. This instability is further exacerbated by the substantial interconnectedness between entities within the shadow banking system and the traditional banking sector, as demonstrated in the paper. This interconnection poses additional risks in the event of a crisis originating in any of these entities, potentially leading to widespread financial contagion and systemic repercussions.

Current financial instability as a result of persistent inflation, geopolitical conflicts and economic uncertainty increases the urgency to properly understand how these institutions behave and regulate non-bank financial intermediaries. Therefore, the primary objective of this study is not only to analyze how this sector responds to monetary policies and explain the paradoxical effect, but also to demonstrate the interconnection of bank and non-bank institutions and to evaluate the risks associated with the lack of regulation, seeking to demonstrate that, without adequate financial supervision, Shadow Banking could generate significant adverse effects on the stability and functioning of the global financial system.

1.2. Topic justification

The study of the phenomenon of Shadow Banking is of vital importance in the current context for several fundamental reasons. Firstly, after the 2008 global financial crisis, an exponential growth of this financial intermediaries has been observed, which emerged as a response to the lack of liquidity right after the global crisis in the markets and has come to be equivalent in terms of assets to the traditional banking system today providing alternative sources of financing to bank deposits (Financial Stability Board, 2023). Moreover, expansionary monetary policies and the low interest environment during the last decade, exacerbated the search for yield, encouraging the growth of these institutions. This situation poses a scenario of critical relevance because Shadow Banking, by operating without the relevant regulation, becomes the main contributor to systemic risk in the economy. Its lack of regulation potentially increases the conjunctural risk of current economies, given the unexpected rise in interest rates and the growing economic fragility, and represents a potential threat to long-term financial stability. Therefore, research and understanding of this phenomenon is imperative, considering the possible implications it could have for the stability and functioning of the economy in general.

The purpose of this qualitative analysis is to deepen and disseminate the importance of the Shadow Banking phenomenon in the context of rising interest rates with the aim of understanding the dynamics and to avoid what happened in the 2008 subprime crisis.

1.3. Objectives

The research question on which this paper will focus will be to analyze the relationship between the monetary policy set by central banks and manifested through interest rate levels and the growth of Shadow Banking. This analysis will be carried out focusing on the Eurozone and the policies of the European Central Bank (“ECB”). The paper also aims to understand how interconnected are the elements that make up the shadow banking network and the traditional banking system. Due to the lack availability of data, primarily because of the private nature and lack of disclosure of such institutions, and the lack of transparency in the sector, the paper aims to analyze this phenomenon through a non-quantitative approach. This qualitative analysis will provide guidance on how risk is transferred from one system to another in the event of a shock in one node and allows us to draw several conclusions about the need for regulation of this booming sector.

1.3.1. Specific Objectives

- Understand what Shadow banking is, its main components, origins, growth since the 2008 crisis for the Euro Zone, and contextualize the relevance and risks associated with these entities within the contemporary economy
- Analysis of the impact of tightening and loosening monetary policy, through increasing and decreasing interest rates on Shadow Banking institutions and assessing risks derived.
- Explain the differences between traditional banking system and Shadow Banking in the context of changing Monetary Policy
- Assessment of the interconnectedness of shadow banking to the traditional banking system and potential transmission of financial shocks.
- Evaluate adverse effects of shadow banking: regulatory arbitrage, interconnectedness, and lack of regulation for growing sector.

1.4. Structure

The development of this research is made up of a second section in which we go over existing literature to further develop on the key elements of the paper and review past research on Shadow Banking, mainly in the context of growth and risks. The third section aims to deeply analyze how monetary policy has impacted Shadow Banking growth over the last years and the response of these set of institutions to exogenous shock in the interest rate environment, in contrast to traditional banks. The focus of the fourth section will be on assessing the interconnection of both emerging and traditional systems, focusing mainly on the money market and the exposure of banks to the shadow banking and viceversa. Lastly, I would conclude by stating the main implications of the unchecked growth of these institutions, key challenges and underscore the necessity for appropriate regulation to uphold financial stability and prevent further financial crises.

Chapter 2

Literature Review

2. Literature review

2.1. Definition, origins, and historical development of the concept Shadow Banking

The term Shadow Banking was first used around 2007 - 2008 with the onset of the Global Financial Crisis (“GFC”). The first author to address it was the American economist Paul McCulley in a speech hosted by the Kansas City Federal Reserve Bank. He defined Shadow Banking as the set of non-financial institutions that engaged in maturity transformation, meaning that they raised short-term funds and use those to purchase assets with longer-term maturities, that were not subject to traditional banking regulation and therefore could not borrow in an emergency scenario from the Federal Reserve (Kodres, L., 2013a). As the system became flooded with mortgage-backed securities and instability grew, the Financial Stability Board (“FSB”) further developed the concept of Shadow Banking to highlight the differences with the traditional system and defined Shadow Banking as the set of entities outside the regulated banking system, that were able to perform credit intermediation. Simultaneously, as the financial crisis began, other economists like Gary Gorton, began to study this phenomenon and the impact of these institutions on the system, considering them as one of the leading causes of the crisis as the repo market is not comparable to bond market (Gorton, G.B., 2012)

The Global Financial Crisis of 2008 was exacerbated by shadow banking and since then, structural changes in the banking sector have been the main driver of shadow banking growth. This makes a lot of sense considering that there was a breakdown of the traditional system, loss of confidence in the banking system and loss of confidence in the health of bank balance sheets. This led to the search for greater flexibility in the markets and much laxer regulation, resulting in the emergence and growth of markets such as over the counter (“OTC”), derivatives and non-bank financial institutions.

Over the years, the study of these entities was deepened and finally, was on the 22nd of October of 2018 when the FSB decided to replace the term *"Shadow Banking"* by a more precise one; *"non-bank financial intermediation"*. This change aimed to avoid the

negative connotation of the previous term and also capture a more specific scope of financial activities, where the number of non-banks is limited to those involved in credit and liquidity intermediation processes.

Regarding growth, some financial indicators show that since the GFC, a notable increase in private credit has been documented, and bank disintermediation and the dislocation of traditional sources of debt have generated additional demand from companies to alternative products. Firstly, as per European Central Bank records, over the past decade the system experienced a notable shift in the composition of financial assets among intermediaries; at the end of 2009, traditional banks accounted for 52% of the total financial assets of all financial intermediaries. However as shown in Figure 1, by 2020, the share of banks dropped to 37%. This signifies a substantial transformation in the financial landscape and suggests the growing prominence of non-bank financial intermediaries.

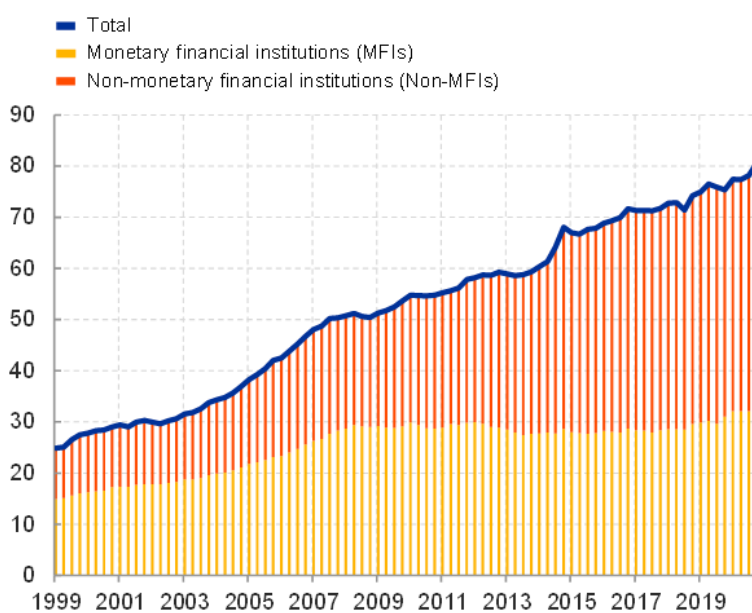


Figure 1. Financial asset holdings in the euro area (€Tn)
Source: Euro area accounts (ECB)

Additionally, in December of 2010 with the introduction of the Basel III regulatory framework that aimed to make the system more resilient to future crises, a series of much stricter capital and liquidity requirements were implemented, resulting in a migration of a portion of the balance sheets and activities of commercial banks towards the unregulated sector of the system. As shown in Figure 1, according to ECB data based on the evolution

of total financial assets, non-bank financial intermediaries have become increasingly relevant.

Moreover, the money multiplier has become somewhat obsolete as the financial system has evolved (Michl & Park, 2022). Over the last decade, there has been a sharp decline in the money multiplier. The money multiplier, defined as the largest degree to which the money supply is influenced by changes in the quantity of deposits (Agarwal, 2022), represents the ability of banks to increase the monetary supply. This metric has declined in the recent years, dropping from 9.2 times in 2008 to 3.5 times as of February 2024 according to the Board of Governors of the Federal Reserve System in the US (Federal Reserve Bank of St. Louis, 2024), showing that the traditional banking business is in decline.

While the money multiplier is a measure of the ability of the traditional banking system to intermediate the monetary base by creating deposits, with the rise of shadow banking, researchers introduced a new concept known as the collateral multiplier, as within this field, liquidity is created through the use of collaterals. Therefore, the collateral multiplier is a measure of the shadow banking system's ability to intermediate the monetary base by creating shadow money, that also measures the extent to which sovereign bonds are used as collateral. The increased lending activity from shadow banks to banks rather than traditional deposits can help explain why money multipliers have decreased so much in the last years, in comparison to the increase of the collateral multiplier (Kaminska, 2012), which reinforces our view of a growing transformation in the financial landscape and the increasing importance of non-bank financial intermediaries in the context of private lending.

Upon understanding the growth of this sector, it can be concluded that Shadow Banking represents a new form of credit intermediation outside the traditional system. Performing similar activities to banks but avoiding minimum capital requirements agreed on Basel Framework and extensive regulation, these institutions are currently considered one of the main sources of systemic risk, monitored by the European Systemic Board. Even though they provide a valuable alternative to bank funding and supports real economic activity growth, they can be seen as a threat to financial stability with adverse effects on the stability of the economy (Pellegrini et al., 2022) which was perfectly underlined during the 2007-09 global financial crisis and highlighted the role of shadow banking institutions for both financial stability and bank regulation.

2.1.1. Participants within Shadow Banking

Most of the credit intermediation activities comprised in the shadow banking perimeter are conducted by a wide range of non-bank financial intermediaries. Understanding the key participants is essential for comprehending their scope of activities and their impact on financial stability and the broader economy. Actors within the Shadow Banking typically including the following (Ghosh et al., 2012);

- a. Money Market Funds, providing short term funding on the Money Market.
- b. Credit Hedge Funds, engaged in leverage strategies to increase returns.
- c. Investment funds, investing the capital of a pool of investors in a wide range of financial products.
- d. Exchange Traded Funds (“ETF”), a type of investment fund
- e. Special Purpose Vehicles, to facilitate securitization and structured finance.
- f. Financial companies, that mainly engage in providing debt for both individuals and companies.
- g. Insurance companies and leasing companies

The vast majority of them are covered by the term Other Financial Intermediaries (“OFI”), which comprises all financial institutions other than those included in the sectors monetary financial institutions (“MFI”) and the insurance corporations and pension funds (“ICPF”).

As shown above, within the Shadow Banking sector there is a wide range of intermediaries performing distinct activities and providing alternative investment and credit services for both corporates and particulars. Moreover, it must be noted that commercial banks can also be considered actors of this sector as they are in cases indirectly involved in Shadow Banking activities by engaging in credit intermediation activities with these institutions through lending and borrowing.

2.1.2. Main activities within Shadow Banking

Regarding the scope of activities, as previously discussed, the primary activity of Non-Bank Financial Institutions is to conduct credit intermediation, namely, to facilitate the flow of funds between capital providers and capital seekers. This section aims to further describe the key aspects of credit intermediation (Kodres, L. 2013b) which include; maturity transformation, credit transformation, leverage and liquidity transformation.

The principal distinction of these activities from what we know about traditional banks lies in the possibility to access Central Bank funds. Banks perform the straightforward function of lending money in the long term, such as mortgages, while receiving loans with much shorter maturities, e.g. deposits. By capitalizing on this maturity and interest rate differential over time, they are capable of paying lower interest than they receive. This, of course, does not negate the possibility of a default, but in the case of traditional banks, their lending and borrowing activity is always backed by a Central Bank. In contrast, shadow banks cannot rely on emergency funds or central bank bailouts, thereby incurring significantly higher risk when performing similar activities.

Additionally, another key difference relies on the Off-Balance Sheet intermediation that occurs in the operations carried out in the Shadow Banking sector.

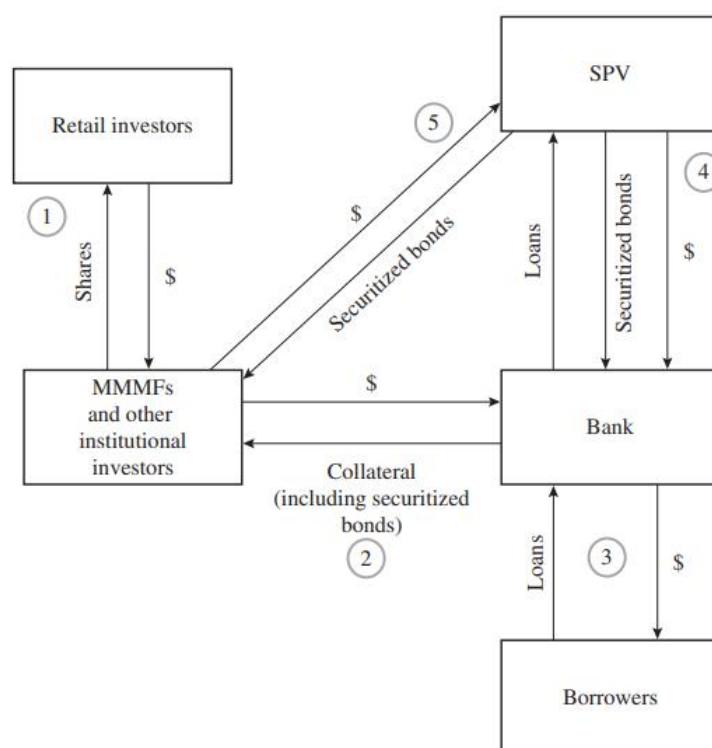


Figure 2. Off-Balance-Sheet intermediation in the Shadow Banking System
Source: (Gorton and Metrick, 2010)

As illustrated in Figure 2, in contrast to the traditional on-balance sheet intermediation carried out by banks, the transactions orchestrated by shadow banking entities are Off-Balance Sheet (“OBS”), providing additional liquidity but obscuring the true financial position of institutions. OBS intermediation implies that loans are pooled and securitized, thereby increasing systemic risk, particularly when markets become volatile, and the

value of the collateral diminishes. These operations highlight the need for stringent regulatory oversight to manage such risks effectively. History has shown that two successful methods for regulating privately created money include setting strict guidelines on collateral and providing government-guaranteed insurance (Gorton and Metrick, 2010). These strategies can help mitigate the inherent risks associated with shadow banking and ensure greater financial stability.

Furthermore, in addition to this, by not adhering to classical banking system regulations, they lack adequate minimum capital requirements to offset potential asset value losses with equity capital rather than debt, leading in many cases to default. The mentioned lack of access to sources of government liquidity reserves and public sector credit guarantees makes shadow banks inherently fragile (Adrian & Ashcraft, 2012). Because most shadow banking activities are intertwined with bank and insurance companies' activities, this sector is a source of systemic risk for the financial system.

2.2. Current regulatory framework, and challenges in the regulation of Shadow Banking

2.2.1. Regulatory framework

The concerns on shadow banking being the leading cause of systemic risk triggered work of the Financial Stability Board among other international standard setting bodies, to develop recommendations and to strengthen the oversight and regulation of the shadow banking system as well as to collect and exchange information concerning shadow banking. The body in charge of this non-bank financial intermediation monitoring is the FSB, which publishes an annual report with a breakdown of total global financial assets, distinguishing between banks, central banks and NBFIs. In addition to monitoring, it is responsible for identifying the main associated risks and developing policies and regulations. Regarding regulation, currently there is no applicable law in force that applies to the shadow banking sector, but guidelines and frameworks to monitor and mitigate systemic risks. Entities such as the European Commission advocate the need for regulation and inclusion of shadow banking credit to construct a realistic description of the aggregate credit supply. It requires adequate regulation due to several factors:

Firstly, the size and increasing number of entities within the sector. According to the latest data released by the Financial Stability Board (Financial Stability Board, 2023), the total

non-bank financial intermediation sector expanded to represent 47.2% of the system's total financial assets.

There is also a need to prevent the shadow banking system from being exploited for regulatory arbitrage.

Lastly, its close connections with the traditional banking system are also of concern. The European Commission aims to regulate not only the activities of Shadow Banking institutions but also the reporting rules regarding traditional banks' exposure to shadow banking. This is to mitigate systemic risk and the potential for contagion. As of September 6th, the European Commission has issued a set of technical standards that all credit institutions must utilize under the capital regulation when reporting their exposures to shadow banking entities.

Therefore, until a regulation specifically designed for activities conducted within the realm of shadow banking is developed and reviewed, the FSB has been establishing indirect regulation by overseeing the connections between shadow banking activities and the traditional banking system (Ghosh et al., 2012).

2.2.2. *Main challenges faced by regulators of the financial system.*

Drawing on the need to regulate banks with the primary aim of protecting depositors, it is also necessary that non-bank financial entities that undertake banking functions be monitored with the same strictness. However, regulating this set of institutions is a challenge due to their complex nature and diversity of structures and business models.

Moreover, the light touch regulation enabled the shadow banking system to increase its leverage level through the years with the potential problem of the risks faced by the shadow banking system quickly being transferred to the banking system due to its interconnectedness and interlinkages with the regular banking system, largely through committed liquidity facilities and reputational concerns (Sinha, 2013).

Studies show that tightening capital requirements imposed to traditional banks induces a reduction in a bank's leverage position and therefore reduces their likelihood of failure, more specifically it has been tested for some cases that with a capital requirement of 26%, the probability of default is completely eliminated (Dempsey, 2020). However, the solution is not as straightforward as this. An increase in the capital requirement for the entire system, both banks and non-banks, would not necessarily pose a solution as in this

context, the credit supply from banks would be reduced, and other emerging institutions in the Shadow Banking sector would come to fill the supply demand gap and meet the loan demand no longer serviced by the banking sector, thus leaving the issue unresolved once again. This explains the true main challenge for regulators regarding Shadow Banking.

Among other key challenges that regulators may face we include:

- Lack of transparency and scarcity of data. Moreover, limited regulatory oversight results in lack of standardized reporting hinders regulators' ability to monitor and address risks at a systemic level.
- Interconnectedness: Although shadow banking entities are independent from the traditional banking system, there is an interconnectedness, which complicates regulation as the two sides often overlap.
- Financial innovation: The continuous financial innovation and the ability of these entities to adapt quickly to regulations or find loopholes with new instruments or practices hinders the work of regulators.
- Variety of business models and new forms of intermediation, presenting additional challenges for regulators seeking to anticipate and supervise these emerging risks.
- Liquidity and maturity mismatches

Paradoxically, the absence and near impossibility of regulation represent an advantage over traditional forms of credit. This "legal loophole" enables non-banks to engage in higher-risk operations, funding projects with elevated risk profiles, and enhancing flexibility in terms of both firms and individuals with credit needs, leading to increased systemic risk.

2.3. Interconnectedness of elements in the financial system

The global financial system may be depicted as an expansive network, wherein each financial institution serves as a node interconnected through linkages. These participants are interacting with each other by lending and borrowing financial assets, creating complex webs of financial liabilities, cross-asset holdings, and correlations in asset returns (Caccioli et al., 2018). Consequently, a disturbance affecting one node inevitably reverberates throughout the entire network, impacting others in varying degrees.

In this sense, shadow banking elements are interconnected creating a specific network that is also linked to the rest of elements on the traditional banking system. This implies that a given financial shock in one of the network elements will have a contagion effect on the entire network. Henceforth, and particularly since the 2008 crisis, numerous studies have focused on comprehending the behavior of this network. Their aim is to grasp the entirety of the financial system and systemic risk and recognition of the complex relationships between different parties involved, especially as the financial system has grown increasingly interconnected over recent decades, largely due to the liberalization of international trade and advances in technology (Franch et al, 2022).

Other authors such as Andrew G. Haldane, emphasize the inherent risk of new forms of credit, which emerge as a migration of financial activity towards assets offering higher returns associated with elevated risk profiles such as leveraged loans, collateralized debt obligation (“CDO”), securitization, among others, purportedly for diversification purposes, but in reality, pose heightened risks to the financial network.

“Securitization increased the dimensionality, and thus complexity, of the financial network. Nodes grew in size and interconnections between them multiplied” (Haldane, 2009)

Moreover, the study reveals that the financial network is long-tailed distributed, suggesting asymmetry (Haldane, 2009), meaning that there are a large number of nodes with a low degree of connectedness, but also some nodes with an extremely high degree of connectedness. The implications of this asymmetric distribution are:

- (1) The majority of nodes, being different kinds of financial institutions, are less influential or less connected
- (2) There is presence in the network of extremely influential or systematically important nodes. These nodes can have a disproportionately large impact on the functioning of the financial network and can be critical to its stability and proper functioning.

From a stability perspective this translates into a duality of robust and fragile system that is highly susceptible to a shock in key financial institutions with rapid contagion to the rest of the network. Henceforth, it is imperative to conduct an analysis of this network to comprehend the role of Shadow Banking, a task we shall undertake in Section 4.

Chapter 3

Monetary policy and Shadow Banking

3. Monetary policy and Shadow Banking

3.1. Introduction

In the context of traditional banking, monetary policy plays a fundamental role in the financial markets impacting bank activity when connecting lenders and borrowers, traditionally serving as an economic stabilizer with the primary objective of managing inflation and fostering economic growth. However, in the contemporary economy, particularly within the domain of shadow banking entities, monetary policy diminishes in its efficacy to stabilize the system. This is mainly because the effect of restrictive and expansive monetary policies has not the same outcome on these sets of institutions and the relationship between them is less evident and transparent. This influence of monetary policy on shadow banking is a paradox that explains why this sector has grown so much in recent years.

One might surmise that the effect of monetary policy set by central banks equally impacts both banks and non-banks, as they ultimately engage in a similar task: credit intermediation. However, there exists a series of reasons why the transmission of monetary policy is not uniform for these two types of institutions.

The primary reason lies in the differences in structure of the balance sheet. A bank's asset side is mostly comprised of loans, while they only account for a small portion of investment fund assets. On the other hand, debt securities play a much larger role for investment funds: approximately 40% of their assets comprise debt securities, compared with around 10% for banks. Those differences translate into different responses to monetary policy shocks (Schnabel, 2021). Additionally, as shadow banks' main sources of financing differ from traditional deposits, interest rates do not affect as much. Furthermore, other differences between intermediaries and traditional banks such as regulation and strategies pursued, contribute to the differential transmission of monetary policy include the business model and regulation of these two groups of institutions.

3.2. Dynamics between monetary policy and shadow banking

To explain how differently shadow banking responds to changes in monetary policy, we first conduct our qualitative analysis based on existing literature and then follow up deepening our analysis for the current interest rate environment. Due to lack of data availability, recent research conducted on main European countries on the growth and response to monetary policy to assess the link between the European Central Bank Monetary policy between 1999-2019 and the rise of the shadow banking sector (Hodula & Libich, 2023) has important implications for our thesis, since our both starting hypotheses are contrasted, leading to the following conclusion:

- a. A restrictive monetary policy set by central banks, which ultimately leads to an increase of interest rates, encourages the growth of shadow banking because financial agents try to reduce their funding costs. The rationale behind is explained as follows, increased funding costs in traditional banking systems lead to a migration of assets into the shadow banking system. Additionally, higher interest rates imply an increase in debt repayments on existing loans, which makes economic agents refinance bank loans in the shadow system. Lastly it is important to address that higher costs of funding increase traditional bank's incentives to engage in securitization carried out and operationalized by shadow banking institutions (Hodula, 2022).
- b. Loose monetary policy, translated into a decrease of interest rates, also expands shadow banking because it intensifies investor's search for yield. In a low interest rate environment, investors lack profitable investment opportunities in the traditional banking system and attempt to secure higher returns on the shadow system. This phenomenon is commonly known as the search-for-yield motive. Additional literature also states that there is evidence that some NBFIs, Money Market Funds mainly, tend to invest in riskier assets classes than banks in an environment of low interest rates (Di Maggio & Kacperczyk, 2017).

Therefore, as a first approach we can state that monetary policies in the shadow banking system do not stabilize but rather can exacerbate and propagate systemic risk. This phenomenon arises from what is known as regulatory arbitrage, a practice wherein individuals and investors exploit gaps or ambiguities in the regulatory framework to secure various advantages, including reduced funding costs or enhanced returns, as is

evident in this scenario. Additionally, the model posits that the nominal value of interest rates also plays a significantly pivotal role in how shadow banking institutions respond to monetary policy. This implies that increases in interest rate levels at higher thresholds will have a greater impact than increases at lower levels.

It is because of this that adequate regulation of shadow banking is necessary because in its absence, monetary policy implemented by central banks not only becomes less effective but also brings counterproductive effects. These findings are further corroborated by studies conducted by other authors in different geographic regions, as exemplified by further studies focused on historical US Shadow Banking dynamics (Agnello et al., 2019). This is not intended as a critique of the tools employed by central banks to maintain macroeconomic stability, but rather to attribute the ineffectiveness of such tools to the absence of financial regulation, which enables such arbitrage within shadow banking institutions.

This paradox, in which any movement of the ECB's translates into growth of Shadow Banking, is useful to explain the exponential growth of this sector over the years despite having gone through periods of restrictive and expansive policies. In response to this issue, the European Central Bank, in a review of its strategy, elucidates certain key points regarding monetary policy and the shadow banking sector, which affords us a deeper understanding of the dynamics and primary ramifications. As per the communication from the European Central Bank regarding shadow banking, and concerning long-term shocks, Non-Bank Financial Institutions exhibit greater responsiveness than traditional banks to monetary policy measures designed to affect long-term interest rates, such as open market operations, wherein institutional balances expand. Consequently, NBFIs are poised to assume a notably active role in transmitting asset purchases to bond markets, thereby contributing to the reduction of yields and fostering issuance.

3.3. Monetary policy and funding levels in the context of Shadow Banking

Changes in asset prices due to movements on interest rate levels have a direct impact on the balance sheets of financial intermediaries and consecutively, on their leverage levels. There is substantial evidence to affirm that investment bank's balance sheets exhibit a strong and positive correlation between changes in the size of the balance sheet and indebtedness, demonstrating that leverage is indeed procyclical (Adrian & Song Shin, 2008). These banks adjust their leverage ratios in response to fluctuations in asset prices,

expanding or contracting their balance sheets accordingly. In the context of Shadow Banking, regardless of the type of monetary policy, there tends to be an expansion in the balance sheets of these financial intermediaries, either for yield searching motives or reducing funding costs. This excess of liquidity in the economy and particularly on the balance sheets of these institutions should be closely monitored, especially considering the levels of interest rates in recent years.

This leads to the following question, defining aggregate liquidity as the growth rate of the aggregate financial sector balance sheet, can excess aggregate liquidity be a problem?

As demonstrated during the sub-prime crisis in the United States, when a bank's balance sheet grows excessively and rapidly, intermediaries enjoy an excess of capital, which they often lend out in pursuit of higher returns (Shin, 2012). Unfortunately, these loans frequently result in defaults. This scenario is easily extrapolatable to the case of non-bank financial intermediaries. In recent years, these entities have experienced significant growth in their balance sheets, largely due to interest rates being at near-negative levels and investors' relentless search for yields. These capital injections into the balance sheets, largely exacerbated by the excess liquidity from major global banks engaging in securitization instruments, pose a source of risk in the context of shifting monetary policy.

European countries with a current account surplus have propelled European banks towards investments in private label mortgage-backed securities and other structured financial products (Shin, 2012). This capital surplus translates into significantly more permissive financial conditions and innovation in the products offered by financial intermediaries. The abundance of capital reduces risk aversion among these intermediaries, leading them to seek out investments with higher yields. This search for increased returns is driven by the need to deploy excess capital effectively, pushing banks and other financial institutions into markets and products that, while potentially more profitable, carry higher risks. These dynamics highlight how macroeconomic imbalances, such as current account surpluses, can influence the behavior of financial institutions and reshape the risk landscape in the financial system.

Any type of economic or financial shock, such as the abrupt interest rate increase by the ECB that started in July 2022 as a response to the COVID19 crisis, can significantly impact financial markets. As a result, those riskier investments that were once generating attractive returns begin to decline in terms of profitability. In environments where there

is a lack of stringent regulations on minimum capital requirements and value at risk, non-bank financial institutions can face long-term significant challenges. This is due to the rising interest rates causing a mismatch in value on their balance sheets. Such mismatches arise when the actual market value of assets held by these institutions falls below the values estimated when the investments were initially made, often because these assets are sensitive to changes in interest rates. This scenario underscores the vulnerability of non-banks to sudden shifts in monetary policy and market conditions, highlighting the critical need for robust risk management practices and regulatory measures to manage the risks associated with excess liquidity and the procyclical nature of leverage within the financial sector. As the balance sheets of these intermediaries swell, the potential for systemic risk increases, necessitating careful oversight and proactive policy measures to safeguard financial stability.

Therefore, we conclude that the overfunding that has been occurring for many years in the non-bank sector is associated with problems such as the formation of speculative bubbles, a decrease in financial discipline and the search for looser standards, and an increase in debt levels that become unsustainable in the long term. Once again, the need for regulation to control the migration of assets to the balance sheets of shadow banking institutions is reiterated.

3.4. Impact on the stability of the financial system in the current interest rate environment

The conclusions drawn from the preceding section assume even greater significance within the economic context of recent years. Following an extended period characterized by interest rates at exceptionally low levels, the abrupt surge observed over the past two years may entail significant repercussions for the growth of the Non-Bank Financial Institutions. Hence, it is now more imperative than ever to review extant regulations and enhance oversight of these institutions.

Private institutions and financial intermediaries are in charge for translating monetary policy to the real economy, firms and households, non-bank credit intermediation has created new risks and hazards for the traditional transmission of monetary policy set by central banks, exacerbated in periods of financial distress (Schnabel, 2021). As a result, it is imperative that new macroprudential regulations are developed to address systemic

vulnerabilities, in particular with respect to liquidity mismatches in money market and investment funds.

Certainly, not all aspects are negative, as these institutions often serve as alternative sources of financing to traditional bank loans, thereby reducing companies' and investors' reliance on banks and facilitating financing diversification. Consequently, The Financial Stability Board is anticipated to imminently release recommendations aimed at bolstering the resilience of the non-bank financial sector and establishing a globally uniform approach to policy reforms. These recommendations will be informed by the ongoing FSB efforts concerning money market funds, open-ended investment funds, and margining practices.

3.5. Case Study: Silicon Valley Bank, Monetary Policy, and Shadow Banking

Empirical evidence on the effect on monetary policy on financial institutions, exacerbated by shadow banking, can be easily exemplified with recent events on the banking system.

The collapse of Silicon Valley Bank (“SVB”) in United States, followed by other set of banks, such as Credit Suisse Bank and First Republic Bank, stands as one of the most significant banking failures since the Global Financial Crisis of 2008, sparking inquiries into banking regulation and the impact of monetary policy on bank balance sheets as well as how risk has migrated to shadow banks in the last years.

As evidenced in March of 2023 with the downfall of SVB, banks engaging in what is commonly referred to as maturity transformation amplifies the exposure of banks and other institutions to interest rate risk due to liquidity mismatches. The inefficiency in hedging this risk with derivatives and other instruments is what leads to the collapse of a bank, as witnessed last year. Moreover, according to several economists, the root of failure of Silicon Valley Bank can be elucidated based on the incentive structure that drives banks to engage in a search for yield, leading them to undertake the maximum permissible risks within the regulatory framework. This has several implications for the Shadow Banking sector, as per discussed in the previous section, a low interest rate environment encourages them to seek higher returns, taking on more risk than the risk appetite of the regulating government.

This holds significance as shadow banks also undertake the so-called maturity transformation, with one crucial distinction: they are not regulated in the same manner as

traditional banks and are unable to borrow from the Central Bank in the event of an emergency. In the case of SVB, within forty-eight hours of the collapse, the United States authorities stepped in to guarantee liquidity for the deposits and distributed emergency funds, but what would have happened if instead of a regulated bank, the liquidity constraint that led to the bank's collapse had occurred in a Shadow Bank and the Federal Reserve had not been able to rescue those deposits? We draw from this reflection that banking regulation is effective. As soon as it became clear that the bank would not be able to pay its customers, the Federal Deposit Insurance Corporation stepped in, took control and tried to compensate the bank's customers, reducing the risk and instability of the system (Roose, 2023).

The events of just over a year ago provide food for thought for the future crises to come, where the focus is on non-bank financial intermediaries and interest rate risk plays a key role. No one was able to predict the collapse of the SVB as both investors and regulators were preoccupied with the credit and liquidity risks that marked past crises and were regulated in the Basel Framework, rather than the interest rate risks associated in the case of SVB with bonds, an instrument that was thought to be very safe. This event thus underscores the importance of broader oversight of the financial system as a whole, including both traditional banks and non-banking financial institutions.

In order to prevent future financial crises, regulators need to shift the focus from traditional to shadow banking and from credit risk to monetary policy and interest rate risk.

Chapter 4

Interconnectedness

4. Interconnectedness of traditional banking system and Non-bank Financial Intermediaries

4.1. Introduction

Drawing on the literature and empirical findings provided by existing research, we can state that non-bank financial intermediaries are internationally interconnected, and these connections are associated with funding conditions in capital markets (Ozgur, 2023). Additionally, according to the European Central Bank, traditional banks are connected to the shadow banking sector via loans, securities, derivatives, and funding dependencies. These linkages expose banks to risks arising from the shadow banking system and vice versa, but more importantly, in periods of stress, the increased interconnection is expected to generate liquidity problems and reduce access to funding in several markets. This issue is further exacerbated by the stringent regulation within the banking system and the absence of regulation for non-bank financial intermediaries.

4.2. Money market and financial interconnection

The money market plays a fundamental role in the financial system and provides investors with the option to buy and sell large volumes of short-term debt products, with low credit risk. Money market investors effectively fund activities within the shadow credit intermediation process (Pozsar et al., 2010). It is through the credit intermediation process funded by money market investors that shadow banking is able to transform risky long-term assets into short-term instruments. Consequently, understanding how this market functions is critical to comprehending the degree of interconnection between these elements.

In this section, on the one hand, we will quantify the exposure of shadow banks in the money market compared to traditional banks, and, in this context, we will analyze how a shock in a non-bank financial intermediary could affect the rest of the network.

4.2.1. Secured money market: Repurchase agreements.

Within the European Money Market, secured transactions constitute the largest segment, accounting for c.56% of total daily transactions and c.30% of the overall market volume (European Central Bank, 2022). In this field, activity is primarily driven by Central Counterparties (“CPP”) and non-banks, particularly Money Market Funds (“MMF”) and Investment Funds. Given the significant proportion of the transactions, the repo market emerges as a crucial variable to demonstrate how traditional and shadow banks are interconnected and how liquidity can be easily compromised through the repurchase agreement market.

A repo represents a special type of deposit, as it constitutes both a deposit and a collateralized loan. Repurchase agreements are used as short-term borrowing, commonly within the shadow banking sector, that consists of a short-term agreement to sell securities and repurchase them later at a slightly higher price. The interest rate assumed for this type of transaction is known as the repo rate and is highly dependent on the level of interest rates set by central banks. Such transactions engender numerous interconnections between banks and non-banks. When a commercial bank requires additional liquidity, it has the option to raise capital through this market; the bank sells their selected security that serves as collateral to a non-bank in exchange for cash. Once the bank’s liquidity constraints are alleviated, they buy back these securities paying an interest, the repo rate. Must be noted that these instruments hide exogenous risks.

In the one hand, whenever central banks raise interest rates, any institution engaging in repurchase agreements, may raise borrowing rates charged on repos or even stop lending, generating a possible liquidity crisis as those banks in need of immediate liquidity no longer have access to this market to obtain funds.

On the other hand, repos are off-balance sheet transactions that are often undisclosed by the parties involved, which makes it harder to keep track of these operations. This could be easily improved by implementing special audits on bank’s liquidity that pay attention to these off-balance sheet transactions.

Insights from the Money Market Statistical Reporting reveal the operations conducted by 47 banks, indicating that a bank is invariably implicated in each transaction, either as a lender or a recipient of funds. However, for our analysis, it is pertinent to scrutinize the

counterparty of each transaction to discern the extent of involvement of both banks and non-banks.

As shown in Figure 3, although approximately two-thirds of trading volume, with an average trading volume of €698bn (European Central Bank, 2022), are centrally cleared by central counterparties, around c.11% of transactions involve banks, while up to c.22% involve non-banks. Notably, Money Market Funds typically function as net cash lenders, while investment funds tend to be net cash borrowers.

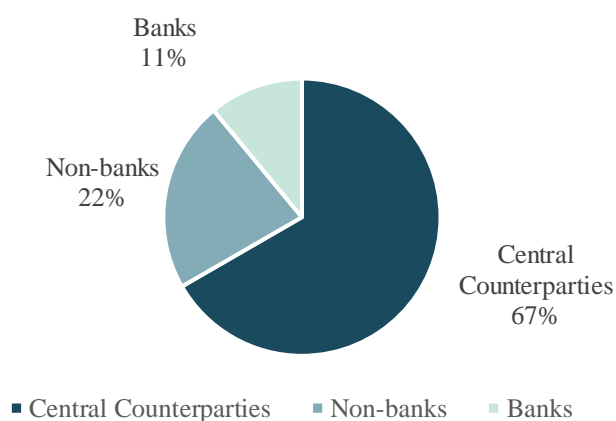


Figure 3. Percentage of trade with non-banks in the secured money market segment
Source: Euro area accounts 2022, ECB

4.2.2. Unsecured money market segment

On the other hand, the unsecured cash segment refers to all transactions within the money market where no collateral or guarantees are involved. Typically, these short-term loans serve as a significant source of financing. Despite constituting approximately one-third of the secured segment in terms of volume, the unsecured segment boasts an average daily trading volume of €138 billion (European Central Bank, 2022). The normalization of the monetary policy cycle and the return to positive interest rates since mid-2022 triggered a decline in the value of securities holdings. This required account holders to deposit additional cash to meet margin calls, consequently amplifying trading volumes.

In this segment, non-banks play a crucial role. As depicted in Figure 4, in 2022, approximately 78% of banks' unsecured transactions involved a non-bank counterparty.

Notably, the largest cash depositors included transfers of funds from non-banks to banks, typically placed in the deposit facility of the Euro system. This further reinforces our initial hypothesis regarding the significant interconnection between the traditional banking system and the shadow banking sector.

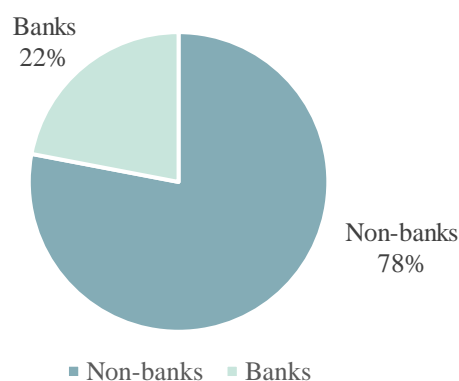


Figure 4. Percentage of trade with non-banks in the unsecured money market segment

Source: Euro area accounts 2022, ECB

4.2.3. Contagion of a shock in a Shadow Banking entity on the rest of the financial network

As demonstrated above, Money Market Funds play a critical role in the money market by investing in short-term debt securities such as commercial paper and treasury bills. This exposure translates into an impact on the stability of the financial market in the event that an exogenous shock alters the value of these instruments. A tremor in the MMF can easily be transmitted throughout the financial system, similar to the events during the 2008 financial crisis when the devaluation of debt instruments affected the value of MMF assets (Portes, 2018). This triggers panic among investors, leading them to withdraw their funds from these institutions. As discussed, these institutions provide a fundamental source of liquidity for corporations in the short term. As corporations found it increasingly difficult to finance their short-term operations, the risk of default escalated, contributing to financial stress. As the liquidity crisis deepens, it propagates through the financial system, leading to more financial institutions facing funding and solvency crises.

This cascade of events highlights the powerful influence that MMFs and investor confidence in these funds have on the stability and functioning of broader financial system and the need for adequate regulation.

4.3. Analyzing the impact of interconnectedness of the financial network on systemic risk

In addition to money markets, over the years many authors have tried to measure the spillover effects of the insurgent system on the traditional banking system, concluding that in Europe, shadow banking contributes more to systemic risk than other financial institutions, leading to a higher spillover effect (Pellegrini et al., 2022). To test this hypothesis, we base our analysis on the reports and data published by the Financial Stability Board on the Global Monitoring Report on Non-Bank Financial Intermediation published in 2023 (Financial Stability Board, 2023) , and we will focus on assessing the interconnectedness between banks and Other Financial Intermediaries, that include; broker-dealers, finance companies, hedge funds, money market funds, other investment funds, structured finance vehicles and trust companies

Our aim is to quantify the exposure, in percentage of global assets, of banks to Other Financial Institutions and viceversa.

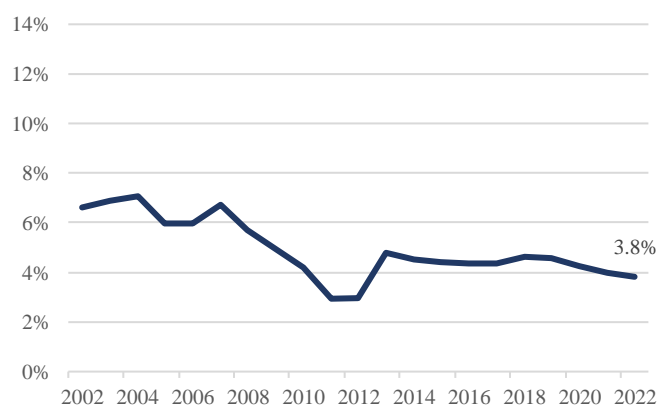


Figure 5. Banks' exposure to OFIs (%)
Source: Jurisdictions' 2022 submissions; FSB calculations.

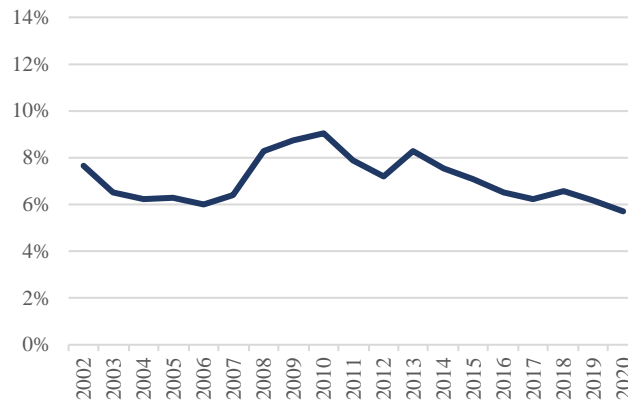


Figure 6. OFIs’ exposure to banks (%)
Source: Jurisdictions’ 2022 submissions; FSB calculations.

From Figures 5 and 6 we derive two conclusions regarding interconnectedness. Firstly, we can argue that The NBFIs sector has more exposure to the traditional system than viceversa, meaning that shocks in the banking system are to have a greater impact on these institutions than those that were to originate from the NBFIs, suggesting a significant level of vulnerability within the Shadow Banking sector to shocks originating in traditional banks. This conclusion has several implications regarding liquidity concerns, as non-banks provide alternative financing options for investors seeking to enhance the liquidity of the entire system. A shock occurring in the traditional banking system that causes liquidity shortages would have broader implications and a more substantial impact on non-banks because of contagion. The additional liquidity they aim to provide would be rendered ineffective, and the liquidity crisis would likely extend further, increasing systemic risk, defines as the risk of potential collapse of the financial system resulting from the failure of one interconnected entity (Portes, 2018). Furthermore, the high level of interconnectedness with the more regulated banking sector can create blind spots in systemic risk oversight since Non-Bank Financial Institutions operate under a less stringent regulatory framework.

Furthermore, we can deduce that despite the ongoing growth of the Non-Bank Financial Institutions, the interconnectedness of NBFIs entities with the banking sector has been consistently diminishing since 2013, encompassing both funding and exposures. This phenomenon can be explained, on one hand, by the enhancement and revision of regulations following the 2008 financial crisis. On the other hand, many investors have opted for alternative forms of financing, including capital markets such as bond financing

(European Central Bank, 2022), or the emergence of the fintech sector, whose accelerated adoption during the COVID-19 pandemic (Feyen et al., 2023) has created financing sources alternative to the traditional banking and shadow banking systems, thus reducing their inter-exposure. This new financing structure enhances financial stability but also increases regulatory challenges due to its more fragmented nature.

The former analysis reveals critical insights into the interconnectedness between the Shadow Banking sector and traditional banks and this landscape advocates for vigilant regulatory strategies to address these emerging risks effectively, ensuring the stability of the broader financial system.

Chapter 5

Conclusions

5. Conclusions

Within the financial system, in recent years there has been a shift of focus to the concept of Shadow Banking due to its increased relevance, growth and the complexity that makes it challenging to regulate. The rapid growth of this type of entities has stoked fear among investors and regulators due to the systemic risk it transfers and its potential to spread contagion among various actors within the financial system. As the volume of credit intermediated by non-bank financial institutions is comparable in magnitude to that managed by the traditional banking system, it is imperative to address the behavior of these entities within the current macroeconomic context and underscore the necessity for appropriate regulation. Such measures are essential to uphold financial stability, mitigate systemic risk, and prevent further financial crises.

Firstly, it is essential to address the differential impact of monetary policy on shadow banks. Owing to the structural differences in balance sheets and the regulatory environments, traditional mechanisms of monetary transmission are less effective in the shadow banking sector than in the traditional banking system. Both restrictive and expansive monetary policies inadvertently foster the growth of the shadow banking sector. Given this migration of assets to non-bank financial intermediaries, enhancing regulatory oversight becomes imperative. Such measures are crucial to prevent the growth of speculative bubbles, maintain financial discipline, and manage the systemic risks associated with excessive liquidity and procyclical leverage dynamics within the financial sector. Furthermore, this conclusion carries significant implications for monetary policy authorities, who bear the responsibility of developing a series of policies tailored to this new type of institution.

Then, regarding the implications of the linkages between shadow banking and the rest of the financial system, it is crucial to emphasize the role of the money market. Serving as a liquidity provider for both banks and non-bank financial institutions, the money market is a critical component in this interconnection. Shocks in this market can propagate throughout the financial system, creating liquidity shortages. On the other hand, despite

the trend of decreasing interconnectedness in recent years, the evolving financing landscape also requires appropriate regulation to ensure financial stability.

Lastly, it is expected that the shadow banking sector will continue to expand globally, and that alternative forms of financing will emerge, supported by technological innovation. This growth underscores the need for regulation based on function rather than the type of institution. By simplifying regulation according to the activities performed by an entity, such as credit intermediation in the case of shadow banking, stability in certain areas of the financial system is ensured. Authors like Adrian and Shin (2010) argue that such an approach addresses the evolving nature of financial intermediation more effectively, helping to mitigate systemic risks associated with shadow banking activities.

Additionally, despite no longer being an emerging sector, it is essential that major financial institutions and those entities responsible for macroeconomic policies, such as Central Banks or other international bodies monitoring the global financial system, continue their research efforts and analysis of the evolution of this phenomenon. This sustained monitoring is crucial to reducing uncertainty and implementing policies designed to mitigate associated risks.

To conclude, it must be noted that our analysis has certain limitations due to the lack of available data. The scarcity of comprehensive and reliable data constrains the depth and accuracy of our findings. That is why I consider that one of the main key takeaways from my analysis is to demonstrate the need to enhance transparency in data reporting, crucial to enable more thorough and robust analyses in future research to complement the previously exposed results. Similarly to what occurs in the field of Decentralized finance (DeFi), the lack of registration poses a significant risk to the system, not only in terms of stability but also in promoting illicit activities. Improved data accessibility would significantly contribute to a better understanding of the dynamics and risks within the financial sector, ultimately facilitating more informed policy decisions and regulatory frameworks.

5.1. Future research lines

The main research directions on the basis of this analysis could focus on the impact of technological innovation in this sector, as technology development is the main source of alternative forms of financing as well as the impact of the lack of data on the stability of the system.

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2. **Crítico:** Para encontrar contra-argumentos a una tesis específica que pretendo defender.
3. **Referencias:** Usado conjuntamente con otras herramientas, como Science, para identificar referencias preliminares que luego he contrastado y validado.
4. **Metodólogo:** Para descubrir métodos aplicables a problemas específicos de investigación.
5. **Interpretador de código:** Para realizar análisis de datos preliminares.
6. **Estudios multidisciplinares:** Para comprender perspectivas de otras comunidades sobre temas de naturaleza multidisciplinar.
7. **Constructor de plantillas:** Para diseñar formatos específicos para secciones del trabajo.
8. **Corrector de estilo literario y de lenguaje:** Para mejorar la calidad lingüística y estilística del texto.
9. **Generador previo de diagramas de flujo y contenido:** Para esbozar diagramas iniciales.
10. **Sintetizador y divulgador de libros complicados:** Para resumir y comprender literatura compleja.
11. **Generador de datos sintéticos de prueba:** Para la creación de conjuntos de datos ficticios.
12. **Generador de problemas de ejemplo:** Para ilustrar conceptos y técnicas.
13. **Revisor:** Para recibir sugerencias sobre cómo mejorar y perfeccionar el trabajo con diferentes niveles de exigencia.

14. **Generador de encuestas:** Para diseñar cuestionarios preliminares.
15. **Traductor:** Para traducir textos de un lenguaje a otro.

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