

Jokivuolle, Esa (Ed.)

Proceedings

Shadow banking: Financial intermediation beyond banks

SUERF Conference Proceedings, No. 2018/1

Provided in Cooperation with:

SUERF – The European Money and Finance Forum, Vienna

Suggested Citation: Jokivuolle, Esa (Ed.) (2018) : Shadow banking: Financial intermediation beyond banks, SUERF Conference Proceedings, No. 2018/1, ISBN 978-3-902109-86-6, SUERF - The European Money and Finance Forum, Vienna

This Version is available at:

<https://hdl.handle.net/10419/193956>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Shadow Banking: Financial Intermediation beyond Banks

Edited by

Esa Jokivuolle

Contributions by

Tobias Adrian • Edouard Chrétien • Michael Chui • Saskia de Vries-van Ewijk • Christoph Fricke • Daniel Fricke • Nicola Gennaioli • Seppo Honkapohja • Jiasun Li • Victor Lyonnet • Stan Maes • Patrizio Morganti • Danièle Nouy • Giorgio Nuzzo • Margarita Rubio • Antti Suhonen • Christian Upper • Lukas Voellmy • Dimitris Zafeiris

A joint publication with the Bank of Finland

Shadow Banking: Financial Intermediation beyond Banks

SHADOW BANKING: FINANCIAL INTERMEDIATION BEYOND BANKS

Edited by
Esa Jokivuolle

Contributions by
Tobias Adrian, Edouard Chrétien, Michael Chui, Saskia de Vries-van Ewijk,
Christoph Fricke, Daniel Fricke, Nicola Gennaioli, Seppo Honkapohja,
Jiasun Li, Victor Lyonnet, Stan Maes, Patrizio Morganti, Danièle Nouy,
Giorgio Nuzzo, Margarita Rubio, Antti Suhonen, Christian Upper,
Lukas Voellmy, Dimitris Zafeiris

Published by
SUERF/Bank of Finland Conference

Shadow Banking: Financial Intermediation beyond Banks
Helsinki, 14-15 September 2017

SUERF – The European Money and Finance Forum

Vienna 2018

SUERF *Conference Proceedings* 2018/1



CIP

Shadow Banking: Financial Intermediation beyond Banks

Editors: Esa Jokivuolle

Authors: Tobias Adrian, Edouard Chrétien, Michael Chui, Saskia de Vries-van Ewijk, Christoph Fricke, Daniel Fricke, Nicola Gennaioli, Seppo Honkapohja, Jiasun Li, Victor Lyonnet, Stan Maes, Patrizio Morganti, Danièle Nouy, Giorgio Nuzzo, Margarita Rubio, Antti Suhonen, Christian Upper, Lukas Voellmy, Dimitris Zafeiris

Keywords: Asset management, Bank Runs, Banking Regulation, Capital Requirements, Chinese financial regulation, credit risk transfer, Crowdfunding, Deposit insurance, Deposit Insurance, Disintermediation, economic growth, Financial crisis, Financial Intermediation, FinTech, fire sales, information economics, investment, Leakage, liquidity, Macroprudential Policies, Mutual funds, Securitization, Security design, Shadow Banking, Shadow banking system, Risk measures, Spillovers, Systemic risk, Traditional banking

JEL-codes: E32, E44, E58, , E61, G00, G01, G10, G11, G21, G23, G28, G38, F34, F41

Vienna: SUERF (SUERF *Conference Proceedings* 2018/1) – January 2018

ISBN: 978-3-902109-86-6

© 2018 SUERF, Vienna

Copyright reserved. Subject to the exception provided for by law, no part of this publication may be reproduced and/or published in print, by photocopying, on microfilm or in any other way without the written consent of the copyright holder(s); the same applies to whole or partial adaptations. The publisher retains the sole right to collect from third parties fees payable in respect of copying and/or take legal or other action for this purpose.

TABLE OF CONTENTS

List of authors	5
1. Key Insights from a Colloquium jointly organised by SUERF and Bank of Finland – Helsinki, 14-15 September 2017.....	7
<i>Esa Jokivuolle, SUERF and Bank of Finland</i>	
2. Shadow Banking and Market-Based Finance.....	14
<i>Tobias Adrian</i>	
2.1. Shadow Banking – A Framework	14
2.2. The Post-Crisis Evolution in Shadow Banking.....	20
2.2.1. Less Shadow Banking, More Market-based Finance .	20
2.2.2. Non-bank Financial Deepening in Emerging Markets	21
2.3. Strengthening Supervision and Regulation – How Far Have We Come?.....	23
2.4. Policy Challenges on the Horizon – Some Regional Examples	28
2.4.1. Credit Intermediation in China	28
2.4.2. The Partial Re-emergence of Structured Leveraged Finance in the U.S.	29
2.4.3. Data Gaps in the Supervision of Market-based Finance – A European Perspective	31
2.5. Concluding Remarks	32
References	33
3. Four questions on shadow banking.....	38
<i>Christian Upper</i>	
4. Recent developments in Chinese shadow banking.....	40
<i>Michael Chui and Christian Upper</i>	
References	43
5. The current landscape: Markets and players, competitors and complementarities	44
<i>Antti Suhonen</i>	
References	50

6. Deputy Governor Seppo Honkapohja: Welcome remarks, Dinner for the SUERF Conference Helsinki, 14th Sept 2017	51
<i>Seppo Honkapohja</i>	
References	52
7. Gaming the rules or ruling the game? – How to deal with regulatory arbitrage	53
<i>Danièle Nouy</i>	
7.1. Regulatory arbitrage – jumping fences and exploiting loopholes.	53
7.2. The regulatory and supervisory response.	56
7.3. Conclusion	58
8. The role of regulation and supervision in shadow banking: An insurance sector perspective.	60
<i>Dimitris Zafeiris</i>	
8.1. What is shadow banking?	60
8.2. Insurance and shadow banking	61
8.3. Insurance and financial stability	62
8.4. Conclusions – challenges	65
9. The role of regulation and supervision in the shadow banking sector: The EU perspective	66
<i>Stan Maes</i>	
9.1. High-level considerations	66
9.2. Overview of existing provisions in EU law	69
9.3. Current policy focus	70
10. Looking ahead: Forthcoming financial innovations and institutions – Opportunities and risks from a financial stability perspective	73
<i>Saskia de Vries-van Ewijk</i>	
10.1. Introduction	73
10.2. What risks do financial innovations pose to financial stability?	73
10.2.1. Macro-financial risks	73
10.2.2. Micro-financial risks	74
10.3. What are the opportunities?	75
10.4. Is the current regulatory framework future proof?	76
10.4.1. More room for innovation at DNB	76

11. 2017 Marjolin Prize “Traditional and Shadow Banks During the Crisis”	77
<i>Edouard Chrétien and Victor Lyonnet</i>	
Non-technical summary.	77
References	83
12. Vulnerable Asset Management?	86
<i>Christoph Fricke and Daniel Fricke</i>	
12.1. Are Asset Managers Systemically Important?	86
12.2. Stress-Test Model	86
12.3. Quantifying the Vulnerabilities of U.S. Equity Mutual Funds	88
12.3.1. Aggregate Vulnerabilities	88
12.3.2. Fund-Specific Vulnerabilities	89
12.4. Implications.	90
References	90
13. A critical review of the statistics on the size and riskiness of the securitization market: evidence from Italy and other euro-area countries	92
<i>Giorgio Nuzzo</i>	
13.1. Introduction	92
13.2. How to measure the size of the securitization market	93
13.2.1. The trouble with the current measures	93
13.2.2. An alternative measure of the size of the securitization market.	95
13.3. How to measure the riskiness of securitizations.	96
14. A Securitization-based Model of Shadow Banking with Surplus Extraction and Credit Risk Transfer	98
<i>Patrizio Morganti</i>	
14.1. Introduction	98
14.2. The model	98
14.2.1. Equilibrium at $t=0$	99
14.2.2. Outcomes at $t=1$	100
14.3. Some stylized facts: the U.S. market for private ABS	101
14.3.1. Supply side	101
14.3.2. Demand side	101
14.3.3. Prices and yields	104
14.4. Conclusions.	104
References	106

15. Shadow Banking and Financial Stability under Limited Deposit Insurance	107
<i>Lukas Voellmy</i>	
15.1. Introduction	107
15.2. Shadow Banks in the Financial Crisis 2007-08	107
15.3. Shadow Banking and Deposit Insurance	108
15.4. Economies with a Large Amount of ‘Uninsurable’ Deposits	109
15.5. Economies with a Small Amount of ‘Uninsurable’ Deposits	110
15.6. Conclusion	111
References	111
16. Shadow Banking, Macroprudential Regulation and Financial Stability	112
<i>Margarita Rubio</i>	
16.1. Introduction	112
16.2. Evidence on Shadow Banking	113
16.3. A policy model to evaluate the effects of shadow banking on the economy	115
16.4. Results.	116
16.5. Conclusions.	116
References	117
17. Summary of Profit Sharing: A Contracting Solution to Harness the Wisdom of the Crowd	119
<i>Jiasun Li</i>	
SUERF – Société Universitaire Européenne de Recherches Financières	124
SUERF Publications.	124
SUERF Policy Notes	125

LIST OF AUTHORS

Tobias Adrian

International Monetary Fund (IMF)

Edouard Chrétien

Institut national de la statistique et des études économiques (INSEE)

Michael Chui

Bank for International Settlements (BIS)

Saskia de Vries-van Ewijk

De Nederlandsche Bank

Christoph Fricke

Deutsche Bundesbank

Daniel Fricke

University College London

Nicola Gennaioli

Bocconi University

Seppo Honkapohja

Professor, Aalto University and former Deputy Governor, Bank of Finland

Jiasun Li

George Mason University

Victor Lyonnet

HEC Paris, École Polytechnique

Stan Maes

European Commission

Patrizio Morganti

Tuscia University

Danièle Nouy

The Supervisory Board of the Single Supervisory Mechanism, ECB

Giorgio Nuzzo

Bank of Italy

Margarita Rubio

University of Nottingham

Antti Suhonen

Aalto University

Christian Upper

Bank for International Settlements (BIS)

Lukas Voellmy

Study Center Gerzensee

Dimitris Zafeiris

Head of EIOPA Risks and Financial Stability Department

1. KEY INSIGHTS FROM A COLLOQUIUM JOINTLY ORGANISED BY SUERF AND BANK OF FINLAND – HELSINKI, 14-15 SEPTEMBER 2017

Esa Jokivuolle, SUERF and Bank of Finland

The 33rd SUERF Colloquium on “Shadow Banking: Financial Intermediation beyond Banks”, was jointly organized by SUERF and the Bank of Finland in the House of the Estates in Helsinki on 14-15 September 2017. The program (www.suerf.org/shadowbanking) consisted of the traditional Marjolin Lecture of the biennial SUERF Colloquiums, three keynotes, three panels and a poster session based on a call for papers. We were happy to host a record audience in a SUERF event in Helsinki, ca. 135 registered participants and speakers.

Shadow banking is a broad concept. A possible definition is that it comprises non-bank institutions which undertake bank-like activities. Another characteristic is that the sector is overall less regulated. Therefore there are still shortcomings in systematic collection of information of the sector. The lack of information was acknowledged as a problem by many speakers during the conference.

Shadow banks, including alternative investment vehicles as well as more traditional funds, may offer better returns and risk diversification opportunities to savers and investors. They help complete the markets. This was one of the opening remarks made by the first keynote speaker Tobias ADRIAN (IMF), a leading researcher of shadow banking since the Global Financial Crisis. He called his speech “Shapes in the shadows: What do the data (not) tell us?”.

On the downside, the lack of transparency of shadow banks can increase opacity and risks in the financial markets. The lack of regulation implies that it is difficult to monitor and prevent the build-up of leverage and concentrated risks in the shadow banking sector. Hence, the sector can be a source of systemic risks.

Adrian noted that one defining difference between shadow banking and traditional market finance (as opposed to intermediated finance) is shadow banks’ more direct links to systemic risks. These can arise from the use of collateral chains, potentially hazardous levels of leverage, agency problems related “securitizing lemons”, and regulatory arbitrage which can contribute to shadow banks’ interconnectedness with banks.

According to Adrian, post-crisis regulatory reforms have dealt with the central loopholes in the interface of shadow banks and banks, and important regulation concerning e.g. money market funds has been passed or is forthcoming, depending on the jurisdiction. Nonetheless, there will always be unintended

consequences from regulation. And it is not necessarily clear that even the current regulation is capturing all “step-in” guarantees provided by banks to non-banks, a phenomenon that turned out to be an important factor in the past crisis.

The first panel discussion, chaired by Christian UPPER (BIS and SUERF) was titled *The current landscape: Markets and players, competitors and complementarities*. Hence it continued many of the themes already taken up in Tobias Adrian’s first keynote.

The first panelist, Tuomas PELTONEN (European Systemic Risk Board) emphasized that it is important for macroprudential policy to look beyond banking. We know that the size of the shadow banking sector is substantial and growing, but we still lack detailed data. In his view, banks in the EU are exposed to non-EU shadow banking entities. Further improvements in the risk analysis of shadow banking are needed.

Yasushi SHIINA (Financial Stability Board) gave an overview of FSB’s work on transforming shadow banking into resilient market-based finance. He defined the shadow banking system as the system of credit intermediation that involves entities and activities fully or partly outside the regular banking system. To address the risks, FSB conducts an annual monitoring exercise at the national and global levels and develop policy measures to strengthen the oversight and regulation of shadow banks to mitigate potential bank-like systemic risks. FSB’s annual monitoring exercise covers about 90% of global financial system assets and includes offshore financial centers. He showed data on the role of Other Financial Intermediaries (OFI) compared to GDP. Important subsectors in the group of OFIs are equity funds, broker-dealers, fixed income funds, money market funds and hedge funds. The OFIs are in several ways interconnected with banks. This has implications for the ultimate distribution of funding risk and credit risk. FSB also monitors pension funds and insurance corporations. The speaker mentioned a number of recent regulatory reforms aiming at the evolving system of market-based finance in general. FSB’s recommendations concern liquidity mismatches, leverage ratios, operational risks and securities lending for asset management activities. Arbitrage opportunities across jurisdictions and sectors also represent important challenges.

Antti SUHONEN (Aalto University) noted that the border between shadow banking and traditional market finance gets easily mixed by authorities. He was talking mainly on the basis of his market experience from the UK. The share of corporate bank loans has increased significantly since the crisis. Peer to peer lending is also starting to be significant in the small firm segment in the UK. There is a search for diversity of financing sources. FinTech has a lot to offer in many regions, which have been lagging behind in digital bank services. However, the credit granting processes of the new players will be tested only in the next crisis.

He found a certain irony in the observation that some disrupters now want to become banks, largely attracted by getting access to deposit insurance. In the Q&A part, Mr. Suhonen made a remark that if, say, peer to peer lending was taken under close supervision and regulation, markets might start expecting a fiscal backstop to these entities.

The panel chair, Christian UPPER also participated actively in the panel by providing his insights as a BIS expert on the rapidly growing shadow banking sector in China. The Chinese authorities are facing a trade-off: the credit growth in the shadow banking sector is importantly supporting economic growth but also causing risks to financial stability. Authorities have required banks to consolidate exposures to shadow banks in stress testing.

Shadow banks can increase competition and spur innovation in the financial sector. The benefits may come in the form of improving efficiency and quality of financial services. The second keynote speaker, Phillip STRALEY (President of ECO World Alliance) who ended the first day, emphasized that new players making use of new technologies will impact incumbent banks' business models. According to him, societal changes are also reshaping the landscape of financial services. Some of the new players are "enablers" while others bring more competition. Straley referred to a well-known discussion paper by Thomas Philippon (The FinTech Opportunity <http://pages.stern.nyu.edu/~tphilipp/papers/FinTech.pdf>), which suggests that regulators have an important role in creating conditions that can help reach the benefits of the new technologies. Straley predicted that the current tech giants will be the key players also in the area of financial services in the future. This is because they have the information base ("Big Data") of the potential customers, and "deep pockets".

Traditional banks may utilize shadow banks for alleviating the effects of regulation, such as capital requirements. This is one reason why shadow banks played a significant role in the build-up of the Global Financial Crisis. Not all actual risks appeared on banks' own balance sheets. They were in effect hidden as off-balance-sheet items in shadow banks. This phenomenon is part of what is called regulatory arbitrage. Regulatory arbitrage was also the topic of Danièle NOUY's (Chair of the Supervisory Board of the Single Supervisory Mechanism) Marjolin Lecture, which she delivered as the first female speaker in the history of this lecture series, starting the second day of the conference.

Nouy identified three categories of regulatory arbitrage, one of which is the earlier mentioned off-balance sheet channel of banks utilizing shadow banking entities. The other is the more traditional "race to the bottom", whereby banks seek the least-cost jurisdiction to book their exposures. Even national regulators may engage in this race by offering laxer regulations to help their country attract new financial business. She noted that such potential developments should be

monitored carefully in the aftermath of Brexit. This form of regulatory arbitrage may also take the form of sectoral shifts.

The third form of regulatory arbitrage concern utilization of loopholes in existing rules, which create incentives for banks to minimize risk indicators and thereby in effect reduce their capital and liquidity requirements.

On what to do about regulatory arbitrage, which indeed undermines the basic idea of regulation, Nouy emphasized the importance of harmonizing rules, using EU regulations, and global cooperation and information sharing. She also reminded that intensified bank competition reinforces incentives to regulatory arbitrage, and that working around the rules is not socially optimal. In response to a question from the audience regarding the fair regulatory treatment of small vs large banks, she acknowledged that proportionality in implementation is a good principle. To a question on regulating interest rate risk she replied that regulators are not shying away from that but the issue is genuinely complex. Interest rate risk can be tackled as part of stress testing.

A major regulatory effort concerning shadow banks in the aftermath of the Global Financial Crisis has been to ensure that traditional banks' exposures to the shadow banking sector are subject to bank capital requirements which match the true risks. Nonetheless, several speakers, including Nouy, reminded that we should not yet be complacent in this respect. New links between banks and shadow banks, which may escape current regulations and hide risks may develop. The earlier mentioned "step-in" risk, in the form of implicit bank guarantees to shadow banking entities which they are connected with, is still not properly tackled.

It is also possible that in a crisis situation, large scale asset fire sales take place in the shadow banking sector, which have an impact on asset values and hence on traditional banks' balance sheets comprising similar assets.

In sum, we are still some way from ensuring that shadow banking has been transformed into resilient market-based finance, able to stand on its own, and not transmitting excessive risks to the banking sector.

The panel that followed Danielé Nouy's lecture, took up the issue of regulating shadow banks (*Out of the shadows? The role of regulation and supervision*), chaired by Jakob DE HAAN (De Nederlandsche Bank and SUERF).

The first speaker, 2016 Nobel Laureate Bengt HOLMSTRÖM reminded the audience that when we seek to regulate something, it is crucial to understand why the phenomenon to be regulated exists in the first place. As a starting point, it is the best antidote against unintended consequences of regulation. The previous crisis brought money markets into the spotlight. Holmström noted that previ-

ously little time in economic research had been spent to understand them. Their dynamics is very different from that of the much-researched equity markets: in normal times, money markets are a low-information environment but in a crisis the information sensitivity of the value of debt traded in money markets can increase dramatically. As a result, the normally high liquidity of money market instruments can be lost.

The growth of shadow banking especially during the years preceding the Financial Crisis resulted largely from the increase in the global demand for safe assets. Holmström noted that the growth of shadow banking in the US went almost hand-in-hand with the flow of surplus capital from China to the US. Risks were spread also to European banks. According to him, one way to increase safety and reduce the risks of shadow banking is to increase the public supply of safe assets. This can improve the repo market. Data shown in Tobias Adrian's keynote presentation suggested that shift to government issued assets has taken place in the money market fund assets after the crisis.

Richard PORTES (London Business School, CEPR, and ESRB) summarized his views and concerns of the shadow banking sector by pointing out that much of the demand is driven by pursuit of new 'safe assets' while their supply is often motivated by regulatory arbitrage; securitization before the crisis as a key example. Shadow banks enjoy no explicit safety nets; yet they may need bail-out (perhaps the US money market funds being a case in point). Systemic risks can arise from the interconnections between banks and shadow banks. He echoed Tuomas PELTONEN (ESRB) in that there are still gaps in the data. In this regard, an important question is e.g. the amount and forms of synthetic leverage.

Dimitris ZAFEIRIS (EIOPA) expanded the view to the insurance sector. Some functions of it are sometimes counted as part of shadow banking although insurance is a regulated industry and hence not in the "shadows". Maturity mismatch is not an issue in the same sense as in (shadow) banking. However, he pointed to the existence of shadow insurance and the potential for regulatory arbitrage in connection with the insurance industry.

Stan MAES (European Commission) emphasized many of the important issues raised by earlier speakers. He asked if we still fully understand the drivers of growth of shadow banking. Is shadow banking offering true efficiency gains, or is it mainly about regulatory arbitrage? What are the institutional factors at play? He noted that regarding regulation of shadow banking, the alternatives are to regulate shadow banking entities, functions, or interconnections with other financial institutions. In the discussion, Christian Upper called for a better understanding of the pros and cons of diversity which shadow banks arguably expand.

The second panel was followed by the third keynote speaker, Nicola GENNAIOLI (Bocconi University) who is well-known for having introduced (together with Andrei Schleifer and Robert Vishny) certain forms of bounded rationality to studies on financial crises and shadow banking. Human biases can lead to ignorance of rare tail events. This leads to underestimation of risk and can lead to over-production of seemingly safe assets, particularly in the shadow banking sector. He also showed development of loss projections over the period of the global financial crisis to show that there were large errors in expectations still in 2007 after the subprime crisis had broken out.

The event ended with the third panel discussion on *Looking ahead: Forthcoming financial innovations and institutions – opportunities and risks*, chaired by Michala MARCUSSEN (Société Générale and SUERF). The panel featured two CEOs of large Nordic institutional investors and two central bank experts on financial stability and digitalization.

Henrik NORMANN (Nordic Investment Bank) took up the consumer protection aspect of the new financial services making use of the new technologies. He was concerned about low net-wealth customers being effectively charged very high interest rates on their loans, and the long-term societal consequences this might have. Regarding data protection and threats of cybercrime, he saw that the digitalization of personal financial information is already beyond the point of no return. The potential for wrong-doings is very real. In response to the chair's question, what keeps the panelists awake at nights, he alluded to market risk premia being at very low levels. He also believed there is over-optimism regarding future pensions.

Saskia DE VRIES-VAN EWYJK (De Nederlandsche Bank) said the current low interest rates are necessary but may be creating a new financial cycle. The policy challenge is to ensure a healthy and stable growth for the future. FinTech is an area that has to be monitored closely by financial authorities.

Risto MURTO (Varma) referred to the large-scale regulatory reforms and unconventional monetary policy measures after the crisis. He said that from an investor's point of view policy had so far shown its positive sides. Insurance has been less affected by new regulation. According to him there are some opportunities to those players that are less regulated. New regulation is also building barriers to entry and he did not see Fintech to be very big yet in the Nordic area. Then again, digital banking has been a reality in the Nordic countries already for twenty years. On the risk side, he asked whether (geo)political risks are underestimated. He also noted that in terms of allowing the digitalization of data, societies are currently a bit naïve. More regulation of these new areas might well be needed.

Bank of Finland's Aleksi GRYM noted in his remarks that much of FinTech is driven by consumers' dissatisfaction with current financial services. They want easy financial services to be available on the 24/7 basis. He expects artificial intelligence to be the next big revolution in financial services, much like self-driving cars could be in traffic. He reminded that there will also be mistakes on the way. For instance, algorithmic trading has already demonstrated the endogeneity of risks from the new techniques. Fintech can lower barriers to entry but the strongest incumbent banks cannot be disrupted in many areas. An important question is whether market structure will really change as a result of the Fintech's evolution. If Fintech grows big, regulation will inevitably step in. He also pointed out that regulators should keep an eye on financial institutions' hidden risks by monitoring their profitability; high profitability can indeed be too good to be true, properly risk-adjusted profitability. Issues of moral hazard and adverse selection will not vanish with Fintech.

The poster session held on the first day comprised of eight very interesting research paper on shadow banking, covering both theory and empirics. The traditional Marjolin Prize, awarded to the best paper presented in the Colloquium by authors no older than 40, was won by Edouard CHRÉTIEN (ACPR, École Polytechnique, CREST) and Victor LYONNET (HEC Paris, École Polytechnique, CREST). Their paper, *Traditional and shadow banks during the crisis*, provides an elegant theoretical model to study a central question: why the regulated banking sector and the less regulated shadow banking sector coexist? The authors show how the two benefit from one another in a crisis situation, given that only banks have access to deposit insurance. The authors find that, in equilibrium, the shadow banking sector can become larger than what is socially desirable. The paper provides new valuable insights to the events during the global financial crisis that started ten years ago.

In sum, the Colloquium offered interesting insights to the past and present of shadow banking. The sector has clearly taken new shapes after the crisis. Much has been done in regulation to oversee the border between banks and shadow banks. Yet, speakers representing financial authorities were certainly not expressing complacency. Shortcomings in both theoretical understanding and data to monitor the sector's developments were widely acknowledged. In the words of one speaker in a private discussion, perhaps we are currently a bit in a wait and see mode, after all the reforms already done.

2. SHADOW BANKING AND MARKET-BASED FINANCE

*Tobias Adrian*¹

Good morning and thank you for the opportunity to offer some reflections on this important issue. I would like to begin by laying out a conceptual framework for shadow banking, and its cousin, market-based finance. I will then use this framework to anchor a discussion of the following three issues:

- First, how have different forms of shadow banking evolved in the wake of the financial crisis, and what are the implications for global financial stability?
- Second, in light of the vigorous regulatory and supervisory response since the crisis, where can we derive some comfort that risks have been adequately tamed, and on the flip side, where is there still work to be done?
- Finally, I will conclude with some regional examples of policy challenges on the horizon.

2.1. SHADOW BANKING – A FRAMEWORK

Shadow banking is a broad term that can mean different things.² It is often thought to comprise private credit intermediation occurring outside the formal banking system. Today I would like to be a little more prescriptive, by speaking to some specific economic characteristics and motivations that might help distinguish certain aspects of shadow banking from other forms of credit-based intermediation – like traditional banking and market-based finance. I should point out that these issues are not just attracting the attention of the Fund. The Financial Stability Board (FSB), in response to a request from the G20 leaders at the 2010 Seoul Summit, has been particularly instrumental in driving the international effort to make non-bank credit intermediation more robust and resilient.

In conceptual terms, one could argue that shadow banking is like any other form of financial intermediation – a response to the unmet needs and preferences of willing borrower and lenders. By helping to complete markets – for instance, by

¹ International Monetary Fund, Helsinki.

² The term “shadow banking” was coined by McCulley (2007), with taxonomies provided shortly thereafter by Pozsar (2008), and Adrian and Shin (2009, 2011). A voluminous related literature has since emerged. For recent reviews, see IMF (2014), and Claessens, Evanoff, Kaufman and Laeven (2015).

giving issuers new outlets for capital raising when bank lending is unavailable, and providing lenders more avenues for portfolio diversification – shadow banking might yield greater efficiencies and risk sharing capacity.

So let me introduce some broad outlines of one possible framework. From the perspective of structural characteristics, the riskier dimensions to certain shadow banking activities could be linked to some of the following features:³

- First, they can involve extensive transformation of risk characteristics through complex structuring. Key in this regard is credit enhancement associated with the pooling and tranching of risk, and/or implicit guarantees. Leverage, complexity and opaqueness can be prominent. Other features include more standard maturity and/or liquidity transformation. An example of all these features would be where a portfolio of illiquid, subprime loans on bank balance sheets is transformed, with the help of a sophisticated pricing model, into an off-balance sheet portfolio of liquid, highly-rated securities, some of which enjoy credit support features not present in the underlying loans.
- Second, these transformations are often performed along a chain of specialized and interconnected intermediaries and can thereby involve the balance sheets of many entities.⁴ For instance, after a non-bank finance company originates a loan, these are pooled and warehoused by broker-dealers, whose syndicate desks structure them into asset-backed and collateralized debt obligation (CDO) securities, which are assigned ratings by credit rating agencies (CRAs), and funded through the issuance of capital notes on the wholesale market, to be purchased by enhanced cash funds. A related feature of shadow banking is the reuse of collateral – we often associate shadow banking with lengthy collateral chains. While collateralized borrowing is generally safe, one drawback is that frequently reused collateral can give rise to heightened interconnectedness⁵.
- Third, shadow banking entities do not have explicit or formal access to official sector backstops (i.e. discount window access and deposit insurance) in the manner of a traditional deposit-taking bank.

³ This synthesis is derived in part from that presented in Adrian (2015).

⁴ For a general discussion, see Poszar, Adrian Ashcraft, and Boesky (2013). For a similar discussion as it pertains specifically to the intermediation chain in securitization markets, see Segoviano, Jones, Lindner and Blankenheim (2015).

⁵ See for instance, Singh (2011, 2013, 2017). As Muley (2016) also points out, collateral intermediation chains can take two general forms – where the value of pledgeable collateral, and hence the amount that can be borrowed, is limited by the face value of the original debt contract (i.e., securitization); and where the collateral enables borrowing of an amount greater than the face value of the debt backed by that collateral (i.e., rehypothecation).

- Fourth, shadow banking activity often benefits from the presumption of sponsor support, such as an implied credit guarantee or a credit line to an off-balance sheet entity provided by a bank that is concerned with incurring reputational damage if investor return expectations are not met. These exposures can become contingent liabilities for the sponsor.
- And fifth, the liabilities of shadow banking products are principally debt-financed in the wholesale market.

In practice, of course, there can be many shades of grey between the riskier elements of shadow banking and the more resilient aspects of market-based finance – the taxonomy in Table 1 is highly stylized and implies clearer distinctions than often exist. In a general sense, and as the FSB has articulated, market-based finance is just the more resilient version of shadow banking. This is not to imply that all shadow banking activity should be stopped – as the Fund and FSB have stressed, shadow banking can serve useful economic functions. But, in certain circumstances, regulators need to ascertain if there are features which might be more amenable to generate financial stability risks, and if so, work through the policy implications. This discussion naturally raises the corollary – just what does ‘resilience’ look like in the context of market-based finance? With that in mind, let me offer some considerations.

- First, resilience might stem from greater simplicity, transparency, and standardization, as reflected in less pronounced, complex and/or opaque structuring and risk transformation. Additionally, enhanced resilience could stem from a lower degree of institutional interconnectedness. This could arise because collateral chains are less prominent, or because there is no presumption of third party support mechanisms (credit lines, guarantees, etc.) and other backstops that can result in the sponsor having to absorb contingent liabilities in bad states of the world. Furthermore, a more resilient funding base might be reflected in more diverse, longer-term and non-runnable forms of debt and equity, rather than a primary reliance on short-term wholesale financing. In aggregate, these forms of resilience might add up to create modes of capital intermediation that productively help to complete markets, without posing undue financial stability risks.

Table 1. A Stylized View of Structural Characteristics of Credit-based Intermediation

<i>Characteristic:</i>	Traditional Banking	Shadow Banking	Market-based Finance
Key Risk Transformations	Liquidity, maturity, leverage	Credit enhancement, liquidity, maturity, leverage	Less emphasis on credit enhancement and less opaque vs. shadow banking
Institutions Involved in Intermediation	Single entity	Can be many entities, interconnected through collateral chains and credit guarantees	Single/few entities
Formal <i>Ex-ante</i> Backstop	Yes	No / Indirect	No
Implied Sponsor Support	n.a.	Yes, can sometimes be contingent liabilities	No (insolvency remote)
Example of Entities	Commercial bank	Synthetic CDO, Structured Investment Vehicle (SIV), CNAV MMF, ABCP Conduit	Bond mutual fund, Distressed debt or PE partnership, Direct lending by pension fund
Main Form of Liabilities	Debt and deposits, Wholesale & retail-financed	Debt, Mainly wholesale financed	Highly diverse – Short and long-term debt and equity, Retail & wholesale financed
Key Resulting Financial Stability Risk	Systemic risk (institutional spillovers)	Systemic risk (institutional spillovers)	Shift in price of risk (market risk premia)

Source: IMF

Yet this discussion gets us only part of the way to understanding why regulators have become exercised over the financial stability implications arising from certain riskier features of shadow banking. We should also try to understand if there are motivations for creating these particular features that need to be taken into account by policy makers and market participants.

- *Agency Frictions and Informational Asymmetries* – while agency problems are omnipresent in finance in general,⁶ including in market-based finance, misaligned incentive problems can be magnified in certain shadow banking contexts because of a high degree of complexity, specialization and opaqueness. These features allow agents considerable scope to exploit informational asymmetries in a way that is capable of generating negative externalities.⁷ Take, for instance, the predatory lending practices of originators,

⁶ This is in part because of asymmetric compensation structures which allows agents to effectively restrike a call option each year (in the absence of clawbacks) in which they have unlimited upside with limited downside. Convex payoff structures of this kind can generate a rational preference for aggressive forms of risk taking that are not necessarily in the best interests of principals or the broader financial system. See for instance, Allen and Gorton (1993); Allen and Gale (2000); Rajan (2005); Stein (2013a) and Jurek and Stafford (2015).

⁷ Ashcraft and Schuermann (2008) identified no less than seven informational frictions in the securitization of subprime mortgages prior to the financial crisis.

or the adverse selection problems that allow securitization arrangers to retain high quality loans while securitizing the ‘lemons’.^{8 9}

- *(Mispriced) Sponsor Backstops and Contingent Liabilities* – some shadow banking activities can have margins that are so low they cannot absorb the full cost a backstop by themselves, and thus require subsidized external risk absorption capacity (i.e., cheap insurance). As an example, because commercial banks benefit from formal official sector backstops, their credit support lines to shadow banking affiliates can distort the cost of the latter’s liabilities by leaving investors with the presumption that these liabilities are ostensibly ‘money good.’ Another example constitutes the tail risk insurance provided by insurance companies via wraps and guarantees.
- *Regulatory Arbitrage* – this is where capital, liquidity, taxation or information requirements are circumvented to make activities profitable that might otherwise not be. A notable example prior to the crisis was seen in the provision of bank guarantees to asset-backed commercial paper (ABCP) conduits in the U.S. that were structured as liquidity-enhancing guarantees, rather than credit guarantees. In some circumstances, this had the effect of reducing regulatory capital charges nine-fold.¹⁰

⁸ Another example is the CDO structurer at an investment bank, who, with access to granular loan-level data on borrower repayment capacity, can iterate default correlation assumptions in such a way as to maximize the size of a tranche that will be of greatest appeal to target investors (unbeknown to them). Because investment mandate restrictions and provisioning charges often mean that institutional investors are confined or strongly encouraged to buy highly rated securities, there are strong incentives for issuers to structure securities on the basis of benign correlation assumptions – that is, those that tend to prevail most of the time, rather than during periods of heightened systemic risk (this connects to the literature on ‘neglected risk’; see for instance Coval, Jurek, and Stafford (2009) and Gennaioli, Shleifer, and Vishny (2013)). Naturally, this leaves investors with an economic exposure that is the functional equivalent of being short catastrophe insurance.

⁹ Another related example of misaligned incentives arises from the ‘issuer pays’ business model for credit ratings, which can lead to ‘ratings inflation.’ This can be a problem in many contexts, including market-based finance, but is especially pronounced in shadow banking because the complexity of shadow banking products often results in investors outsourcing aspects of their due diligence process by relying heavily on external credit rating assessments. Because issuers have the ability to ‘ratings shop’ – it is they rather than the investor who employ the services of the rating agency – agencies have a strong incentive to assign ratings in a manner that maximizes the probability of winning business from issuers. This behavior has been recognized to have played a role in amplifying the effects of the crisis. For instance, the United States Financial Crisis Inquiry Report concluded that “the failures of credit rating agencies were essential cogs in the wheel of financial destruction.” Empirical studies, including Griffin and Tang (2012) and He, Qian, and Strahan (2012), have documented inflated credit ratings assigned to mortgage-backed securities before the crisis. Jiang, Stanford, and Xie (2012) show that rating agencies assign higher credit ratings after switching from the “investor-pays” to the “issuer-pays” business model. Strobl and Xia (2012), Cornaggia and Cornaggia (2013) and Segoviano, Jones, Lindner and Blakenheim (2015) discuss the conflicts of interest leading to credit rating inflation.

¹⁰ Under the Basel I and II frameworks, little capital (or zero in the case of Basel I) was required for credit exposures to, or liquidity support for, banks’ off-balance sheet asset-backed commercial paper conduits (ABCP) and other securitization vehicles, compared to holding the underlying assets on their balance sheet. One result was that while the Financial Accounting Standards Board (FASB) issued guidance in 2003 to the effect that sponsoring banks should consolidate assets in ABCP conduits onto their balance sheets, U.S. banking regulators clarified that these assets would not, in fact, need to be included in the measurement of risk-based capital. Instead, a 10 percent credit conversion factor for the amount covered by a liquidity guarantee was imposed, which in effect meant that regulatory charges for conduit assets covered by liquidity guarantees were 90 percent lower than regulatory charges for on-balance sheet financing. In response, the majority of guarantees were structured as liquidity-enhancing guarantees, aimed at minimizing regulatory capital, instead of credit guarantees. Unsurprisingly, the majority of conduits were supported by commercial banks subject to the most stringent capital requirements. See Acharya, Schnabl, and Suarez (2013).

Allow me now to make one final point about the riskier aspects of certain shadow banking activities. From the perspective of global financial stability, we are more concerned with an increase in systemic risk – the disruption of the intermediation capacity of the financial system – than an increase in the market price of risk *per se*. It is in this sense that certain aspects of shadow banking could potentially pose concern.¹¹

As this distinction between the market price of risk and systemic risk is sometimes conflated, allow me to elaborate. Variation in market risk premia in part reflects changes in fundamentals, and in part reflects frictions such as mutual fund investors' procyclical response to past performance. In either case, there could be real economic consequences, felt through higher corporate borrowing costs or negative wealth effects, for instance. Indeed, research by Fund staff has shown how the first mover advantage effects in fund management can amplify movements in market prices.¹² But while shifts in the price of risk can certainly be an ingredient in systemic risk, other amplification mechanisms, like leverage and institutional interconnectedness, are typically needed to generate systemic implications.¹³ Viewed through a different lens, a rich literature has emerged to show that while limits-to-arbitrage can prevent dislocations in market price action from swiftly self-correcting, this tends to connect more to issues of time variation in the pricing of risk than systemic risk *per se*.¹⁴ More generally, it remains hotly contested as to whether policy makers should even try to influence the market price of risk, and even if so, how best, and under what conditions, to do it.¹⁵

By contrast, the desire of policy makers to defend against *systemic risk* is universal. And what most concerns us here is that, while not all shadow banking is potentially systemic, certain aspects of shadow banking can lend themselves to amplifying shocks and generating systemic risk, not just outsized movements in market prices. How so? Because the balance sheets of a large number of shadow banking entities can be interconnected along a lengthy intermediation chain

¹¹ Of course, size is a critical ingredient in any discussion of system risk. It is entirely possible that small shadow banking entities fail, and this not generate systemic consequences.

¹² IMF (2015). Note this work did not aim to provide a verdict on the overall systemic importance of asset management activities and firms. However, the analysis did reveal that unlike banks, larger funds and funds managed by larger asset management companies do not necessarily contribute disproportionately more to systemic risk.

¹³ Leverage can both accelerate the process of fire sales, and reduce the ability of institutions to absorb losses.

¹⁴ It would be remiss not to acknowledge that in October 1987, when the U.S. equity market shed around one-quarter of its value in a single day, no financial institution of any significance failed, and real GDP in that quarter went on to expand at an annualized rate of more than 6 percent. Nevertheless, given the rising share of institutional investment activity and the more widespread use of leverage over recent decades, it is not clear that a repeat episode would end so benignly.

¹⁵ An extensive literature has evolved on the conditions under which authorities should consider leaning against the wind of time-varying risk premia. For recent reviews with a U.S. emphasis, see Stein (2013b) and Mishkin (2010, 2011). Jones (2015) provides a contemporary synthesis of the competing 'Jackson Hole' and 'Basel Consensus' paradigms.

(often involving repledged collateral);¹⁶ because complex risk transformations can increase opacity (and thus uncertainty in a crisis) and obscure the true nature of underlying risk; because some shadow banking liabilities are principally debt-financed in short-term wholesale markets, which are notoriously fickle; and because the role of implicit sponsor backstops means that stresses experienced by some shadow banking entities can quickly metastasize into contingent liabilities for their sponsors, who may not have the capital or liquidity to absorb them. The associated vulnerabilities can be magnified when agents are incentivized to exploit regulatory loopholes and asymmetric information, possibly requiring the ultimate backstop – the sovereign balance sheet – to be deployed to put out the ensuing blaze.¹⁷ Activating this contingency might come at great cost.

2.2. THE POST-CRISIS EVOLUTION IN SHADOW BANKING

Among the key changes to have unfolded in global patterns of non-bank credit intermediation since the financial crisis, two stand out. At the activity level, there has been a material swing away from riskier aspects of shadow banking toward market-based finance. And at the geographical level, there has been a relative increase in the emerging market (EM) share of global non-bank intermediation.

2.2.1. Less Shadow Banking, More Market-based Finance

The first notable trend, most pronounced in Advanced Economies (AEs), has been a reduction in the types of shadow banking activities that amplified the effects of the global financial crisis. There has been a generalized ‘flight to simplicity and transparency’ in the intermediation of non-bank credit, away from the more opaque forms of shadow banking, toward more resilient forms of market-based finance.

Because data inconsistencies and definitional issues at the cross-country level make attempts at precisely quantifying the size of this shift problematic, let me just draw attention to two sets of data to help make the general point (without the implication that either is perfect). On one measure – based on the FSB’s Flow of Funds data – a roughly US\$10 trillion swing toward market-based finance (proxied here by standard collective investment vehicles) can be inferred between 2007 and 2015, and a \$6-7 trillion swing against all other types of non-bank

¹⁶ Rehypothecation of collateral by lenders to a third party creates the lenders’ bankruptcy risk in the sense that if the lender defaults on his obligation to the third party, the collateral is confiscated by the third party and the original borrower does not get it back even if he is willing and able to fulfill his obligations. See Muley (2016).

¹⁷ One of the more notable examples was the deployment of a backstop by the U.S. Treasury in response to the market stresses occasioned by the Reserve Primary Money Market Fund ‘breaking the buck’ following the Lehman bankruptcy.

credit intermediation, including some forms of shadow banking, which created significant problems a decade ago (Figure 1).¹⁸ On another measure, this time focusing exclusively on the U.S. Flow of Funds, one can see a broadly similar trend – assets intermediated through simple and insolvency-remote collective investment vehicles like bond mutual and exchange-traded funds have more than doubled since 2007, while the assets of broker-dealers, finance companies, asset-backed securities issuers and money market funds (MMFs) have almost halved (Figure 2).¹⁹ Importantly, interconnectedness has also reduced.²⁰

As the FSB recently pointed out, these developments, spurred by regulatory changes and a reorientation in intermediary business models, mean that many of the shadow banking activities which contributed substantially to the global financial crisis pose substantially less systemic financial stability risks.²¹

2.2.2. Non-bank Financial Deepening in Emerging Markets

The second generalized shift in global patterns of non-bank credit intermediation has been rising activity in Emerging Market (EM) economies, consistent with the broader trend of financial deepening. Once again, data imperfections don't allow us to be as precise as we would like. But one crude measure of this shift can be seen in comparing the growth in assets of what the FSB refers to as 'Other Financial Intermediaries' (OFIs),²² where the EM share of global assets has increased from just 4 percent in 2011, to 11 percent as of 2015. The upward trend has been observed both in China and across EMs more generally, while among AEs, the U.S. and U.K. have seen the largest relative declines in their share of global OFI assets (5 percentage points in both cases). Different data sets point to broadly similar trends in the relative growth of non-bank credit intermediation in EM.^{23 24}

¹⁸ It should be noted that non-Flow of Funds data do not point to a similar sized decline in certain types of intermediation activities. For a discussion of changing patterns of collateral intermediation, see also, Singh (2013).

¹⁹ See Adrian, Boyarchenko and Shachar (2017) for a discussion of these divergent trends in the context of broker-dealer intermediation of corporate bond trading.

²⁰ In part, this reflects the emergence of shorter collateral chains – after all, collateral does not flow in vacuum – it needs balance sheet to move, and balance sheet space for key entities has become scarcer.

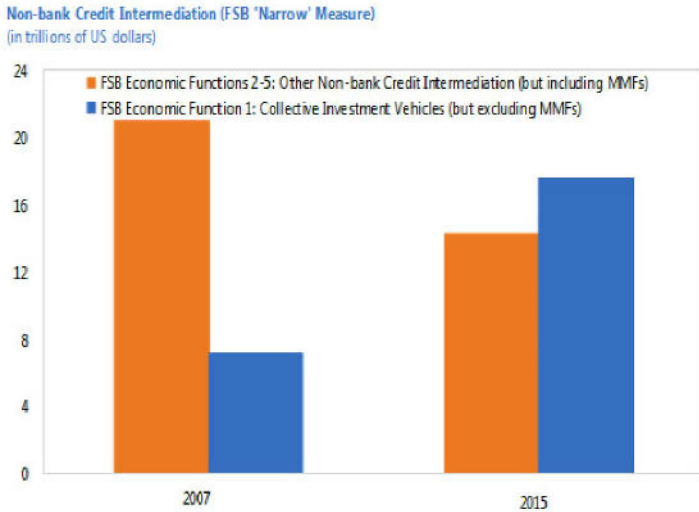
²¹ Financial Stability Board (2017b).

²² This measure includes financial system assets outside of that held by banks, central banks, public financial institutions, insurers, pension funds and financial auxiliaries.

²³ See for instance, IMF (2014), which focused on non-core liabilities.

²⁴ On the basis of comparable cross-country data focused exclusively on certain types of shadow banking entities, such as constant net asset value (NAV) MMFs, we observe a similar upward shift in the relative size of EM intermediation.

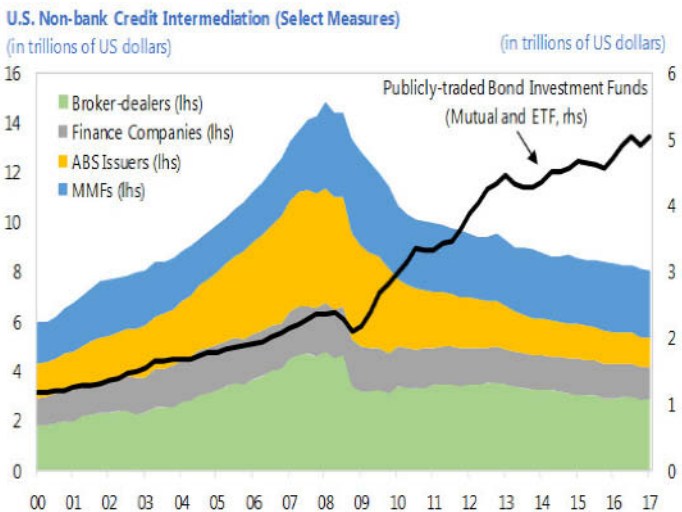
Figure 1. Global Non-Bank Credit Intermediation, by FSB Economic Function



Source: Financial Stability Board (2017a), IMF staff.

Notes: Economic functions (EFs) as per the ‘narrow’ measure in Financial Stability Board (2017a), but with MMFs moved from EF1 to the EF2-grouping, EF1 = collective investment vehicles (fixed income funds, hedge funds, real estate funds, fund of funds, mixed funds, pooled funds, and other funds), EF2 = finance companies, leasing companies, real estate credit companies, consumer credit companies, factoring companies, non-bank credit card issuers, EF3 = broker dealers and securities finance companies, EF4 = financial guaranty insurers, mutual guarantee societies, mortgage guarantee insurers, insurance corporations, loan guarantee co-ops, EF5 = asset-backed and structured finance vehicles.

Figure 2. U.S. Non-Bank Credit Intermediation, by Vehicle Type



Source: Federal Reserve Board, Flow of Funds;

One implication, to which I will speak more in a moment, is that as systems of non-bank credit intermediation continue to increase in size and scope in EM economies, ensuring that regulation and supervision is globally synchronized will take on increasing importance.

2.3. STRENGTHENING SUPERVISION AND REGULATION – HOW FAR HAVE WE COME?

Since the crisis, a concerted policy effort has been undertaken to strengthen the regulation and oversight of non-bank credit intermediation, with the aim of promoting more resilient forms of market-based finance. The FSB has been instrumental in this regard,²⁵ and the Fund itself has been increasingly engaged – by intensifying its supervision under the auspices of bilateral Financial Sector Assessment Programs (FSAPs) and Article IV Consultations, in addition to its multilateral surveillance work featured in the Global Financial Stability Report²⁶ and other research publications.

A detailed synthesis of related regulatory reforms could constitute a separate speech in its own right,²⁷ so all I shall say here is that among the most consequential developments have been the Basel III reforms, designed in part to ensure better recognition and capitalization of banks' explicit and contingent exposures to shadow banking entities. Largely as a result, the off-balance sheet provision of credit insurance by deposit-taking institutions has declined, helping to reverse the pre-crisis trend of growing interconnectedness between the traditional and shadow banking systems. Other important shadow banking reform priorities have focused on dampening risks associated with securities financing transactions and over-the-counter (OTC) derivatives.²⁸

To give a sense of how far we have come, let me speak to two examples of shadow banking activities that caused significant problems during the crisis, but by virtue of regulatory reforms have since been placed on a sturdier footing: MMFs and securitizations.

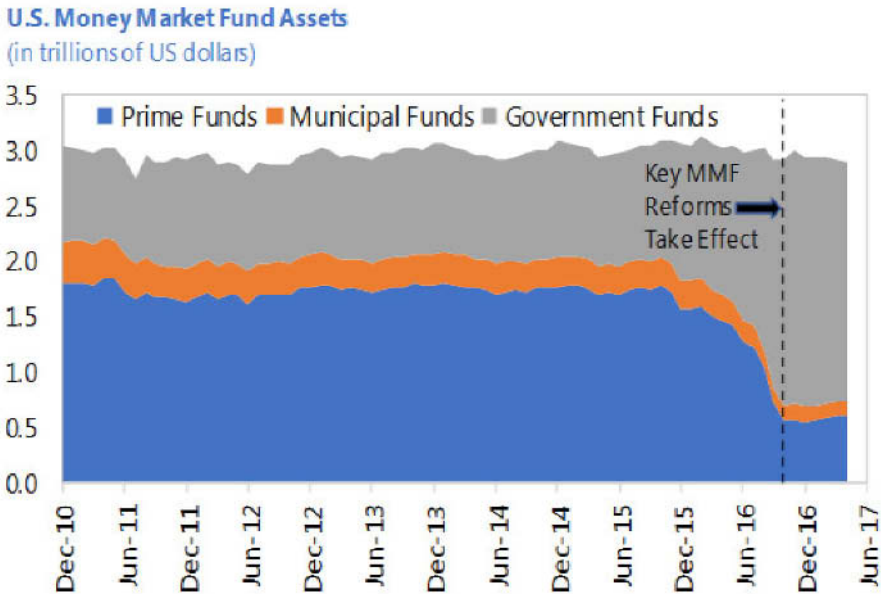
²⁵ Having designated shadow banking as one of its priority areas, the FSB has created a system-wide monitoring framework to track developments in the global shadow banking system, with a view to identifying the build-up of systemic risks and initiating corrective actions where necessary. The annual Global Shadow Banking Monitoring Report is a feature of this work. And here in Europe, the European Systemic Risk Board (ESRB) has commenced a mapping of the EU shadow banking system, which feeds into the ESRB's Risk Dashboard, internal risk assessment processes and the formulation and implementation of related macroprudential policies. IMF (2014).

²⁶ IMF (2014).

²⁷ Useful recent reviews can be seen in FSB (2017b) and FSB (2017e).

²⁸ These have included, for instance, reducing liquidity mismatches arising from non-banks' use of securities financing transactions (SFTs); constraining excessive build-up of non-bank leverage with the imposition of haircuts on non-centrally cleared SFTs; and reducing risks in OTC derivatives and tri-party repo markets through market infrastructure reforms. With many of these efforts ongoing, it is still too early to speak to their effectiveness.

Figure 3. Money Market Fund Assets



Source: S.E.C., Haver.

Dampening the financial stability risks associated with MMFs (and constant net asset value money market mutual funds [CNAV MMFs] in particular) has been a priority.²⁹ In the U.S., which accounts for around 60 percent of global MMF assets, prime institutional MMFs are now required to “float their NAV” (i.e., no longer guarantee investors redeemability at par); non-government MMF boards have been equipped 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 critically, bank sponsors are now required to capitalize their MMF support lines. These reforms have culminated in a significant shift away from prime institutional MMFs, which some investors assumed were providing something for

²⁹ Though relatively simple structures, the centrality of CNAV MMFs in the crisis stemmed from two reasons. Firstly, they issued runnable bank-like liabilities that were redeemable at par on demand, in order to fund portfolios of assets with credit risk, lower liquidity and longer maturity. In other words, mismatches of various types were hardwired into their structure. Second, by virtue of their sheer size and the structure of their asset-liability mix, MMFs were strongly connected to the commercial banking system on both sides of the balance sheet: through implicit sponsor insurance lines on the liability side aimed at preventing MMFs from breaking the buck, and on the asset side, through repo exposure and their holdings of bank paper and deposits. From a spillover perspective, these structural vulnerabilities were not just confined within domestic borders – as a case in point, the run on U.S. MMFs created significant financing problems for banks in Europe when the former were subjected to large scale redemptions.

nothing – risky asset returns, without the risk (Figure 3). And here in Europe, a similar set of regulations are set to take effect over the next 12-18 months.³⁰

Securitization markets have been similarly overhauled.³¹ Loan underwriting standards have been strengthened; the scope of prudential consolidation has been expanded to require banks who sponsor securitization vehicles to hold regulatory capital against these exposures; information disclosure requirements have increased; and credit retention requirements – popularly known as ‘skin in the game’ – have been introduced to better align the incentives of originators and investors.³² As a result, the issuance of riskier types of residential mortgage-backed securities – known in the U.S. as subprime, Alt-A, Home Equity Lines of Credit, and Junior Liens – has all but ceased, having previously topped out at just over \$1 trillion in 2006 (Figure 4).³³

In both the U.S. and Europe,³⁴ regulators are now striving to create an enabling environment to support the issuance of higher quality, more standardized and more transparent securitizations as a means of contributing to a healthier overall credit mix, although activity has been a little less robust than hoped for. The Fund’s own research also shows that revitalized securitization markets could play a constructive role in addressing Europe’s non-performing loan overhang.³⁵ The broader point is that the push to transform riskier elements of shadow banking into more resilient and productive forms of credit intermediation is underway.

Nevertheless, this is not to suggest the job is done.³⁶ As the FSB recently acknowledged in a Peer Review, implementation of the Policy Framework for Shadow Banking Entities remains at a relatively early stage.³⁷ There are still lingering

³⁰ These measures entail 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.

³¹ The key role of particular forms of securitization activity in amplifying the crisis has been well documented. In short, where credit risk transformation was motivated by regulatory arbitrage and misaligned incentives, amplified by neglected tail risk, and abetted by mispriced backstops which had significant spillover implications for the insurance providers, the effects were devastating. It is worth recalling it was not just in the United States where securitization markets took on a very different complexion in the pre-crisis period. In Europe, annual securitization issuance soared from less than \$US100 billion in 1999, to \$US1.2 trillion at the 2008 peak, most of which comprised RMBS (Segoviano, Jones, Lindner and Blankenheim, 2015).

³² In the EU, retention rules were put in place in January 2011 (and subsequently revised in 2014) which allowed investor financial institutions to assume exposure to a securitization only if the originator, sponsor, or original lender has explicitly disclosed to the institution that it will retain, on an ongoing basis, a material net economic interest of at least 5 percent. In the U.S., risk retention rules now require securitization issuers or sponsors to retain an economic interest of at least 5 percent of the aggregate credit risk of the collateralizing assets (since December 2015 for securitization transactions backed by residential mortgage loans, and since December 2016 for all other ABS).

³³ Reforms have also been directed to increasing the transparency and standardization of securitization products, a direct response to the opaqueness and complexity that came to characterize securitization innovations (i.e., synthetic CDOs) in the pre-crisis period. This requires both intermediating banks and credit rating agencies to disclose far more information about underlying loan pools, and the assumptions used to arrive at credit rating assessments.

³⁴ See for instance, Bank of England and European Central Bank (2014), and European Banking Authority (2014, 2015).

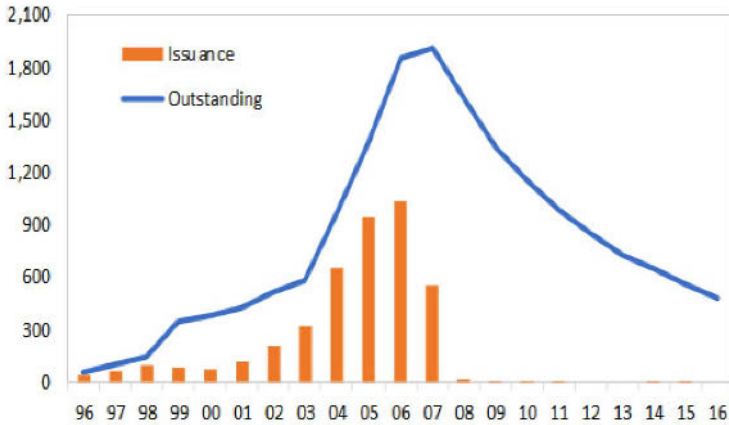
³⁵ Aiyar, Bergthaler, Garrido, Ilyina, Jobst, Kang, Kovtun, Liu, Monaghan, and Moretti (2015).

³⁶ See also, FSB (2017b).

³⁷ FSB (2016).

Figure 4. ‘Riskier’ U.S. Residential Mortgage-Backed Securities

Combined Subprime, Alt-A, HELOC, and Junior Lien Residential MBS
(in billions of US dollars)



Source: SIFMA.

question marks as to whether some of the earlier discussed economic motivations for shadow banking activities have been fully addressed, and whether risk has simply shifted towards corners of the financial system where we have less visibility and fewer instruments to deploy. This should give us reason for pause if we accept that systemic risk stems, at least in part, from market failures such as moral hazard, information frictions, agency problems, and coordination failures that afflict large institutions.³⁸

Take the issue of informational and agency problems. While some pre-crisis behaviors which exploited informational asymmetries and misaligned incentives in the mortgage market have been at least partially addressed, other incentive problems have proven more challenging to overcome. As a case in point, credit rating agencies (CRAs) still overwhelmingly operate under the ‘issuer pays’ model.³⁹

Other incentive-related issues in structured finance have proven similarly difficult to iron out, with the result that regulatory arbitrage remains a persistent threat, including at the cross border level. For instance, many countries outside of the EU and U.S. are either yet to put into effect ‘skin in the game’ rules, or have

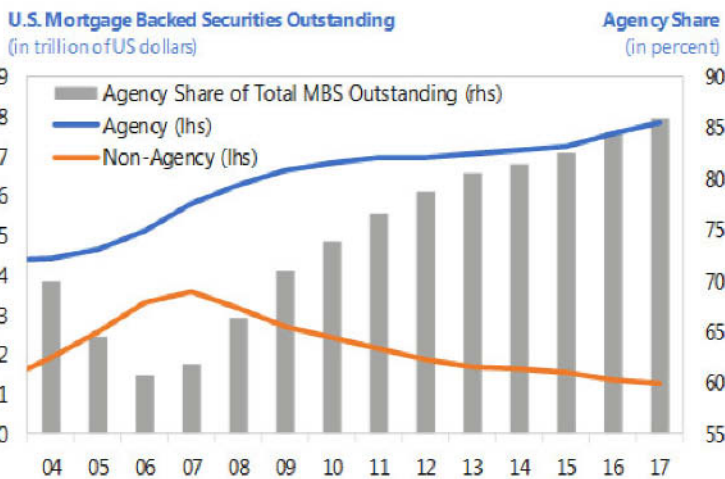
³⁸ See for instance, Adrian, Covitz and Liang (2013).

³⁹ Some researchers have suggested excessive regulatory reliance on ratings and the increasing importance of risk-weighted capital in prudential regulation have more likely contributed to distorted ratings than the matter of who pays for them, particularly in light of the fact that for a century prior to the global financial crisis, CRAs were viewed by regulators and investors as valuable independent agents in the financial system (see Cole and Cooley, 2014). However, many countries have since taken steps to reduce the mechanistic reliance on CRAs in their laws and regulations.

maintained exemptions which might dilute their effectiveness.⁴⁰ Additionally, there are questions as to whether the coverage of new retention rules has been adequate.⁴¹ Furthermore, the prospect of cross-border regulatory arbitrage continues to loom large in securities financing transactions where reforms enacted in the U.S. have not been replicated elsewhere.⁴²

As to the issue of mispriced implicit backstops – one of the key features of riskier forms of shadow banking – progress here has also been mixed. For instance, supervisory guidelines to address banks’ ‘step-in risks’ for non-contractual and reputational exposures remain to be finalized. In the U.S., reform of the U.S. government sponsored entities appears to have stalled at a time where their share of MBS activity has expanded to 86 percent, up from 61 percent in 2006 (Figure 5). And the issue of implicit backstops has also become more pressing in some larger EMs, where shadow banking activity is growing most briskly.

Figure 5. U.S. Mortgage-Backed Securities: Agency vs. Non-Agency



Source: SIFMA.

⁴⁰ IOSCO (2015).

⁴¹ In the EU, products that are guaranteed by governments and public institutions are generally exempt from retention requirements, as are some products guaranteed by certain regulated financial institutions. In the U.S. meanwhile, securitizations related to some government programs are also exempt from incentive alignment requirements, along with securitizations considered to have met high quality underwriting standards or are otherwise considered in the public interest (IOSCO, 2015).

⁴² These reforms have culminated in the supervision of the two key triparty service providers and a substantial reduction in potential financial stability risks associated with repo market infrastructure. For example, the share of tri-party repo volume that is financed with intraday credit from a clearing bank has declined from 100 percent as recently as 2012, to around 5 percent more recently (FSB, 2017b).

2.4. POLICY CHALLENGES ON THE HORIZON – SOME REGIONAL EXAMPLES

I would like to conclude the substantive portion of my remarks by briefly touching on three regional examples of the types of policy challenges that might lie ahead: managing the rise of credit intermediation in China, navigating the partial return of structured leveraged finance in the U.S, and addressing the challenges in asset management supervision in Europe.

2.4.1. Credit Intermediation in China

As part of an on-going Financial Sector Assessment Program, the Fund is currently engaged in close dialogue with the Chinese authorities over financial system stability issues. This analysis will likely be reported upon later in the year. As we are not in a position to speak to these issues at this juncture, let me instead offer a few very general observations here, utilizing the framework I introduced in my opening remarks, and following on from the work we have published in our regular Article IV Consultations and Global Financial Stability Reports.

The first point to acknowledge is that a high savings rate, coupled with a gradual process of financial liberalization, has enabled China's system of credit intermediation to become more inclusive and facilitate remarkably high and stable growth rates over a long period of time. Financial deepening has been good for China, and good for the global economy.

Second, the Fund has, however, expressed some concern as to the nature of credit imbalances (both inside and outside the formal banking sector) that have accumulated in the process of generating these impressive rates of economic growth. It is now well known that China's credit system has become very large. This aside, it has also developed some structural features that appear broadly consistent with the framework for shadow banking activities I outlined in Table 1. For instance, there are various risk transformations taking place that are sometimes difficult for regulators and investors to 'look through;' interconnections between banks and non-banks have expanded over the years; some of these activities seem conditioned on the presumption of sponsor or official backstops; and short-term wholesale financing is becoming more prominent.

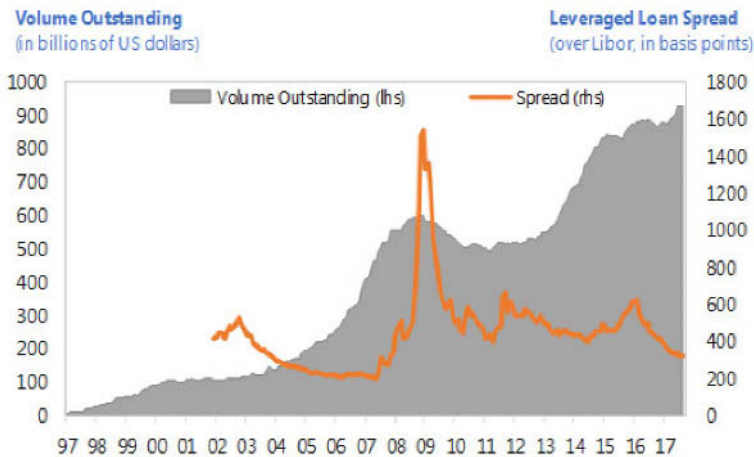
Third, all this said, we have been encouraged by the willingness of the authorities in China to respond to these emerging trends by tackling some of the underlying motivations for these activities. Most notable in this regard have been the efforts of the authorities to close down avenues for arbitrage between the traditional and non-traditional banking sector, and to gradually unwind the presumption of sponsor support for wealth management products. Though it is early days, it

appears that some of these efforts are already having the desired impact. As our recent Article IV Consultation pointed out, bank claims on non-bank financial institutions and off-balance sheet wealth management products have essentially stopped growing.

2.4.2. The Partial Re-emergence of Structured Leveraged Finance in the U.S.

While far fewer subprime mortgage loans are now issued and securitized, and there has been a dramatic reduction in complex securitizations, U.S. structured finance markets are growing swiftly, reflected for example in a surge of relatively low-rated leveraged and subprime auto-loans.

Figure 6. U.S. Leveraged Loans: Outstanding Volumes and Spreads



Source: S&PLCD

In the case of the leveraged loan market, new issuance has set a record over the past year, and outstanding volumes are now more than 50 percent above the 2008 peak (Figure 6). The share of loans at the riskier end of the rating distribution (B+ or below) has reaccelerated this year to near record levels, along with the covenant-lite share.⁴³ This debt has increasingly been raised for the purposes of funding leveraged buyouts and other types of procyclical merger and acquisition (M&A) transactions, and is consistent with the average debt/EBITDA multiple on

⁴³ Apart from a deterioration in lending standards, a high 'Cove-lite' issuance share could reflect other developments, such as an increase in the quality of the borrower pool, and/or the rising share of institutional investors (who are less likely to make use of covenants) in the leveraged loan market. For a review of financial stability-relevant information that can be reflected in both price and non-price terms in credit markets, see Stein (2013a) and Jones (2016).

leveraged loans also making new highs. In response to the decline in underwriting standards, a higher share of loans are now being downgraded, and default rates are picking up.⁴⁴ All of this at a time where spreads are at the low end of their historical range.⁴⁵

There are two issues to disentangle here: first, whether risks are being mispriced, and second, whether any systemic implications could arise as a result. On the first issue, there is ample evidence that risk premia are low by historical standards, particularly in light of the loosening in underwriting standards. However, as to the broader implications of any potential mispricing, it is unclear whether these are systemic, for the moment. Despite its rapid growth, the leveraged loan market is still only equivalent to around 5 percent of U.S. GDP, and in absolute terms, is half the size of the subprime mortgage market at its peak. Furthermore, the distribution of leveraged loan exposure across investor types seems better calibrated to risk absorption capacity than was the case before the financial crisis. For instance, the bank share of leveraged loans has declined from around 25 percent a decade ago to less than 10 percent now, a trend that may have been at least partly reinforced by stricter guidance issued by financial regulatory agencies in 2013.⁴⁶ Dedicated institutional investors that manage pass-through vehicles like distressed debt now play a more active role. Turning to the U.S. subprime auto-loan asset-backed securities markets, rather similar dynamics (in terms of strongly rising issuance amidst an uptick in default rates) are also unfolding (Figure 7), but at less than \$50 billion, this is a considerably smaller market than that for leveraged loans.⁴⁷

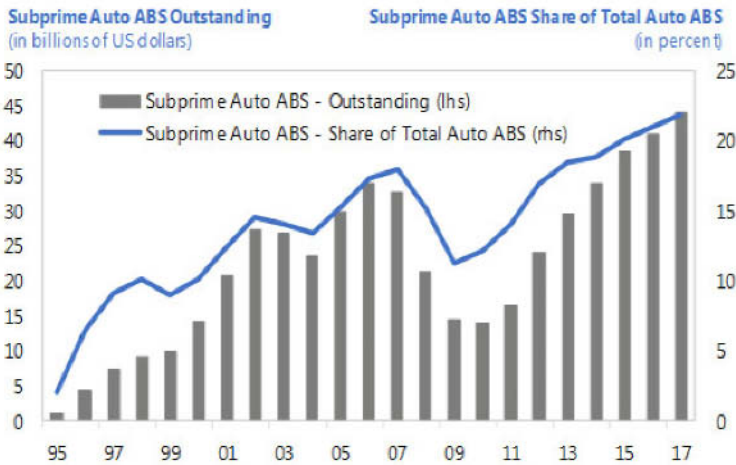
We are monitoring developments in structured finance very closely. While we see these issues as sector-specific rather than systemic, they serve as a timely reminder that the credit system continues to evolve, and our monitoring efforts need to stay attuned to new risks accordingly.

⁴⁴ Historically, defaults on leveraged loans have closely tracked macroeconomic and financial conditions, with default rates a little lower than high yield bonds (in the range of one and twelve percent annually) and recovery rates much higher (around 70 percent, reflecting that leveraged loans are typically collateralized and senior to other debt instruments).

⁴⁵ Similar dynamics can also be observed in other areas of leveraged finance, such as the high yield bond market.

⁴⁶ The agencies involved included the Office of the Comptroller of the Currency, the Board of Governors of the Federal Reserve System, and the Federal Deposit Insurance Corporation. The guidance outlined the agencies' minimum expectations on a wide range of topics related to leveraged lending, including underwriting standards, valuation standards, pipeline management, the risk rating of leveraged loans, and problem credit management. For a review of its effectiveness, see: <http://libertystreeteconomics.newyorkfed.org/2016/05/did-the-supervisory-guidance-on-leveraged-lending-work.html>.

⁴⁷ The subprime loan share of the total auto-loan market is rising strongly, with \$110bn of subprime auto-loans issued last year alone. Growth in auto-loan ABS issuance has followed suit, with the subprime share of auto-loan ABS also surging to a new high. Accompanying the rise in lower credit quality auto-loans and subprime auto-loan ABS, delinquency and loan loss rates are on the rise. However, the stock of subprime auto-loan ABS is still under \$50 billion, and there is less scope for sizable forecast errors on auto-loan collateral values compared to the housing market given the boom/bust nature of home price cycles has no equivalent in the auto sector.

Figure 7. Subprime Auto-Loan Asset-Backed Securities

Source: SIFMA.

2.4.3. Data Gaps in the Supervision of Market-based Finance – A European Perspective

Much has been said in recent years of the possible risks to financial stability posed by the largest segment of market-based finance, the asset management industry.⁴⁸ The Fund itself has been engaged in assessing these risks, including through a number of recent FSAPs in Europe: Ireland, Luxembourg and Sweden are some recent examples.

This area poses some interesting policy challenges. Even though market-based collective investment vehicles like mutual funds have been in existence for decades, the emphasis of regulation and supervision has traditionally been focused on consumer protection, not system-wide financial stability. Because asset managers are fundamentally different to banks,⁴⁹ one cannot superimpose the prudential policy framework developed for banks onto asset management firms or their activities.

⁴⁸ For instance, after a lengthy consultation process, the FSB earlier this year issued a set of policy recommendations to address structural vulnerabilities arising from asset management activities. These related to liquidity transformation by investment funds; leverage within funds; operational risk and challenges in transferring investment mandates in stressed conditions; and securities lending activities of asset managers and funds (FSB, 2017d).

⁴⁹ For instance, they typically act in an agency capacity rather than as principals, their vehicles are generally insolvency remote, and they do not have an official backstop. Additionally, the asset management community is highly heterogenous, which makes one-size-fits-all policy prescriptions problematic.

There is a host of related topics currently under examination. Issues like the potential role of central banks as market makers of last resort⁵⁰ and the effectiveness of liquidity management tools⁵¹ are some of the issues that have come up in this discussion. Of course, any assessment of potential stress amplification mechanisms requires policy makers to have the right type of data. On this front, much remains to be done.

As we are in Europe, let me speak briefly to some key data limitations here. In the case of the European mutual fund industry,⁵² it is difficult for supervisors to know the composition of fund unit liabilities once they are distributed by intermediaries, and thus whether some funds are more vulnerable than others to synchronized runs. The manner in which leverage data are collected in the funds management industry also makes it difficult to distinguish gross from net exposure, and whether derivatives are used for hedging or speculative purposes. And more broadly, for special purpose vehicles established for activities other than securitization, information available to European supervisors has also been limited as these vehicles have typically resided outside the regulatory perimeter.⁵³

Encouragingly, the authorities now have a number of initiatives underway to help address these gaps, but it is fair to say we still have some ways to go in collecting and categorizing data in a way that would be most helpful in macro-financial surveillance. And of course, I should stress that many of these points are pertinent outside of just Europe.

2.5. CONCLUDING REMARKS

Let me conclude here by circling back to a key point I raised at the outset.

At the November 2010 Seoul Summit, G20 Leaders called for shadow banking to be transformed into a system of resilient, market-based finance. Seven years on, it strikes me that the central question is: how far have we come along this journey?

To this question, I would like to leave you with two reflections.

⁵⁰ On central bank reaction functions in this respect, see, for instance, King, Brandao-Marques, Eckhold, Lindner and Murphy (2017), Dobler, Gray, Murphy and Radzewicz-Bak (2016), and Bank for International Settlements (2014).

⁵¹ Liquidity management tools include redemption gates, fees, swing pricing and other measures designed to ameliorate first mover advantage. The topic of liquidity stress testing for investment funds has also been addressed in recent FSAPs.

⁵² Undertakings for Collective Investment in Transferable Securities.

⁵³ While these entities sit outside the regulatory perimeter, the Central Bank of Ireland has been notably active in attempting to better understand the nature of activities performed by them, and the risks they might pose, if at all, to financial stability. See for instance, Barrett, Godfrey and Golden (2016).

First, we should derive some comfort that in advanced economies, many of the types of activities that amplified the impact of the global financial crisis no longer pose an existential threat to financial stability. To cite just a few areas, securitization practices have been strengthened, repo market activities have been overhauled, money market funds have been made more robust, and interconnect- edness between banks and shadow banks has declined. Reform efforts have aimed at transforming the structural characteristics of riskier aspects of shadow banking, as well as the economic incentives. The business models of intermedi- aries have fundamentally changed as a result.

Second, we note, however, that certain areas of reform remain outstanding. Harmonizing retention rules, reforming certain rating agency practices, and winding back implicit official backstops are examples of issues to be tackled. And important data and disclosure gaps remain with respect to collective investment vehicles and cross-border interconnectedness. We must stay attentive to the emergence of new challenges such as FinTech for instance.⁵⁴

We have made important progress in achieving the constantly moving target of a system of resilient market-based finance that supports productive risk-taking and economic growth.

On that note, I wish you the very best for the remainder of the conference.

Thank you.

REFERENCES

- ACHARYA, V. A., Ph. SCHNABL and G. SUAREZ, (2013), “Securitization Without Risk Transfer,” *Journal of Financial Economics*, 107(3): 515-536.
- ADRIAN T. and H. SONG SHIN, (2009), “The Shadow Banking System: Implica- tions for Financial Regulation,” *Banque de France Financial Stability Review*, 13: 1-10.

⁵⁴ Any assessment of the financial stability implications arising from FinTech is inherently challenging by virtue of the limited availability of official and privately disclosed data. The information we do have suggests credit intermediation by the industry is still very modest, less than 1 percent of bank loans. A recent assessment in FSB (2017c) concluded there was no evidence to suggest that FinTech poses a compelling financial stability risk in its present form. However, though it is small, it is rapidly growing, and there are particular elements that will need to be monitored going forward as the scale and scope of FinTech increases. These include, for instance: where payments service companies invest the float of customer debit accounts in credit products without the proper expertise, disclosure or safeguards; where peer-to-peer lending begins to take the form of an originate-to-distribute model without being subject to skin-in-the-game requirements; and at the operational risk level, where poor governance or process control could potentially lead to risk of disruption in the provision of financial services or infrastructure. A growing FinTech industry will also give rise to important consumer protection and financial integrity concerns (i.e., AML/CTF) that authorities will need to address. And like any financial innovation, it will be incumbent on the relevant agencies to ensure FinTech serves a broader public good, like making the financial system more inclusive, without imperiling its health in the process. For a broader recent discussion, see He, Leckow, Haksar, ManciniGriffoli, Jenkinson, Kashima, Khiaonrong, Rochon, and Tourpe (2017).

- ADRIAN T. and H. SONG SHIN, (2011), "Financial Intermediary Balance Sheet Management," *Annual Review of Financial Economics*, 3: 289-307.
- ADRIAN T., D. COVITZ and N. LIANG, (2013), "Financial Stability Monitoring," Finance and Economics Discussion Series, Federal Reserve Board, Washington, D.C.
- ADRIAN T., (2015), "Financial Stability Policies for Shadow Banking," in CLAESSENS, S., D. EVANOFF, G. KAUFMAN and L. LAEVEN (Eds.), 2015, 'Shadow Banking Within and Across National Borders,' World Scientific Studies in International Economics, 40.
- ADRIAN T., N. BOYARCHENKO and O. SHACHAR, (2017), "Dealer Balance Sheets and Bond Liquidity Provision," Federal Reserve Bank of New York Staff Report No. 803., New York.
- AIYAR, Sh., W. BERGTHALER, J. M. GARRIDO, A. ILYINA, A. JOBST, K. KANG, D. KOVTUN, Y. LIU, D. MONAGHAN, and M. MORETTI, (2015), "A Strategy for Resolving Europe's Problem Loans," International Monetary Fund Staff Discussion Note 15/19, Washington D.C.
- ALLEN, F., and G. GORTON, (1993), "Churning Bubbles." *Review of Economic Studies*, 60(4): 813-836.
- ALLEN, F., and D. GALE, (2000), "Bubbles and Crises," *Economic Journal*, 110(460): 236-255.
- ASHCRAFT, A. B., and T. SCHUERMANN, (2008), "Understanding the Securitization of Subprime Mortgage Credit," Federal Reserve Bank of New York Staff Reports No. 318., New York.
- BANK FOR INTERNATIONAL SETTLEMENTS, (2014), "Re-thinking the Lender of Last Resort," BIS Paper No. 79, Basel.
- BANK FOR INTERNATIONAL SETTLEMENTS, (2016), "Revisions to the Securitisation Framework," Basel III Document, July 2016, Basel.
- BANK OF ENGLAND AND EUROPEAN CENTRAL BANK, (2014), "The Case for a Better Functioning Securitisation Market in the European Union," May.
- BARRETT, D., B. GODFREY, and B. GOLDEN, (2016), "New Data Collection on Special Purpose Vehicles in Ireland: Initial Findings and Measuring Shadow Banking," Central Bank of Ireland Quarterly Bulletin 04, October, Dublin.
- CLAESSENS, S., D. EVANOFF, G. KAUFMAN and L. LAEVEN, (2015), "Shadow Banking Within and Across National Borders," World Scientific Studies in International Economics, 40.
- COLE, H. L., and Th. F. COOLEY, (2014), "Rating Agencies," NBER Working Paper No. 19972, Cambridge.
- COVAL, J., J. JUREK and E. STAFFORD, (2009), "The Economics of Structured Finance," *Journal of Economic Perspectives*, 23(1): 3-25
- CORNAGGIA, J., and K. CORNAGGIA, (2013), "Estimating the Costs of Issuer-Paid Credit Ratings," *Review of Financial Studies*, 26(9): 2229-2269.

- DOBLER, M., S. GRAY, D. MURPHY and B. RADZEWICZ-BAK, (2016), "The Lender of Last Resort Function after the Global Financial Crisis," IMF Working Paper 16/10, Washington D.C.
- EUROPEAN BANKING AUTHORITY, (2014), "Discussion Paper on Simple Standard and Transparent Securitizations," October.
- EUROPEAN BANKING AUTHORITY, (2015), "Report on Qualifying Securitisation," July.
- FINANCIAL STABILITY BOARD, (2010), "Principles for Reducing Reliance on CRA Ratings," October, Basel.
- FINANCIAL STABILITY BOARD, (2016), "Thematic Review on the Implementation of the FSB Policy Framework for Shadow Banking Entities," May, Basel.
- FINANCIAL STABILITY BOARD, (2017a), "Global Shadow Banking Monitoring Report: 2016," May, Basel.
- FINANCIAL STABILITY BOARD, (2017b), "Assessment of Shadow Banking Activities, Risks and the Adequacy of Post-Crisis Policy Tools to Address Financial Stability Concerns," July, Basel.
- FINANCIAL STABILITY BOARD, (2017c), "Financial Stability Implications from FinTech: Supervisory and Regulatory Issues that Merit Authorities' Attention," June, Basel.
- FINANCIAL STABILITY BOARD, (2017d), "Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities," January, Basel.
- FINANCIAL STABILITY BOARD, (2017e), "Implementation and Effects of the G20 Financial Regulatory Reforms: Third Annual Report," July, Basel.
- GENNAIOLI, N., A. SHLEIFER and R. VISHNY, (2012), "Neglected Risks, Financial Innovation, and Financial Fragility," *Journal of Financial Economics*, 104(3): 452-468.
- GRIFFIN, J., and D. YONGJUN TANG, (2012), "Did Subjectivity Play a Role in CDO Credit Ratings?" *Journal of Finance*, 67(4): 1293-1328.
- HALDANE, A., (2014), "The Age of Asset Management?" Bank of England, Speech at the London Business School, London.
- HE, J., J. QIAN, and Ph. STRAHAN, (2012), "Are All Ratings Created Equal? The Impact of Issuer Size on the Pricing of Mortgage-Backed Securities," *Journal of Finance*, 67(6): 2097-2137
- HE, D., R. LECKOW, V. HAKSAR, T. MANCINI GRIFFOLI, N. JENKINSON, M. KASHIMA, T. KHIAONARONG, C. ROCHON, and H. TOURPE, (2017), "Fintech and Financial Services: Initial Considerations," IMF Staff Discussion Note, 17/05, Washington D.C.
- INTERNATIONAL MONETARY FUND, (2014), "Shadow Banking Around the Globe: How Large, and How Risky?," Global Financial Stability Report, Chapter 2, October, Washington D.C.

- INTERNATIONAL MONETARY FUND, (2015), "The Asset Management Industry and Financial Stability," Global Financial Stability Report, Chapter 3, April, Washington D.C.
- INTERNATIONAL ORGANIZATION OF SECURITIES COMMISSIONS (IOSCO), (2015), "Peer Review of Implementation of Incentive Alignment Recommendations for Securitisation: Final Report," September.
- JIANG, X., M. H. STANFORD, and Y. XIE, (2012), "Does It Matter Who Pays for Bond Ratings? Historical Evidence," *Journal of Financial Economics*, 105: 607-621.
- JONES, B., (2015), "Asset Bubbles: Rethinking Policy for the Age of Asset Management," IMF Working Paper 15/27, Washington D.C.
- JONES, B., (2016), "Spotting Bubbles: A Two-Pillar Framework for Policy Makers," *Journal of Banking and Financial Economics*, 2(6): 90-112.
- JUREK, J.W., and E. STAFFORD, (2015), "The Cost of Capital for Alternative Investments," *Journal of Finance*, 70(5): 2185-2226.
- KING, D., L. BRANDAO-MARQUES, K. ECKHOLD, P. LINDNER, and D. MURPHY, (2017), "Central Bank Emergency Support to Securities Markets," International Monetary Fund, WP/17/152, Washington D.C.
- MCCULLEY, P., (2007), "Teton Reflections," PIMCO Global Central Bank Focus.
- MISHKIN, F. S., (2010), "Monetary Policy Flexibility, Risk Management, and Financial Disruptions," *Journal of Asian Economics*, 21(3): 242-246.
- MISHKIN, F. S., (2011), "Monetary Policy Strategy: Lessons from the Crisis," NBER Working Paper 16755, Cambridge.
- MULEY, A., (2016), "Collateral Reuse in Shadow Banking and Monetary Policy," Working Paper, Massachusetts Institute of Technology.
- PAN, K., and Y. ZENG, (2017), "ETF Arbitrage under Liquidity Mismatch," Working Paper, Harvard University.
- POZSAR, Z., (2008), "The Rise and Fall of the Shadow Banking System," Available at: Moody's Economy.com.
- POZSAR Z, A. T. ASHCRAFT AB, BOESKY H., (2013), "Shadow Banking," Federal Reserve Bank of New York *Economic Policy Review* 19(2): 1-16.
- RAJAN, R., (2005), "Has Financial Development Made the World Riskier?" Proceedings of the Federal Reserve Bank of Kansas City Economics Symposium: 313-69.
- RIVLIN, A. M., and J. B. SOROUSHIAN, (2017), "Credit rating Agency Reform is Incomplete," Brookings Institution. Available at: <https://www.brookings.edu/research/credit-rating-agency-reform-is-incomplete/>
- SECURITIES AND EXCHANGE COMMISSION, (2016), "Annual Report on Nationally Recognized Statistical Rating Organizations," December, Washington D.C.

- SEGOVIANO, M., B. JONES, P. LINDNER and J. BLANKENHEIM, (2015), "Securitization: The Road Ahead," IMF Staff Discussion Note 15/01, Washington D.C.
- SHLEIFER, A., and R. W. VISHNY, (1997), "The Limits of Arbitrage," *Journal of Finance*, 52(1): 35-55.
- SINGH, M., (2011), "Velocity of Pledge Collateral: Analysis and Implications," International Monetary Fund Working Paper 11/256, Washington D.C.
- SINGH, M., (2013), "The Changing Collateral Space," International Monetary Fund Working Paper 13/25, Washington D.C.
- SINGH, M., (2017), "Collateral Reuse and Balance Sheet Space," International Monetary Fund Working Paper 17/113, Washington D.C.
- S&P GLOBAL RATINGS, (2014), "Twenty Years Strong: A Look Back at U.S. CLO Ratings Performance From 1994 Through 2013," January.
- STEIN, J.C., (2013a), "Overheating in Credit Markets: Origins, Measurement, and Policy Responses," Speech at the Research Symposium, Restoring Household Financial Stability after the Great Recession: Why Household Balance Sheets Matter, Federal Reserve Bank of St. Louis: St. Louis, MS, February 7
- STEIN, J.C., (2013b), "Lean, Clean and In-Between," Speech at the National Bureau of Economic Research Conference: Lessons from the Financial Crisis for Monetary Policy, Boston, Massachusetts, October 18, 2013.
- STROBL, G. and H. XIA, (2012), "The Issuer-pays Rating Model and Rating Inflation: Evidence from Corporate Credit Ratings," Working Paper, University of Texas, Dallas.
- WURGLER, J., (2010), "On the Economic Consequences of Index-Linked Investing," NBER Working Paper 16376, Cambridge.

3. FOUR QUESTIONS ON SHADOW BANKING

Christian Upper^{1 2}

The purpose of this panel is to take stock of recent developments in the shadow banking sectors around the world. When thinking about shadow banking, I find it useful to ask four questions: First, what are shadow banks? Second, why are there shadow banks? Third, should we worry? And fourth, what should we do if we do worry?

So what is a shadow bank? Definitions vary, but shadow banks are generally defined as institutions that are not considered banks but that intermediate credit. Shadow banks can perform at least some of the classical functions of the banking system, for instance transform illiquid into liquid and long term into short term assets. Since shadow banks are not considered to be banks, they are not regulated as such. But this does not mean that they necessarily are outside the regulatory perimeter. Shadow banks can be quite tightly regulated, but the constraints imposed on them may differ considerably from those of banks.

The second question is why there are shadow banks. The reason that springs to the mind of most people is regulatory arbitrage. And it is true that many shadow banking institutions came into being in order to evade regulatory restrictions imposed on banks. Just think of US money market funds, whose creation was a response to the toxic combination of high inflation and bank interest rate ceilings. Interest rate ceilings are also one of the factors behind the rise of shadow banking in China, along with other regulations such as lending caps, loan-to-deposit ratios and high reserve requirements.

But regulatory arbitrage cannot be the full story. The United States abolished interest rate ceilings over three decades ago, yet money market funds continue to exist. So there must be other factors keeping these institutions alive. Often, these are shortcomings in the traditional banking system that have little to do with regulation. In China, to take one example, the loan books of the deposit-rich large banks are heavily tilted towards state-owned enterprises, forcing private firms to look for other source of funding.

The very term *shadow bank* suggests that there is something shady about these institutions. But is this true? Do we really have to worry? Obviously, if the failure of a shadow bank spills over to the remainder of the financial system we do need

¹ Bank for International Settlements.

² The views expressed here are those of the author and not necessarily those of the Bank for International Settlements.

to worry. This was the case in 2007, when a large money market fund “broke the buck”, i.e. saw asset values fall below the value of liabilities. But shadow banking does not endanger financial stability by definition. Whether it does depends on essentially two factors: the fragility of shadow banks themselves, and their connection to the remainder of the financial system. Shadow banks’ fragility in turn depends on their capital and liquidity positions. And the scope for contagion depends on the direct or indirect exposures of the banking system and other financial intermediaries to shadow banks. These exposures could be direct, e.g. through loans or guarantees, or indirect, e.g. through similar asset holdings that make them vulnerable to valuation effects caused by fire sales or to confidence effects). Other reasons to worry about shadow banks are consumer protection or market integrity.

This brings me to my final question: what should we do if we do worry? The first reaction should be to fix the problems (if any) that led to the existence of the shadow banking sector in the first place. In China, to take an example, allowing state-owned enterprises go bankrupt could force the large banks to offer better services to private firms, lowering their incentives to turn to shadow banks for funding. Repealing inefficient regulations that give rise to regulatory arbitrage may also help; getting rid of interest rate ceilings is a case in point.

But the abolition of the US interest rate ceilings also shows that fixing the problems that gave rise to shadow banks is not enough to get rid of them. Money market funds are still around even though interest rate ceilings are long gone. So we may have to learn to live with shadow banks and design a regulatory framework that addresses the risks they pose. This could take two forms: First, treat them like banks and impose them to similar restrictions. Alternatively, address the particular design feature that makes them dangerous but otherwise make them as different from banks as possible. US regulators have followed this second approach when reforming their money market funds. Instead of imposing capital or liquidity requirements that ensure that money market funds can redeem at par they forced them to redeem at the current asset value, thus reducing the risk of runs. In other cases, it may be sufficient to regulate counterparties to reduce the connections to the banking system. And making shadow banks sufficiently different from banks could also reduce the risk of indirect contagion, e.g. through fire sales or information contagion.

4. RECENT DEVELOPMENTS IN CHINESE SHADOW BANKING

Michael Chui and Christian Upper^{1 2}

China's shadow banking sector has grown considerably in recent years. The size differs due to the variations in the definition, but most estimates point to an uninterrupted trend growth. For example, of the aggregate financing data published by the People's Bank of China (PBoC), the three items of credit intermediation relate to entities (fully or partially) outside the regulatory banking system – entrusted loans, trust loans and undiscounted bankers' acceptances – totalled RMB 26 trillion (USD 4 trillion) at end-2016, up 64% from end-2012 (Graph 1, left-hand panel). Moody's defines the PBoC's data "core shadow banking activities" and adds other types of credit (dominated by wealth management assets) to its shadow bank definition.³ On this basis, the size of China's shadow banks grew by almost 170% over the same period to RMB 65 trillion at end-2016 (Graph 1, centre panel). Even taking into consideration China's rapid economic growth, the doubling of the size of the shadow banking sector in terms of GDP between 2012 and 2016 was quite remarkable. We also adopt the shadow bank definition used by Zhang et al (2014) of the Chinese Academy of Social Sciences and extend the data to 2016, the resulting figures show similar growth pattern (Graph 1, right-hand panel).⁴

A special feature of the shadow banking sector in China is the role played by banks in funding shadow banking activities. Over the past few years, a number of factors have put banks under increasing pressure to boost profitability. First, the lending and deposit rate liberalisation and competition squeezed banks' interest margins. Second, the fast growing wealth of Chinese residents led to financial disintermediation with depositors searching for higher-yielding assets. Third, since 2009, the government has launched a series of measures to dampen lending to the real estate sector, those industries that cause high pollution and have high energy consumption or suffer from overcapacity. This weighed on banks' profits as loans to these firms typically were larger and paid higher-than-average interest rates. As return on equity fell sharply over the past few years, banks appeared to react to the decline in profits by boosting their non-interest income activities (Graph 2). Many of these activities reportedly include banks

¹ Bank for International Settlements.

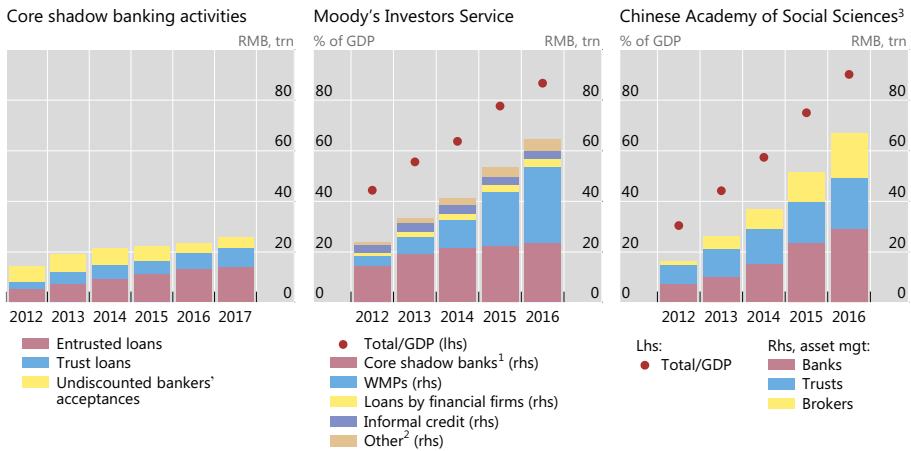
² We would like to thank Torsten Ehlers and Feng Zhu for valuable inputs. The views expressed here are our own and not necessarily those of the Bank for International Settlements.

³ See various issues of Moody's quarterly china shadow banking monitor.

⁴ The authors adopted a narrow definition that focuses on three items: the outstanding amount of banks' asset management products, total trust assets and total assets under management of securities companies.

“channelling” funds (either from wealth management products sold or interbank borrowing) through brokers or other financial institutions to the private sector. In doing so, banks circumvent the lending constraints imposed by regulators (eg the loan-to-deposit cap in place up to late 2015 or the capital adequacy ratio) by reclassifying their loan assets as saleable assets or through off-balance sheet operations. In this sense, Chinese shadow banks can be described as the shadow of the banks – quite unlike shadow banking in other jurisdictions, most prominently the United States.

Graph 1. Size and composition of China’s shadow banking

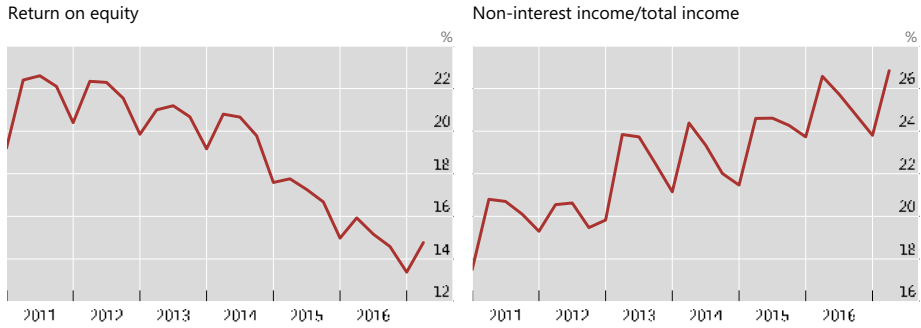


¹ Include entrusted loans; trust loans and undiscounted bankers’ acceptances. ² Include finance leasing, small loans, pawn loans, peer-to-peer lending, asset-backed securities and consumer financing. ³ Zhang, M, H Gao, D Liu (2014): *Revealing the Chinese Shadow Banking System*, Chinese Academy of Social Sciences publisher, Beijing.

Sources: PBoC; Moody’s Investors Service; WIND; Zhang et al (2014); BIS calculations.

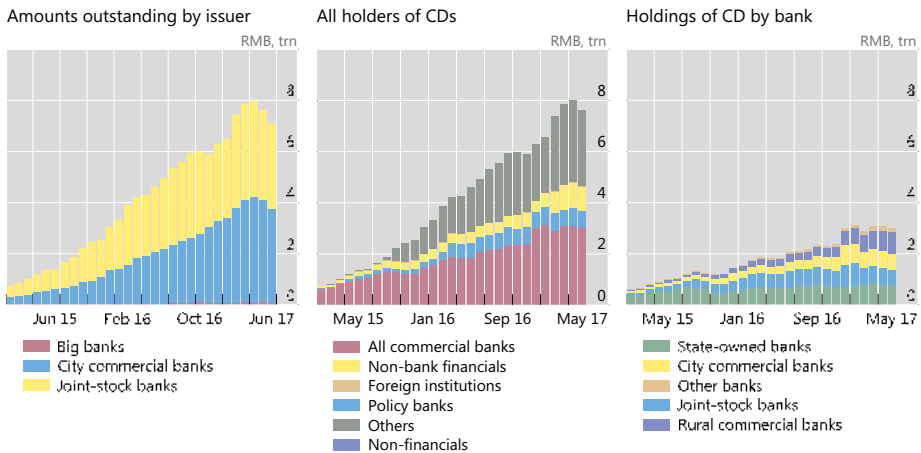
In general, Chinese banks tend to rely on issuing wealth management products (WMPs) directly or through other entities, and interbank borrowing to fund shadow bank activities. In particular, one of the most rapidly growing interbank liabilities have been certificates of deposits (CDs). Since the inception of this market in 2014, the amount outstanding of bank CDs has increased to RMB 8 trillion at the end of the first quarter 2017. Notice that virtually all issuance is by the joint-stock and city commercial banks, the share of the 5 large state-owned banks (red bars) is close to zero. This largely reflects that fact that most deposits are concentrated at the 5 large banks, which also have ample qualified assets that can be pledged as collateral for central bank liquidity. These factors reduce the big banks’ dependency on wholesale market funding. In fact, these big banks are the “net lenders” in the CD markets as they hold a fair share of the outstanding CDs among all banks (Graph 3, centre and right-hand panels).

Graph 2. Balance sheet indicators of Chinese commercial banks



Source: WIND.

Graph 3. Certificates of deposit



Source: WIND.

The authorities’ response to prevent the rapid growth in shadow banks from developing into systemic financial risk is to tighten the regulations on the “fast evolving shadow”. For example, between 2008 and 2014, the banking and securities regulators introduced various measures to make it more difficult for trusts and securities firms to serve as conduits for banks’ channelling business. Starting from 2016, the PBoC upgraded its bank assessment exercise to a quarterly macroprudential assessment (MPA) scheme, which has become an important tool to protect the banking sector resilience.⁵ For example, in early

⁵ The MPA covers seven areas: (i) capital and leverage, (ii) assets and liabilities, (iii) liquidity, (iv) pricing behavior, (v) asset quality, (vi) cross-border financing risk and (vii) credit policy implementation. Banks that failed in certain areas may face higher required reserve ratio or borrowing cost from the central bank or being suspended from being primary dealers.

2017, the PBoC extended their MPA to cover off-balance sheet WMPs, which are an important shadow banking instrument. The central bank also announced that CDs will be counted as interbank liabilities and subject to a cap from 2018 and that appeared to have dampened the strong growth in bank CDs. Overall, perhaps reflecting the authorities' efforts, there are tentative signs that the pace of expansion in the shadow banking sector has slowed in recent months. But that could also be caused by the higher interest rates and tighter financial conditions that reduce the incentives to lever up.

Finally, in addressing risks associated with shadow banking, the authorities face a trade-off between financial stability and ensuring a steady supply of credit to the private sector. This is particularly important because lending of the deposit-rich big banks is heavily tilted towards state-owned enterprises, perhaps because of their lower presumed credit risk.

REFERENCES

- CHEN, Z., Z. HE and C. LIU, (2017), "The financing of local government in China: Stimulus loan wanes and shadow banking waxes", *NBER Working Paper 23598*.
- HACHEM, K. and Z.S. SONG, (2017), "Liquidity regulation and unintended financial transformation in China", mimeo.
- KROEBER, A.R., D.J. ELLIOT and Q. WU, (2015), "Shadow banking in China: a primer", *Economic Studies at Brookings*, March.
- MOODY'S, (2017), "Quarterly china shadow banking monitor", August 2017.
- ZHANG, M., H. GAO, D. LIU, (2014), *Revealing the Chinese Shadow Banking System*, Chinese Academy of Social Sciences publisher, Beijing.

5. THE CURRENT LANDSCAPE: MARKETS AND PLAYERS, COMPETITORS AND COMPLEMENTARITIES

*Antti Suhonen*¹

In his keynote presentation at the SUERF Helsinki conference, Dr. Tobias Adrian of the IMF discussed a framework for distinguishing traditional banking, shadow banking, and market-based finance (“MBF”).² Crucially, while MBF activities are a form of credit intermediation, they do generally not involve maturity or liquidity transformation, or leveraging of the lender’s balance sheet. Furthermore, most current forms of MBF cannot be seen to be benefiting from guarantees or backstops from a sponsor or, ultimately, public funds.

The differences between the three segments of modern financial markets described by Dr. Adrian should be clearly identified in any public policy debate, however in practice it appears that MBF is often subsumed under the catch-all title of shadow banking and associated with its connotations. Some of the initiatives to introduce tighter regulation and supervision of the asset management industry serve as an example.

The purpose of this presentation is to discuss the drivers of two activities defined as “nascent MBF” by the British Financial Conduct Authority,³ namely direct (non-bank), and marketplace (MPL) or “Peer-to-Peer” lending, and to consider some of the emerging risks that the sector may involve.

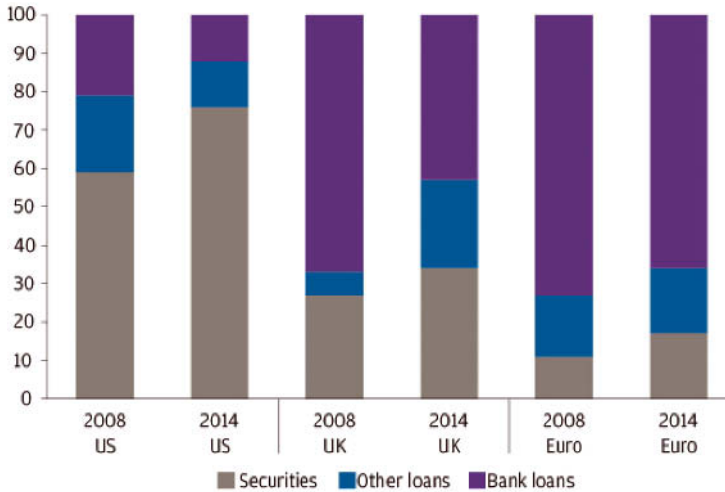
Britain is an interesting example of bank disintermediation in the post-financial crisis era. Exhibit 1 illustrates the proportion of overall corporate borrowing raised from banks, capital markets, and other sources in the U.S., U.K., and the Euro area in 2008 and 2014. Banks provided only around a fifth of all corporate debt financing in the U.S. already in 2008, and in 2014 the proportion had shrunk further to just 12%. At the opposite end of the spectrum, while securities markets and non-bank lending have grown in importance in the post-crisis years, Euro area corporates still source around two thirds of their borrowing from banks. The transition of the British market is clearly visible from the Exhibit, with bank lending dropping from 68% to 44% in 2008-2014. The majority of U.K. bank lending has been replaced by “Other loans”, i.e. lending by institutions other than banks.

¹ Professor of Practice, Department of Finance, Aalto University School of Business.

² <http://www.imf.org/en/news/articles/2017/09/13/sp091417-shadow-banking-and-market-based-finance>.

³ Market-Based Finance: Its Contributions and Emerging Issues. Financial Conduct Authority Occasional Paper 18 (May 2016).

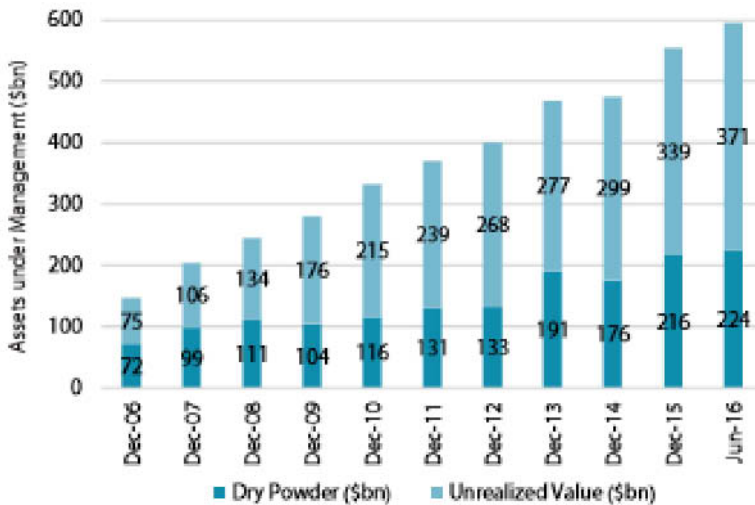
Exhibit 1: Sources of Corporate Borrowing, % of Total



Source: IMF (2014)

Private credit (essentially, non-bank institutional lending to mid-market companies) forms an important component of the MBF market. Exhibit 2 shows the growth of global private credit assets managed by specialist asset managers on behalf of institutional investors. Asset growth has been steady over the past decade, and according the estimate by Preqin, the total AuM stood at just under \$600 billion as of June 2016.

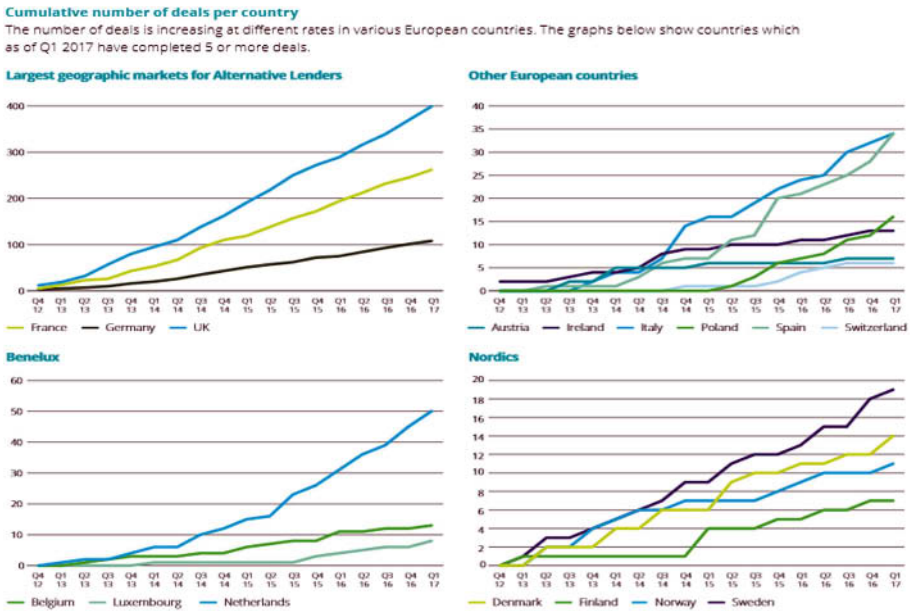
Exhibit 2: Private Debt Assets under Management



Source: Preqin (2017)

The U.K. has been the main recipient of private credit investments in Europe, followed by France and Germany (Exhibit 3). The cumulative private debt deal count in the U.K. is around a third greater than that in France, and almost four times the German volume since Q4 2012.

Exhibit 3: Cumulative Number of Deals per Country

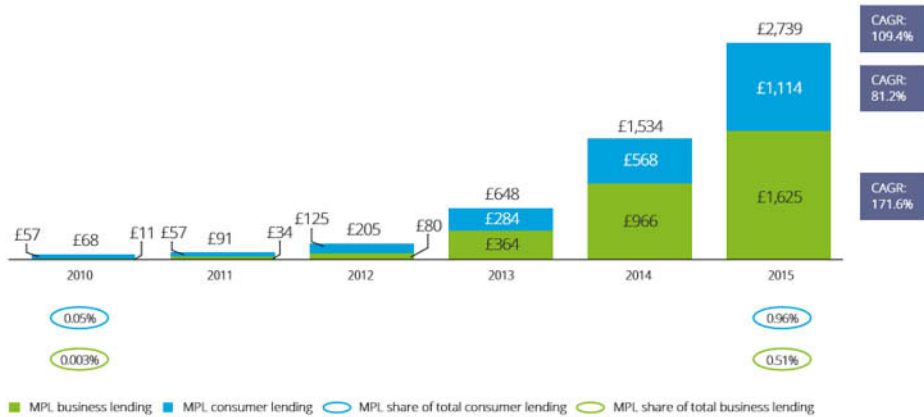


Source: Deloitte (2017)

At the smaller end of the borrower spectrum, the U.K. has also been the host to some of the global pioneers in marketplace lending. The original concept of MPL is captured in the name “peer-to-peer”, however over the past years institutional investors have become an important source of funds in the British marketplace lending space. Nevertheless, the proportion of individual investors in the U.K. is still significantly higher than in the U.S. where institutional funds dominate marketplace lending. At £2.7 billion volume as of 2015 (see Exhibit 4), the market is several times larger than the rest of the European markets combined (around €700 million). U.K. marketplace lending is almost evenly split between consumer and small-business lending. The volumes are still very small in the context of the overall market, but it is interesting to note that MPL is reported to represent one tenth of all lending to small enterprises in the first quarter of 2016.⁴

⁴ Cebr (2016).

Exhibit 4: UK MPL Annual Loan Volumes, £ million, 2010-2015*



Source: Liberum AltFi Volume Index, AltFi Data, data as of 26 February 2016

See also: http://www.altfi.com/charts/charts/uk-volume_chart.php, Office for Budget Responsibility, Deloitte analysis

*MPL business lending includes real estate loans and invoice trading, figures are rounded to the nearest million

Source: Deloitte (2016)

What might explain the growth of MBF in the U.K., and what, if any, conclusions can be drawn from the U.K. experience for the wider European market? The effect of the financial crisis of 2008-9 was obviously transformative, resulting in traditional banks being constrained on economic and regulatory capital, balance sheet, and funding. Three of the major high street banking groups had to resort to taxpayer-funded bailouts or forced mergers, and the crisis had long-standing repercussions on the U.K. economy given the importance of financial services to the country.

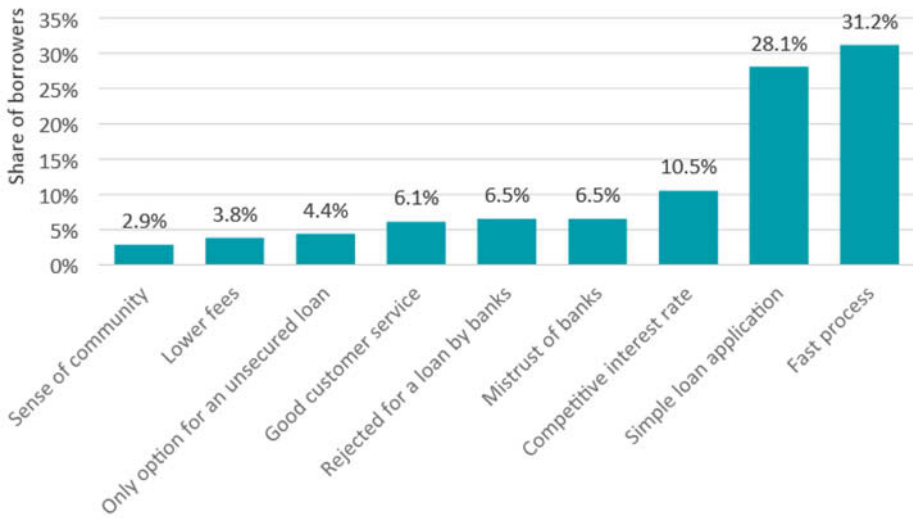
The direct impact of the crisis started dissipating in the years that followed, and the narrative of MBF replacing banks that are unwilling or unable to lend does not appear adequate in explaining the continuing growth in non-bank activity. There are, however, segments of the debt market that have become structurally less attractive for banks in the light of the post-crisis regulatory, capital, and funding requirements. These include junior loans and lending to weaker credits, as well as longer-dated loan provision (e.g. maturities beyond 10 years).

On the supply side, the search for yield by investors in a low-rate environment has been a global phenomenon. The importance of fixed income assets offering long-duration income streams has been accentuated in the U.K. context by regulatory requirements on pension funds to match fixed income-like liabilities on the asset side of the balance sheet. Along with the potential additional returns offered by credit and illiquidity premia implicit in private credit, this has made the asset class an important part of many a U.K. pension fund's asset allocation.

Borrowers may be motivated to seek alternatives to bank lending due to better

availability of loans, reduction of cost, and diversification of funding risk, but the attraction of MBF may also be in part explained by other aspects of the borrowers’ experience. As an illustration from the small business lending market, in a survey of corporate borrowers using the Funding Circle (MPL) platform,⁵ the primary reasons for choosing MPL were the speed of process, and the simplicity of loan application (both mentioned by around 30% of the respondents), whereas reasons related to restricted bank loan availability were indicated by only one in ten borrowers (see Exhibit 5). Survey data should be interpreted with caution, but it does suggest at least anecdotally that U.K. marketplace lending does not serve primarily as a last resort to borrowers rejected by traditional banks.

Exhibit 5: The Main Influencing Factor in a Business’ Decision to Obtain a Loan through Funding Circle



Source: Cebr (2016)

Apart from the natural demand for fixed income assets by the pension fund sector, there are other reasons that are at least to an extent specific to the U.K.,⁶ and may suggest that similar growth in MBF is unlikely to occur in other European markets. Part of the growth in the financial technology (“Fintech”) sector in the U.K., which marketplace lending can be considered a part of, can be attributed to the ageing technology of traditional banks. Anecdotally, from a Nordic perspective the digital services offered by British banks appear limited in scope and dated in the user experience, giving a competitive advantage to

⁵ Cebr (2016).

⁶ Some European life insurance companies with liabilities in traditional fixed annuity policies face similar needs to hold fixed income assets due to solvency regulations.

challengers with a focused business model and state-of-the-art digital services, and without the baggage of a legacy IT infrastructure.

Second, the financial crisis, bailouts, and the multitude of recent and well-publicized banking scandals ranging from payment protection insurance mis-selling to LIBOR and currency market manipulation, and extending to bribery and fraud in the small business banking unit of a high street lender have undoubtedly done significant reputational damage to the traditional banking community. One would expect the result to be a search for alternatives to banks, especially by private consumers and SMEs.

Third, U.K. public policy has been broadly supportive of the MBF sector. The Financial Conduct Authority (FCA) has the stated objective of promoting competition and innovation in financial services, which has fostered the growth in the Fintech industry. Furthermore, MPL and venture funding enjoy non-trivial tax incentives that seek to promote long-term investing by individuals. Finally, the U.K. benefits from a well-established and functioning legal system and bankruptcy code that removes unpredictability from the lending process.

Based on their current activities, private credit and marketplace lending don't appear to have characteristics that would warrant their inclusion in the category of shadow banking. There are, however, risks inherent in the MBF sector that should be considered in the regulatory and supervisory policy debate.

The quality of underwriting and loan processes of MBF lenders will be tested in the next downturn – both in the institutional private credit market and, perhaps even more importantly, in marketplace lending. Resultant default losses and the variations in the market price of risk may bring about investor and consumer protection issues, and should any eventual policy response involve the bailing out of investors, there is a possibility that MBF will morph into another form of publicly backed bank-like financing activity. A related issue are the recent stated intents of certain marketplace lenders to seek a banking license to benefit from deposit funding. If successful, such conversions from MBF to traditional banking should obviously bring the entities involved within the scope of relevant regulations and supervision.

In its present form MBF complements the financial system and helps allocate funding and risk efficiently without obvious feedback loops back into the regulated sector, but the interconnectedness of MBF and traditional banking should be monitored to avoid a repeat of the experiences of incomplete risk transfer from the previous financial crisis. There is, however, a balance to be sought between effective monitoring of MBF, and the risk of supervisory activities being interpreted as an implicit government endorsement of the sector and an indication of eventual taxpayer-funded crisis support. The primary focus of

public policy should be on making regulated banks genuinely safer through adequate capitalization. Furthermore, existing bank regulation and supervisory mechanisms should be deployed to identify possible emerging risks in banks' provision of financing and contingent commitments to the MBF sector. Such actions are likely to yield better overall results towards greater financial stability than misdirected initiatives to mitigate the risks of "shadow banking" by bringing MBF within the scope of a bank-like regulatory and supervisory framework.

REFERENCES

- Alternative Lender Deal Tracker. Deloitte (Q1 2017)
- Global Financial Stability Report. International Monetary Fund (October 2014)
- Global Private Debt Report. Preqin (2017)
- Market-Based Finance: Its Contributions and Emerging Issues. Financial Conduct Authority Occasional Paper 18 (May 2016)
- Marketplace lending. A temporary phenomenon? An analysis of the UK market. Deloitte (2016)
- Small business, big impact. The changing face of business finance. Evidence from Funding Circle. Cebr (August 2016)

6. DEPUTY GOVERNOR SEPPO HONKAPOHJA: WELCOME REMARKS, DINNER FOR THE SUERF CONFERENCE HELSINKI, 14TH SEPT 2017

*Seppo Honkapohja*¹

Speakers, organizers and participants of the 33rd SUERF Colloquium.

It is my pleasure to welcome you to the dinner. Shadow Banking, the theme of the conference is of course highly topical and is also a central concern for financial regulation. I will not try to comment on the conference theme but instead thought to tell you a little bit of Finnish financial history in my short welcoming remarks.

Finland has not experienced any major problems in banking or financial markets during the recent global financial crisis. Finland did, however, go through a major financial crisis in the early 1990's. In fact, the Finnish crisis was one of the Big Five in the table of 18 financial crises in advanced economies in the period from WWII to 2007 (i.e. before the current global crisis) developed by Ken Rogoff and Carmen Reinhart in 2008.² Incidentally, both Norway and Sweden are also among Big Five.

The Finnish crisis was a boom-bust cycle, which was to large extent caused by problems in the deregulation of the financial system in the 1980s. Before the deregulation, the Finnish financial system was tightly controlled with interest rates mostly set by the central bank and controls of external capital movements.

Financial deregulation led to a huge credit expansion and large inflows of capital. The growth rate in bank lending reached to about 45% at the end of 1980's.³ The boom period came to an end in 1990 when a rapid decent in real activity ensued. This development led to a major banking crisis which started in September 1991.

Large amounts of public funds and some other forms of support had to be employed to counter the crisis. Major restructuring of the banking system was carried out to improve the efficiency of the banking system. The banking crisis came to its end in 1996-7 when the banks began to show positive profits, though structural changes in the banking system continued much longer.

¹ Professor in Aalto University.

² See Reinhart and Rogoff (2008, 2009).

³ The Finnish crisis and those of Norway and Sweden are well discussed in the literature. For example, see Honkapohja (2014 a, b) and the references there in.

This is in brief the story of the Finnish financial crisis in the 1990's. I should note that shadow banks did not have any major role in the Finnish financial system in 1980s and in the financial crisis. However, we saw a little bit of the shadow bank phenomenon in what was called “grey economy” and “grey financial activity”, where notary departments of banks mediated loans with flexible interest rates outside the official system. The “grey economy” was an indication of the pressures created by tight rationing of the Finnish financial system in the 1980's.

REFERENCES

- HONKAPOHJA S., (2014a), “Financial Crises: Lessons from the Nordic Experience,” *Journal of Financial Stability*, 13, 193-201.
- HONKAPOHJA S., (2014b), “Lessons from the Financial Liberalization in the Nordic Countries in the 1980s,” in WOO, W.T., PAN, Y., SACHS, J., QIAN, J. (Eds.), *Financial Systems at the Crossroads*, World Scientific Publishing, Singapore, 2014, 135-163.
- REINHARD C.M. and K.S. ROGOFF, (2008), “Is the 2007 US Sub-Prime Financial Crisis So Different? An International Historical Comparison,” *American Economic Review* 98, 339-344.
- REINHARD C.M. and K.S. ROGOFF (2009), *This Time Is Different, Eight Centuries of Financial Folly*, Princeton University Press, Princeton.

7. GAMING THE RULES OR RULING THE GAME? – HOW TO DEAL WITH REGULATORY ARBITRAGE¹

*Danièle Nouy*²

In 1986, Nobel laureate Merton Miller noted: “The major impulses to successful innovations over the past 20 years have come, I am saddened to have to say, from regulation and taxes.”³

It is true that banks can be highly innovative when it comes to reducing the regulatory burden. They are always tempted to game the rules. They are tempted to exploit loopholes and seize on the fact that rules differ across countries and sectors.

Such regulatory arbitrage is, of course, a problem. Rules are put in place for a reason, and working around them defeats that purpose. As you all know, we have just emerged from the worst financial crisis since the Great Depression. That’s why we have made these rules stronger: to make such crises less likely. Whenever a bank tries to get around the rules, it increases the risk of another crisis.

So regulatory arbitrage is a matter of great concern for regulators and supervisors. Let’s take a closer look at how it works and what we can do about it.

7.1. REGULATORY ARBITRAGE – JUMPING FENCES AND EXPLOITING LOOPHOLES

What exactly do we mean by “regulatory arbitrage”? Well, we are referring to banks structuring their activities in a way that reduces the impact of regulation without a corresponding reduction in the underlying risk. The result, of course, is that the risk becomes insufficiently regulated. And that is not a good thing.

As you can imagine, such arbitrage can quickly become highly complex. The rules are complex in the first place, so regulatory arbitrage has to be even more so. In my speech today, I will try to spare you all the technical details and just focus on the essence of the problem.

In very general terms, regulatory arbitrage takes three forms. The first can be described as “cross-jurisdiction arbitrage”. This exploits the fact that rules for

¹ The text reflects a speech that was given in September 2017.

² Chair of the Supervisory Board of the ECB.

³ Miller, M.H. (1986), “Financial innovation: The last twenty years and the next”, *Journal of Financial and Quantitative Analysis*, Vol. 21(4), pp. 459-471.

banks differ from one country to another. Some rules, for example, might be less strict in country A, while others might be less strict in country B.

Banks might therefore be tempted to set up their operations in such a way that they are always subject to the most relaxed rules. They would constantly jump fences in order to be where the grass is greenest.

This could, for instance, involve adapting their booking models. A booking model determines how and where a bank books its transactions. For example, a European subsidiary of a US bank could choose to book its exposures back to back with its parent in the United States. Depending on the circumstances, this might enable the bank to get around local rules.

The effect of one bank doing this might not be that big. But if, over time, more and more business shifts to countries where the rules are less strict, this could easily become a threat to stability – not just in one country, but everywhere.

What is more, cross-jurisdiction arbitrage can also trigger a race to the bottom. Countries that lose business might be tempted to relax their rules as well in order to keep banks from jumping the fence. As a result, rules would become less strict around the world and crises would become more likely.

Here in Europe, cross-jurisdiction arbitrage has become even more of an issue since the United Kingdom decided to leave the EU. Post-Brexit, UK banks will need to set up entities in Europe, and most likely in the euro area, in order to retain access to the Single Market. In this context, we will need to keep a close eye on back-to-back booking, for instance.

And that's not all. While some UK banks might choose to set up subsidiaries in the euro area, others might set up branches. And such third-country branches would not be supervised by the ECB; they would be supervised by national authorities, with national rules being applied. A similar issue would arise if UK banks were to set up investment firms.

Thus, there is still room to arbitrage national rules within the euro area. The single European rulebook is not yet single enough.

However, jumping national fences is just one way to get around the rules. Banks can also jump sectoral fences. While the banking sector is highly regulated, other parts of the financial system are much less so. The shadow banking sector, for instance. This opens the door to what could be referred to as “cross-framework arbitrage”.

Banks can pass through that door by moving business to the shadow banking sector. They can shift exposures to entities that are not consolidated for prudential purposes. Looking back at the run-up to the financial crisis, one of the

more popular ways to do this was through special-purpose vehicles, or SPVs. The consequences of this are now well known.

However, banks don't need to turn to shadow banks. They also have other options when it comes to shifting business out of the prudential perimeter. These options often involve adjusting their legal structure. Under some accounting rules, for instance, joint ventures do not need to be fully consolidated. This allows risks to be kept out of regulators' reach.

The danger, of course, is that these risks could eventually spill back into the banking sector. Out of the shadows, banks could suddenly be hit by a flood of risks that have not been accounted for.

This is what happened during the financial crisis. In the build-up to the crisis, banks shifted assets to SPVs. When those SPVs got into trouble and lost access to market funding, the banks stepped in. In many cases, they were not legally obliged to do so, but they supported the SPVs to safeguard their own reputations.

If banks shift exposures to shadow banks, they become vulnerable to what is known as "step-in risk". And this kind of risk often remains hidden and unaccounted for. That's why the shadow banking sector is a concern for banking supervisors. It is intertwined with the banking sector, and risks could easily spill over.

And finally, there is also a third kind of regulatory arbitrage, where banks do not even have to jump national or sectoral fences to find a way around the rules. This can be termed "intra-framework arbitrage". In this case, rather than trying to exploit differences between two or more sets of rules, banks try to exploit loopholes within a single set of rules.

Banks' main objective in this regard is to "optimise" prudential indicators such as capital and liquidity ratios. To call a spade a spade, they seek to hold less capital and liquidity for a given level of risk. In order to achieve this goal, they have to structure transactions in such a way that the underlying risk profile remains unchanged, but the amount of capital or liquidity that needs to be held is reduced.

This affects the leverage ratio and the liquidity coverage ratio, for instance. Two things can be observed in this regard. First, although the rules do capture most off-balance-sheet exposures, they still leave some room for interpretation. So banks have an incentive to move exposures off their balance sheets to make use of this grey area.

Second, there is scope for banks to tweak the maturity of transactions – particularly where the contractual and economic maturities of a trade differ. As regards the leverage ratio, for instance, more capital needs to be held for longer-dated

derivatives than for shorter-dated ones. At the same time, the liquidity coverage ratio only captures transactions with a residual maturity of 30 days. This might tempt banks to structure their transactions around certain maturity thresholds to save on capital and liquidity.

To sum up, banks have plenty of scope for getting around the rules. And this is a problem. Regulatory arbitrage undermines the basic idea of regulation, and it poses a threat to stability. So, the question is: what do we do about it?

7.2. THE REGULATORY AND SUPERVISORY RESPONSE

Well, regulatory arbitrage often exploits differences between rulebooks. So, the first thing we can do is harmonise the rules. This is a powerful tool when it comes to preventing cross-jurisdiction arbitrage, for instance. If the rules were the same in all countries, banks would have less scope for getting around them.

A lot of progress has been made in this regard. At the global level, we now have a common set of standards known as “Basel III”, which will help to reduce the scope for regulatory arbitrage.

There are three caveats, though. First, Basel III has not yet been finalised, so that needs to be done as quickly as possible. Second, Basel III still needs to be transposed into national law, and that needs to be done in a coherent and consistent manner. And third, supervisors around the world will then need to apply those rules in the same way. Only then will cross-jurisdiction arbitrage be prevented effectively.

Here in Europe, we are in a similar situation. For some time now, we have had a single European rulebook for banks. However, parts of that rulebook still need to be transposed into national law. And this has, again, led to differences in rules across countries. As I said earlier, the single European rulebook is not yet single enough. There are still differences that banks can exploit – something that has gained even more relevance with Brexit on the horizon.

So, there is a clear case for further harmonising the European rulebook. To that end, we should rely less on EU directives and more on EU regulations, which are directly applicable in all Member States.

However, as I said earlier, it is not just about differences between countries. There is also the issue of cross-framework arbitrage and the shadow banking sector.

From my point of view, the first priority is to try to ensure that no risks spill over from the shadow banking sector to the banking sector. This means looking at the links between banks and shadow banks and addressing step-in risk.

Much has been done in this area since the crisis, but step-in risk has not yet been fully taken care of. With this in mind, the Basel Committee on Banking Supervision has made step-in risk part of its official work programme. It is currently working on guidelines for banks and supervisors. Those guidelines contain a number of criteria that will help to assess step-in risks for individual banks. And they propose measures aimed at helping banks to deal with such risks.

However, the aim is not to specify a single standardised approach. It is rather to encourage banks to adopt measures that are tailored to their individual needs. Thus, the guidelines will not contain automatic Pillar 1 capital or liquidity add-ons. Instead, they will provide a list of potential measures that leverage existing tools. It will be up to the banks to choose the most appropriate measures, while supervisors will check and challenge the choices banks make.

From a supervisor's point of view, it is important to tackle the links between banks and shadow banks. But shadow banking raises other, broader issues as well. Against that backdrop, I fully support the work being carried out by the G20 and the European Commission. The aim should be to address financial stability concerns and turn shadow banks into a resilient source of market-based funding.

This brings us to the third form of regulatory arbitrage: the one that happens within a single set of rules – intra-framework arbitrage. Here, we are more concerned with closing loopholes rather than harmonising rules and preventing the spillover of risks. This can be achieved using a variety of different tools.

One solution could be to change the rules in such a way that loopholes are closed. However, for this to be effective, regulators would first have to identify every loophole, which we all know is impossible. So it makes sense to also apply tools that have a broader and more preventive effect. And such measures are indeed being implemented.

In the wake of the financial crisis, the rulebook for banks has been revised with a view to shutting down intra-framework arbitrage. Before the crisis, the rules focused on just one dimension: risk-weighted capital. That was the only stringent constraint banks faced. Structuring transactions in a way that would “optimise” that single constraint was not too difficult.

Today, the rules focus on more than one dimension. Thanks to Basel III, banks around the world now face multiple constraints: the risk-weighted capital ratio has been supplemented by a leverage ratio and liquidity ratios. These constraints reinforce each other, which makes it much more difficult for banks to game them.

But tackling regulatory arbitrage is about more than just multidimensional rulebooks. It's also about flexibility. As former Deputy Governor of the Bank of England Paul Tucker writes: “A static rulebook is the meat and drink of

regulatory arbitrage.”⁴ The more detailed the rules are, the more scope there is for getting around them. Rules should therefore be based on key principles. “Same business, same risk, same rules” is one of them. Shaping the rules in line with this principle would help to further limit opportunities for regulatory arbitrage.

To sum up, there are ways and means of dealing with regulatory arbitrage. These range from harmonising rules across countries to closing loopholes. But in spite of all that, regulatory arbitrage will remain an issue.

The financial crisis triggered an overhaul of banking regulation, and banks now face much tougher rules than ever before. This is good, of course. Still, it gives the banks even more incentive to game the rules. This is reinforced by the fact that competition among banks is very intense. They might therefore try to gain a competitive edge by getting around the rules and avoiding the associated costs.

Against that backdrop, supervisors need to keep a close eye on banks. Prudential banking supervision is fundamentally about ensuring sensible bankers set aside enough capital for the risks they choose to take. Supervisors do this in a number of ways but the end result should always be the same: well capitalised banks that take prudent risks. For euro area banking supervision, an important element of this is ensuring supervisors can have confidence in the internal models used by some banks to calculate risk and the level of capital they need to set against it. The ECB’s ongoing targeted review of internal models at over 60 banks, including all nine of the globally significant banks supervised in the euro area, is an important part of this process.

Supervisors need to scrutinise what bankers do and examine individual transactions to see whether they might be an attempt to game the rules.

This obviously requires us to cooperate with supervisors around the world. Only by working together and sharing information will we be able to effectively address regulatory arbitrage. For that reason, the ECB is in very close contact with other supervisors, such as those in the United States and the United Kingdom.

7.3. CONCLUSION

I think we can all agree that an unregulated banking sector is not a good thing. Experience – some of it fairly recent – shows that banks need rules. Effective rules help to ensure that banks remain resilient and can reliably serve the economy.

⁴ Tucker, P. (2014), *Regulatory Reform, Stability, and Central Banking*, Hutchins Center on Fiscal and Monetary Policy, Brookings Institution, Washington D.C.

It is true, of course, that rules also place a burden on banks. Complying with them is costly. As a result, banks are always tempted to work around rules, particularly in difficult times such as these.

Such behaviour may look optimal from the point of view of an individual bank. But from the perspective of society as a whole, it is not. Working around the rules undermines their purpose and might lead to another crisis. And we all know what such crises entail for the economy, for savers, for investors and for taxpayers.

So, regulators and supervisors are engaged in a game of catch-up with banks – a game that is sometimes referred to as “regulatory dialectic”. Regulators set rules in order to ensure stability and prevent financial crises. Banks seek ways around these rules in order to lessen the associated burden. Regulators then adjust the rules; and banks find new ways to get around them. This game has probably been going on since the very first rule was designed – and not just in banking, either. And it will probably go on until the end of time.

So it is in everyone’s interests for supervisors and regulators to have the edge in this game. They have to rule the game, in order to prevent banks from gaming the rules.

And this is the key question – do supervisors and regulators rule the game? Well, today’s rules are far more harmonised than ever before – at both global and European levels. That leaves less scope for regulatory arbitrage. At the same time, we can also see more clearly what banks might be up to. Thanks to European banking supervision, we have a much better overview of their activities. We are now more able to detect regulatory arbitrage at an early stage and react quickly.

So, regulators and supervisors have made their latest move in the game of catch-up. We would now expect the banks to make theirs. In my view, however, banks should reconsider their position on regulatory arbitrage. This is not a movie where a rogue hero happily flouts all the rules to save the world. This is about the stability of the banking sector, the prosperity of the economy and the wealth of society as a whole.

8. THE ROLE OF REGULATION AND SUPERVISION IN SHADOW BANKING: AN INSURANCE SECTOR PERSPECTIVE

Dimitris Zafeiris^{1 2}

Shadow banks can be broadly defined as non-banking financial institutions engaging in activities typically performed by banks without being subject to similar regulatory and supervisory requirements. As such, shadow banking can potentially contribute to the overall systemic risk in the financial system, which makes it a key concern for regulators and supervisors. When discussing the role of regulation and supervision in shadow banking, or in any activity with financial stability implications, the key questions are: what is the problem you are trying to solve? Where is the source of risk?

In a bank-centric world, sometimes institutions and sectors are defined as ‘non-banks’, ‘shadow-banks’ and, in general, financial activities are somehow benchmarked to banking. The purpose of this note is to shed light on how the insurance sector is situated in the context of the shadow banking activities and discuss the overall potential for insurance to have an impact on financial stability.

First of all, is the insurance sector part of shadow banking? In order to answer that question it will be necessary to go back to the basics and seek the most commonly used definitions of shadow banking.

8.1. WHAT IS SHADOW BANKING?

According to the FSB (2011), shadow banking is “the system of credit intermediation that involves entities and activities outside the regular banking system”. The FSB further recommends that authorities should then narrow down their focus to credit intermediation activities that have the potential to pose systemic risks, and proposes four key risk factors: maturity transformation, liquidity transformation, imperfect credit, transfer and leverage.

When it comes to monitoring, the FSB applies different levels of aggregation in its Global Shadow Banking Monitoring Report:

¹ Head of EIOPA Risks and Financial Stability Department.

² The views expressed in this note are those of the author and not of EIOPA. The author would like to thank Juan Zschiesche and Cecilia Melo Fernandes for their contribution.

- i. *Monitoring Universe of Non-banking Financial Intermediation*
All non-banking financial intermediation: OFIs, insurance corporations and pension funds
- ii. *Other Financial Institutions*
All financial intermediation not classified as banks, insurance corporations, pension funds, public financial institutions, central banks and financial auxiliaries. Conservative proxy for shadow banking.
- iii. *Narrow measure of shadow banking*
Non-bank financial entity types that are considered by authorities to be involved in credit intermediation where financial stability risks from shadow banking may occur.

The ESRB (2016) takes a broad approach to shadow banking which includes all non-bank financial intermediaries and excludes insurance corporations and pension funds.

8.2. INSURANCE AND SHADOW BANKING

In spite the insurance sector's relevance in terms of size for the total financial sector, it is not included in the most commonly used definitions of shadow banking both in the literature and in the market, and for very good reasons: The insurance sector is not so 'shadow' and is not so 'banking'.

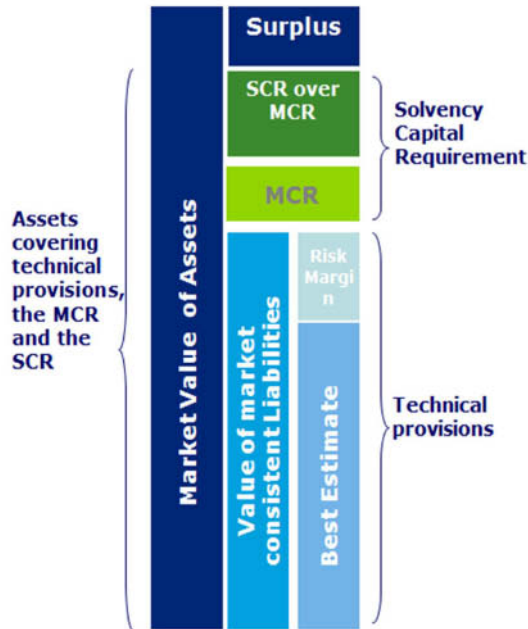
On the one hand, it is subject to Solvency II, a risk based framework that entails a number of provisions for capital requirements, risk management and transparency. On the other hand, insurance business and assets are (mostly) liability driven. Long term liabilities potentially match the profile of long term funding, making some key conditions for defining shadow banking not applicable, such as activities involving maturity and liquidity transformation.

The recent crisis revealed the need for a robust regulatory framework for all sectors. Solvency II was part of the effort to respond to this need. It introduces a total balance sheet approach where both assets and liabilities are marked to market.

SCR (the first level of supervisory intervention) and MCR (the minimum level of capital needed to be able to remain in the market) reflect capital set aside to meet unexpected losses – at different level of confidence levels.

In summary, Solvency II seems to consider adequately the risks that insurers are exposed to. Given that the new prudential approach has only recently entered into force, more time is needed to assess its impact.

Figure 1. Solvency II in a Nutshell



But is this the end of the story? Does the fact that the insurance sector is not part of shadow banking mean that it does not, or cannot, engage in activities that resemble those of the banking sector? Put it more broadly, do insurers engage in activities that may have impact on financial stability? In order to answer such questions, we need to consider the potential origins of systemic events.

8.3. INSURANCE AND FINANCIAL STABILITY

Systemic risks can be originated by the failure of a systemically relevant insurer or the collective failure of several insurers generating a cascade or “domino” effect” (the so called ‘entity-based’ or direct approach of assessing systemic relevance).

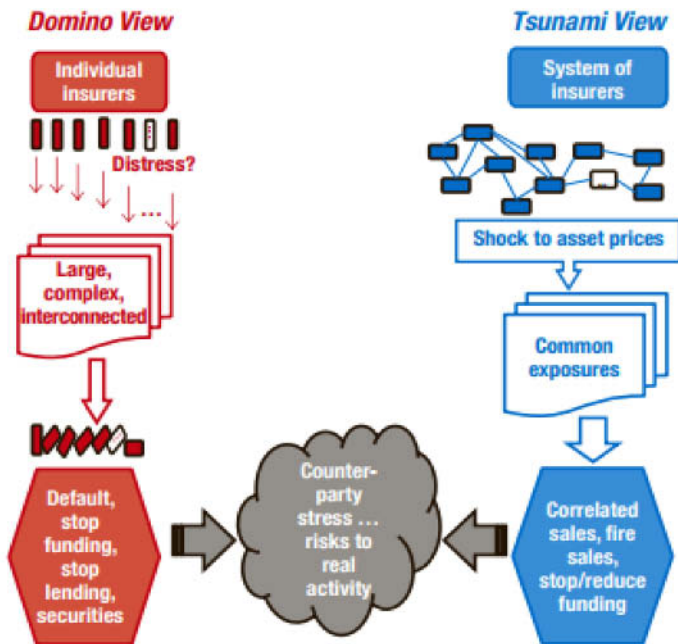
However, there can be potential externalities caused by the engagement in specific activities or generated by the widespread common reactions of market participants to exogenous shocks (the activity-based or indirect origin of systemic risks).

The IMF proposes two views of systemic risk. On the one hand, the “domino view”, where due to interconnectedness or other channels of contagion, the failure of one institution may lead to failure of other institutions(s), hence the term ‘domino effect’.

On the other, the “tsunami view”, which refers to a range of activities and common behaviours that may have a negative impact on financial stability, if sparked by a negative event.

According to EIOPA’s approach to systemic risk, a triggering event will have an impact on an insurer, according to its risk profile. The extent to which this event will impact financial stability and the real economy will depend on the existence of systemic risk drivers as well as transmission channels.

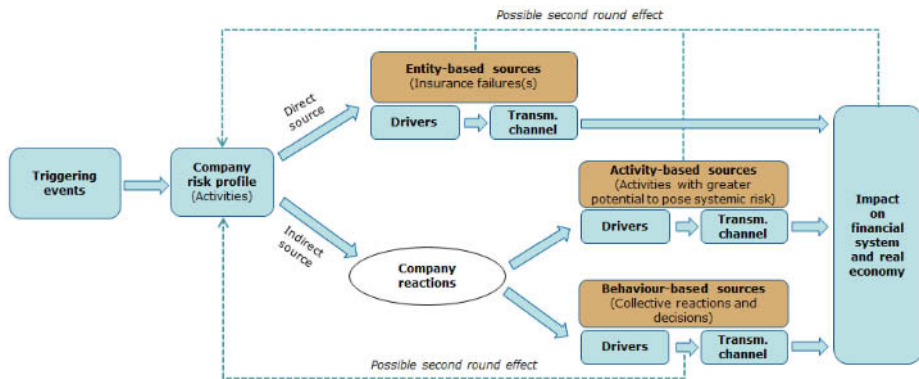
Figure 2. The IMF view of Systemic Risk



Source IMF: Global Financial Stability Report, April 2016

Systemic risk drivers are linked to the origin of systemic risk. In case the event affects a specific entity (entity-based approach), possible systemic risk drivers are factors such as size, interconnectedness, lack of substitutability of critical products or functions, etc. In case the triggering event affects a range of activities (activity-based approach), it will be these specific activities that may drive systemic implications. These may include the extensive use of derivatives for reasons other than hedging, variable annuities, credit provision, guaranteed products, etc. In addition, this event may affect the behaviour of insurers, leading to *collective-herd behaviour*. Transmission channels can in turn be through direct exposures, lack of economically important insurance products or functions, distortions in funding, etc.

Figure 3. An Approach to the Financial Stability Impact of Insurance



Source: EIOPA

Using the low interest rate environment as an example, may help clarify the above illustration. The extent to which low interest rates affect an entity, will depend on its risk profile, i.e. the total activities of the group. Is the firm mostly active in life or non-life? Does it have a large negative duration gap? High level of guaranteed rates?

In an entity based approach, this environment may lead to the failure of one or more institutions. This event by itself however is not sufficient to be of systemic relevance. A series of failures based on interconnectedness or other factors that may channel to the real economy through lack of economically important functions (provision of funding, insurance coverage or others) need to occur. The low interest environment can also affect the activities and/or behaviour of insurers. The sector may start engaging (or increase engagement) to activities or behaviours that may be relevant for the real economy such as collectively searching for yield, transferring market risk to policy holders through unit linked products or engaging in new activities that may entail maturity or liquidity transformation.

Furthermore, there may be significant feedback loops, i.e. second round effects that may ultimately modify the risk profile of the company. Such loops bring to surface the need, not only for co-existence but also for coordination and complementarity of micro and macro supervision. In such a framework, firms will have a different risk profile after a triggering event and this is to be considered by micro supervisors. To the extent that the risk profile will determine the systemic impact of the next triggering event, is also becoming of relevance to the macro prudential supervisors.

8.4. CONCLUSIONS – CHALLENGES

“The challenge for policymakers is to maximize the benefits of shadow banking while minimizing systemic risks”

(IMF, 2014)

Indeed, when it comes to regulating shadow banking, it seems more relevant to place the discussion more in terms of activities rather than entities; In a world of increased interconnectedness and where the borders between financial institutions become blurry, an approach that focuses also on activities is needed. There is a number of challenges ahead:

- Data gaps – currently there are difficulties in identifying and monitoring the relevant risks.
- Possibilities of regulatory gaps and arbitrage – the role and added value of cross sectoral supervisory institutions like the ESRB or, in general the European System of Financial Supervision, needs to be highlighted and further explored.
- Challenges in integrating the entity and activity dimensions as regulation and supervision have so far mostly focused on entities – The way forward may be towards general ‘cushion’ or ‘umbrella’ frameworks such as a recovery and resolution framework for the insurance sector. Such frameworks are not necessarily prescriptive but more of a toolkit to have in place if (when) things go wrong.

9. THE ROLE OF REGULATION AND SUPERVISION IN THE SHADOW BANKING SECTOR: THE EU PERSPECTIVE

Stan Maes^{1 2}

This article discusses whether the EU regulatory framework is adequate to address risks in the area of “shadow banking”³. The first section presents some introductory high level considerations on the Commission’s regulatory approach in the shadow banking area. Section 2 provides a brief overview of the existing tools and provisions in EU legislation as regards shadow banking. Section 3 concludes by briefly describing the Commission’s current policy focus in the area of shadow banking.

9.1. HIGH-LEVEL CONSIDERATIONS

As a matter of *principle*, financial market regulation should (i) mitigate well-articulated market failures, (ii) be proportionate to the systemic importance of the entities and activities targeted, (iii) be coherent and comprehensive, in the sense that similar rules should be applicable to similar activities to prevent possible circumvention and risk migration (e.g. credit provision should ideally be regulated at the level of the end borrowers independently of the type of borrowing, bank or non-bank), (iv) be cost efficient, (v) be internationally coordinated, (vi) avoid that valuable innovation and sustainable growth is stifled.

Applying the above principles in practice is of course challenging. Assessing the systemic importance of shadow banking activities, for example, is inherently difficult. The size and growth in size of the shadow banking system, is not necessarily reflecting its systemic risk. Compared to the banking sector, some risk metrics in shadow banking seem to be relatively benign (e.g. leverage). Also, not all activities raise systemic risk concerns. A number of metrics suggest that credit

¹ Deputy Head of Unit, Macroprudential policy and relations with the ESRB, DG FISMA, European Commission.

² This paper reflects the author’s panel intervention at the 14-15 September 2017 SUERF Conference. The views are my own and not necessarily those of the European Commission. I am grateful to Christian Buelens for preparatory discussions and assistance.

³ The “shadow” banking qualifier implicitly refers to an absent or lighter regulation compared to banks. EU regulation of non-banks has however been revamped in recent years, implying that the alleged characteristic of absent or light regulation is no longer accurate. Many institutions nowadays prefer to use more neutral jargon, notably “market-based financing” or “non-bank financial intermediation”. The FSB emphasises that the term shadow banking is not intended to cast a pejorative tone on shadow banking and points out to the common use of the concept in G20 communications.

intermediation, maturity transformation, leverage have in fact been broadly stable in the nonbanking sector in recent years.

More investment is needed in understanding the drivers behind the growth of shadow banking. Depending on the driver, we may have more or less of a policy concern. A number of explanations for the rapid growth of shadow banking have been put forward. Five reasons can broadly be distinguished: (i) valuation effects, (ii) genuine benefits or efficiencies, (iii) the growing demand for safe assets and collateral, (iv) regulatory arbitrage, and (v) specific institutional factors.

- i. *Is shadow banking growth primarily reflecting valuation effects?* To the extent that the size of a sector is measured by its assets under management, changes in the price or valuation of these assets will affect the sector's size. Asset prices have indeed strongly increased in recent years, notably as a result of accommodative and non-standard monetary policy measures. For example, the Euro Stoxx 50 increased by almost 60% between the (implicit) announcement in July 2012 of the ECB's Outright Monetary Transaction program and July 2017. This is of a similar order of magnitude as the increase in the broad shadow banking measure in the euro area (+40%).
- ii. *Are genuine benefits or efficiencies driving the growth of shadow banking?* Shadow banking activities such as securitisation and securities financing transactions (SFT) in principle should allow to deliver a number of benefits to society, such as improved price discovery, enhanced market efficiency, additional credit creation and market liquidity, supporting economic growth and financial stability. The crisis experience has taught us that generalisations need to be qualified, though, and that adequate and proportionate regulation is needed to ensure that the above benefits and efficiencies effectively are being realised (e.g. Simple, Transparent and Standardised (STS) Securitisation Regulation).
- iii. *Is shadow banking growth reflecting the need to accommodate investor demand for safe assets and financial institution demand for collateral?* Investor demand for safe and liquid assets has increased significantly because of risk-aversion or regulatory reasons and has exceeded the available pool of insured deposits and highly-rated government bonds. Market participants are seeking the security of collateral to underpin a wider range of claims to execute arms-length transactions in an increasingly integrated global financial system. Likewise, the collateral demand from financial institutions has also increased significantly, following the materialisation of counterparty risk in the financial crisis. New regulations may also have increased the demand for collateral-based operations. Shadow banking growth also allegedly allows accommodating the investor demand for safe and liquid assets as collateral, as certain types of shadow banking aim to

create safe, short-term and liquid instruments, i.e. quasi money, from risky, long-term and illiquid assets. Securitisation has played an important role in this process, and SFT further increases the quasi-money creation potential of the financial system.

- iv. *Or is regulatory arbitrage a key driver?* Regulatory arbitrage has certainly explained part of the pre-crisis growth of shadow banking in the US and Europe. In the pre-crisis period, banks could reduce regulatory capital charges by the use of allegedly bankruptcy remote special purpose vehicles (so-called conduits and structured investment vehicles) that relied on implicit – thus not requiring capital charges – credit and liquidity support from banks, or by simply holding securitised assets on their own balance sheet which received better credit ratings than the underlying assets. Regulatory arbitrage has exploited loopholes and has led to a sharp build-up of risk and leverage along the way.
- v. *Finally, institutional factors may also explain certain discrepancies in shadow banking trends between the US and the EU throughout the crisis years.* Specifically, unlike the Federal Reserve and Bank of England, the ECB monetary policy framework allowed for a wide range of collateral to be used for ECB open market operations. As a result, almost all of the EUR ABS issuance in 2008 was retained by the issuer and used as collateral for ECB liquidity-providing refinancing operations.

In sum, it is crucial to understand the drivers behind shadow banking developments, in order to reflect on whether regulatory initiatives are needed. Post-crisis drivers are likely to differ from pre-crisis drivers, and the regulatory and market environment has significantly changed. Further analysis is required to assess the relative importance and importance over time of the different potential shadow banking drivers.

To conclude these introductory remarks, it is important to realise that *a wide range of financial regulatory policies affect systemic risk in the financial system, and shadow banking activities and entities more specifically.* Capital Markets Union (CMU), Banking Union (BU), accounting rules, etc. but also monetary policy, competition policy and tax policies all influence systemic risk and impact the shadow banking system. It is important to assess their joint consistency and their interaction.

9.2. OVERVIEW OF EXISTING PROVISIONS IN EU LAW

There are basically two different policy approaches to shadow banking regulation. There is direct regulation of shadow banking *entities*. And there is direct regulation of shadow banking *activities*.

As regards the direct regulation of shadow banking entities or sectors, several legal frameworks can be singled out in the EU specifying the requirements for:

- i. the exposures of banks to shadow banks (CRD/CRR);
- ii. investment funds (Undertakings for collective investment in transferable securities and their managers – UCITS Directive, Alternative investment fund managers (hedge fund managers) – AIFMD, money market funds – MMF Regulation);
- iii. users of derivatives – EMIR;
- iv. regulated markets, investment firms, credit institutions and CCPs – MiFID/MiFIR;
- v. users of securities financing transactions – SFTR;
- vi. insurance and reinsurance undertakings – Solvency 2 Directive; and
- vii. institutions for occupational retirement provision – IORP Directive.

As regards the direct regulation of shadow banking activities we also have a handful of legal frameworks in place:

- i. simple, transparent and standardised securitisation – STS Securitisation Regulation;
- ii. reporting to trade repositories, central clearing of OTC derivatives, risk mitigation for non-centrally cleared OC derivatives – EMIR;
- iii. short sales/short positions related to share capital of companies that have shares admitted to trading on a regulated market in the EU and to debt instruments issued by an EEA sovereign issuer – SSR;
- iv. reporting of SFTs to trade repositories, disclosure of SFTs by investment funds, transparency of re-use – SFTR;
- vi. investment services, equity and non-equity instruments – MiFID/MiFIR.

The EU regulatory framework put in place since the crisis already addresses several of the inherent financial stability risks in the area of shadow banking, both in entity/sectorial and activity-based regulation. To give some examples:

- i. *Liquidity risk:* Liquidity risk management provisions and tools (e.g. redemption gates/suspensions/fees, stress tests, stress test requirements) are foreseen in UCITS, AIFMD and the MMF Regulation. Such provisions/tools are applicable to managers and/or competent authorities.
- ii. *Leverage risk:* Leverage risk is also addressed in different EU sectorial frameworks. For instance, borrowing is prohibited under the MMFR and restricted under UCITS. Short selling is prohibited under both MMFR and

UCITS. While AIFMD contains no caps on counterparty risk/leverage limits/borrowings/ short sales, AIFMs are nonetheless required to report regularly on the overall level of leverage employed by their AIFs. Furthermore, competent authorities may impose leverage limits under certain conditions. It should however be noted that such limits have not been imposed and so far lack operational clarity. More supervisory convergence is needed here. Work is ongoing at IOSCO, ESRB and ESMA on possible common procedures as regards leverage limits under the AIFMD.

- iii. *Interconnectedness*: Provisions exist under SFTR and EMIR that increase transparency and allow the mapping of exposures between different entities. However, fragmented national regulatory regimes for some types of shadow banking entities and a lack of information and disclosure can lead to regulatory arbitrage concerns and impede systemic risk monitoring. Banks currently possess limited information regarding the supervisory treatment of their shadow banking counterparts. Furthermore, implicit guarantees and backstops of shadow banks by sponsoring banks (step-in risks) may facilitate the spreading of risk across sectors.
- iv. *Data gaps*: are being addressed at several fronts (see below).

In sum, a robust regulatory framework has been put in place in the EU to address risks in the area of shadow banking. We will continue to assess and evaluate whether it is adequate in addressing systemic risk concerns.

9.3. CURRENT POLICY FOCUS

The Commission participates in the monitoring of shadow banking activities and entities (together with ESRB, ESAs, FSB). It supports efforts to understand the drivers behind shadow banking trends and fill data gaps. It strives to ensure that an effective toolkit is available and is effectively used. And it will continue to review existing legislation and to coordinate international work in this area.

Further improvements in monitoring frameworks and system-wide oversight will be critically important. Monitoring is important to frame the different shadow banking-related activities, identify relevant entities, uncover trends, innovations and emerging risks.

Putting in place a policy framework has been the logical next step. This comprises both regulatory provisions applicable to supervised entities that induce prudent behaviour, as well as tools that supervisors can activate when they see risks building up.

Designing and calibrating such a policy framework requires analytical groundwork and the subsequent operationalisation of these concepts. While we can (most likely) agree that we want to avoid “excessive” risk-taking (e.g. excessive leverage, excessive mismatch, excessive interconnectedness, etc.) by imposing mitigants to reduce risks or build up resilience, agreeing on the specific design and activation of such mitigants is likely to be more controversial (e.g. margin and haircut requirements for derivatives and securities financing transactions).

When designing tools or regulatory provisions, we also have to take into account their impact on the targeted product and market. Certain policy tools are indeed likely to substantially alter a product in the first place, hence calibration becomes crucial. Securitisation, for example, is expected to deliver a number of benefits, but also bears risks, as illustrated during the crisis. The Commission is trying to relaunch the securitisation market through its proposal for a Securitisation Regulation (which is one of the key elements of CMU). The objective is to set up a framework for “simple, transparent and standardised (STS)” securitisations. To mitigate the risks and ensure the safety of the securitised products a key principle is that the issuer of securitisations retains “skin in the game”, in order to ensure an alignment of incentives with those of investors. If this risk retention level would be set too high, however, the securitisation may not to take off in the first place and the expected advantages would be lost as a result.

To calibrate tools adequately, we need evidence, but often encounter data gaps. Lack of data (and consequently lack of transparency) should however not be used as an excuse for inaction. The G-20 has launched their “data gaps initiative” and many of the recent EU legal texts contribute to remedy the situation and fill those gaps by enhancing reporting requirements. For example, EMIR requires counterparties engaging in derivatives transactions to report them to trade repositories, hence shedding light into derivative markets. The SFT Regulation also foresees reporting requirements (on details of SFTs and their reuse), which will start in 2019.

Stress testing is also important. Authorities should perform system-wide top-down stress tests for asset managers and funds, financial market infrastructures including CCPs, insurers and pension funds, to assess the need for additional provisions or tools in EU legislation. ESMA is developing principles on stress testing practices and scenarios for UCITS, AIFs and MMFs.

We need to understand the functioning of the tools already in place and what their impact is. Based on such a careful analysis, we can then assess whether there are indeed gaps that need to be filled. The Commission is closely monitoring developments in shadow banking and has an open mind as to introducing or improving rules and requirements, if and when needed, based on sound analysis

and evidence. At this stage, the Commission considers that there is no urgent and compelling evidence for the need to develop additional tools. But where residual risks are being identified and no policy tools are in place to address them, then it is our responsibility as policy makers to act. We should first ensure that existing policies are operationalised across the EU and assess the effectiveness of the existing tools and provisions, before deciding whether additional initiatives are needed.

Like in banking, it is important to ensure an internationally coordinated approach both to ensure a level playing field and to minimise risks of regulatory arbitrage, but also to ensure that best practices are identified.

The ultimate objective of the Commission is to ensure that the financial sector plays its role of serving the real economy by helping households and firms to manage their risks, running an efficient and reliable payment system, and intermediating liquid and risk free short-term savings into long-term investments.

10. LOOKING AHEAD: FORTHCOMING FINANCIAL INNOVATIONS AND INSTITUTIONS – OPPORTUNITIES AND RISKS FROM A FINANCIAL STABILITY PERSPECTIVE

*Saskia de Vries-van Ewijk*¹

10.1. INTRODUCTION

Technological innovation is seen as one of the main drivers of change in the financial sector. Think for example of the increased use of artificial intelligence, the rise of cloud services, the possibilities that distributed ledger technology offers, or the more severe risks of cyberattacks. These developments have the potential of being disruptive to the financial system. However, at this point in time, it is still too early to predict which innovations will bring great change, and which will not. In the following, I will take a regulatory point of view, focusing on the risks and opportunities from a financial stability perspective.

10.2. WHAT RISKS DO FINANCIAL INNOVATIONS POSE TO FINANCIAL STABILITY?

Technological innovations in the financial sector pose multiple risks to financial stability. They can be classified as either macro-financial or micro-financial risks. Macro-financial risks reflect system-wide vulnerabilities and can cause financial instability. Micro-financial risks affect individual firms, but can have a systemic impact to the extent that they affect (systemically important) institutions that provide critical functions. This section briefly discusses these risks, based on recent work by the Financial Stability Board.²

10.2.1. Macro-financial risks

Macro-financial risks largely arise because the application of financial innovations increases interconnectedness in the financial sector and could also arise if the financial system heavily depends on a small number of companies for certain services. One innovation that could make the system more intertwined is the rise

¹ Head of Department International Financial Architecture, Financial Stability division, De Nederlandsche Bank.

² For a detailed analysis of what is discussed in this section, see Financial Stability Board (2017): Financial Stability Implications from FinTech – Supervisory and Regulatory Issues that Merit Authorities Attention.

of artificial intelligence. This field is closely interlinked with other developments such as big data and machine learning. By making smart use of artificial intelligence and machine learning, new or existing players can develop algorithms that are providing more (cost) efficient services. An example would be the use of robo-advisors for making investment decisions. Broad scale adoption of similar algorithms in making investment decisions; or great reliance on one third party could therefore pose a risk to the system.

Another typical example due to which the sector can become more interconnected and that may involve concentration risks, is the provision of cloud services. Cloud computing provides firms with the possibility to outsource part of their business to third parties. This could be the storage of data or for example the execution of calculations. The cloud can provide businesses safety for data storage, as it provides a back-up. The downside is that, as more institutions make use of cloud services, the financial system becomes more vulnerable to cyberattacks on cloud services providers. In addition, single firms that provide cloud services may become *too highly connected to fail* if financial institutions heavily rely on their services.

The two examples above illustrate that the new wave of financial technology (FinTech) may result in a more interconnected financial sector with several players, on which the sector relies heavily. This could lead to a more unstable system. We believe that there are at least four macro-financial risks that merit regulators' attention:

- *Contagion*: Due to a more interconnected system, distress experienced by a single institution can be more easily transmitted to other institutions.
- *Procyclicality*: FinTech innovations may increase the procyclicality of the financial system. The use of robo-advisors may for example cause greater herding behavior when models used are based on similar algorithms.
- *Excess volatility*: With the implementation of certain technologies, the financial system could overreact to news. A market overreaction can in turn lead to adverse outcomes such as liquidity problems.
- *Systemic importance/too highly connected to fail*: When new players enter the financial sector and become highly connected entities, the problem of *too highly connected to fail* can arise.

10.2.2. Micro-financial risks

Micro-financial risks, such as operational risk, affect individual firms, but can have a systemic impact to the extent that they impact institutions providing critical functions. The vulnerability of the system in this respect may increase with the adoption of new technologies. As such, especially the risk of cybercrime will likely become more relevant. I list two examples of micro-financial risks here:

- *Third-party reliance:* A systemic risk can arise when systemically important institutions or markets rely heavily on the same third parties for certain services (e.g. providers of cloud computing services).
- *Cybersecurity risks:* Cyber-attacks on financial institutions and financial market infrastructures are becoming more common and more sophisticated. Given the mutual interdependencies between institutions, vulnerabilities at one financial institution or overreliance on a single third party service provider may affect the system as a whole. This way, targeted cyber-attacks may bring down an individual institution's system or even cause disruption across a nation's financial system.

10.3. WHAT ARE THE OPPORTUNITIES?

Innovations also bring new opportunities. A regulator aims to stimulate new ideas while safeguarding the financial system from potential risks. One of the main benefits of innovations is a better, more efficient provision of services at a lower cost. Artificial intelligence may make financial services more accessible to consumers and investors via applications such as robo-advisors. Moreover, artificial intelligence and machine learning could lead to more customized and personalized services through better use of data.

More broadly speaking, new technologies can result in more financial inclusion. This is especially the case for developing countries. In many countries FinTech is already improving the access to finance for new consumers and firms – ranging from rural Kenya to urban China. Also in advanced economies FinTech improves financial inclusion, by lowering the costs of investment services via applications such as robot finance. At the same time, we must monitor the effects of a higher degree of financial inclusion on the financial stability.

Several relevant opportunities can be identified that could enhance financial stability:

- *Decentralization and diversification:* FinTech could result in lower entry barriers which may lead to a more decentralized and diverse financial system. This can make the financial system more resilient as the effect of the failure of a single institution is dampened.
- *Efficiency and cost reduction:* FinTech developments can result in more efficient services (e.g. higher processing speed of transactions) and lower costs.
- *Risk modelling:* With developments in artificial intelligence, machine learning and big data, firms can more accurately estimate risks, which reduces the vulnerability of the financial system.

10.4. IS THE CURRENT REGULATORY FRAMEWORK FUTURE PROOF?

We observe risks on both the macro and micro level. In this light, we have to ask ourselves the question whether our current rules are *fit for FinTech*. The first impression is that current legislation and regulations can accommodate innovations sufficiently. Nonetheless, regulators should be ready to act if the current regulatory framework turns out to be ill-suited to new or existing services offered by FinTech companies. In order to answer this question, we should keep having dialogues with both existing and new parties in the financial sector and to exchange experiences between regulators and supervisors. The work in this area by international standard-setting bodies such as the FSB is as such welcome and necessary.

10.4.1. More room for innovation at DNB

At DNB we try to make our regulation technological-neutral: we aim to stimulate innovations, whilst safeguarding financial stability. One joint initiative that contributes to this aim is our “Innovation Hub”. In 2016, DNB created the Innovation Hub in collaboration with the Dutch Authority for the Financial Markets, with the purpose of accommodating innovation in the financial sector. The hub is a channel through which entrepreneurs and incumbent market participants can contact the supervisor directly with questions. The Innovation Hub contributes to the communication of DNB with the industry. It creates possibilities for dialogue and it enhances the understanding of DNB of what is happening in the market.

The Innovation Hub also provides a “regulatory sandbox”.³ By focusing more on what rules are actually trying to achieve, we can create more room for innovation by avoiding unnecessary barriers. The regulatory sandbox is open to all innovations that contribute positively to a stable financial sector, efficiently operating financial markets and sustainable financial well-being of consumers and investors. This way, in light of the rapid financial-technological developments, we focus on the purpose of rules when assessing innovative products, services or business models to provide bespoke solutions. Through this sandbox, we also can assess whether established policies, rules or regulations require any changes to accommodate the new developments.

³ For a more detailed discussion on this, see: De Nederlandsche Bank & The Authority for the Financial Markets (2016) *More room for innovation in the financial sector – Market access, authorization and supervision: Next steps AFM – DNB*.

11. 2017 MARJOLIN PRIZE “TRADITIONAL AND SHADOW BANKS DURING THE CRISIS”

Edouard Chrétien and Victor Lyonnet

NON-TECHNICAL SUMMARY

“Shadow banks” now account for about a quarter of total financial intermediation worldwide (IMF, 2014).¹ They are market-based institutions ranging from money market funds to asset-backed securities issuers, supplying credit through more or less complex intermediation chains outside of the traditional regulated banking system. By most accounts, the emergence of shadow banking has been largely motivated by regulatory arbitrage (Acharya et al., 2013; Gorton and Metrick, 2011), i.e. an attempt to bypass the cost associated with the regulations traditional banks must comply with, enabled by financial innovation allowing many of the services provided by traditional banks to be sustained by other types of banks (see e.g. Merton, 1995; Rajan, 1998a).

Following the failures of financial regulation revealed by the crisis of 2007, the need for regulatory reforms emerged a consensus (Duffie, 2016). However, while the collapse of shadow banking was at the heart of the crisis, the ongoing tightening of banking regulation applies to traditional banks, not shadow banks. Some debates about the effectiveness of banking regulation thus center on their effects on shadow banks, with concerns that financial intermediation may migrate away from traditional banks and towards shadow banks (Hanson et al., 2011; Buchak et al., 2017). Yet, more complex interactions between both sectors, beyond regulatory arbitrage, are suggested by evidence that during the crisis large amounts of assets and liabilities were transferred from shadow to traditional banks. To gauge the effects of traditional banks’ regulation on shadow banks, one needs to understand these interactions, and in particular why traditional and shadow banks coexist.

We propose a theory of the coexistence of traditional and shadow banks. In our model, bankers must choose to set up a traditional or a shadow bank: Shadow banks escape the costly regulation traditional banks must comply with, but forgo deposit insurance, which traditional banks can rely upon in a crisis. Thus, in a crisis, shadow banks repay their creditors by selling assets at fire-sale prices to

¹ This estimate is in terms of credit intermediation (see IMF, 2014). For descriptions of shadow banking, see Pozsar et al. (2013) for the United States, ESRB (2016) for the European Union, IMF (2014) and FSB (2015) for global estimates. Globally, shadow banks’ assets were worth \$80 trillion in 2014, up from \$26 trillion more than a decade earlier (FSB (2015)).

traditional banks, which fund these purchases with insured deposits. The larger the relative size of the traditional banking sector, the higher these asset prices, and thus the higher a banker’s incentive to set up a shadow bank in the first place. We show that in equilibrium traditional and shadow banks coexist. The analysis implies that an increase in deposit insurance leads to a *decrease* in the relative size of the traditional banking sector, and that in equilibrium, the shadow banking sector is larger than socially optimal. Our model is consistent with several facts from the 2007 financial crisis: some assets and (deposit-like) liabilities migrated from shadow banks to traditional banks, and shadow bank assets were sold to traditional banks at fire sale prices.

Specifically, we consider a model with three dates 0, 1, 2, and two groups of agents: bankers and households. At date 0, each banker can set up a traditional bank or a shadow bank. The banker invests his endowment, which constitutes the banks’ only equity. Banks can also issue claims to households, which we assume must be money-like claims, i.e., riskless short-term debt (henceforth “short-term debt”).² With these funds, banks invest in risky assets which pay off at date 2. At date 1, two states are possible: Either a crisis occurs, in which case date-2 asset returns are low and uncertain, or no crisis occurs and date-2 asset returns are high and certain.

We assume two differences between traditional and shadow banks. On the one hand, traditional banks incur a cost associated with the regulation they must comply with, which shadow banks evade. This assumption captures the idea that shadow banking is largely motivated by regulatory arbitrage (Hanson et al., 2011; Buchak et al., 2017). On the other hand, traditional banks can, up to a limit, issue claims backed by deposit insurance, which shadow banks cannot. Therefore in a crisis at date 1, despite uncertain asset returns, deposit insurance enables traditional banks to issue the riskless claims households demand, but not shadow banks. We assume that deposit insurance is actuarially fairly priced and limited, i.e. each bank can issue riskless debt only up to a fixed dollar amount. In practice, deposit insurance only guarantees a limited level of deposits. In the U.S., this limit holds per depositor, per FDIC-insured bank.³ It follows that only part of households’ wealth can be invested in insured deposits, so that as we assume in our model, each bank is *de facto* limited in the total dollar amount of riskless debt it can issue using deposit insurance. This limit may stem, for instance, from fiscal costs (see Davila and Goldstein, 2016), or ex-ante distortions in banks’ behavior (Calomiris and Kahn, 1991; Diamond and Rajan, 2001).

² When households are infinitely risk-averse, short-term debt arises naturally as the optimal contract between the households and the bank. For instance, in Gennaioli et al. (2013) households have an infinite risk-aversion utility function, and in Caballero and Farhi (2016) they have Epstein-Zin preferences with infinite relative risk aversion and infinite intertemporal elasticity of substitution.

³ Since the FDIC creation in 1934, this limit has increased from \$2.5k per depositor per bank, to \$250k.

If at date 1 there is no crisis, asset returns are high and certain. Thus all banks can issue riskless debt, which they do to refinance their assets with short-term debt. Instead, in a crisis, shadow banks are unable to roll over their short-term debt because their assets are risky and households demand riskless debt. Hence, shadow banks must liquidate assets to repay their existing debt. We assume that only traditional banks can buy shadow banks' assets in a crisis. They can finance these purchases by issuing short-term debt backed by deposit insurance. Because of limited deposit insurance, traditional banks have limited debt capacity and therefore shadow banks' assets trade at a discount.

At date 0, when bankers choose to set up a traditional or a shadow bank, they trade off the costs and benefits associated with each type of bank, i.e. low regulation costs but need to sell assets at a discount in a crisis versus high regulation cost but ability to buy assets at a discount in a crisis. The trade-off depends on the asset discount anticipated in a crisis, itself a function of the relative size of the two banking sectors. The larger the relative size of the traditional (shadow) banking sector, the higher (lower) asset prices in a crisis, and the higher bankers' incentive to set up a shadow (traditional) bank in the first place. In that sense, traditional and shadow banks form an ecosystem. In equilibrium, bankers must be indifferent between setting up a traditional or a shadow bank. This pins down asset prices in a crisis and thus the relative size of the traditional and shadow banking sectors in equilibrium.

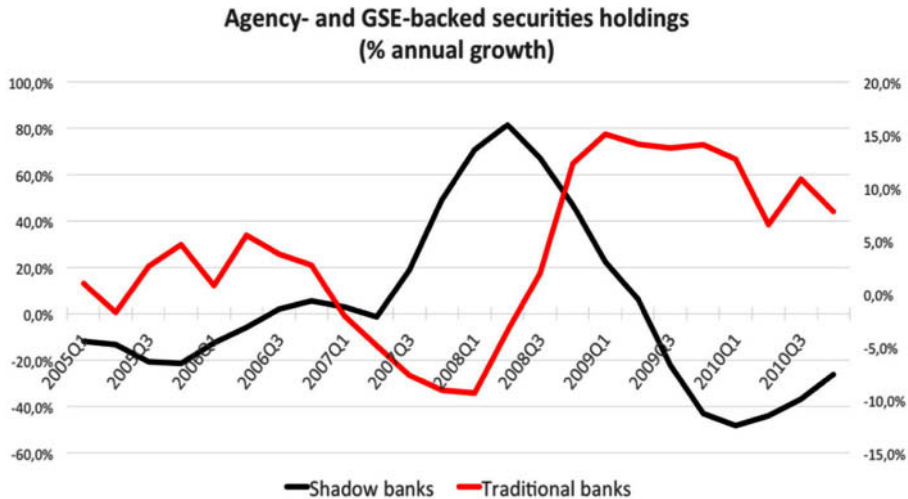
Our analysis is consistent with several facts from the 2007 financial crisis.

First, in our model, shadow banks must liquidate assets in a crisis to repay their existing debt. This is consistent with the wide run on the shadow banking system that occurred in the crisis (Gorton and Metrick, 2011). Instead, in our model, traditional banks are able to issue short-term debt in a crisis. This is consistent with the evidence that during the crisis, almost \$600 billion of deposits went into the largest traditional banks in less than a month, following the bankruptcy of Lehman Brothers in 2008q3 (see Acharya and Mora, 2015, for a discussion).

Second, in our model, traditional banks purchase shadow banks' assets in a crisis. This is consistent with the evidence that in the crisis, about \$800 billion assets flew out of shadow banks, out of which \$550 billion flew into traditional banks from 2007q4 to 2009q1.⁴ The corresponding asset flows are shown in the above figure, using the Financial Accounts of the United States data. In our model, tradi-

⁴ The reason why these numbers do not exactly add up is twofold. First, traditional banks have used deposit inflows in the crisis for other purpose than asset purchases (for instance, to meet credit line drawdowns, as shown in Ivashina and Scharfstein, 2010). Second, the documented figures come from balance sheets data and it need not be that, for a given volume, assets switching from one bank to the other keep a constant value. Indeed, it can be that assets trade at a discount, in which case the asset seller's balance sheets contraction is greater than the buyer's balance sheets expansion. Abbassi et al. (2015) also find banks played an important role in providing price support to the distressed securities markets by buying fire-sold securities.

Figure: Traditional and shadow banks' asset flows



Source: Financial Accounts of the United States

tional banks finance these purchases by issuing riskless debt backed by deposit insurance. Using Call Report data, we regress traditional banks' asset purchases on deposit changes. We find evidence that traditional banks purchased assets sold by shadow banks by issuing *insured* deposits. Finally, consistent with our assumption that deposit insurance is limited, there is evidence that in the crisis, mortgage-backed government-agency securities traded at spreads well above historical norms (Merrill et al., 2012; Gagnon et al., 2011). Such high spreads for a security with no credit risk points to the scarcity of asset buyers' arbitrage capital.

Third, in our model, asset fire sales arise a crisis. Gorton and Metrick (2011) provide evidence that in the crisis, certain higher-rate bonds traded at a higher spread than lower-rate bonds of the same category and maturity. So many higher-rated bonds were sold that their price fell to attract buyers. This negative spread thus provides anecdotal evidence of fire sale of assets. Other evidence of asset fire sales is documented in Krishnamurthy (2008) and Chernenko et al. (2014). Arbitrage of regulatory costs has been an important feature of the banking industry since the first Basel accords of 1988. Some debates about the effectiveness of banking regulation thus center on regulatory arbitrage by shadow banks (Hanson et al., 2011), whereby shadow banks emerge in response to high regulatory costs for traditional banks. Yet, this view does not capture the interactions between both sectors that we document, nor their coexistence. For instance, if traditional banks face higher regulatory costs and no advantage, why not all bankers set up shadow banks? In our model, we assume that traditional banks

can, up to a limit, issue claims backed by deposit insurance, which shadow banks cannot. We study how, in our model, the level of deposit insurance affects the relative size of traditional and shadow banks. We find two competing effects.⁵

On the one hand, traditional banks' increased debt capacity allows them to operate on a larger scale. This effect increases bankers' incentives to set up a traditional bank. On the other hand, traditional banks use their increased debt capacity to bid for shadow banks' assets in a crisis, which leads to higher asset prices. In turn, higher asset prices in a crisis increases shadow banks' initial debt capacity, which allows them to operate on a larger scale. This second effect increases bankers' incentives to set up a shadow bank.

We show that the latter effect dominates the former. To gain intuition about this result, recall that asset prices are pinned down in equilibrium so that traditional banks' regulatory costs are offset by their purchases of shadow banks' assets. Everything else equal, when deposit insurance expands, traditional banks use their increased debt capacity to bid for shadow banks' assets in a crisis, which leads to higher asset prices. This increases bankers' incentives to set up a shadow bank. Therefore, for traditional and shadow banks to coexist when deposit insurance expands, asset prices must decrease to realign bankers' incentives to set up either type of bank. For asset prices to decrease in a crisis, the economy moves to an equilibrium with a relatively higher size of shadow banks. Overall, we find that expanding support to traditional banks in a crisis *increases* the relative size of shadow banks.

Last, we consider the normative implications of our analysis, comparing the equilibrium size of both sectors to their socially optimal size. We find that asset fire sales involve a pecuniary externality. When operating a shadow bank, bankers take as given the asset purchases from traditional banks in a crisis. At the margin, they fail to internalize that operating a shadow bank instead of a traditional bank reduces the support from traditional to shadow banks in a crisis. In turn, shadow banks' ability to issue riskless debt initially depends on the collateral value of their assets in a crisis. This involves a pecuniary externality whereby too many bankers operate a shadow bank in equilibrium, reducing other shadow banks' profitability. We show that in equilibrium, a social planner would choose to have relatively less bankers operating shadow banks, i.e. a smaller relative size of shadow banks.

This paper relates to several strands of the literature.

⁵ We study *small* changes in traditional banks' support in a crisis because large changes in traditional banks' support in a crisis wipe out either type of bank from the market, which is an effect already emphasized in existing models of shadow banking as regulatory arbitrage (see e.g. Plantin (2015), Ordóñez (2013), Harris et al. (2015)).

Merton (1995) and Rajan (1998a,b) are early discussions of the future of traditional banks in light of increased competition from other types of banks.⁶ More recently, Hanson et al. (2011) show concerns that ongoing banking reforms fail to fully come to grips with shadow banks. Given the level of financial competition, they argue that tightened regulation applying to traditional banks will drive a larger share of intermediation into shadow banks. In this paper, we find that despite higher regulatory costs, traditional are complements to shadow banks. In line with the regulatory arbitrage view, we find that absent regulatory costs for traditional banks, traditional and shadow banks would not coexist. Bankers would only set up one bank type.

Some papers study banking regulation in the presence of shadow banks, i.e. capturing the regulatory arbitrage mechanism. Plantin (2015) studies optimal bank capital regulation in the presence of shadow banks, and finds that the optimal regulation needs not be in line with current regulatory reforms. In Ordonez (2013), regulation provides a commitment device for traditional banks to avoid excessive risk taking. He finds that an optimal policy is to tax shadow banks and subsidize traditional banks, allowing banks to self-select into the traditional and shadow banking sectors depending on their investment opportunities. In the existing literature, shadow banks emerge in response to tightened regulation of traditional banks, failing to explain the coexistence of traditional and shadow banks that we observe in reality. This is the aim of this paper. We propose a theory of the coexistence of traditional and shadow banks based on their interactions in a crisis, consistent with documented stylized facts.

A second group of theories assume the coexistence of traditional and shadow banks. Luck and Schempp (2016) study the conditions for runs in the shadow banking sector to spread to traditional banks. Hanson et al. (2015) are interested in which assets are held by traditional versus shadow banks.

Our model is in line with theories of banks as issuers of riskless claims. A seminal paper is Gorton and Pennacchi (1990).⁷ Our model is based on Stein (2012), however we consider two types of banks, traditional and shadow banks.

Finally, some papers study the coexistence of traditional and shadow banks. In LeRoy and Singhanian (2017), deposit insurance subsidizes traditional banks, benefitting shadow banks through different channels depending on how deposit insurance is priced. The relative size of the traditional banking sector then depends on the size of the insurance subsidy. Gornicka (2016) develops a model where shadow banking stems from regulatory arbitrage by traditional banks, and traditional banks provide exogenous guarantees to shadow banks that render both bank types complements. To the best of our knowledge, our paper is the first

⁶ Other examples include Boyd and Gertler (1994) and James and Houston (1996).

⁷ Other recent papers include DeAngelo and Stulz (2015), Plantin (2015), and Gennaioli et al. (2013).

to provide a theory of the coexistence of traditional and shadow banks based on their interaction in a crisis, that is consistent with stylized facts from the financial crisis.

REFERENCES

- PURIYA, A., R. IYER, J.-L. PEYDRÓ, and Fr. R. TOUS, (2015), “Securities trading by banks and credit supply: Micro-evidence”, *Journal of Financial Economics*.
- VIRAL, A. V. and N. MORA, (2015), “A Crisis of Banks as Liquidity Providers”, *Journal of Finance*, 70(1):1-43, 02.
- VIRAL, A. V., Ph. SCHNABL, and G. SUAREZ, (2013), “Securitization without risk transfer”, *Journal of Financial Economics*, 107(3): 515-536.
- TOBIAS, A. and H. SONG SHIN, (2010), “Liquidity and leverage”, *Journal of Financial Intermediation*, 19(3):418-437.
- ANG, A., S. GOROVYY, and Gr. B. VAN INWEGEN, (2011), “Hedge fund leverage”, *Journal of Financial Economics*, 102(1):102-126.
- BARON, M., (2016), Countercyclical bank equity issuance.
- BIGIO, S., J. BEGENAU, and J. MAJEROVITZ, (2016), “What can we learn from the financial flows of the 2008-2009 crisis?”, mimeo, Harvard University.
- BOYD, J.H., and M. GERTLER, (1994), “Are banks dead? Or are the reports greatly exaggerated?”, *Quarterly Review*, (Sum):2-23.
- BUCHAK, G., G. MATVOS, T. PISKORSKI, and A. SERU, (2017), Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks, NBER Working Papers 23288, National Bureau of Economic Research, Inc.
- CABALLERO, R.J, and E. FARHI, (2016), The Safety Trap, Working Paper 233766, Harvard University OpenScholar.
- CALOMIRIS, Ch.W., and Ch. M KAHN, (1991), “The Role of Demandable Debt in Structuring Optimal Banking Arrangements”, *American Economic Review*, 81(3):497-513.
- CHERNENKO, S., S.G. HANSON, and A. SUNDERAM, (2014), The Rise and Fall of Demand for Securitizations, NBER Working Papers 20777, National Bureau of Economic Research, Inc.
- COPELAND, A., A. MARTIN, and M. WALKER, (2014), “Repo Runs: Evidence from the Tri-Party Repo Market”, *Journal of Finance*, 69(6):2343-2380.
- DAVILA, E., and I. GOLDSTEIN, (2016), Optimal deposit insurance, Working paper.
- DEANGELO, H., and R.M. STULZ, (2015), “Liquid-claim production, risk management, and bank capital structure: Why high leverage is optimal for banks”, *Journal of Financial Economics*, 116(2):219-236.

- DIAMOND, D.W., and Ph.H. DYBVIK, (1983), “Bank runs, deposit insurance, and liquidity”, *Journal of Political Economy*, 91(3):401-19.
- DIAMOND, D.W., and RAGHURAM, G. RAJAN, (2001), “Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking”, *Journal of Political Economy*, 109(2):287-327.
- DUFFIE, D., (2016), *Financial Regulatory Reform after the Crisis: An Assessment*, Research Papers 3440, Stanford University, Graduate School of Business.
- EUROPEAN SYSTEMIC RISK BOARD ESRB, (2016), *Eu shadow banking eu shadow banking monitor*, ESRB Reports, 1.
- FINANCIAL STABILITY BOARD FSB, (2015), *Global shadow banking monitoring report 2015*, Technical Report.
- GAGNON, J.E., M. RASKIN, J. REMACHE, and B.P. SACK, (2011), “Large-scale asset purchases by the Federal Reserve: did they work? *Economic Policy Review*, (May):41-59, 2011.
- GATEV, E., and Ph.E. STRAHAN, (2012), “Banks’ Advantage in Hedging Liquidity Risk: Theory and Evidence from the Commercial Paper Market”, *Journal of Finance*, 61(2):867-892.
- GENNAIOLI, N., A. SHLEIFER, and R.W. VISHNY, (2013), “A Model of Shadow Banking”, *Journal of Finance*, 68(4):1331-1363.
- GORNICKA, L., (2016), “Banks and shadow banks: Competitors or complements?”, *Journal of Financial Intermediation*, forthcoming.
- GORTON, G. and A. METRICK, (2011), “Securitized banking and the run on repo”, *Journal of Financial Economics*, 104(3):425-451.
- GORTON, G. and G. PENNACCHI, (1990), “Financial Intermediaries and Liquidity Creation”, *Journal of Finance*, 45(1):49-71.
- HANSON, S.G., A.K. KASHYAP, and J.C. STEIN, (2011), “A Macroprudential Approach to Financial Regulation”, *Journal of Economic Perspectives*, 25(1):3-28.
- HANSON, S.G., A. SHLEIFER, J.C. STEIN, and R.W. VISHNY, (2015), “Banks as patient fixed-income investors”, *Journal of Financial Economics*, 117(3):449-469.
- HARRIS, M., Chr.C. OPP, and M.M. OPP, (2015), “The system-wide effects of bank capital regulation on credit supply and risk-taking”, mimeo.
- HE, Z., I. Gu KHANG, and A. KRISHNAMURTHY, (2010), “Balance sheet adjustments during the 2008 crisis”, *IMF Economic Review*, 58 (1):118-156.
- IMF, (2014), *Shadow banking around the globe: How large, and how risky?*, Global financial stability report, International Monetary Fund.
- IVASHINA, V. and D. SCHARFSTEIN, (2010), “Bank lending during the financial crisis of 2008”, *Journal of Financial Economics*, 97(3): 319-338.
- JAMES, Chr. and J. HOUSTON, (1996), “Evolution Or Extinction: Where Are Banks Headed?”, *Journal of Applied Corporate Finance*, 9 (2):8-23.

- KASHYAP, A.K., R. RAJAN, and J.C. STEIN, (2002), “Banks as Liquidity Providers: An Explanation for the Coexistence of Lending and Deposit-Taking”, *Journal of Finance*, 57(1):33-73.
- KRISHNAMURTHY, A., (2008), *Fundamental value and limits to arbitrage*.
- KRISHNAMURTHY, A., and A. VISSING-JORGENSEN, (2015), “The impact of Treasury supply on financial sector lending and stability”, *Journal of Financial Economics*, 118(3):571-600.
- LEROY, S. and R. SINGHANIA, (2017), *Deposit insurance and the coexistence of commercial and shadow banks*, mimeo.
- LUCK, S. and P. SCHEMPP, (2016), *Banks, Shadow Banking, and Fragility*, Working paper.
- MERRILL, C.B., T. NADAULD, R.M. STULZ, and Sh.M. SHERLUND, (2012), *Did Capital Requirements and Fair Value Accounting Spark Fire Sales in Distressed Mortgage-Backed Securities?*, Working Paper Series 2012-12, Ohio State University, Charles A. Dice Center for Research in Financial Economics.
- MERTON, R.C., (1995), “Financial innovation and the management and regulation of financial institutions”, *Journal of Banking & Finance*, 19(3-4):461-481.
- ORDONEZ, G., (2013), *Sustainable Shadow Banking*, NBER Working Papers 19022, National Bureau of Economic Research, Inc.
- PLANTIN, G., (2015), “Shadow Banking and Bank Capital Regulation”, *Review of Financial Studies*, 28(1):146-175.
- POZSAR, Z., T. ADRIAN, A.B. ASHCRAFT, and H. BOESKY, (2013), “Shadow banking”, *Economic Policy Review*, (Dec):1-16.
- RAJAN, R.G., (1998a), “Do we still need commercial banks?”, in NBER.
- RAJAN, R.G., (1998b), “The Past and Future of Commercial Banking Viewed through an Incomplete Contract Lens”, *Journal of Money, Credit and Banking*, 30(3):524-50.
- SHLEIFER, A., and R.W. VISHNY, (2010), “Unstable banking”, *Journal of Financial Economics*, 97(3):306-318.
- STEIN, J.C., (2012), “Monetary Policy as Financial Stability Regulation”, *The Quarterly Journal of Economics*, 127(1):57-95.
- STEIN, J.C., (2013), *The fire-sales problem and securities financing the fire-sales problem and securities financing transactions*, Speech by Governor Jeremy C. Stein, New York.

12. VULNERABLE ASSET MANAGEMENT?

Christoph Fricke and Daniel Fricke

12.1. ARE ASSET MANAGERS SYSTEMICALLY IMPORTANT?

There is no clear consensus on whether the asset management industry contributes to financial instability. On the one hand, empirical evidence suggests that significant portfolio overlap and correlated trading strategies among institutions can indeed have major systemic repercussions. Two prominent examples are first, the role of portfolio insurers in the market crash of October 1987 and second, the systemic repercussions of the hedge fund Long Term Capital Management in 1998. On the other hand, leading industry representatives repeatedly argue that asset managers are not a source of systemic risks. For example, the Investment Company Institute claims that existing microprudential regulations for investment funds (e.g., leverage and liquidity constraints) are effective in the sense that these were quite robust during the most recent crisis episodes (Investment Company Institute (2016)). Clearly, simply because no major disruptions were observed in the recent past, this should not be taken as an assurance that nothing will happen in the future. Therefore, there is a general need for regulators and policymakers to understand whether the industry is vulnerable to systemic crises.

The next question is how to quantify the systemic risk contribution of individual institutions. The Financial Stability Board (2015) mentions asset liquidation and exposure risk as potential channels through which stress can propagate within the sector, and therefore size and leverage could serve as simple systemicness indicators. Building on Greenwood, Landier, and Thesmar (2015), we develop a macroprudential stress-test for asset managers that takes both market and funding liquidity risk into account. As an illustration, we then apply the model to the economically important subset of U.S. equity mutual funds.

12.2. STRESS-TEST MODEL

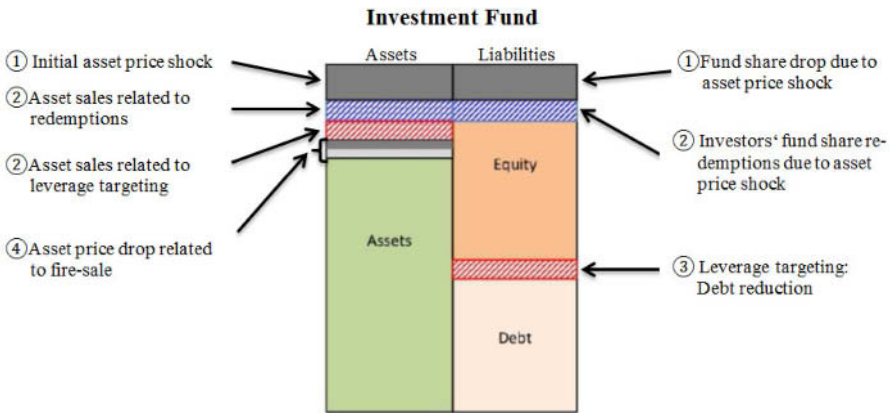
Our model is an extension of Greenwood et al. (2015). Broadly speaking, the model can be applied to any set of asset managers and has four main steps:

1. we impose an initial shock on the value of asset managers' asset holdings.
2. Investors in these asset managers react to the initial shock by withdrawing some of their investments (flow-performance relationship).
3. Asset managers have fixed leverage targets and aim to keep their portfolio weights constant.

4. Asset liquidations affect market prices, with more illiquid assets showing larger price changes for a given liquidation amount (price impacts).

Figure 1 illustrates these steps based on the stylized balance sheet of an asset manager. The main innovation of our stress-test model is step 2, the inclusion of a funding shock to the asset manager. This is in line with a vast existing literature on mutual funds’ funding stability (e.g., Sirri and Tufano (1998); Berk and Green (2004)). For simplicity, we assume a positive linear relationship between asset managers’ performances and net inflows. Hence, negative (positive) fund performance is followed by an outflow (inflow) of money. Note that this additional funding shock can be seen as an amplifier of the initial shock in step 1.

Figure 1: Illustration of the four steps in our macroprudential stress test.



Ultimately, we are interested in the price impacts and the resulting losses, in step 4. These are measured by the light and dark gray blocks in Figure 1, which give us the losses of a given asset manager due to asset liquidations of other institutions.

Following Greenwood et al. (2015), we therefore propose several measures of vulnerability. Our first measure, which we call *Aggregate Vulnerability (AV)*, quantifies the total losses due to asset liquidations relative to initial equity. Technically, *AV* can be calculated by summing up the abovementioned light and dark gray blocks from step 4 for all asset managers, and then dividing it by the total initial equity in the system. We also derive two institution-specific vulnerability indicators: the *Systemicness (S)* of a given asset manager *i* is its contribution to the aggregate vulnerability of the system, *AV*. In other words, *S* measures the externality of a given institution on all others. The *Indirect Vulnerability (IV)* of a given institution *i* is its vulnerability to all other institutions’ asset liquidations. Thus, it quantifies the externalities of other institutions on *i*.

12.3. QUANTIFYING THE VULNERABILITIES OF U.S. EQUITY MUTUAL FUNDS

While the model could be used to quantify systemic vulnerabilities of any set of asset managers, here we apply it to the set of U.S. domestic equity funds. We restrict ourselves to this particular fund type since we have accurate information on their asset holdings over a relatively long sample period (CRSP Mutual Fund Database). Moreover, we can match these holdings with stock-specific information from CRSP-Compustat, which allows us to estimate the price impact parameters separately for each stock over time.

Our final sample comprises 48 quarters between 2003-Q1 and 2014-Q4.¹

12.3.1. Aggregate Vulnerabilities

Here we impose an initial shock of -5% on all stocks and calculate the aggregate vulnerabilities (AV) separately for each quarter. We only show the results for time-varying, stock-specific price impacts.

Figure 2 shows the range of possible AVs for varying assumptions on the leverage ratios. With zero leverage, the typical AVs are on the order of 0.5%; with maximum leverage these values are around 2%.

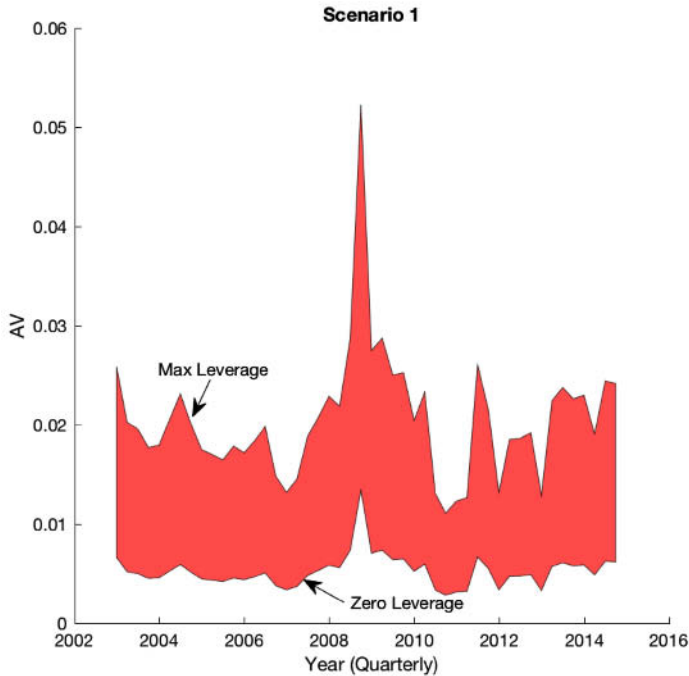
In comparison with the AV of 245% reported by Greenwood et al. (2015) (assuming a 50% GIIPS shock), these values are generally small.

Another question is whether the vulnerability of this subset of the asset management sector has significantly increased over time. It turns out that, for the scenario under study here, the AVs exhibit no significant time trend. In other words, when using time-varying and asset-specific price impacts we do not find that the system has become more vulnerable despite the strong growth in terms of system size.

Overall, these results indicate that the aggregate vulnerability of the system is relatively small. Hence, systemic asset liquidations are unlikely to be a major issue for the set of U.S. equity mutual funds, at least when looking at this part of the asset management industry in isolation.

¹ It turns out that two parameters are key for our analysis. First, the flow-performance relationship (see Chevalier and Ellison (1997)). We estimate a sensitivity of fund percentage net inflows to one month lagged fund returns of ≈ 0.3 . Second, the price impact of fire-sales. These are measured by the standard Amihud (2002) ratio. The typical (volume-weighted) price impact corresponds to a price drop of roughly -1% when assets worth \$1 million are liquidated.

Figure 2: Aggregate vulnerabilities of U.S. equity mutual funds. We calculate the AVs when using zero leverage and maximum leverage (according to the Investment Company Act of 1940), respectively, such that the shaded area shows the range of possible AVs.



12.3.2. Fund-Specific Vulnerabilities

What makes funds vulnerable to asset fire-sales? Our model suggests that system-icness should increase with a larger fund size or interconnectedness. This is because larger funds should fire-sale more assets in absolute terms, and a higher interconnectedness means that those funds sell assets that are held by many other funds as well. Consequently, fire-sales of more interconnected funds affect the performance of other funds more strongly compared to less connected funds, keeping everything else equal. The reverse is true for indirect vulnerability, since more diversified funds should be less vulnerable to other funds' asset liquidations. More illiquid funds should be both more systemic and vulnerable in general, since illiquid funds' asset liquidations will affect market prices more strongly and they will also be more affected by other funds fire sales.

Based on the above discussion, we explore the natural determinants of fund-specific vulnerabilities, namely fund size, portfolio overlap with other funds, and portfolio illiquidity. We find empirical evidence in line with the above

hypotheses.² An important finding is that both fund-specific vulnerabilities tend to increase with portfolio illiquidity. This makes sense, given that funds with illiquid asset portfolios will have a larger price impact when liquidating the same amount of assets as a relatively liquid fund.

12.4. IMPLICATIONS

Do our findings suggest that the mutual fund sector is robust to systemic crises? The answer is 'yes' if we are interested in the set of U.S. domestic equity funds in isolation. However, especially the corporate and high-yield bond fund sector has grown substantially since the financial crisis (Goldstein, Jiang, and Ng (2016); Cetorelli, Duarte, and Eisenbach (2016)). Therefore, regulators might be interested in applying our model to the whole asset management sector in order to achieve a better understanding of all interdependencies in the sector.

As fund illiquidity tends to contribute to vulnerabilities in the asset management industry, we suggest that regulators should monitor funds' liquidity profiles. This is in line with recent initiatives by micro- and macroprudential regulators to monitor the liquidity profiles of individual funds or the asset management sector as a whole (see Financial Stability Board (2017), Securities and Exchange Commission (2016)).

REFERENCES

- AMIHUD, Y., (2002), "Illiquidity and stock returns: Cross-section and timeseries effects", *Journal of Financial Markets* 5 (1), 31-56.
- BERK, J.B. and R. GREEN, (2004), "Mutual fund flows and performance in rational markets", *Journal of Political Economy* 112, 1269-1295.
- CETORELLI, N., F. DUARTE, and T. EISENBACH, (2016), Are asset managers vulnerable to fire sales? Blogpost Liberty Street Economics (February 18, 2016).
- CHEVALIER, J. and G. ELLISON, (1997), "Risk taking by mutual funds as a response to incentives", *Journal of Political Economy* 105 (6), 1167-1200.
- FAMA, E. and J. MACBETH, (1973), "Risk, return, and equilibrium: Empirical tests", *Journal of Political Economy* 81, 607-636.

² Our findings make use of the Fama and MacBeth (1973)-methodology, where we regress the fund-specific vulnerability measures Indirect Vulnerability (IV) and Systemicness (S) on fund-specific variables. More details on the empirical exercise can be found in Fricke and Fricke (2017).

- FINANCIAL STABILITY BOARD, (2015), Assessment methodologies for identifying Non-Bank Non-Insurer Global Systemically Important Financial Institutions. Consultative document.
- FINANCIAL STABILITY BOARD, (2017), Policy recommendations to address structural vulnerabilities from asset management activities. Policy document.
- FRICKE, C. and D. FRICKE, (2017), “Vulnerable Asset Management? The Case of Mutual Funds”, *Deutsche Bundesbank Discussion Paper* No 32/2017.
- GOLDSTEIN, I., H. JIANG, and D. NG, (2016), “Investor flows and fragility in corporate bond funds”, forthcoming: *Journal of Financial Economics*.
- GREENWOOD, R., A. LANDIER, and D. THESMAR, (2015), “Vulnerable banks”, *Journal of Financial Economics* 115, 471-485.
- INVESTMENT COMPANY INSTITUTE, (2016), ICI 2016 fact book. Technical report.
- SECURITIES AND EXCHANGE COMMISSION, (2016), Investment company liquidity risk management program rules. Policy document.
- SIRRI, E. R. and P. TUFANO, (1998), “Costly search and mutual fund flows”, *Journal of Finance* 53, 1589-1622.

13. A CRITICAL REVIEW OF THE STATISTICS ON THE SIZE AND RISKINESS OF THE SECURITIZATION MARKET: EVIDENCE FROM ITALY AND OTHER EURO-AREA COUNTRIES

*Giorgio Nuzzo*¹

13.1. INTRODUCTION

The global financial crisis that erupted in 2007 has highlighted the risks stemming from non-bank financial intermediation (Gorton and Metrick, 2012; Acharya et al., 2013; Adrian and Ashcraft, 2012).² The debate on these risks has expanded and the notion of shadow banking has been created (the term was coined by McCulley, 2007). However, the risks have been important mainly in Anglo-Saxon countries. In Italy, non-bank financial entities are fully regulated in accordance with the principle of “bank equivalent regulation” and have proved to be safe (see Gola et al., 2017 for a detailed description of the Italian supervisory and regulatory framework of non-bank financial intermediaries).

Among shadow banking activities, securitization is often indicated as one of the most significant and potentially harmful (e.g. Stein, 2010; Pozsar et al., 2013). Therefore, the international debate has paid increasing attention to measuring the size and riskiness of the securitization market. In this note size and riskiness are discussed separately, on the grounds that a bigger securitization market is not necessarily riskier than a smaller one.

The data on the balance sheets of financial vehicle corporations (FVCs) are a useful source for the analysis of the securitization market and in fact the European Central Bank (ECB) has been collecting them since 2009 (see Appendix for details). The main activity of FVCs is the “securitization” of a bundle of assets (mainly loans) transferred from banks and other intermediaries by transforming them into debt securities. However, data on FVCs’ balance sheet are complex and hide insidious technical details: on closer scrutiny they are likely to provide poor estimates of the size and riskiness of the securitization market. This note provides a critical review of the metrics mainly used in international fora and applies them

¹ Giorgio Nuzzo, Statistical Analysis Directorate, Bank of Italy. I thank Massimiliano Affinito, Giorgio Albareto, Marco Burroni, Riccardo De Bonis, Giovanni di Iasio, Carlo Gola, Clive Jackson, Antonio Ilari, Michele Lanotte and Eduardo Maqui. The views expressed in this note are my own and do not necessarily reflect those of the Bank of Italy.

² Gorton and Metrick (2012) mainly describe the panic in the “repo” market in the years 2007-08. Acharya et al. (2013) highlight the role of regulatory arbitrage in widening the shadow banking system. For a review of the literature on shadow banking see Adrian and Ashcraft (2012).

to both Italy and the rest of the euro area; it also compares the results obtained by the standard analyses with those obtained using new indicators.

The analysis confirms that FVCs' total assets are not a satisfactory statistic for measuring the size of the securitization market. Rather, risk analysis should focus on specific areas such as maturity mismatch and the opaqueness/complexity of operations. According to more appropriate measures, the Italian securitization market is much smaller and characterized by a lower risk than those of other euro-area countries.³ This evidence is in line with the negligible defaults of Asset Backed Securities (ABS) in Italy since the introduction of securitization in 1999.

The rest of the note is organized as follows. The second section analyses the measures of the size of the securitization market. The third section reviews risk indicators of securitization activities.

13.2. HOW TO MEASURE THE SIZE OF THE SECURITIZATION MARKET

13.2.1. The trouble with the current measures

There are several definitions of shadow banking (See Financial Stability Board, 2013 in Annex 2.1 for an overview of those used in the literature). We focus on the most widely used definition, that proposed by the Financial Stability Board (FSB): “*credit intermediation involving entities and activities outside the regular banking system*” (FSB, 2013). According to the FSB, shadow banking includes all the non-bank financial intermediaries that create/bear bank-like risks, regardless of whether they are regulated and/or supervised.⁴ The choice is motivated by the willingness of the FSB to “cast the net wide” and not to take account of specific country supervisory/regulatory frameworks. Here, we accept the point of not considering the supervision/regulation of these entities as a sufficient reason for excluding them from the shadow banking perimeter. Nevertheless, I argue that there are some critical issues with the current entity-based statistics of the size of shadow banking, in particular in the context of the securitization market.⁵

Indeed, standard measures of the size of the securitization market use FVCs' total asset as they are reported in the statistics on FVCs.⁶ This approach can result in

³ See Affinito and Tagliaferri (2010) on *ex-ante* determinants of bank loan securitization in Italy.

⁴ OECD (2016) also shows the mapping of shadow banking through national accounts as including all non-bank financial entities, even if they are regulated and supervised.

⁵ As an alternative to the FSB's entity-based measurement approach, IMF (2014) and Harutyunyan et al. (2015) have proposed an activity-based measure of the size of shadow banking that uses all non-core liabilities (i.e. other than deposits) of both bank and non-bank financial institutions. However, under their approach the contribution of securitizations to shadow banking cannot be singled out.

⁶ These data are available for all the euro-area countries.

an over-estimation of the market's size for two reasons: the first is the presence in the assets of FVCs of retained securitizations; the second stems from the failure to give adequate consideration to an accounting evaluation problem that occurs when loans (mainly non-performing ones) are securitized at a discount price.

As for the first issue, retained securitizations, i.e. those operations where securities issued by FVCs are mainly bought back by the originators of the securitized loans,⁷ should not be considered in shadow banking, but more properly as a banking activity.⁸ In the most recent reports by the FSB this issue is taken into account, even if only in the process of narrowing down the broad shadow banking definition. In FSB (2013) only self-securitizations (those operations where the bank acquires all the securities backed by its securitized loans), which are a part of all retained securitizations, are filtered out when calculating "narrow" shadow banking, while in FSB (2014, 2015) all FVCs prudentially consolidated in banking groups are more correctly ruled out.

In addition, it should be noted that in some euro-area jurisdictions originators' statistical reports continue to show the loans connected to retained securitizations in their balance sheets. For example, in Italy the International Accounting Standard (IAS) rules on derecognition apply to banks' statistics. Thus, derecognition is not allowed when originating banks transfer an asset but retain the related risks and rewards. FVCs' statistics record assets regardless of whether they are derecognized by the originators or not. Therefore, summing FVCs' and banks' assets to calculate total financial assets is not correct, since non-derecognized securitized assets are added twice; more properly they should be considered only as banks' assets. In other words from an accounting and risk perspective, these assets should be considered banks' assets. The issue is sizeable: in December 2016 loans securitized and non-derecognized (through euro-area FVCs) amounted to around 47 per cent of the total loans securitized by euro-area FVCs. The share is even higher for Italy (69 per cent; 29 per cent of total euro-area non-derecognized loans).

The second over-estimation is related to an accounting valuation problem. In FVCs' statistics securitized assets are evaluated at their nominal value. However originators can write down the assets before they are transferred to the vehicles so that FVCs purchase assets at a price below the nominal value. The issue is particularly significant in the case of the securitization of non-performing loans. The item "other liabilities" in FVCs' balance sheet may show the importance of this mismatch as it includes the difference between the nominal value and the

⁷ Such operations became common in the years immediately after the collapse of Lehman Brothers in order to produce collateral to use in refinancing operations with the ECB. In recent years, the presence of alternative funding instruments, such as covered bonds, has reduced the importance of these operations.

⁸ However, Grillet-Aubert et al. (2016) argue that when retained securitizations are placed with investors, they should be taken into account again.

purchase price of assets, in accordance with ECB regulations. In December 2016 the ratio between “other liabilities” and total securitized loans was 15 per cent for euro-area FVCs⁹ and 36 per cent for Italian FVCs.

The disposals of bad loans at a discount price usually occur outside the boundaries of banking groups. Therefore the FSB narrow shadow banking measure, which filters out FVCs consolidated in banking groups, is still affected by an overestimation problem. In the FSB reports this question is not addressed, while it is highlighted in a recent report on shadow banking in Italy (Gola et al., cit.). This issue also poses a problem of comparability among shadow banking activities, since other important sectors (e.g. investment funds) are usually evaluated at market price.

To sum up, the two overestimating factors are not negligible and their impact is strikingly more important for Italian securitizations than for those of other euro-area countries.

13.2.2. An alternative measure of the size of the securitization market

A feasible measure¹⁰ of the actual importance of the securitization market may be obtained as the difference between all debt securities issued by domestic FVCs and the FVCs’ securities bought back by banks.¹¹ On the one hand, subtracting FVCs’ securities bought back by banks clears up “retained securitization”; on the other, using debt securities issued by FVCs reduces valuation problems, since in a typical securitization the FVC issues debt securities at a value in line with the acquisition value of the assets.

However, this measure is accurate only for those euro-area countries, such as Italy, where securitization markets are self-contained at the domestic level; in addition, by definition, it is correct for the aggregate of the whole euro area.

Italy has a securitization market larger than the rest of the euro area when FVCs’ total assets are considered, but it is significantly smaller when the alternative measure is considered.

⁹ The data refer to the item published in the ECB statistical datawarehouse (SDW) related to traditional FVCs, which also includes “passive financial derivatives”. According to confidential data available to national central banks, financial derivatives on the liability side of FVCs’ balance sheet are a small part of the total item “financial derivatives and other liabilities”. In addition, a reason to consider the item “other liabilities” as consisting mainly of the difference between nominal and acquisition values is the fact that its value is near zero in countries where securitizations of non-performing loans are rare.

¹⁰ This measure is not applicable to synthetic securitizations or to activities (such as the direct lending permitted recently in Italian legislation on FVCs) not typically linked to securitizations.

¹¹ Focusing on securities issued rather than on total assets is in line with IMF (2014) and its activity-based approach to measuring shadow banking with non-core liabilities. Nevertheless, the statistics proposed here make it possible, using entity-based data on FVCs, to identify the securitization component of shadow banking.

13.3. HOW TO MEASURE THE RISKINESS OF SECURITIZATIONS

Several attempts to measure the risks associated with shadow banking activities have been made to date. We focus on the recent work by Grillet-Aubert et al. (2016), who describes the monitoring framework developed by the European Systemic Risk Board (ESRB).¹² The paper provides a useful classification of risk indicators, but in our view it fails to properly recognize that very different non-bank financial intermediaries are included in the shadow banking system and have very diverse risk profiles.¹³ For instance, Doyle et al. (2016) stress that investment funds are characterized by their own specific risks. The same is likely to hold for FVCs. This section is a first attempt to identify more specific risk measures for the securitization market.

Risk areas such as leverage, credit intermediation and interconnectedness with the regular banking system are not very significant if assessed through FVCs' balance sheets.

Leverage is always very high for FVCs. In some jurisdictions they typically have only the minimum statutory shareholders' equity required by their respective national laws. In many jurisdictions, such as Italy, FVCs are bankruptcy free. Therefore, holders of ABS can claim on the cash flows of the securitized assets or the eventual rescue by the sponsoring banks¹⁴ rather than on the FVCs' capital. In addition, data on euro-area countries reveal high heterogeneity in FVCs' capital, which severely affects leverage measures.

Nor are risks related to credit intermediation correct when addressed through FVCs' balance sheet. As highlighted in the previous section, FVCs' balance sheet record both derecognized and non-derecognized loans, which have a different role in credit intermediation. The derecognition of loans allows originators to free up capital. On the contrary, the main purpose of typical operations with non-derecognized loans, such as self-securitizations, is to provide temporary liquidity to originators. Therefore, indicators on credit intermediation that include both these two kinds of securitized loans could be misleading.¹⁵

¹² Recent FSB reports on shadow banking present risk areas similar to those of the ESRB and also apply indifferently to all shadow banking entities. OECD (2016) also provides an assessment of credit risk transfer, leverage and interconnectedness based on instruments available in national accounts for different sub-sectors, while not adequately identifying securitization peculiarities. Therefore, our main critical review of ESRB risk metrics also applies to the reports of the above-mentioned institutions.

¹³ However, Grillet-Aubert et al. (2016) complement their entity-based approach to risk measures with an activity-based approach which is more appropriate in the context of securitizations.

¹⁴ See Segura (2017) on the reasons why sponsoring banks rescue their structured investment vehicles despite having no contractual obligation to do so.

¹⁵ Grillet-Aubert et al. (2016) also admit that retained securitizations do not contribute to risks in shadow banking; they nonetheless calculate risk indicators on FVCs' data that include retained securitizations.

As for interconnection with the regular banking system, the evidence based on FVCs' statistics is not easy to interpret. For example, a higher interconnection related to self-securitization could be interpreted as an increase in the risk of contagion between banks and FVCs; however self-securitizations are banking operations and are therefore not part of shadow banking.

To sum up, only liquidity and maturity mismatch are assessed properly using FVCs' data. In addition, there are risk areas not mentioned by Grillet et al. that deserve the development of proper analytical tools. In particular, the financial crisis showed that complexity and opaqueness in securitization structures are closely correlated and pose several risks.¹⁶ To fill this gap we propose two indicators calculated using FVCs' statistics.¹⁷ The first is the percentage ratio of debt securities issued by synthetic securitizations¹⁸ and other non-traditional FVCs¹⁹ to the total debt securities issued by all FVCs. The second indicator is the percentage ratio of securitized loans with a non-domestic counterparty to total securitized loans. The two indicators are computed under the hypotheses that operations involving derivatives, non-credit assets and different jurisdictions can be considered more complex/opaque. Using this indicator, Italian FVCs are characterized by a negligible diffusion of non-traditional operations and by the importance of "domestic" securitizations, i.e. operations where operators and assets belong to the same jurisdiction.

¹⁶ IMF (2014) also identifies "*opacity and complexity*" as a risk profile relevant for shadow banking, but it fails to identify specific risk measures. Caballero and Simsek (2009) argue that opaqueness/complexity constitute vulnerabilities, since during periods of stress investors tend to retrench and flee to quality and transparency.

¹⁷ The measures proposed here cannot be used to properly estimate the importance of simple, transparent and standardized securitization for prudential purposes.

¹⁸ Synthetic securitizations imply the transfer of the credit risk of an asset or pool of assets through the use of credit derivatives, guarantees or some similar mechanism.

¹⁹ Those typically engaged in the securitization of non-credit related assets. ECB Regulation no. 40/2013 defines traditional securitizations as "*securitizations where there is a transfer of credit risk of an asset or pool of assets achieved either by the transfer of legal title or beneficial interest of the assets being securitised or through sub-participation*".

14. A SECURITIZATION-BASED MODEL OF SHADOW BANKING WITH SURPLUS EXTRACTION AND CREDIT RISK TRANSFER

*Patrizio Morganti*¹

14.1. INTRODUCTION

Driven by regulatory arbitrage, financial innovation, and the search for high-yield investment opportunities, the boom of shadow banking started in the U.S. at the end of the 1990s and lasted until the outbreak of the recent financial crisis. In 2007, U.S. total shadow banking liabilities were estimated as \$20 trillion against \$13 trillion of traditional banking ones, and the liabilities of the private securitization market were alone worth \$4.6 trillion, about 60% of total domestic private financial bonds.² Asset-backed securities (ABS) became very attractive instruments since they provided issuing companies with great liquidity while offering high-yield and less-risky investment opportunities to investors. Such investors mostly belonged to the asset under management industry: money market funds (MMFs) funded the asset-backed commercial paper (ABCP) segment while medium- to long-term debt investors, such as securities lenders, hedge funds, pension funds and insurance companies, funded the corporate segment. In the run-up to the crisis, investment decisions were broadly characterized by a huge wave of optimism that led investors to undertake a large-scale risk-taking behavior: “optimistic” risk-taker investors, such as hedge funds, played a key role in driving demand, and pushing up prices, for securitized risky assets.

Our paper contributes to the literature by offering *i*) a theoretical model, based on the framework of Gennaioli et al. (2013), for securitization involving credit risk transfer and for the search for yield motive of shadow banking, *ii*) some stylized facts related to the U.S. market for private ABS which support our theoretical outcomes.

14.2. THE MODEL

The model lasts two periods $t=0,1$ and is featured by two broad categories of agents, intermediaries and outside investors. Three possible final states may occur

¹ Research fellow at Tuscia University (Viterbo, Italy), Department of Economics and Engineering. Contact: morganti@unitus.it

² Pozsar et al. (2010) and U.S. Flow of Funds data.

at $t=1$, each one denoting general macroeconomic conditions: a “growth” state (g) in which most investments succeed, a less productive “downturn” (d), and an even less productive “recession” (r).

Intermediaries are risk-neutral and act both as originators and as special-purpose vehicles. They originate both riskless (prime) and risky (sub-prime) loans which are financed by their own equity and by the resources raised through the issuance of riskless debt claims. At $t=1$ prime loans yield a sure return, while the outcome of risky loans depends on *i*) the aggregate risk related to uncertain macroeconomic conditions, and on *ii*) the state-contingent idiosyncratic risk related to underlying borrowers. As a consequence, risky assets may yield a positive return or may default. Intermediaries securitize their whole portfolio of risky loans, in order to diversify idiosyncratic risk. However, we assume idiosyncratic risk to be fully eliminated only when ABS are traded among intermediaries: this implies that an intermediary cannot diversify idiosyncratic risk through its own projects but it must buy those of others.

Investors consist of two types: “pessimistic” or infinitely risk-averse, and “optimistic” or risk-taker. They invest their wealth in riskless debt or in asset-backed securities. Investors act as a sort of programmed agents that suffer of bounded rationality. According to their type, they expect to receive the highest, or the lowest, return on their portfolio of ABS, associated, respectively, to the realization of the best (growth) or of the worst (recession) state of the world. Their sentiment on future macroeconomic conditions affects the reservation prices related to their demand for securitized assets: the optimistic ones are willing to pay higher prices than the pessimistic ones.

14.2.1. Equilibrium at $t=0$

At $t=0$, agents make their optimal investment decisions and trade securities among them. Riskless loans are financed for first, but they are supposed to be limited. Two macro scenarios arise depending on the level of wealth available in the economy. When investors’ wealth is low (Scenario 1), only riskless debt is issued and the returns from safe loans are sufficient to guarantee its repayment. At high levels of wealth (Scenario 2), prime borrowers are all satisfied: intermediaries start financing sub-prime customers, and thus start securitizing risky assets. The returns on safe loans are no longer enough to repay additional units of debt, and intermediaries face an opportunity cost given by the proceeds they would give up from the sale of ABS in order to issue more units of debt pledged by additional securitized assets. It emerges that the trade of ABS is feasible only between intermediaries and optimistic investors since *i*) optimistic investors are attracted to the high-yield opportunity of investing in ABS, and *ii*) intermediaries are attracted to the high

willingness to pay of optimistic investors. Risk-taker investors are thus offering intermediaries a rent extraction incentive, and intermediaries want to extract the highest feasible surplus. Pessimistic investors invest only in riskless debt securities. The following equilibria may arise: 1) intermediaries trade ABS among themselves (implying no rent extraction), 2) intermediaries trade ABS only with optimistic investors (implying rent extraction), 3) intermediaries trade ABS among themselves and with optimistic investors (implying no rent extraction). By selling ABS to optimistic investors, intermediaries also transfer the idiosyncratic risk. Table 1 summarizes the main equilibrium outcomes at $t=0$.

Table 1: Summary of the main outcomes at $t=0$

Scenario 1	Scenario 2
Only prime loans are financed	Prime loans are exhausted, and risky loans are financed
No securitization	Intermediaries: <ul style="list-style-type: none"> ♦ issue and securitize risky loans ♦ sell ABS to optimistic investors and transfer idiosyncratic risk ♦ clear the ABS market if needed

14.2.2. Outcomes at $t=1$

At $t=1$, the state of the world is revealed and learned by everybody, output is produced and distributed to agents. Payoffs on ABS are state contingent (see Table 2). Capital gains are obtained only if the growth state occurs. When “bad” times occur aggregate risk turns to be systemic in the sense that it leads to large-scale losses to the holders of risky assets. Losses related to idiosyncratic risk are borne only by those optimistic investors whose underlying risky loans default, whatever the state of the world is. Shadow banking is confirmed to be procyclical, since it inflates payoffs when good times occur while it amplifies losses during bad times.

Table 2: Summary of the payoffs at $t=1$

Gains	Losses
Investors <ul style="list-style-type: none"> ♦ return on riskless debt claims (certain) ♦ optimistic ones: capital gain on ABS if the growth state occurs (state contingent) 	Related to aggregate risk <ul style="list-style-type: none"> ♦ suffered by optimistic investors and intermediaries on their portfolio of ABS if “bad” states occur (d or r)
Intermediaries <ul style="list-style-type: none"> ♦ proceeds from the sale of ABS (certain) ♦ capital gain on ABS if the growth state occurs (state contingent) 	Related to idiosyncratic risk <ul style="list-style-type: none"> ♦ suffered by those optimistic investors whose underlying risky loans default, whatever the state of the world is

14.3. SOME STYLIZED FACTS: THE U.S. MARKET FOR PRIVATE ABS

During the run-up phase to the recent crisis investors were overwhelmed by a huge wave of optimism which led to unambiguous signs of risk-taking behavior in the U.S. market for private ABS. We analyze a vast bulk of data on entities and instruments involved in the market in order to provide some stylized facts which support our theoretical outcomes.

14.3.1. Supply side

The supply of private asset-backed securities dramatically rose during the run-up to the crisis (Figure 1, upper panel). Corporate issuance grew more than commercial paper one, and total ABS liabilities accounted for 50 to 60% of total domestic financial bond issuance (Figure 1, lower panel).³ By aggregating quarterly data from securitization reports of SIFMA and AFME it emerges that before the crisis almost the 50% of issued ABS were below investment grade rating or not rated at all.

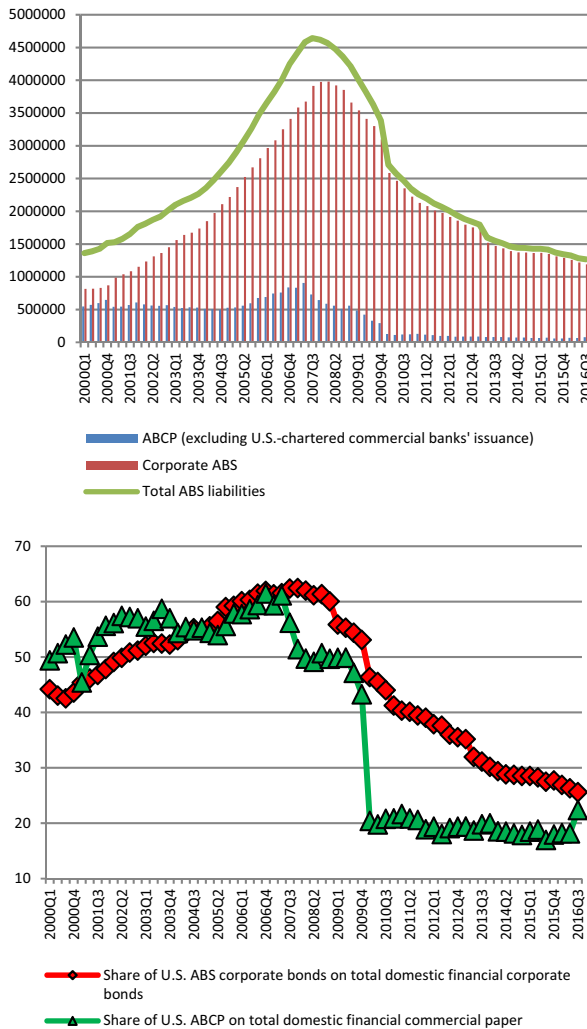
14.3.2. Demand side

The creditors of the securitization market mostly belong to the asset under management industry. We focus the attention on the corporate segment given its prominent weight on both total ABS issuance and total domestic bonds issuance.⁴ Figure 2 reports the holders of corporate ABS during 2003-2016. Flow of Funds provide data only for the following entities: U.S. chartered depository institutions, credit unions, property-casualty insurance companies, life insurance companies, government-sponsored enterprises, and rest of the world. Before the crisis, these entities held together almost the 50% of total ABS. The discrepancy between total corporate ABS liabilities and the total amounts of ABS held as assets by the previous reported entities corresponds to the amount of medium- and long-term ABS that was reasonably held by other longer-term investors, such as mutual funds other than MMFs, hedge funds, closed-end funds, brokers-dealers, finance companies, and funding corporations. Hedge funds were among the major holders of high-risky tranches of securitized assets through their involvement in the ABS-CDOs market. By June 2007 global hedge funds assets

³ Shares of ABS liabilities remain prominent even considering total domestic private bonds issuance: almost 30 to 40% for corporate ABS, and well above 50% for ABCP.

⁴ Money market funds mostly funded the ABCP segment. ABS intermediation was mostly conducted by broker-dealers through securities financing transactions (SFTs). See Pozsar et al. (2010), Gorton and Metrick (2012).

Figure 1: Liabilities of ABS issuers (quarters, 2000-2016)



Upper panel: levels, \$US millions. Lower panel: percentages.

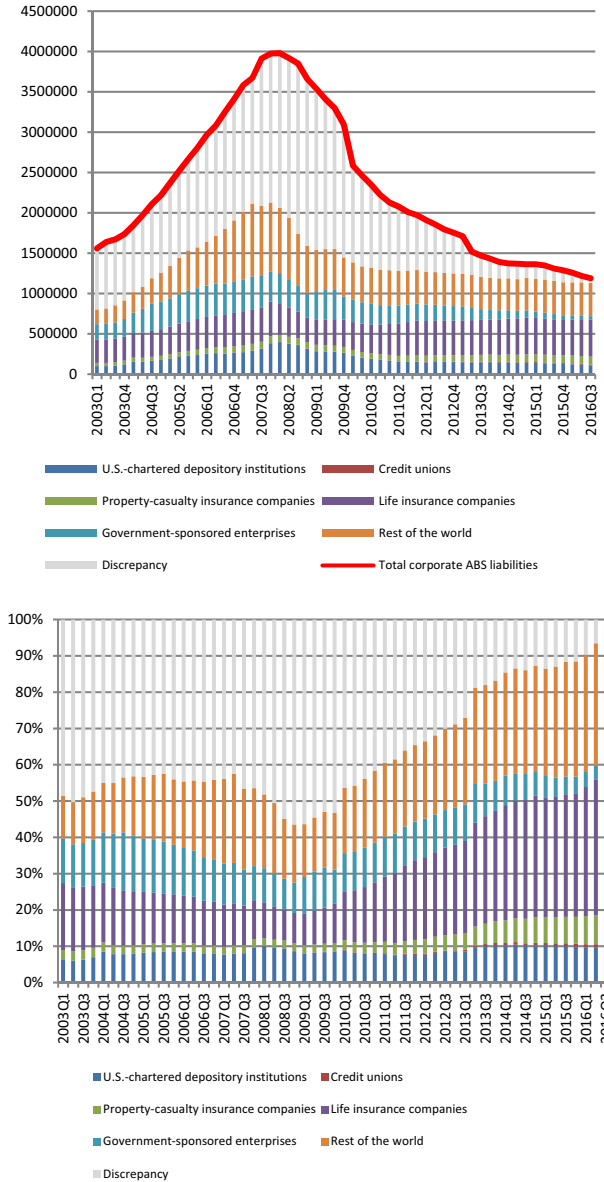
Source: FED Flow of Funds.

were estimated as \$2.2 trillion, with almost \$1.4 trillion invested in collateralized-debt obligations.⁵ Hedge funds qualify as a particular type of risk-taker investor whose strategy is aimed to produce high-positive returns by having little market risk and a lot of idiosyncratic risk.⁶

⁵ See FCIC (2010), Goda and Lysandrou (2014).

⁶ J.P. Morgan (2009).

Figure 2: Holdings of corporate ABS (quarters, 2003-2016)



Upper panel: levels, \$US millions. Lower panel: percentages on total corporate ABS liabilities.
Source: FED Flow of Funds.

14.3.3. Prices and yields

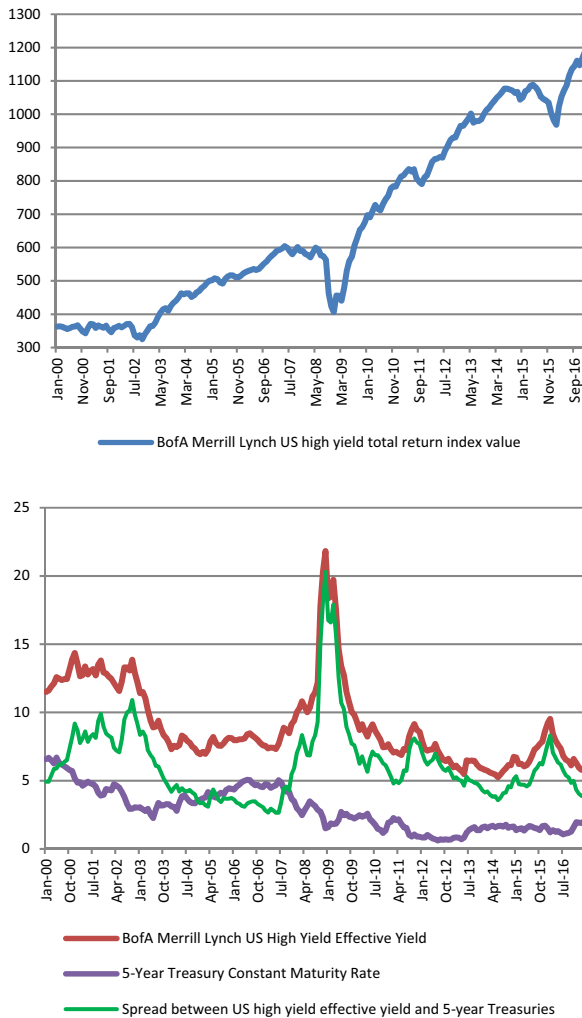
We use the BofA Merrill Lynch US High Yield Total Return Index Value and the BofA Merrill Lynch US High Yield Effective Yield, both from the Federal Reserve Bank of St. Louis, to retrieve representative information on prices and yields of risky corporate ABS (Figure 3).⁷ The performance of the U.S. high yield corporate bonds was remarkable in the pre-crisis period, mostly due to the growing demand for the attractive investment opportunities manufactured by the securitization market. We just learned how hedge funds, and in general other risk-taker “optimistic” investors, played a key role in driving the demand, and thus pushing up the prices, for the riskiest tranches of securitized assets. Such high-yield instruments were also perceived as nearly safe as similar treasury securities: from mid-2004 to mid-2007 the spread between the BofA Merrill Lynch US High Yield Effective Yield and the secondary market rate for 5-year constant maturity Treasuries was below 5%, reaching 266 basis points in February 2007.

14.4. CONCLUSIONS

Our paper provides a theoretical framework for securitization involving credit risk transfer and for the search for yield motive of shadow banking. As opposed to Gennaioli et al. (2013), the search for safe collateral motive is replaced by the search for yield motive. Investors’ sentiment on future macroeconomic conditions crucially determines the reservation prices related to the demand for securitized assets: investors with “optimistic” expectations are willing to pay higher prices than other market participants and thus offer a rent extraction incentive. Optimistic risk-taker investors are attracted to the high-yield investment opportunities manufactured by the ABS market, while intermediaries are attracted to the high willingness to pay of optimistic investors. The presence of optimistic investors allows our model to achieve the following outcomes: *i*) intermediaries sell ABS to optimistic investors in order to extract the highest feasible surplus, *ii*) intermediaries transfer the idiosyncratic risk to optimistic investors, *iii*) shadow banking is pro-cyclical since it inflates payoffs in “good” times, while it leads to large-scale losses in “bad” times. Our theoretical outcomes are consistent with the huge wave of optimism and the risk-taking behavior that has characterized investment decisions in the U.S. market for private ABS before the recent crisis. Risk-taker investors, such as hedge funds, played a key role in pushing up demand and prices for securitized risky assets in response to the growing appetite

⁷ These series represent, respectively, the values and effective yields of the BofA Merrill Lynch US High Yield Master II Index, which tracks the performance of US dollar denominated below investment grade rated corporate debt (based on an average of Moody’s, S&P, and Fitch) issued in the US domestic market with more than one year of remaining maturity.

Figure 3: U.S. high yield corporate bonds performance and effective yield (months, 2000-2017)



Upper panel: index points. Lower panel: percentages.
 Sources: BofA Merrill Lynch (2017a,b), FRED (2017).

for high returns. However, the recent crisis showed that the diversification benefits expected from securitization never materialized. The euphoria and the optimism in the financial markets concealed the inherent downside risk of such complex, and often low-quality, structured securities: no one would have expected a very bad state of the world, such a severe financial crisis, to occur in the short-run.

REFERENCES

- BOFA MERRILL LYNCH, (2017a), BofA Merrill Lynch US High Yield Effective Yield [BAMLH0A0HYM2EY], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/BAMLH0A0HYM2EY>, April 21, 2017.
- BOFA MERRILL LYNCH, (2017b), BofA Merrill Lynch US High Yield Total Return Index Value [BAMLHYH0A0HYM2TRIV], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/BAMLHYH0A0HYM2TRIV>, April 22, 2017.
- BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM, (2017), 5-Year Treasury Constant Maturity Rate [DGS5], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/DGS5>, April 22, 2017.
- FINANCIAL CRISIS INQUIRY COMMISSION, (2010), *Shadow Banking and the Financial Crisis*, Preliminary Staff Report.
- GENNAIOLI, N., A. SHLEIFER, and R.W. VISHNY, (2013), “A Model of Shadow Banking”, *The Journal of Finance*, 68(4), 1331-1363.
- GODA, T., and P. LYSANDROU, (2014), “The Contribution of Wealth Concentration to the Subprime Crisis: A Quantitative Estimation”, *Cambridge Journal of Economics* 38 (2): 301-27.
- GORTON, G., and A. METRICK, (2012), “Securitized Banking and the Run on Repo”, *Journal of Financial Economics*, 104(3), 425-451.
- J.P. MORGAN CHASE & CO., (2009), *Post-Modern Asset Management: The Credit Crisis and Beyond*, J.P. Morgan Asset Management.
- POZSAR, Z., T. ADRIAN, A. ASHCRAFT, and H. BOESKY, (2010), *Shadow Banking*, Federal Reserve Bank of New York, Staff Report No. 458.

15. SHADOW BANKING AND FINANCIAL STABILITY UNDER LIMITED DEPOSIT INSURANCE

*Lukas Voellmy*¹

15.1. INTRODUCTION

In this article, shadow banks denote financial institutions outside the traditional banking system that issue liabilities which can be considered substitutes to bank deposits. Just like bank deposits, shadow bank liabilities are redeemable on demand and promise a stable nominal value. Examples are money market mutual fund shares, overnight asset backed commercial paper or certain forms of repo. Poszar et al. 2010 and Ricks 2012 among others have documented this ‘money-creation’ outside the traditional banking system. Shadow banking as defined here is a phenomenon that is largely specific to the United States. However, the theoretical arguments that I make in this article should be relevant for other countries as well. In the United States, the first money market mutual funds have appeared in the 1970s as a response to regulation Q that forbid interest payments on bank deposits. Growth of shadow banking took off during the 1990s, notably at a time when regulation Q had largely been repealed. Shadow banks cater mostly to institutional investors that manage large cash balances (Poszar 2011).

15.2. SHADOW BANKS IN THE FINANCIAL CRISIS 2007-08

Economists have not paid much attention to shadow banking, until shadow banks took center stage during the financial crisis of 2007-08. The panic that took place in the money market mutual fund industry in the days after the Lehman bankruptcy in September 2008 was one of the most dramatic events of the financial crisis. After Lehman’s bankruptcy, the Reserve Primary Fund, a large money market mutual fund, revalued its outstanding shares from \$1 to \$0.97. This triggered a panic in the money market mutual fund industry, with investors withdrawing around \$300 billion from prime money funds within just three days. The Reserve Primary Fund was liquidated and eventually paid back 99.1% of its outstanding debt.² Schmidt et al. 2016 describe the entire episode in detail.

The panic in the money market mutual fund industry led to significant disruptions on financial markets and resembled bank runs of earlier times. In the United

¹ Study Center Gerzensee.

² See <http://www.primary-yieldplus-inliquidation.com/pdf/Fund-Update-92314.pdf> (last checked on 8/11/2017).

States, large-scale bank runs seemed to be a matter of the past after the creation of the FDIC and the establishment of deposit insurance in the 1930s. A key difference between the 2008 episode and banking panics of earlier times was that, in 2008, it was institutional investors rather than retail investors who ran on the (shadow-) banks.

15.3. SHADOW BANKING AND DEPOSIT INSURANCE

It is unlikely that the run on money market mutual funds could have happened if money market mutual fund shares were insured by government-provided deposit insurance. Insured depositors are protected from any losses and are unlikely to have an incentive to run on a bank. Uninsured depositors can have an incentive to run on a bank however. Banks generally follow a ‘first-come-first-serve’ rule when paying out their depositors. If uninsured depositors fear that a bank will be in trouble, be it because some of their investments failed or simply because many other depositors are going to withdraw from the bank, thereby causing liquidity problems for the bank, every uninsured depositor has an incentive to run to the bank in order to be the ‘first in the line’ and to be able to withdraw his deposits before the bank fails. The higher the share of uninsured depositors at a bank, the more likely it is that the bank is susceptible to runs.

Shadow banks operate outside the perimeter of the FDIC and therefore have 100% uninsured ‘depositors’ by definition. This makes shadow banks susceptible to runs and led some observers to conclude that the shadow banking sector poses a threat to financial stability. In this article, I want to highlight an important caveat to this argument. Shadow banks cater mostly to investors who do not have access to deposit insurance independent of the type of bank in which they invest. The institutional cash pools that are the main investors in shadow banks often manage cash holdings of several hundred million USD (Poszar 2011). Given that deposit insurance is capped at \$250’000 per bank and depositor it is likely to be impossible or impracticable for many institutional cash pools to hold their entire cash in the form of insured bank deposits.

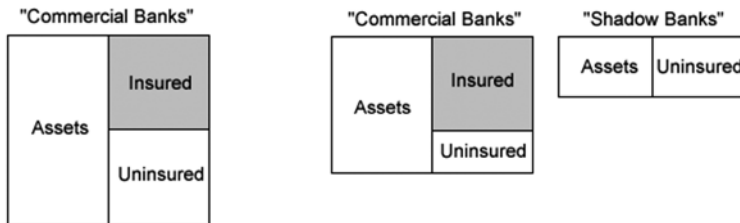
Given that shadow banks cater mostly to investors who do not have access to government-provided deposit insurance, what would the counterfactual situation without shadow banks look like? If the regulator curtails shadow banking, institutional cash pools might shift their cash holdings from shadow banks into commercial banks. Since the amounts managed by these cash pools generally far exceed the cap on deposit insurance, this will likely result in a massive increase in the amount of uninsured deposits held at commercial banks. It is not clear whether such an increase in uninsured deposits at commercial banks is desirable from a financial stability perspective. Indeed, one of the main theoretical results

of my paper is that a shadow banking sector can be beneficial from a financial stability perspective if the amount of cash-assets held by investors without access to deposit insurance is large. In the following, I will summarize the theoretical results of the paper. The full description of the model set-up and the derivation of the results can be found in the paper.³

15.4. ECONOMIES WITH A LARGE AMOUNT OF ‘UNINSURABLE’ DEPOSITS

Figure 1 depicts two alternative structures of a financial system, under the assumption that 50% of cash-assets are held by investors without access to deposit insurance. The left-hand side of figure 1 depicts a financial system with only commercial banks while the right-hand side depicts a financial system that features both a commercial banking- and a shadow banking sector. Since shadow banks cater to investors without access to deposit insurance they absorb uninsured deposits from the commercial banking sector.

Figure 1: Two alternative structures of the financial system.



If the share of uninsured deposits at commercial banks is high, then commercial banks become susceptible to runs. Hence in the financial system with only commercial banks and a high share of uninsured deposits in the commercial banking sector, as depicted on the left-hand side of figure 1, commercial banks may be susceptible to runs. In this case, bank runs can affect all banks in the economy. Consider now the financial system with both commercial- and shadow banks depicted on the right-hand side of figure 1. The presence of the shadow banking leads to a higher share of insured deposits in the commercial banking sector compared to the financial system with only commercial banks. The high share of insured deposits at commercial banks means that commercial banks are not susceptible to bank runs. Hence, while bank runs may occur in this financial system, they will be limited to the shadow banking sector. The potential

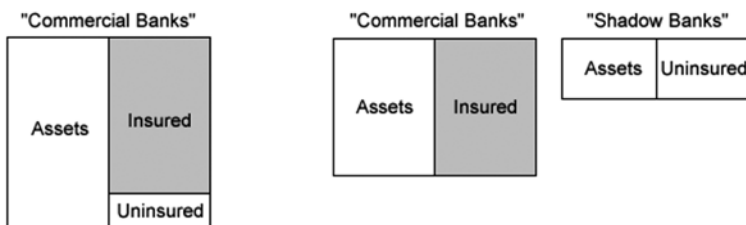
³ The full paper is available at SSRN: <https://ssrn.com/abstract=2988261>.

magnitude of systemic bank runs in the financial system with shadow banks is therefore smaller compared to the financial system with only commercial banks.

15.5. ECONOMIES WITH A SMALL AMOUNT OF ‘UNINSURABLE’ DEPOSITS

The result in the previous paragraph holds only true if the amount of cash-assets held by investors without access to deposit insurance is large. Figure 2 depicts again the two alternative structures of the financial system, with and without a shadow banking sector. The difference to figure 1 is that the amount of cash-assets held by investors without access to deposit insurance is low.

Figure 2: Situation with a small amount of uninsurable deposits.



In the situation depicted in figure 2, the share of uninsured deposits in the commercial banking sector is low, even if all investors without access to deposit insurance hold their cash-assets in the form of commercial bank deposits. This can occur if the cap on deposit insurance is high or if institutional cash pools constitute only a small fraction of all cash investors in the economy. Due to low share of uninsurable deposits, systemic bank runs do not occur in the financial system with only commercial banks. The right-hand side of figure 2 depicts a situation in which some cash investors invest in shadow banks rather than commercial banks. The incentive to invest in shadow banks may be to avoid various regulatory costs imposed on commercial banks. Since the liabilities issued by shadow banks are not protected by deposit insurance, the shadow banking sector is susceptible to runs. Different to the financial system with only commercial banks, bank runs can occur in the financial system with shadow banks. This illustrates that, if the amount of uninsurable deposits in the economy is low, the situation without shadow banks is generally preferable from a financial stability perspective.

15.6. CONCLUSION

This article highlights that the relation between shadow banking and financial stability depends on the cap on deposit insurance in place. If a large part of cash-assets is held by investors that do not have access to deposit insurance at commercial banks, policies aimed at curtailing the shadow banking sector should be viewed with caution. This is especially true if such policies lead to a flow of uninsured deposits into the commercial banking sector.

REFERENCES

- POSZAR, Z., (2011), “Institutional Cash Pools and the Triffin Dilemma of the U.S. Banking System”, *IMF Working Papers* No. 11/190.
- POSZAR, Z., T. ADRIAN, A. ASHCRAFT, and H. BOESKY, (2010), *Shadow Banking*, Federal Reserve Bank of New York Staff Reports No. 458.
- RICKS, M., (2012), “A Regulatory Design for Monetary Stability”, 65 *Vanderbilt Law Review* 1287.
- SCHMIDT, L., A. TIMMERMANN, and R. WERMERS, (2016), “Runs on Money Market Mutual Funds”, *American Economic Review*, Vol. 106(9), pp. 2625-57.

16. SHADOW BANKING, MACROPRUDENTIAL REGULATION AND FINANCIAL STABILITY

*Margarita Rubio*¹

16.1. INTRODUCTION

In the aftermath of the financial crisis, there is consensus on the need of macroprudential policies to smooth the financial system and therefore enhance its resilience. However, the jurisdiction to which macroprudential policies are applied may matter for their effects. If there are financial institutions that escape regulation, this latter could not have the desired effects on financial stability.

This is precisely the case with shadow banking. The definition of shadow banking is broad but it usually responds to the following features: (i) in credit intermediation, it performs a function similar to that of regular banks, (ii) this function is performed frequently by several players interacting with each another, usually via the financial market, and, (iii) shadow banking entities are neither subject to banking regulation or oversight, nor do they have access to deposit guarantee schemes or central bank money.

Thus, shadow institutions are not subject to the same prudential regulations as traditional banks. In the shadow banking system, credit intermediation takes place in an environment where prudential regulatory standards and supervisory oversight are either not applied or are applied to a materially lesser or different degree than is the case for regular banks engaged in similar activities. Shadow banking poses then regulatory arbitrage concerns: on the one hand, shadow banking activity can be used to circumvent and undermine banking regulations, leading to unintended spillovers of regulation. Moreover, when non-bank financial entities, which are subject to no regulation or a lighter regulation, undertake bank-like functions, large risks are created which could potentially be destabilizing for the entire financial system.

However, due in part to their specialized structure, shadow banks can sometimes provide credit more cost-efficiently than traditional banks. In the US, prior to the 2008 financial crisis, the shadow banking system had overtaken the regular banking system in supplying loans to various types of borrower; As they are often less risk averse than regular banks, entities from the shadow banking system will sometimes provide loans to borrowers who might otherwise be refused credit. Nevertheless, while all investments expose the investor to some level of risk, the

¹ University of Nottingham.

unknown consequences of having such a large shadow banking system may lead some investors to prefer more conservative investment strategies.

Therefore, shadow banking activities constitute a very useful part of the financial system. The main advantages of shadow banks lie in their ability to lower transaction costs of their operations, their quick decision-making ability, customer orientation, and prompt provision of services. Notwithstanding the complementary role played by shadow banks to the banking system, their activities, on the flip side, create risks which can assume a systemic dimension, due to their complexity, cross-jurisdictional nature, as well as their interconnections with the banking system. In other words, there are both advantages and disadvantages of a growing shadow banking system.

16.2. EVIDENCE ON SHADOW BANKING

The presence of shadow banking constitutes a growing concern on international policy institutions. The Financial Stability Board (FSB) closely monitors the evolution of this sector and raises issues on the risks it poses for financial stability. The FSB acknowledges that non-bank financing provides a valuable alternative to bank funding and helps support real economic activity, providing healthy competition for banks. However, its main concern is that it can become a source of systemic risk. To monitor these risks, the Financial Stability Board (FSB) has been conducting an annual monitoring exercise since 2011 to assess global trends and risks in the shadow banking system.

According to its most recent report, the activity-based, narrow measure of shadow banking was \$34 trillion in 2015, increasing by 3.2% compared to the prior year, and equivalent to 13% of total financial system assets and 70% of GDP of the jurisdictions analysed. The aggregated numbers do not show considerable heterogeneity between jurisdictions in terms of the importance and growth of other financial intermediaries in the respective domestic financial and economic systems. Loans extended by other financial intermediaries have been growing in 14 jurisdictions and the euro area since 2011. In some jurisdictions the growth in these loans since 2011 has been substantial, increasing at an annual rate of 10% or more in Australia, China, Germany, Indonesia, Korea, and South Africa, with China reporting the highest increase of 35%. The euro area as a whole had the largest sector of other financial intermediaries at end-2015 with assets totalling \$30 trillion, followed by the US (\$26 trillion), the UK (\$8 trillion), China (\$8 trillion), the Cayman Islands (\$6 trillion), Canada and Japan (each \$4 trillion). Compared to 2011, the euro area's share of total other financial intermediaries increased marginally from 32% to 33%, whereas the US' share decreased from 33% to 28% and the UK's share from 14% to 9%. In particular,

non-bank financial intermediation continued to grow in 2015 for 21 jurisdictions and the euro area, although at a more moderate rate compared to previous years. In terms of the relative size of the shadow banking sector, the US had the largest shadow banking sector across jurisdictions in 2015, representing 40% of the total shadow banking sector. The Cayman Islands reported the second largest shadow banking sector, followed by Japan, and Ireland. Combined together, the US, the UK, and participating euro area jurisdictions represented 65% of the total global shadow banking at end-2015. According to the European Systemic Risk Board (ESRB), the EU financial system remains primarily bank-based, but the non-bank component of the financial system has grown much faster since the crisis. While the aggregate growth of bank balance sheets is flat, a measure of EU market-based financing (other financial institutions, or OFIs, and investment funds) has almost doubled since 2008, and insurance companies and pension funds (ICPFs) have grown by 65%. Thus, evidence shows that shadow banking has been increasing over time and that in some areas it represents a large share of total banking activities.

In light of this evidence, the ESRB places the increasing presence of shadow banking on top of its priorities, since it may represent risks for financial stability. The ESRB acknowledges that current macroprudential requirements mainly apply to bank credit, which is only one component of total credit. Therefore, macroprudential instruments to address financial stability risks beyond the banking sector should be part of a wider macroprudential policy strategy. Cizel et al. (2016) perfectly summarize the risks of a large presence of shadow banking. These authors focus on the consequences of macroprudential policy of shifting activities and risks both to non-bank entities, that is, shadow banking or market-based financing. They estimate empirically the unintended effects of these policies producing cross-sector substitution effects. Their results support the hypothesis that macroprudential policies reduce bank credit growth. In their sample, in the two years after the activation of macroprudential policies, bank credit growth falls on average by 7.7 percentage points relative to the counterfactual of no measure. This evidence supports the idea that there is the need to extend macroprudential policy beyond banking, especially in advanced economies.

However, the development of this strategy needs to take account of different degrees of systemic risk in different parts of the financial sector as well as weighing both the benefits of financial stability against the possible costs in terms of constraints on credit provision. The ESRB is also concerned about the lack of a comprehensive macroprudential policy framework that can cause activities and risks to migrate across sectors. The impact of migration across sectors is more nuanced, as a shift to more non-bank finance may also reflect a rise in new systemic risks. A lack of supervisory data and differences in the regulatory framework imply that such cross-sector migration is difficult to capture. Then,

the development of macroprudential policy beyond banking is a key policy priority. As the non-bank financial sector grows and increases in systemic importance, it becomes more important to address financial stability risks beyond banking in a preventive manner. While all regulation seeks to strike the right balance between the costs and benefits of policy intervention, there is a strong case for a prudent approach to systemic risks in rapidly changing and developing areas of the financial system.

16.3. A POLICY MODEL TO EVALUATE THE EFFECTS OF SHADOW BANKING ON THE ECONOMY

I develop a model that constitutes a policy framework to evaluate the unintended effects of macroprudential policies when they leak to the shadow banking sector. The model aims at including all the relevant ingredients that account for the presence of a sector that it is not regulated, that is, benefits and costs. Within this framework, the implications of shadow banking for financial stability and welfare can be studied. Ultimately, some policy implications about how to approach regulation in this context can be given.

More specifically, I touch upon these issues, providing an analytical framework to disentangle the mechanisms behind the implications of a shadow banking sector for financial stability and regulation. I use a Dynamic Stochastic General Equilibrium (DSGE) model with housing, and two types of agents; borrowers and savers. Borrowers can borrow from private lenders, which represent the shadow banking system, and regulated banks. Borrowers face collateral constraints. Financial regulation comes in the form of both capital requirements and the loan-to-value ratio (LTV). However, private lenders are not subject to the same banking regulation as traditional banks. Within this setting, I study first how the proportion of shadow banking affects the dynamics of the model and financial stability. Then, I extend the model to endogenise the proportion of shadow banking and analyse its interrelation with LTV and Basel regulation.

This study is related to several strands of the literature. First, it is closely related to studies that analyse macroprudential rules in a DSGE setting, such as Kannan et al. (2012), Rubio and Carrasco-Gallego (2014), or Angelini et al. (2014), among others. Nevertheless, this literature has not touched upon the implications of shadow banking for the effects of macroprudential policies. The paper is also related to the literature that tries to explain the implications of shadow banking. For instance, Luck and Shempp (2014), study the presence of shadow banking in a banking model of maturity transformation in which regulatory arbitrage induces the coexistence of regulated commercial banks and unregulated shadow banks. As in my paper, they find that the relative size of the shadow banking

sector determines the stability of the financial system. Gola et al. (2017) analyse the Italian shadow banking system and find that it is possible to setup a well-balanced prudential framework, where both bank and non-bank regulation contribute to reducing systemic risks and regulatory arbitrage. To my knowledge, my paper is the first one in which macroprudential policies, in the form of capital requirements and LTV regulation, are introduced in a DSGE framework together with shadow banking. The heterogeneous nature of the model, in the sense that it displays several types of consumers; borrowers, savers and banks, also allows to see the different effects that shadow banking has among agents.

16.4. RESULTS

Results show that shadow banks increase the availability of credit in the economy and this is beneficial for borrowers, because they can consume more both consumption goods and housing. However this comes at the cost of more instability in the financial system. Therefore there is a trade-off between the beneficial effects of shadow banking and its costs. Welfare analysis conveys these results. Even though shadow banking is initially beneficial for households, after a certain threshold welfare starts to decrease.

When I extend the model to endogenise the proportion of shadow banking, I find that this proportion, in the steady state, mainly depends on the private lender and bank LTVs. LTVs directly affect the borrower choice on whether to obtain loans in the shadow or regulated banking sector because of the presence of collateral constraints. When there is a decrease in the banking sector LTV, borrowers will prefer to borrow from private lenders instead, that is, credit will flow to the industry that is less regulated. On the other hand, results also show that if Basel regulation could also be applied to the shadow banking sector, it would be more effective for achieving its macroprudential goal of bringing a more stable financial system.

16.5. CONCLUSIONS

I provide an analytical framework to disentangle the mechanisms behind the implications of a shadow banking sector for financial stability and regulation. In the aftermath of the financial crisis, this is a much discussed topic. On the one hand, shadow banking is supposed to have beneficial effects for the economy, since it increases the overall availability of credit. However, on the other hand, it may pose risks to financial stability, a major concern these days.

To study this issue, I use a DSGE model with housing, and three types of agents;

borrowers, savers and banks. Borrowers can decide whether to borrow from savers (private lenders), which represent the shadow banking system, or from regulated banks. Borrowers face collateral constraints for all types of credit. Financial regulation comes in the form of both capital requirements and the loan-to-value ratio (LTV). However, private lenders are not be subject to the same banking regulation as traditional banks.

Within this setting, I study first how the proportion of shadow banking affects the dynamics of the model and financial stability. Results show that shadow banks increase the availability of credit in the economy and this is beneficial for borrowers, because they can consume more both consumption goods and housing. However this comes at the cost of more instability in the financial system. Therefore there is a trade-off between the beneficial effects of shadow banking and its costs. Welfare analysis conveys these results. Even though shadow banking is initially beneficial for households, after a certain threshold welfare starts to decrease. Then, I extend the model to endogeneise the proportion of shadow banking and I find that this proportion, in the steady state, mainly depends on the private lender and bank LTVs. LTVs directly affect the borrower choice on whether to obtain loans in the shadow or regulated banking sector because of the presence of collateral constraints. When there is a decrease in the banking sector LTV, borrowers will prefer to borrow from private lenders instead, that is, credit will flow to the industry that is less regulated. On the other hand, results also show that if Basel regulation could also be applied to the shadow banking sector, it would be more effective for achieving its macroprudential goal of bringing a more stable financial system.

The policy implications that come from these results are the following: In terms of LTV regulation, it seems appropriate to make an effort in supervising those unregulated entities and trying to enforce them to some limits in LTVs, so that the share of shadow banking does not reach values that can endanger financial stability and decrease welfare. On the other hand, the Basel committee should take into account both benefits and costs of shadow banking when considering the extension of their regulatory perimeter. Thus, without necessarily aiming at regulating all financial activities in the economy, the implementation of Basel III should make sure that the proportion of non-regulated banks is within the range of welfare-enhancing values.

REFERENCES

- ANGELINI, P., S. NERI, F. PANETTA, (2014), “The Interaction between Capital Requirements and Monetary Policy”, *Journal of Money, Credit and Banking*, Vol. 46, Issue 6, pp. 1073-1112.

- CIZEL, J., J. FROST, A. HOUBEN, and P. WIERTS, (2016), *Effective Macroprudential Policy: Cross-Sector Substitution from Price and Quantity Measures*, IM WP16/94.
- GOLA, C., M. BURRONI, F. COLUMBA., A. ILARI, G. NUZZO, and O. PANZARINO, (2017), *Shadow banking out of the shadows: non-bank intermediation and the Italian regulatory framework*, Bank of Italy Occasional Paper 372.
- KANNAN, P., P. RABANAL, and A. SCOTT, (2012), “Monetary and Macroprudential Policy Rules in a Model with House Price Booms”, *The B.E. Journal of Macroeconomics*, Contributions, 12 (1).
- LUCK, S., and P. SCHEMPP, (2014), *Banks, Shadow Banking, and Fragility*, ECB WP 1726.
- RUBIO, M., and J.A. CARRASCO-GALLEGO, (2014), “Macroprudential and Monetary Policies: Implications for Financial Stability and Welfare”, *Journal of Banking and Finance* 49, pp. 326-336.

17. SUMMARY OF PROFIT SHARING: A CONTRACTING SOLUTION TO HARNESS THE WISDOM OF THE CROWD

*Jiasun Li*¹

Many business activities feature a “wisdom of the crowd” effect, meaning that a group’s collective opinion often dominates the assessment of any single individual. An explanation for this phenomenon is that by aggregating a large number of responses, the idiosyncratic noises associated with each individual judgment tend to cancel out by the law of large numbers – an argument somewhat similar to diversification in traditional portfolio theory. Although the specific term “wisdom of the crowd” has not been pushed into the mainstream until the rise of web 2.0 (e.g. Wikipedia or Quora), and only recently gains further popularity with the emergence of some new financing practices such as crowd-funding, its underlying idea is rooted in the tradition of economic thoughts, ranging from how the market economy coordinates economic activities under decentralized possession of information to theories of rational expectation in the financial market. In our information age, how well we take advantage of wisdom of the crowd affects resource allocation efficiency as well as economic productivity.

Cast in a specific setting of funding a scalable risky investment project by a group of investors, this paper studies the optimal rules to divide up the project payoff among all the participants. The result touches on a less explored area of how contract designs in the primary market (rather than market prices in the secondary market) could affect individual decisions under private information. It could provide general insight for organizing business activities under decentralized possession of information as well as specific guidance on FinTech applications such as “smart” contract designs for investment crowdfunding.

The main takeaway from the paper is that in the presence of wisdom of the crowd, the optimal pie-splitting rule among investors differs from the often-observed common stock contract and features profit sharing, in which each investor agrees ex ante to a share of the project payoff not necessarily proportional to their actual investment amounts. In a broad class of standard settings, the splitting rule may take a particularly simple structure and be completely independent of individual investment amount. The familiar common stocks

¹ George Mason University, 4400 University Drive, MSN 5F5, Fairfax, VA 22030. jli29@gmu.edu.

happen to be optimal only in extreme cases where the value of wisdom of the crowd is zero.

To best illustrate, consider the simplest example in which only two investors, Alice and Bob, participate in funding a risky project. Assume that both Alice and Bob are deep pocketed and identically risk averse, and they independently decide how much money to commit to the project, based on their optimal return-risk trade-off. When making their investment decisions, both investors rely on their own private information, which contains idiosyncratic noises, of the return-per-dollar-invested from the project. Neither investor has access to the other's private information. Given these conditions, how should Alice and Bob split the payoff from their investment?

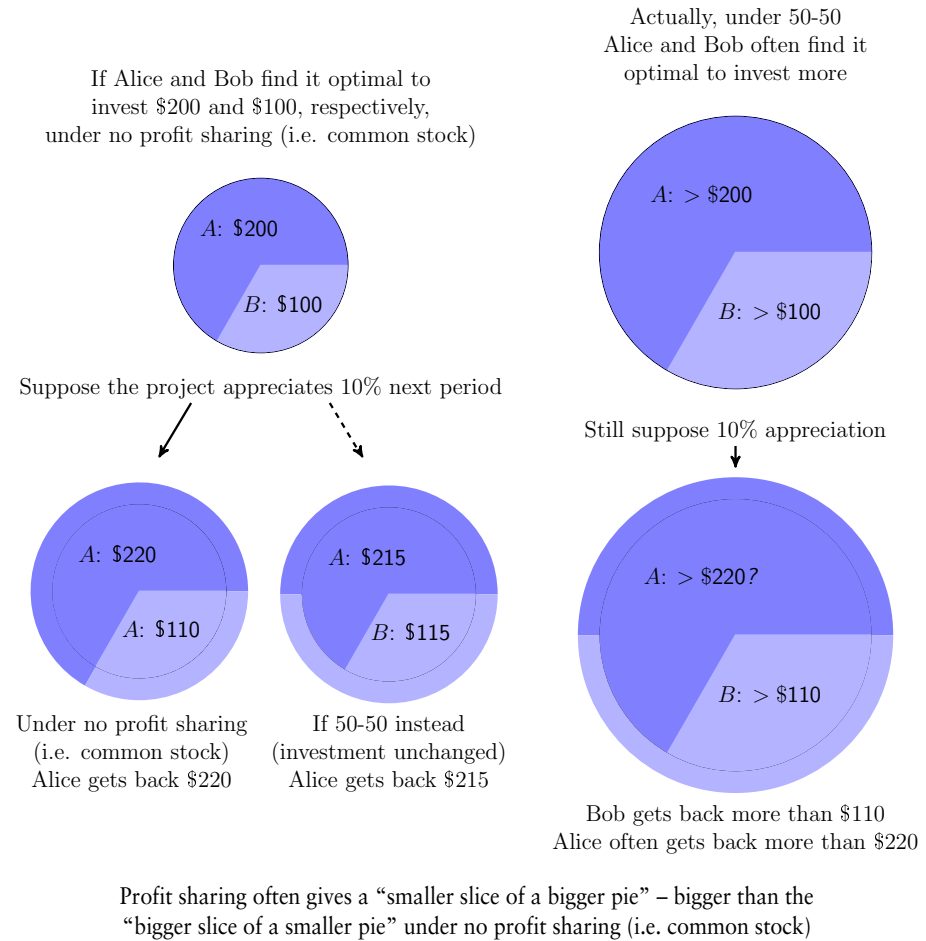
The paper analyzes this example in detail and proves a somewhat counterintuitive result: Regardless of how different Alice's and Bob's information quality or their actual investment amounts may be, as a Nash equilibrium outcome they both prefer to split net investment profit equally (while each investor still gets back the exact amount of her/his initial investment). For example, if Alice invests \$200, Bob invests \$100, and the project value appreciates 10 percent (i.e. the (net) profit from their investment is $(\$200 + \$100) * 10\% = \$30$), then the optimal profit sharing rule stipulates that Alice gets back $\$200 + \$30/2 = \$215$, and Bob gets back $\$100 + \$30/2 = \$115$. In comparison, if Alice and Bob hold common stocks, which deliver payment in proportion to their initial investment, then assuming unchanged investment decisions and the same project performance, Alice gets back $\$200 * (1+10\%) = \220 , and Bob $\$100 * (1 + 10\%) = \110 .

At first sight profit sharing might look like a bad deal for Alice. She could get \$220 under a common stock arrangement all else being equal, so why would she prefer to go 50-50? The answer lies in the fact that profit sharing changes both investors' risk-taking incentives as it provides insurance for the idiosyncratic noises in their private information. Effectively, the improved risk sharing among investors under a profit-sharing agreement helps them overcome aversions to "winner's curses" (generalized to the context of a divisible common value auction), enhances their ability to bear risks, and allows them to give more weight to their own private information when deciding on the optimal investment amount. On average, compared to common stocks, profit sharing increases the aggregate amount committed from all investors. Thus even if Alice equally divides net profits with Bob, under profit sharing she will actually be entitled to a smaller slice of a larger pie. Figure 1 illustrates this intuition.

Indeed a stronger result emerges from this particular example: Under a 50-50 profit-sharing contract, Alice and Bob's total investment in equilibrium pays each of them exactly what she/he could have received had she/he known the other investor's private information, even though she/he actually does not. It is in this

sense that profit sharing harnesses Alice’s and Bob’s collective wisdom. Although the 50-50 arrangement is a special result due to identical risk aversion, it hints at a general insight: In a world featuring decentralized possession of information among many individuals, some simple profit-sharing contracts could coordinate individual actions to achieve the first-best full-information outcome.

Figure 1: Profit Sharing Entitles Alice to a Smaller Piece of a Bigger Pie



The general insight is confirmed in settings of a large number of investors with hetero-geneous risk aversions. In an application to investment crowdfunding, the paper derives the general structure of the optimal sharing rule. Overall, a profit-sharing contract has three attractive properties. First, it often achieves the first-best outcome. The paper proves that an optimal profit-sharing contract perfectly coordinates the collective wisdom of all investors and gives them the first-best

outcome as long as wealth effects in preferences are negligible and idiosyncratic noises in each individual's private information are normal. Other than these standard assumptions, results hold for any distributions of project return and accommodate potential (dis)economies of scale.

Second, the optimal profit-sharing contract is simple. It only requires information about an investor's risk tolerance, and does not depend on how well-informed each individual is, which is private information and often hard for the contract designers to solicit. Such simplicity makes practical implementation of the contract particularly easy. For example, a crowdfunding platform can use answers to standard know-your-customer (KYC) questions on income, wealth, investment experience, investment objectives, etc. that investors provide when opening an account to determine the optimal sharing rule among investors participating in any given project. We further prove that with an optimal profit-sharing contract, investors will also have incentives to truthfully report on such KYC questionnaires.

Third, the contract is cost-effective. Because profit sharing does not involve the direct exchange of private information, there is no requirement of sophisticated communication technology, no need to offer incentives to encourage disclosing private information, and no fear of individuals lying or herding. A simple contract gives all.

While our general theory has many implications for how to better organize business activities under decentralized information possession, in this paper we focus on one specific application to a nascent financing practice known as investment crowdfunding (Other applications include, for example, determining the compensation structure within a VC/PE general partnership or a team managed investment fund, designing alternative public venture financing mechanisms such as initial coin offerings (ICO), or drafting smart contracts to implement a decentralized autonomous organization (DAO)). In May 2016, against the backdrop of Title III of the Jumpstart Our Business Startups (JOBS) Act to help early-stage business ventures form capital, the SEC further expanded access to investment crowdfunding in which entrepreneurs can directly solicit contributions from a large number of investors in return for monetary payoffs specified by contracts agreed to at the time of investment.

Contracts currently used in practice offer returns in the form of common stock, debt, or a mixture of both. It remains an open question, however, as to what the optimal contract should look like. On a separate note, one of the many claimed benefits of crowdfunding is that it helps harness investors' wisdom of the crowd. This argument has been extensively made from the entrepreneur's perspective: By aggregating the investment decisions of a large number of investors, the idiosyncratic noises associated with each individual's judgment tend to be diversified.

Because of this diversification, the aggregate investment amount provides crucially useful information to the entrepreneur. There are, however, few studies on how investors themselves could similarly benefit from their own wisdom of the crowd. Apparently a contract that benefits investors of their collective wisdom adds attractiveness to the crowdfunding market. It also improves capital allocation efficiency and hence indirectly benefits entrepreneurs with promising projects – the Congress’s original motivation to promote investment crowdfunding. An application of our theory to crowdfunding fills these two gaps.

The paper further validates the robustness of our main result by relaxing assumptions on return distribution, including costly information acquisition, and looking beyond projects with constant return to scale. We show that the benefit of profit sharing remains intact under non-normal project return distributions, costly information acquisition, and the presence of (dis)economies of scale. For all relaxations, the equilibrium outcome under profit sharing (plus cash transfers such as admission fees or signing bonuses if necessary) sustains the first-best outcome that would have been chosen by a benevolent and omniscient social planner.

In other words, a version of the Second Welfare Theorem is obtained even at the presence of asymmetric information and externality.

SUERF – SOCIÉTÉ UNIVERSITAIRE EUROPÉENNE DE RECHERCHES FINANCIÈRES

SUERF is incorporated in France as a non-profit-making Association. It was founded in 1963 as a European-wide forum with the aim of bringing together professionals from both the practitioner and academic sides of finance who have an interest in the working of financial markets, institutions and systems, and the conduct of monetary and regulatory policy. SUERF is a network association of central bankers, bankers and other practitioners in the financial sector, and academics with the purpose of analysing and understanding European financial markets, institutions and systems, and the conduct of regulation and monetary policy. It organises regular Colloquia, lectures and seminars and each year publishes several analytical studies in the form of *SUERF Conference Proceedings* formerly *SUERF Studies*. SUERF has its full-time permanent Executive Office and Secretariat located at the Austrian National Bank in Vienna. It is financed by annual corporate, personal and academic institution membership fees. Corporate membership currently includes major European financial institutions and Central Banks. SUERF is strongly supported by Central Banks in Europe and its membership comprises most of Europe's Central Banks (including the Bank for International Settlements and the European Central Bank), banks, other financial institutions and academics.

SUERF PUBLICATIONS

For details on *SUERF Conference Proceedings* (SCPs) and *Studies*, please consult the SUERF website at www.suerf.org/studies.

- SCPs 2017/2 New Challenges in Central Banking: Monetary Policy and Macprudential Issues, edited by Ernest GNAN and Donato MASCIANDARO, November 2017
- SCPs 2017/1 Brexit and the implications for financial services, by Patricia JACKSON, June 2017.
- SCPs 2016/4 Central Banking and Monetary Policy: what will be the post-crisis new normal?, edited by Ernest GNAN and Donato MASCIANDARO, August 2016
- SCPs 2016/3 The SSM at 1, edited by Jens ULBRICH, Carl-Christoph HEDRICH and Morten BALLING, June 2016.
- SCPs 2016/2 Banking reform, edited by Patricia JACKSON, April 2016.
- SCPs 2016/1 Cash on Trial, edited by Christian BEER, Ernest GNAN and Urs W. BIRCHLER, March 2016.

SUERF POLICY NOTES

- Issue No 10 “Bail-ins - Issues of Credibility and Contagion” by Claes WIELBORG.
- Issue No 11 “Completing the architecture of the Euro” by Lorenzo BINI SMAGHI.
- Issue No 12 “(No) worries about the new shape of international capital flows” by Matthieu BUSSIÈRE, Julia SCHMIDT and Natacha VALLA.
- Issue No 13 “The political economy of central banking in the digital age” by Sir Paul TUCKER.
- Issue No 14 “Banks or platforms: The digital future” by Patricia JACKSON.
- Issue No 15 “Technological Change and the Future of Cash” by François R. VELDE.
- Issue No 16 “International financial crises: new understandings, new data” by Jaime CARUANA.
- Issue No 17 “Gaming the rules or ruling the game? – How to deal with regulatory arbitrage” by Danièle NOUY.
- Issue No 18 “Is there a risk of snapback in long-dated yields?” by Hyun Song SHIN.

www.suerf.org/policynotes