The Scope, Prospects and Implications of New Forms of Financial Intermediation for Monetary Policy in ASEAN Economies

Ferry Syarifuddin

The South East Asian Central Banks (SEACEN)
Research and Training Centre
(80416-M)

The SEACEN Centre

The Scope, Prospects and Implications of New Forms of Financial Intermediation for Monetary Policy in ASEAN Economies

Ferry Syarifuddin

The South East Asian Central Banks (SEACEN)
Research and Training Centre
(80416-M)

The SEACEN Centre

FOREWORD

Recent developments, such as the rapid advancement under the umbrella of the Digital Revolution 4.0, have led to increasing interest in new forms of financial intermediation. This trend has been followed by tremendous changes in the scope of, and prospects for, financial intermediation and its implication for monetary policy globally, including SEACEN member economies. One interesting phenomenon is that many banking activities related to financial intermediation are increasingly being conducted by non-bank financial institutions (NBFIs), which are also known as shadow banking institutions. They include trust companies, securities companies, bank wealth management arms, entrusted private entities and online platforms such as peer-to-peer (P2P) lending and crowdfunding. This bank-like financial intermediation by shadow banking institutions is generally supported by Financial Technology (FinTech). Financial innovation has created new financial instruments, especially for intermediating sources of funds, which may be defined as new forms of financial intermediation. This research study uses this definition to analyse current conditions and prospects for new forms of financial intermediation by shadow banking institutions in four ASEAN countries.

Unlike banking institutions, which are subject to very stringent regulations and tight supervision by financial supervisory agencies, many shadow banking activities are more lightly (if at all) regulated and less tightly supervised. Most of the existing financial regulations are still focused on the banking system. Hence, one reason why many bank-like intermediary activities are conducted by shadow banking institutions is simply to reduce costs by engaging in regulatory arbitrage. On the plus side, shadow banking activities have broadened financial intermediation/services not only to the banked but also to unbanked people, thus benefiting all of society. This includes providing financial access to the unbanked part of the population as well as small businesses, thus enhancing financial inclusion.

That being said, this phenomenon is not without possible negative consequences for financial sector stability as well as the economy as a whole. The emergence of financial risks may result in a higher threat of contagion across sectors and economies, arising from riskier intermediation activities and proliferating interconnectedness with regulated banks. This could very well pose dangers to financial system stability which heightens the probability of financial crises. Financial innovation, regulatory arbitrage and FinTech advancement are some of the main factors behind the rapid growth of shadow banking activities. These activities can cause the growth of the money supply to be faster and uncontrollable, with implications for the effectiveness of monetary policy. In light of this, the central bank may be unable to manage domestic liquidity or the broad money supply which could potentially lead to financial instability.

Nevertheless, these new forms of financial intermediation can herald a bright future for the ASEAN-4 as financial institutions are incentivised to adopt financial technology and develop new forms of financial intermediation. These trends are expected to lead to the development of broader and deeper varieties of financial products which could improve financial inclusion. While the growth of this phenomenon is accompanied by substantial innovations and benefits, it also creates heightened risks which need to be mitigated.

While there are opportunities for NBFIs to create various new products, in the absence of regulations and oversight by the authorities, this may lead to regulatory arbitrage. Therefore it is recommended that the financial authorities step up their efforts to improve regulation and supervision by bringing shadow banking entities under the regulatory umbrella, to better understand their business models as well as to obtain the necessary data to boost regulations or other policy responses.

This SEACEN research study, taken up by Bank Indonesia, is aimed at investigating the development and prospect for new forms of financial intermediation in four ASEAN countries (Indonesia, Malaysia, Thailand and Singapore), as well as to analyse their implications for monetary policy. The analyses of the project benefitted from focus-group discussions with officials of the FinTech Office of the Financial Supervisory Authority in Indonesia (OJK) and two related offices within Bank Indonesia, i.e., the Macroprudential Policy Department and the FinTech Office (BI), as well as officials from Bank Negara Malaysia, Bank of Thailand and the Monetary Authority of Singapore. This study looks at five important issues related to NBFIs which perform shadow banking activities in the respective four countries, namely (i) the definition of shadow banking activities, (ii) how these entities are regulated, (iii) the distinction between shadow banking entities and NBFIs, (iv) the potential risks emanating from shadow banking activities of NBFIs, and (v) the impact of monetary policy on the shadow banks.

The SEACEN Centre wishes to record its appreciation to Dr. Ferry Syarifuddin, Principal Economist/Deputy Director at Bank Indonesia, for conducting this research study. The assistance of SEACEN staff members, in particular Mrs. Masyitah Rosmin and Mrs. Jami'ah Jaffar, is most gratefully acknowledged. The Centre is pleased to have been able to provide input for the project at a research workshop and seminar held at The SEACEN Centre where the findings of the project were presented and discussed. We would also like to acknowledge the assistance of Professor Hermanto Siregar from IPB University in Jakarta for his constructive comments as a reviewer. The author wishes to express his sincere gratitude to Dr. Solikin M. Juhro, Head of the Bank Indonesia Institute, for his support as well as to Rere, Nagib, Ayu and Danis from Bank Indonesia. Appreciation also goes to officials of Bank Negara Malaysia, Bank of Thailand and the Monetary Authority of Singapore who contributed their time and provided valuable input during the preparation of this research project. Without their contributions, the publication of this research study would not have been possible. Lastly, the views expressed in this study are those of the author and do not necessarily reflect those of The SEACEN Centre, Bank Indonesia or the SEACEN member banks/monetary authorities.

Dr. Ole Rummel
Director, Macroeconomic and Monetary Policy Management
The SEACEN Centre
May 2020

EXECUTIVE SUMMARY

1. This SEACEN research topic was awarded to Bank Indonesia in 2019 to investigate the development and prospects of new forms of financial intermediation in four Southeast Asian (ASEAN) countries, namely Indonesia, Malaysia, Thailand and Singapore, as well as to analyse their implications for monetary policy. It elaborates on the relevant literature from various sources, including focus group discussions with colleagues from the FinTech Office of the Financial Supervisory Authority in Indonesia (OJK) and two related offices within Bank Indonesia, i.e., the Macroprudential Policy Department and the FinTech Office. This study also elaborates on five important issues related to non-bank financial institutions (NBFIs) which perform shadow banking activities in the respective four Southeast Asia countries, namely (i) the definition of shadow banking activities, (ii) how these entities are regulated, (iii) the distinction between shadow banking entities and NBFIs, (iv) the potential risks emanating from shadow banking activities of NBFIs, and (v) the impact of monetary policy on the shadow banks through the asset price channel.

2. An encompassing definition for these new types of financial institutions has proved elusive until 2014, when the Financial Stability Board (FSB) defined shadow banking activities as credit intermediation involving entities and activities (fully or partially) outside the regular banking system. Meanwhile, the International Monetary Fund (IMF, 2014) outlined that shadow banking could be broadly divided into three categories: entity-based, activity-based and a mixture of the two. From the available options, this research study will focus on the "activity-based" definition, which can be considered the most appropriate interpretation for defining shadow banks in the selected ASEAN countries. Basically, the "activity-based" definition separates shadow banks from commercial banks in the intermediation process. Consistent with global trends, the shadow banking sector in Asia experienced strong growth in the run-up to the Great Financial Crisis (GFC), dropping off somewhat in 2008, and has since continued to grow in many ASEAN economies, albeit at a reduced pace. The rapid growth of these novel institutions is driven by regulatory arbitrage and, above all, the emergence of financial technologies.

3. The development of new forms of financial intermediation is proliferating. We define a new form of financial intermediation as a shadow banking activity accompanied by the use of financial technology, whereby shadow banking is an intermediary activity outside the regular banking sector. This development is reflected in both the increase of the share of shadow banking assets against the total assets of financial corporation and against gross domestic product (GDP), which is accompanied by the rise in the share of broad money to GDP. Financial technology (FinTech) is often seen as a recent amalgamation of financial services and information technology. Financial technology plays a special role in the modern transformation of the financial system in that it helps to improve financial activity and increase its profitability. The main component of financial technology is its capability in creating financial innovations – the development of the accounting background, the creation of banking and modern payment systems,

the introduction of complex derivatives and financial and credit instruments and modern financial technologies. These are not only designed to increase profitability, but also to change the financial system more fundamentally. On the other hand, there is the negative impact of the introduction of new financial technologies associated with the increased possibility of cyberattacks, which constitutes a major threat to financial stability.

4. In ASEAN, the majority of countries are emerging or developing economies, where many individuals and corporations may not get the benefits of banking access for funding sources. Moreover, there is an interconnection between the banking sector and NBFIs in ASEAN through the establishment of banking subsidiaries to support financial banking activities. Even though it is still marginal, the increases in the share of NBFIs to GDP show the rising role of shadow banking in the economy in several ASEAN countries. The new forms of financial intermediation expose the entry points for financial technology into the environment of financial institutions in ASEAN as well as make the financial transactions easier. However, the development of FinTech can also lead to cyber risks. In reality, several shadow banking activities in ASEAN have yet to be supported by the appropriate regulations because they are not considered to carry out credit intermediation and thus, their activities do not construct systemic risk. The caveat or limitation of shadow banking data in each ASEAN country is the main problem of this study. Thus, this study does not include specific monetary policy recommendations. It just provides an indicator to the central bank that with the limitation, the policy interest rate in the most of the ASEAN-4 countries does not have a significant effect on the interest rates of the biggest shadow bank in each country. As the sample/data taken is based on only one of the largest asset management companies in each country, the results of the analysis cannot be generalized. However, this finding makes it important for the central bank to be vigilant when designing monetary policy in the future. Of course, further research, when more comprehensive shadow banking data is available, is needed to derive better recommendations so that central banks would be able formulate more targetted monetary policies.

5. In Indonesia, shadow banking entities can be classified into two groups, namely trust companies and security or wealth management companies. The former encompass insurance, pension funds, microfinance, pawnshops, guarantee companies and FinTech lending. Meanwhile, security and wealth management companies can be divided further into two entities. Non-bank financial institutions which perform shadow banking activities have interconnection with regular banking through their funding and borrowing activities. We also find that regular banks establish subsidiaries which engage in shadow banking activities. In general, NBFIs that perform shadow bank activities conduct their operations through bond purchases and loans in the form of securities lending, repurchase agreements, credit derivatives and credit enhancements. NBFIs in Indonesia are not backed by Bank Indonesia with respect to liquidity mismatches and by the Indonesia Deposit Insurance Corporation (LPS) with respect to bank liquidation. Nevertheless, shadow banking regulation has developed quite a bit, and the Financial Services Authority (OJK) oversees its activities. In Indonesia, it is mainly NBFIs (with the exception of mutual fund companies) that are performing shadow banking activities as classified by the FSB (2014), but since they do not conduct credit intermediation activities, the risks that are generated from their activities do not

pose systemic risks and since they fall under an appropriate regulatory regime, they are no longer categorised as shadow banks.

6. Furthermore, the new forms of financial intermediation have an undoubtedly positive prospect in Indonesia, which has an abundant and growing number of internet users. This encourages financial institutions to adopt financial technology and develop new forms of financial intermediaries. But the growth of this phenomenon is accompanied by out-of-the-box innovation and benefits that create more heightened risks which need to be mitigated. The rapid growth of new forms of financial intermediation has an implication for the effectiveness of monetary policy. Using the monetary policy rate, we tested the significance of the policy rate in relation to one shadow bank institution. We find that monetary policy has no significant impact on the shadow bank's return but has a significant impact on the specific shadow bank's asset under management growth. The BI deposit rate has a positive impact on the shadow bank's products mainly allocated on the equity side and a negative impact on the products allocated in money markets. Meanwhile, the interbank rate has an impact on the products which are mainly allocated in debt securities.

7. Thailand's financial system comprises a wide range of institutions, which can be grouped into three broad categories: banks, non-bank financial institutions (NBFIs), and specialised financial institutions (Shrestha, 2007). Banks include domestic commercial banks, retail banks, branches of foreign banks and subsidiaries, while NBFIs consist of finance companies, credit frontier companies, cooperatives, insurance companies, securities companies, mutual funds, pension funds and asset management companies. The specialised financial institutions group comprises deposit taking and non-deposit taking specialised institutions as well as institutions for financial sector resolution. The NBFIs' total assets-to-GDP ratio shows the highest value among the countries considered in this study. It also shows an upward trend, from 31.5% in 2007 to 48.9% in 2016. The increasing number of NBFIs' total assets in this country is in tandem with the growth level of its assets. Moreover, since the mutual fund market holds the largest asset share in financial markets overall, we regard these institutions as depicting shadow banks in Thailand. Most of the leading domestic banks possess subsidiaries that are mutual fund institutions. The top four mutual fund companies are Kasikorn Asset Management Company (with a 20% share of asset under management), SCB Asset Management (18%), BBL Asset Management (14%) and Krung Thai Asset Management (14%). NBFIs in Thailand are mainly conducting shadow banking activities as classified by the FSB (2014), but since they do not conduct credit intermediation activities, the systemic risks that are generated by their activities are not significant and as they fall under the appropriate regulatory regime, they are no longer categorised as shadow banks.

8. The prospects of new forms of financial intermediation emerging have been planned and catered for by the Bank of Thailand (BOT) as part of the FSMP III regulation. One of FSMP III's objectives is to improve the efficiency of the financial system and bolster electronic payment and financial services by developing new technological innovation and boosting the competitiveness of financial service providers to assist market enlargement. Here, BOT encourages financial institutions to provide more diversified electronic financial products and services. Not only that, but the BOT will

also promote the National e-Payment Master Plan introduced by the government and will support the use of electronic transactions through the augmentation of consumer confidence and financial literacy. Nevertheless, the development of this initiative also has a negative impact since it can create systemic risks that need to be mitigated – reducing the effectiveness of monetary policy. Using the monetary policy rate, we examined the effect of the policy rate on one shadow bank's return as well as asset growth. Based on our assessment, changes in administrative and price-based monetary policy tools do not affect the shadow banking interest rate and the growth of assets in Thailand. Administrative monetary policy tools are represented by the policy rate, lending rate and deposit rate whereas the price-based monetary policy tool is represented by the interbank interest rate.

9. The transformation of traditional credit activities in Malaysian banks have expanded the credit intermediation chain and enabled banks or entities owned by banks to conduct shadow banking activities. The growth of shadow banking in Malaysia began in the 1990's, contributing in a complementary manner to the financial system and completing the role of banking institutions. The rapid growth of M3 in Malaysia began after the GFC in 2008 and was mainly caused by the entry of FinTech into Malaysia. The latter increased both households' awareness and confidence in depositing their money in other banking institutions. Up to 2018, the size of M3 in Malaysia was almost five times that of M1. Furthermore, enhancing FinTech in Malaysia increases credit extension and facilitates credit creation by the NBFIs operating in the financial system. Therefore, the existence of FinTech creates new technology in old non-bank entities or establishes new entities that are based on FinTech, through Peer-to-Peer (P2P) financing and equity crowdfunding. In aggregate, the market share of Malaysian NBFI assets is quite large, amounting to 39.7% in 2018, rising very significantly from 27.0% in 2000. Provident and pension funds and the fund management industry contribute the largest proportion of total NBFI assets in Malaysia, accounting for approximately 18.4% and 14.0% of total assets in the Malaysian financial system in 2018 respectively. NBFIs in Malaysia are mainly performing shadow banking activities as defined by the FSB (2014), but since they are under the purview of the appropriate regulatory regime, do not conduct credit intermediation activities and the risks generated from their activities are not systemic, they are not categorised as shadow banks.

10. To examine the impact of monetary policy rates on shadow banking in Malaysia, we chose one of the largest asset management companies in Malaysia, namely Affin Hwang Asset Management Bhd. In 2018, it was among the top three largest players in Malaysia, and its importance has grown rapidly. At the end of December 2018, it managed over RM47 billion in assets for retail and professional clients. Based on our estimation, the monetary policy rates (overnight policy rate, lending rate and deposit rate) have a significant negative impact on the mutual fund's return. In addition, we use two types of funds of Affin Hwang's assets, namely Affin Hwang Select Dividend Fund to capture equity funds and Affin Hwang Aiiman Income Plus Fund to proxy fixed income funds. The results suggest that the interbank rate is positively and statistically significantly affecting Affin Hwang's equity fund assets. On the other hand, all interest rates have no significant impact on Affin Hwang's fixed income fund assets.

11. The very well-developed financial system in Singapore has led this country to be regarded – together with Hongkong – as a financial hub amongst the ASEAN members. It is marked by the use of M3 as the representation of broad money that transforms liquid money into money market instruments, commercial paper, electronic currency and so on. The movement of M3 and inflation has become looser over time. Particularly in 2008, M3 and inflation have become unrelated and thus inflation is not entirely a monetary phenomenon. It also indicates that the government cannot target broad money velocity. The difficulties encountered by the government in controlling broad money may have occurred due to the intervention of cutting-edge technology reflecting Singapore's level of financial development or new forms of financial intermediation. Singapore's shadow banks share similar definitions and scope to the FSB's (2014) classification, in that most entities are in Economic Function 1 and Economic Function 5. Singapore's shadow banks consist of several types of entities, namely, collective investment schemes, money market funds, hedge funds and structured finance vehicles. The empirical result from Temasek Holdings show an insignificant relationship with the policy rate, interbank rate, deposit rate, lending rate and nominal effective exchange rate index. But while the emergence of FinTech systems are welcomed in the country, FinTech still cannot cross the border posed by banking licences which are required for lending or securities dealing

12. To assess the effect of changes in monetary policy on shadow banking in Singapore, we use the effective annual returns of one of the largest asset management firms in Singapore, namely Temasek Holdings, as a proxy for the shadow banking interest rate in Singapore. We included exogenous control variables that involve interest rates: the interbank rates to measure the price-based monetary policy tool, the policy rate, the lending rate and the deposit rate to capture administrative monetary policy tools as well as the nominal effective exchange rate (NEER). The results suggest that only the policy rate has a significant negative effect on Temasek Holdings' returns. The small contribution of monetary policy tools may come from other factors. The negative association between Temasek Holdings' returns and price-based monetary policy tools means that any increase in the policy rate will lower Temasek Holdings' returns. This argument might be able to explain the insignificant result of interbank interest rates and monetary policy tools which are not effective in influencing the shadow banking market since there is a lack of connection between them. Besides, alterations in the interbank interest rate have significant positive effects on Temasek Holdings' equity assets under management. This is in line with the argument that Singapore's interbank rate is well-established and effective in influencing inflows into Temasek Holdings' equity assets. On the other hand, this finding cannot be generalised due to data limitations. As a consequence, we are only able to use one asset management company in our sample, even though it is the largest in Singapore.

POLICY RECOMMENDATION

1. Shadow banking uses reduced costs and the lower burden of regulation as the main arguments to expand their range and scope at the expense of commercial banks. Shadow banks lack access to a depositor base, sources of emergency liquidity from the central bank and public sources of insurance. Consequently, systemic risk can be created as a result of the lack of access to public liquidity or to the public sector in an emergency. There are two crucial potential risks emerging directly from the shadow banking sector: leverage risk and maturity and liquidity mismatch. These risks may be amplified as they include the potential for excess leverage, amplification of procyclicality, instability of wholesale funding, modern-style bank runs, transmission of systemic risk and regulatory arbitrage and circumvention. Furthermore, the excess liquidity available in the shadow banking system has incentivised households to incur much higher debt levels because of less stringent loans conditions. Instead of the households' economic situation improving; this results in graver poverty and more bad loans, also draining capacity from the shadow banks.

2. The share of shadow banks has been steadily increasing over time due to the growth of financial technology. But the expansion of FinTech innovations and the accompanying changes to the financial landscape will eventually bring with them new types of economic and financial risks. The regulator will face evolving implications of unprecedented systemic financial stability risks. There are other potential threats related to the emergence of FinTech companies since they leverage the use of modern software and the internet to provide financial services at lower prices. Some very good complex and advanced examples of this include the blockchain and cryptocurrencies. Their anonymity and decentralised nature can be harmful as they can be used for illegal purposes such as money laundering, tax evasion and illegal transactions. Another potential threat are cyberattacks that can put bank customers' data privacy at risk.

3. New forms of financial intermediation, which we define as new shadow banking activities if they are accompanied by financial technology, have proliferated significantly over time. While some of these activities are regulated by central banks or appointed regulators, there still appears to be a lack of regulations and supervision for these new entities, especially the ones that use and develop such financial technology. Financial technology companies are savvy and able to identify regulatory gaps however small they appear. Thus, they can develop their business by exploiting regulatory arbitrage. Therefore, we recommend that the central banks or appointed regulators step up their efforts to improve regulations and supervision by bringing shadow banking entities under the regulatory umbrella, to better understand their business models as well as to obtain the data necessary to boost regulations or other policy responses. Furthermore, the existence of FinTech should be "legitimised" and covered by suitable regulations. Otherwise, the lack of regulation may encourage risky behaviour.

TABLE OF CONTENTS

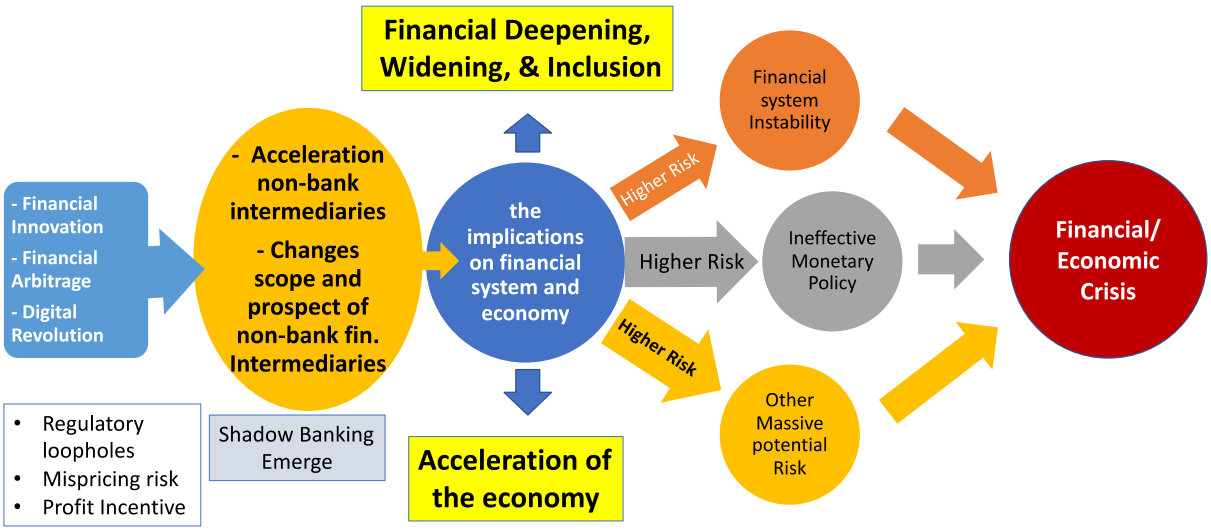
CHAPTER 1

THE SCOPE, PROSPECTS AND IMPLICATIONS OF NEW FORMS OF FINANCIAL INTERMEDIATION IN ASEAN ECONOMIES

1.1 Background

Recent developments such as the rapid advancement in the field of digital revolution 4.0 have led to an increasing interest in new forms of financial intermediation. This trend has been followed by tremendous changes in the scope and prospects of financial intermediation and its implication to monetary policy around the globe, including the SEACEN economies. One interesting phenomenon is that many banking activities mainly related to financial intermediation are increasingly being conducted by non-bank financial institutions, which are known as shadow banking institutions and they include trust companies, securities companies, bank wealth management arms (WMAs), entrusted private entities and online platforms such as P2P lending and crowdfunding. This bank-like financial intermediation by shadow banking institutions is, as previously mentioned, supported by Financial Technology (FinTech). Financial innovation has created new financial instruments, especially in intermediating sources of funds, which may be defined as a new form of financial intermediation. This research study uses this term to analyse the current conditions and prospects of new forms of financial intermediation by shadow banking institutions in several ASEAN countries.

Figure 1.1
The Impact of New Forms of Financial Intermediaries



Unlike banking institutions which are subject to very stringent regulations and under tight supervision by financial supervisory agencies, shadow banking activities are less regulated and less tightly supervised by official authorities. Most of the existing financial regulation is still focusing on the banking system. Hence, this is one reason why many bank-like intermediary activities are conducted by shadow banking institutions. On the plus side, it is the case that shadow banking activities have broadened financial intermediation/ services not only to banked people but also to unbanked people, thus benefiting all of society, including access to financial support for the needs of the unbanked part of the population as well as small businesses. This is otherwise known as financial inclusion.

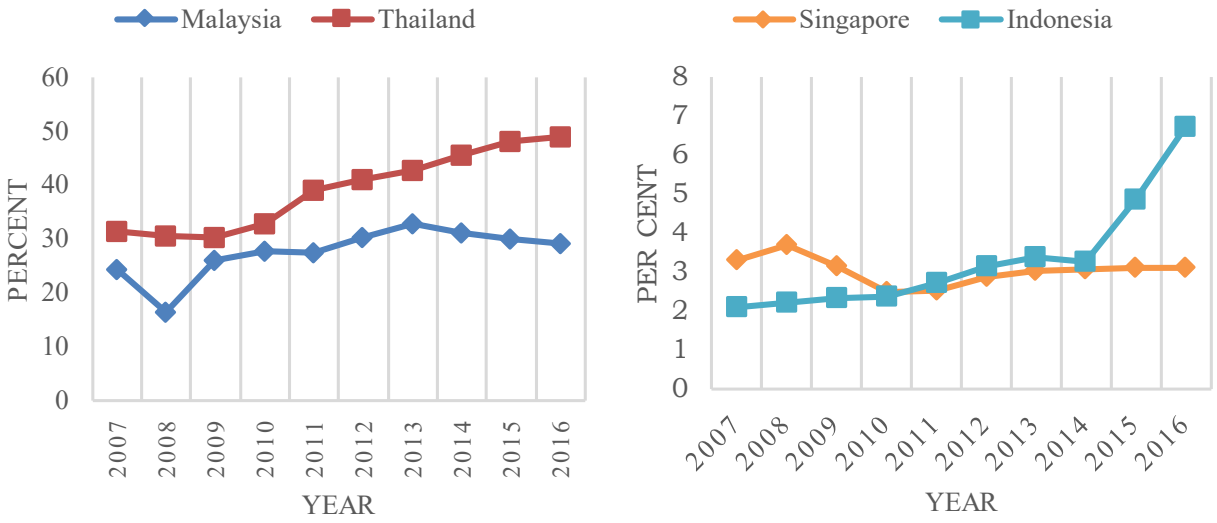
But this phenomenon is not without a possible negative impact and consequences for financial sector stability as well as the economy as a whole, as shown in Figure 1.1. The emergence of financial risks may result in a higher risk of contagion across sectors and economies, arising from the sector's less prudent intermediation activities and its proliferating interconnections with regulated banks. Altogether, this may create dangers to financial system stability which raises the probability of financial/economic crises. Financial innovation, regulatory arbitrage and FinTech advancement are some of the main factors behind the rapid growth of shadow banking activities. At the same time, these activities could bring with it faster and uncontrollable growth of money supply. Thus, the central bank will be unable to completely control domestic liquidity or the broad money supply. This ongoing, and maybe future phenomenon, would make money demand unstable.

The shadow banking system has been cited as a possible source of the financial crisis in 2008, as many banking activities were undertaken into the form of shadow banking. While many have regarded shadow banking as an impediment, Pozsar et al. (2010) view it as an innovation in credit intermediation, since it has introduced new ways of distributing funds. The shadow banking system decomposes the simple process of deposit-funded, hold-to-maturity lending conducted by banks into a more complex, wholesale-funded, securitisation-based lending process that involves a range of shadow banks. They also explain that the products and services offered by the shadow financial system were mainly taken up by credit-constrained households because they offer them an opportunity to access credit. In line with this, Cetorelli, Mandel and Mollineaux (2012) state that shadow banks have brought with them a decentralisation in financial activity, one in which the matching of the supply and the demand for funds occurs along an extended credit intermediation chain, with specialised markets and non-bank institutions each playing a part along the way.

This decentralisation of activities opens up compelling opportunities for economies of specialisation, which has become the main reason for the emergence of non-bank entities. Even though they have a narrower scope than banks, the latter have successfully performed an important function in finalising securitisation activity. In this alternative model, traditional banks have a diminished role to play. The emerge of arbitrage opportunities through regulatory loopholes, mispricing of risk in more complex models and certain incentives from activities like securities and obligation are another factor that exacerbates the domain of traditional banks in financial market (Allen, Goldstein and Jagtiani, 2018).

Up to now, the estimation of the size of the shadow banking industry in Asia has been difficult due to the lack of clear definition and the scope of activities of the shadow banking sector. Asian economies have not followed consistent definitions of shadow banking and even claim the right on discretionary application of the global definition domestically. Given such difficulties, the World Bank has successfully collected data on several ASEAN economies that shows the increasing proportion of shadow banks' total assets to GDP, which is growing in all countries except Singapore (Figure 1.2). In spite of the increasingly ubiquitous shadow banking issues in the financial world, the purple line shows a downward trend, although the decline is not that marked – from 3.3% in 2007 to 3.1% in 2016. On the other hand, Thailand's shadow banks' total assets are the highest among other economies. The blue line also shows an upward trend, from 31.5% in 2007 to 48.9% in 2016. Furthermore, the increasing number of the total assets of shadow banks in these countries is consistent with the growth level of the assets. While the growth of credit by non-bank financial institutions is always lower compared to the commercial banks, based on the shadow banking report from the Financial Stability Board, the outstanding level grew positively over time until 2014, mostly around a proportion of over 15% to the outstanding credit by commercial banks.

Figure 1.2
Non-Bank Financial Institutions' Assets to GDP Ratio for Thailand, Indonesia, Malaysia and Singapore from 2007-2016 (%)



Notes: Total assets held by financial institutions that do not accept transferable deposits but that perform financial intermediation by accepting other types of deposits or by issuing securities or other liabilities that are close substitutes for deposits as a share of GDP. It covers institutions such as saving and mortgage loan institutions, post-office savings institution, building and loan associations, finance companies that accept deposits or deposit substitutes, development banks, and offshore banking institutions. Assets include claims on domestic real non-financial sector such as central-, state- and local government, non-financial public enterprises and private sector.

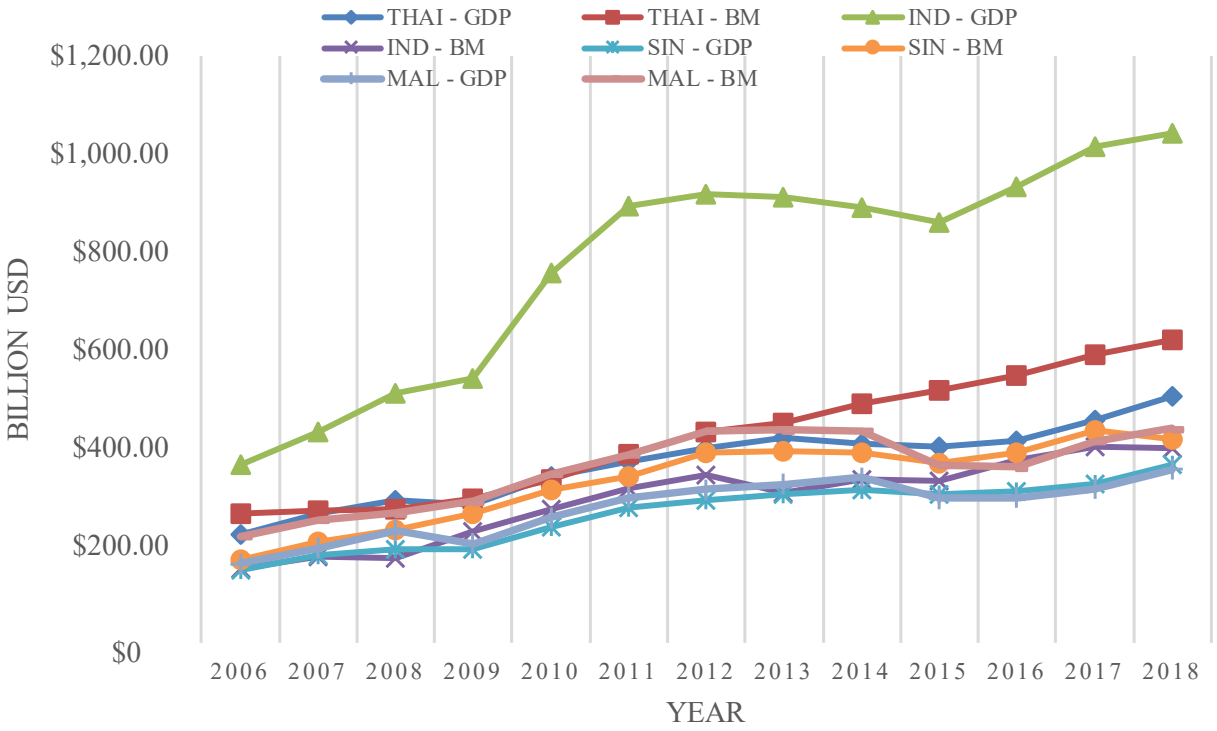
As we could not find the newest data on non-bank financial assets to GDP in Malaysia, we alter the component to a more specific non-bank financial institution namely, mutual fund as it has the largest composition of asset in the non-bank financial institution market. A mutual fund is a type of managed collective investment scheme that pools money from many investors to purchase securities. Data taken from a variety of sources such as Investment Company Institute and national sources.

Source: World Bank (2018).

Furthermore, in order to keep up with the modern era, shadow banks started to take advantage of technological advances, namely FinTech. The latter employs innovative technology solutions and customer-centred approaches to reach more people including the unbanked, more widely and efficiently than traditional banks, and implement and leverage financial opportunities (Ansari and Krop, 2012; Christensen, 2013). FinTech is aimed at making financial transactions quicker and easier compared to more conventional financial transaction methods. Recently, the way consumers think and act has changed simultaneously along with digital transformation to create new kinds of consumer demand (Nemet, 2009). Consequently, the number of FinTech providers has increased significantly over time. Accenture (2017) reports that global investment in the FinTech area has risen significantly from USD930 million in 2008 to more than USD40 billion in 2017. The total value of global FinTech transactions is estimated at USD3,446 billion in 2017 and expected to reach USD8,000 billion by 2022. The transaction value in 2017 is dominated by digital payments, accounting for about 80% of the total, as reported by FinTech Report (2017), based on data from Statista.com.

FinTech as an important tool to enhance shadow banking activities has accelerated the spread of the shadow banking system around the world. For instance, China is one of the countries that has a giant shadow banking system. The system can be divided into three levels - the first of which are categorised as security, insurance, entrusted loan, money market funds, private equity investments and others; the second level includes credit creation for small companies, investment corporations, financial assurance corporations and other quasi-financial institutions; and the third level involves chambers of commerce as well as the private financial system represented by private banks, entrepreneur clubs and internet finance (Han, Hus and Li, 2019). But shadow bank financing in China presents a big risk because there is no integrated control to cover the product. There are at least four risks faced by Chinese shadow banking institutions, namely bad assets at banks, default of debt obligations on bonds, shadow financing and online financial services. Although new regulations have been drafted, if the emerging regulatory system lacks bite, risks might spread rapidly and pose a significant impact on the whole financial system and the economy. Moreover, the extent to which authorities will be legally responsible for this part is still unclear (Nikkei Asian Review, 2017).

Figure 1.3
Level of GDP and Aggregate Broad Money from 2006-2018 for Singapore, Indonesia, Malaysia and Thailand (Billion USD)

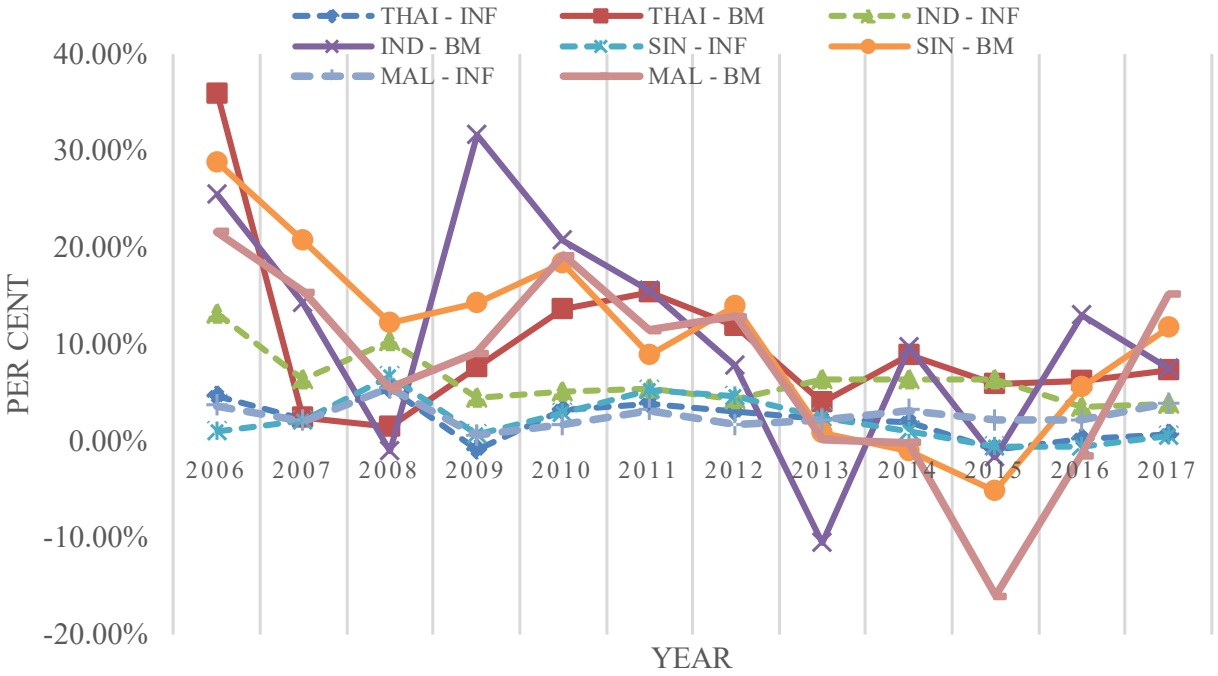


Note: Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveller's checks; and other securities such as certificates of deposit and commercial paper such as certificates of deposit and commercial paper.

GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used.

Source: World Bank (2019).

Figure 1.4
Inflation and M2 Money Growth Rate from 2006-2017 for Singapore, Indonesia, Malaysia and Thailand (%)



Note: Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.

Source: World Bank (2019).

FinTech and shadow banking have grown significantly for small-, medium- and large-sized enterprises. The tendency of people to use digital financial intermediaries more intensively will affect microeconomics and macroeconomics significantly, including the current role of the central bank. Supporting this statement, Zhang and Wan (2017) foresee that conventional monetary policy pursued by the central bank could become impotent in influencing the financial system. This can happen because the demand for money is no longer stable. Figure 1.3 shows the level of GDP and aggregate broad money in the ASEAN countries under observation and illustrates that the broad money (BM) growth rate is increasingly outpacing the growth rate of GDP, above all in Thailand and Indonesia. As we can see, in Thailand the ratio of broad money-to-GDP rose from 100.4% in 2007 to 119.9% in 2011, and then reached its peak of 125.7% in 2016. Similarly, in Indonesia, the ratio of broad money-to-GDP rose from 38.3% in 2008 to 40.4% in 2016. Moreover, Figure 1.4 illustrates that since 2006, the growth rate of M2 in Thailand and Indonesia has failed to follow one of the basic rules in monetary economics; that higher money growth translates into higher inflation. The red line representing the growth of M2 in Thailand is not in accordance with the blue dotted line that denotes the inflation rate. In 2008, the red line indicated an 8% increase in M2, whereas the inflation rate was decreasing from 5.5% to –0.8%. For Indonesia, the growth rate of M2 given by the purple line and the inflation rate (green dotted line) mirror the observation in Thailand. Instead of causing a decrease in Indonesian M2, the decreasing inflation rate in 2008 is apparently causing Indonesia M2 to increase sharply, from –1% to 32% in 2009. This implies that inflation and M2 have become unrelated – thus inflation is not entirely a monetary phenomenon.

These observations indicate that the monetary aggregates are very unstable, and that the money multiplier is endogenously determined by the behaviour of market participants. This evidence shows that it is time to reshape the monetary policy framework by including FinTech and shadow banking activities in the monetary policy formulation because the financial environment has changed dramatically in recent years and will continue to do so in future. The rapid rise of shadow banking and the boom in financial innovation including FinTech have introduced many complexities into the monetary system since 2008, thus identifying and controlling broad money have become harder. The money multiplier and the velocity of money are no longer stable, which is against the basic assumptions of the Fisher quantity theory of money (QTM), making quantitative instruments less desirable and unreliable. While shadow banking also involves credit and liquidity creation, it also creates system risk on account of the complexity of its product structure, its operations outside of the traditional banking system, a lack of legal clarity and insufficient control (Wang and Li, 2013). In short, while shadow banking provides a valuable alternative to bank funding and can play an important role in allocating finance to support real economic activity, it can also create financial stability risks when it involves a high degree of bank-like risk, such as credit risk, liquidity risk and market risk (IMF, 2019). Shadow banking can be part of complex chains of transactions that are connected to the formal banking system. If shadow banking risks are large and/or interconnected, then they are more likely to be systemic. Shadow banking activities are frequently non-transparent, leading to increased scrutiny by monetary authorities as well as raising the need of conducting comprehensive research to mitigate the risks. The necessary comprehensive steps by the monetary authority to respond appropriately to the behaviour of new forms of financial intermediation from the macroeconomics and monetary policy perspective have become more urgent, timely and relevant.

The remainder of this paper is organised as follows. The first Chapter provides the background, the behaviour of the non-bank financial intermediaries in several ASEAN countries and the research objectives. The second Chapter describes the definition, scope and prospects of new forms of financial intermediation, monetary policy implications, and the research methodology adopted in this study. Chapters 3 to 6 present empirical studies for several ASEAN countries, namely Indonesia, Thailand, Malaysia and Singapore. The last Chapter summarises the findings and their implications for monetary policy.

1.2 Objectives

1. Mapping the shadow bank activities as a new form of financial intermediation in ASEAN as a whole, Indonesia, Thailand, Malaysia and Singapore;
2. Analysing the prospects for shadow banking activity in ASEAN as a whole, Indonesia, Thailand, Malaysia, and Singapore;
3. Measuring the impact of monetary policy on shadow banks through the asset price channel in Indonesia, Thailand, Malaysia, and Singapore.

1.3 Research Benefits

1. This paper provides another reference regarding shadow banking intermediation activities in ASEAN countries for academics, practitioners and regulators.
2. Research findings also contribute to providing a backdrop for central banks' monetary or macroprudential policies and regulatory and supervisory issues of financial supervisory agencies, and thus assist these authorities in formulating better policy recommendations.

CHAPTER 2

NEW FORMS OF FINANCIAL INTERMEDIATION: CONCEPTS, MACROMAPPING, IMPLICATIONS, PROSPECTS AND REGULATION

2.1 Concept and Scope of New Forms of Financial Intermediation

It is generally believed that financial intermediation is an activity that facilitates the channeling of funds from units in surplus to units in deficit. Bakk-Simon et al. (2012) also interpret credit intermediation as a lending activity where the surplus unit does not have to lend the funds directly to the borrower, but at least one institution is included. Financial institutions, most notably banks, often play a critical role in this activity which, in the long-term, obviously makes a pivotal contribution to boosting and sustaining economic growth. There is a considerable body of evidence showing that a country which utilises banking intermediation in its financial system will not only display higher economic growth but also wider financial services, advanced economic performance (Levine, 2005), poverty cutback (Beck et al., 2007) and diminished inequality (Demirgüç-Kunt and Levine, 2009).

The costs associated with financial intermediation constitute a significant drain on the banking system. The higher the costs, the lower the amount of credit channelled by lenders to borrowers, which is explained by credit rationing as described in Stiglitz and Weiss (1981). To estimate how high the costs of financial intermediation are, a commonly used proxy is the spread in interest rates, chiefly the difference between the deposit rate and the lending rate. According to Calice and Zhou (2018), countries with lower intermediation costs possess higher levels of financial advancement and higher infiltration in utilising financial services. Therefore, in order to improve bank efficiency and accomplish more financial deepening, it is crucial for policymakers to investigate and understand the determinants of intermediation costs.

Nevertheless, as authorities fail to keep up with the needs of the public – reflected in a decrease in financial intermediation costs, an easing of banking regulations, efficiency and cost effectiveness in transferring funds, the creation of financial institutions other than banks – unregulated financial institutions and the aforementioned shadow banks have an incentive to enter the financial system and seek a way to deal with this problem by utilising the inevitable advance in financial technology, which has led to tremendous innovation in how the financial world works and of course, its long- term effects on the economy.

This can be seen from the steadily rising number of new forms of financial activities and instruments which operate outside the traditional banking system, yet possesses the same characteristics as banks, e.g., P2P lending. For the purpose of this paper, the definition of shadow banking will be limited to the narrow measure as defined by the FSB (2014).

The rapid development of financial intermediation has had a sizeable impact on the rise of new forms or instruments in financing supported by financial innovation and FinTech, as well as efforts in regulatory arbitrage – avoiding regulation and taking

profits. In this case, many of the activities that occur in shadow banking are supported by technology so as to create new activities in financial intermediation. The expansion of the global economy as well as the rapid growth of global financial markets create non-bank financial activities which have been expanding remarkably due to the lack of regulation in this sector, promising significant profits and accommodative monetary policies supportive of technological and market innovations. Since then, financial activities conducted by the two types of institutions have been implemented in parallel. This new phenomenon is supported by an open market system, financial innovation and technological developments leading to the creation of new forms of financial intermediation. Besides, the evolution of the shadow banking has been boosted as traditional banks themselves are striving to find ways of doing financial activities outside the regulatory perimeter in order to boost profits. Consequently, this has ignited the progress and growth of both shadow banking activities as well as traditional financial institutions. The emergence of shadow banking is also extensively used as a tool to increase leverage and circumvent regulatory capital or liquidity requirements. Another reason behind the growth of shadow banking is that existing traditional bank regulations have made the process of getting loans more difficult by prolonging the process and involving several precautionary steps, including the evaluation of the financial situation and the ability of potential borrower to pay back the loan. This makes shadow banking appear more attractive from the point of view of the borrower. Shadow banking may also benefit credit-constrained borrowers as it provides funds for those who cannot obtain credit from traditional banks (Pluksna, 2013).

In view of these considerations, shadow banking in this paper refers to activities related to credit intermediation as well as liquidity and maturity transformation that take place outside the regulated banking system. Credit intermediation can be defined broadly as any kind of lending activity where the saver does not lend directly to the borrower, but at least one intermediary is involved. Additionally, credit transformation can be achieved by dividing a portfolio of assets – like securitised loans – into tranches with a different risk profile than the underlying individual portfolio assets. Securitisation facilitated the large-scale use of this process, which was instrumental in the growth of the shadow banking system. Maturity transformation broadly relates to the use of short-term liabilities to fund investment in long-term assets. Both liquidity and maturity transformation take place during the process of credit intermediation. This quite broad definition that is proposed, which defines shadow banking by function/activities rather than entities, allows the monitoring of developments over time and may help in decreasing the scope for regulatory arbitrage. The financial institutions and segments of the financial sector included in this broad definition are finance companies, money market funds, some hedge funds, special-purpose vehicles and other vehicles that are involved in various activities related to securitisation.

But, trying to unequivocally define what shadow banking is remains difficult to this day. FSB (2012) tries to describe shadow banking as an intermediary for credit, involving several entities and where either the whole or part of the activity is carried out outside the regular banking system. Solarz (2013) sees shadow banking as a collection of transactions that represent traditional banking services, namely, obtaining financial means from savers and investors and lending these facilities to credit recipients, however, with different statuses. In this case, the possibility of avoiding banking regulations becomes undeniable, since these transactions are not controlled by the appropriate supervisory institutions. Moreover, according to Liu, Sheng and Ma (2014), non-financial enterprises

tend to enter the shadow banking' category and categorise themselves as non-bank institutions on account of the lower, or even absent, regulatory requirements. Such firms are developing shadow banking activities through private lending and equity innovation with the intention of gaining investment earnings, improving operating performance and whitewashing financial statements. IMF (2018) attempts to extend the shadow banking term by classifying financial institutions based on their characteristics. Table 2.1 shows a clear distinction between financial institutions that is often misinterpreted.

Table 2.1
A Stylised View of Structural Characteristics of Credit-Based Intermediation

Characteristic:	Traditional Banking	Shadow Banking	Market-based Finance[1]
Key Risk Transformation	Liquidity, maturity, leverage	Credit enhancement, liquidity, maturity, leverage	Less emphasis on credit enhancement and less opaque vs shadow banking
Institution Involved in Intermediation	Single entity	Can be many entities, interconnected through collateral chains and credit guarantee	Single/few entities
Formal Ex-ante 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 Vehicles (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 and retail financed	Debt, mainly wholesale financed	Highly diverse- Short and long-term debt and equity, Retail and wholesale financed
Key Resulting Financial Stability Risk	Systemic risk (institutional spillovers)	Systemic risk (institutional spillovers)	Shift in price of risk (market risk premia)

Note :
1. Market-based finance in general is more capable of sharing risks and passing losses back to investors than the banking system. It also enables investors to put funds in equity, which is the most effective way to share risks for financial stability purposes (Bank of England, 2017).

Source: IMF (2018).

Expanding on previous research, IMF (2014) encapsulates all definitions of shadow banking by declaring that shadow bank can broadly be divided into three categories: entity-based, activity-based and a mixture of the two. Briefly, the entity-based category can be interpreted as all financial activities, except traditional banking, which relies on personal or public backstops to operate (Claessens and Ratnovski, 2014). These authors use the backstop as the main feature of shadow banking practices – because it combines risk transformation, low margins and high scale. This definition certainly includes all financial activities that are often called shadow banking, as shown in Table 2.2.

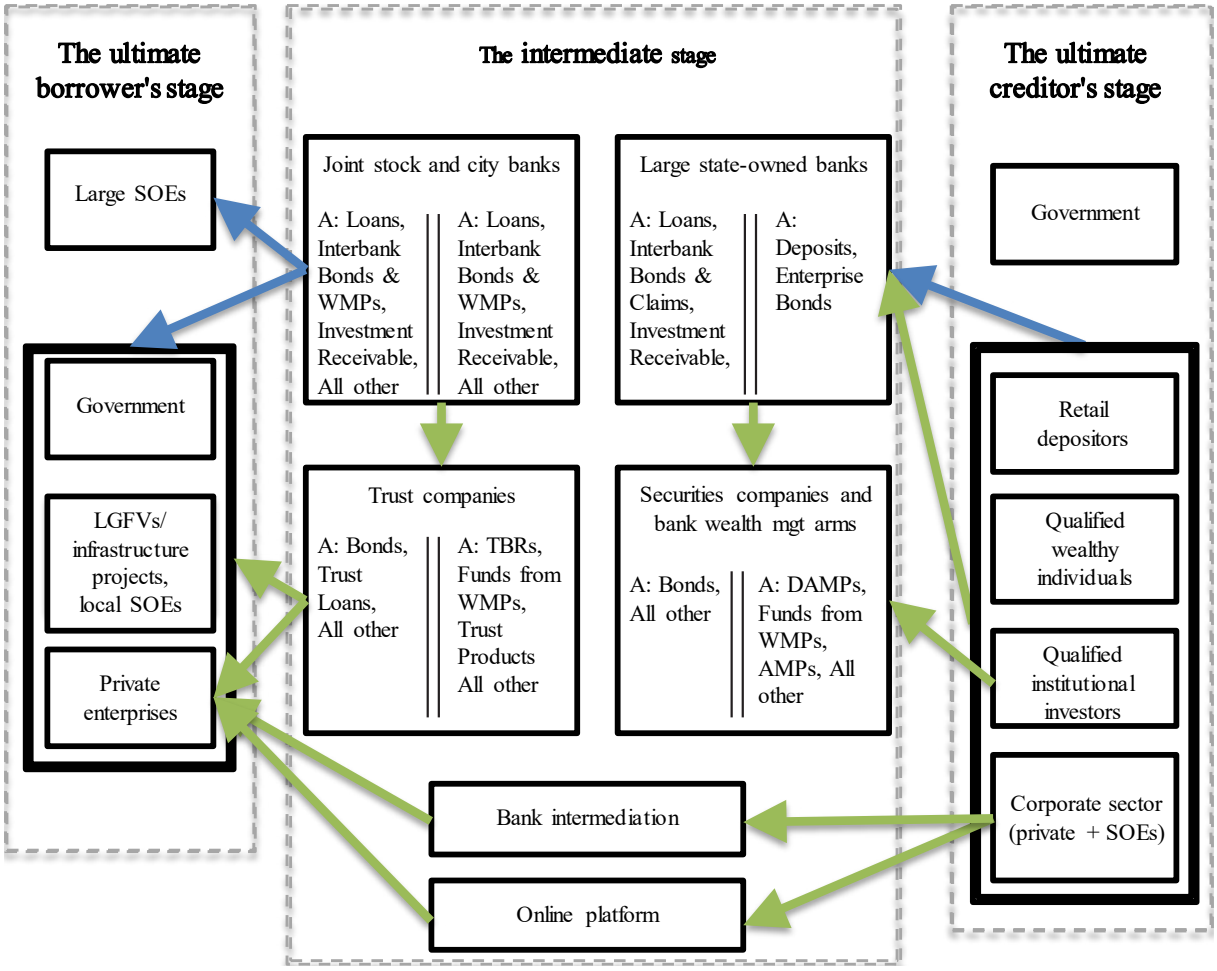
Table 2.2
The Spectrum of Financial Activities

"Traditional" intermediation by institutions	Activities commonly referred to as forms of "shadow banking"	"Traditional" intermediation by market entities
Traditional banking (deposit-taking and lending). Traditional insurance	Securitization, including trenching of claims, maturity transformation, liquidity "puts" from banks to SIVs, support to par value money funds. Collateral services, primarily through dealer banks, including: supporting the efficient re-use of collateral in repo transactions, for OTC derivatives, and in prime brokerage; securities lending. Bank wholesale funding arrangement, including the use of collateral in repos and the operations of the tri-party repo market Deposit-taking and/or lending by non-banks, including that by insurance companies (e.g., France) and bank-affiliated companies (e.g., India and China).	In capital markets: Hedge funds Investment companies Underwriters Market-makers Custodians Brokers In the non-bank sector: Leasing and finance companies Corporate tax vehicles

Source: Claessens and Ratnovski (2014).

Moreover, to be able to define shadow banks based on their activity, Ehlers, Kong and Zhu (2018), have created a map depicting how funds circulate in the shadow banking system. Figure 2.1 shows the interlinkages of the financial system generated by the essential role of commercial banks and shadow banks activities. The green arrows depict the fundamental instruments of shadow banks as well as the results, whereas the blue arrows indicate the formal credit channelled by traditional banks. As mentioned before, this map derived from the activity-based approach distinguishes three particular stages of shadow credit intermediation in China, namely the ultimate creditor stage, the intermediate stage, and the ultimate borrower stage – in which each stage not only consists of different types of instruments and entities but also serves different economic functions.

Figure 2.1
Shadow Banking Map



Source: Ehlers, Kong and Zhu (2018).

According to Ehlers, Kong and Zhu (2018), the ultimate creditor stage (Figure 2.1, right-hand side) can be defined as the ultimate supply of funding, consisting primarily of private and company depositors. The instruments involved at this stage are wealth management (WMPs) and trust products. While WMPs are issued by banks and serve just like other savings instruments, they provide higher compensations than traditional bank deposits. Here, individual investors play a major part in bankrolling WMPs. Trust companies have also issued another instrument serving similar functions to traditional banks, yet not subject to the same regulations, namely trust product. Also, there is another relevant party, namely small private lenders which provide informal credit; however, this sector is hard to quantify and does not form part of the map. Furthermore, earned funds are then transferred and converted into a different kind of shadow banking assets, meaning that we can classify this activity as the intermediate stage (Figure 2.1, centre). At this stage, funds are intermediated from banks to shadow lenders. By doing so, commercial banks are not only creating strong connections but also undoubtedly boosting the amount of shadow credit, as commercial banks efficiently transform the collected funds into shadow banking instruments. The third stage is the ultimate borrower stage (Figure 2.1, left-hand side). This is the end of the transformation of shadow credit. At this point, shadow credit provides financing for companies and individuals who have restricted access to commercial banks credit.

At the end of 2018, the FSB changed the "shadow banking" terminology to "non-bank financial intermediation (NBFI)", which affects either the substance or the coverage of the new definition. The new nomenclature encompasses all forms of credit originated by all non-bank institutions involving asset management companies and funds that issue and buy debt and money instruments. While very broad and comprehensive, the reference to "credit" is partially misleading. Non-bank financial intermediation is more widely connected to financial intermediation that involves maturity transformation, relying on liquidity inside the intermediation chain rather than credit that emphasise leverage. NBFIs have become a preferred option to bank loans for many companies and households, bolstering competition in the supply of financing as well as strengthening economic activity notably from the emergence of FinTech that can create a more efficient financial system. NBFIs are increasingly supplying the need for medium- and long-term credit, while commercial banks take advantage of short-term funds for trading and commerce. They also tend to focus on accommodating the part of the population that is not covered by banks in terms of financial access. Regarding the role of NBFIs, FSB (2018) perceives them as complementary institutions to traditional banks, as they commonly borrow funds from banks and convey them as loans to their clients. But as NBFIs also compete with banks in deposit collection and loan disbursement, they attract customers by offering attractive interest rates and extending efficient services.

A very unexpected statement subsequently comes from Landau (2019), who declared that the ECB in 2012 has provided a better, although less official, definition of shadow banking, which states that "… shadow banking refers to activities related to credit intermediation, liquidity and maturity transformation that take place outside the regulated banking system". The author also mentions that the definition of shadow banking is very country specific. By adding this statement, Landau proposes to reverse the previous research done by Ehlers, Kong and Zhu (2018). He states that the definition of shadow bank falls into two new categories, namely Chinese style and Western style.

In China, the activity of shadow banks mostly comprises intermediation activities, where traditional banks run a major role as operators but strive to keep transactions off their own balance sheets – hence averting capital, liquidity and regulatory requirements. Chinese banks or "trust companies" aim to arrange loans between companies while avoiding the use of their own balance sheets. These products are called "entrusted loans". In order to collect funds without falling under interest rate regulations, trust companies produce "bankers' notes" or sell WMPs to various households, whereby they offer a low-risk instrument that still provides higher yields than bank deposit rates. The same does not hold for "Western style" shadow banking.

"Western style" shadow banking is quite different and more complex. In contrast to the previous version, whereby deposit banks play the central role in the intermediation activity, "Western style" has Other Financial Institutions (OFI), such as mutual funds, dealer banks, money market funds and asset management companies, performing the dominant role. To be able to more fully understand the complicated structure of this new category, Landau subdivides the players based on the time horizon: a narrow shadow banking definition corresponding to the short-term intermediation occurring in debt and money markets, and a broader definition where shadow banking encompasses investment funds and asset managers divesting immediately cashable shares and investing the outcome into long-term securities.

Landau then explains that in the first case, the major cash users who manage long-term portfolios, yet lack the cash to be able to do business on those portfolios, are called "institutional cash pools". These users of cash consist of insurers, hedge funds and pension funds. The shaded financial activity allows them to quickly collect their part of their portfolio and earn the needed cash to finance their transactions. To put it in another way, the exchange of collateral for cash through repurchase operations (repos) represents the main engine that keeps shadow banking running. Here, repos offer the maximum security for the circulation of cash by assuring that each transaction is guaranteed by warrant. Therefore, the availability of collateral is crucial for shadow banks to operate. Although government bonds provide the most assurance, a substantial part reportedly relies on privately created collateral. This type of collateral is created through securitisation: the issuance of short-term debt, such as asset-backed securities (ABS) along with the bundling and tranching of current loans, can under certain circumstances legally serve as collateral. Additionally, shadow banking is not only benefitting from transforming long-term into short-term assets, but also producing the collateral itself through the securitisation of loans performed by asset managers and investment banks. To sum up, Landau declares that the deep link between securitisation, repos and collateral constitutes the backbone of shadow banking.

Surprisingly, however, in the second stage, Landau extends the definition of shadow banking by introducing the asset management industry as a new, modern and contemporary form of shadow banking. This is due to the shrinking volume and importance of traditional shadow banks as another form of non-bank intermediation rapidly takes its place in advanced financial systems. These institutions operate as open-ended funds that issue short-term or redeemable liabilities and transform them into long-term securities.

The changes in shadow banking structure are critical for the financial world, notably for emerging markets today, which are at the acquiring end of shadow banking and directly affected by the system. According to current evidence, shadow banks in advanced countries can cause financial problems in the shape of "large and volatile capital flows". In addition, research by Malatesta, Masciantonia and Zaghini (2016) shows that the shadow banking industry in the euro-area has grown in importance in the wake of the GFC, although there is significant heterogeneity across countries. They also find that shadow banking interconnectedness with the commercial banking system has increased over time. The latter means that risks have become more contagious, raising the spectre of the "too-big-to-fail" issue in developed financial markets.

In line with the previous statement, Landau then warns authorities to rigorously acknowledge future risks and vulnerabilities that may arise from the activity of this new institution. The main function of shadow banks that looks innocuous at first may therefore not be as beneficial as it might seem. The ability to directly transform large funds for issuers depends on the process working well at all times. Shadow banks are very susceptible to runs as they only have limited backstops that rely on illiquid future deposits, which may eventually jeopardise other financial institutions. This is further aggravated by the existence of an exceptionally and durably low interest rate environment. Such an environment not only discourages investors from investing but also leads them to pursue assets with high returns, which are usually those with lower liquidity. In other words, an adverse financial environment may create a higher demand for shadow bank assets which would exacerbate

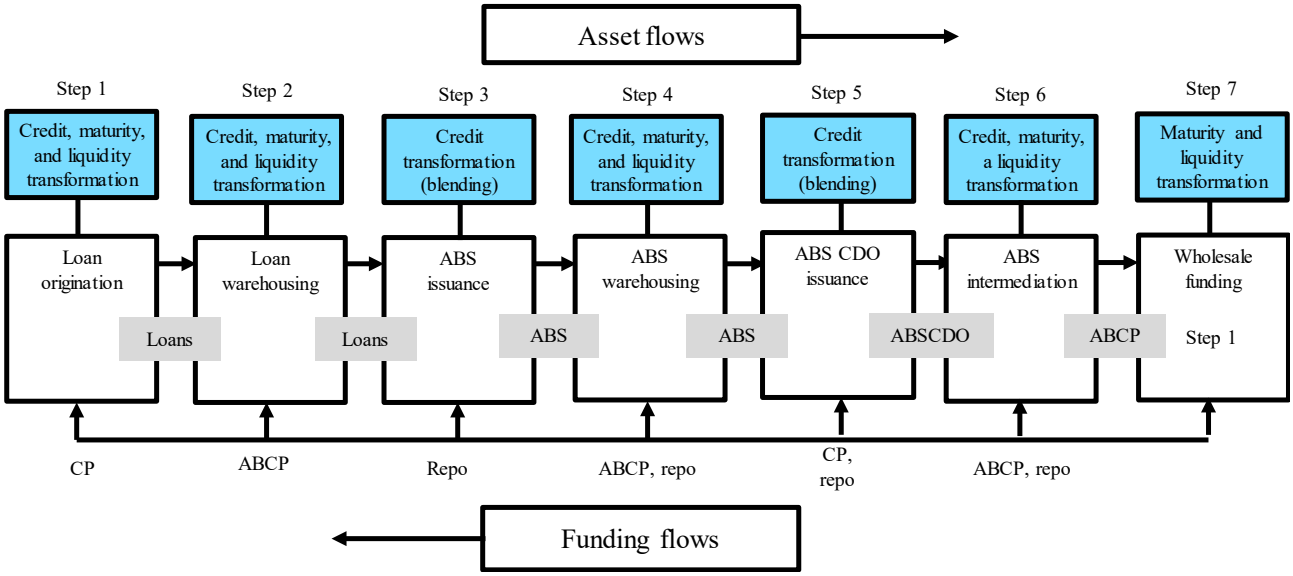
the risks. Landau also adds that imminent shocks may materialise from exactly those elements of the financial system. He very forcefully regards shadow banks as the main source of any future financial tensions and crises.

"Western style" shadow banking appears not to be a new thing in financial markets since Pozsar et al. (2010) discussed it a few years before Landau. They stated that in the shadow banking system, mortgages, loans and leases were converted into marketable instruments. Capitalisation was also in the shape of sellable securities, e.g., commercial paper.

Like traditional banking, the shadow banking system performs credit intermediation. Nevertheless, in contrast to the traditional banking system, in which credit intermediation is carried out "under one roof", in the shadow banking system, credit intermediation is executed through a chain of non-bank financial intermediaries consisting of a multi-step process. These steps still require the role of traditional banks and they contain (1) loan origination, (2) loan warehousing, (3) ABS issuance, (4) ABS warehousing, (5) ABS CDO issuance, (6) ABS "intermediation" and (7) wholesale funding. According to Pozsar et al. (2010), the shadow banking system implements these steps in a rigorous and successive order, with each step operated by a particular type of shadow bank and *via* a definitive financing technique.

1. Loan origination is carried out by finance companies which are supported by medium-term notes (MTNs) and commercial paper (CP).
2. Loan warehousing is managed by single and multi-seller channels and is financed through asset backed commercial paper (ABCP).
3. The pooling of loans into term asset-backed securities (ABS) is operated by broker dealers' ABS.
4. ABS warehousing is funded through repurchase (repo) agreements or total return swaps and promoted through trading books.
5. The pooling and arranging of ABS into CDOs are also performed by broker-dealers' ABS.
6. ABS intermediation is accomplished by structured investment vehicles (SIVs), securities arbitrage conduits, limited purpose finance companies (LPFCs) and credit hedge funds, which are financed in a variety of ways containing ABCP, repo, bonds, capital notes and MTNs.
7. The financing of all these institutions and activities is executed in wholesale funding markets by funding providers such as money market investors, securities lenders and regulated and unregulated money market intermediaries. Aside from these investors, which provide money for shadow banks through short-term repo, ABCP instruments and CP, pension funds, fixed income mutual funds and insurance companies also bankroll shadow banks by lending in their longer-term bonds and MTNs.

Figure 2.2
The Credit Intermediation Chain



Note: ABS is asset-backed security; CDO is collateralised debt obligation; CP is commercial paper; ABCP is asset-backed commercial paper; NAV is net asset value.
Source: Pozsar et el. (2010).

Table 2.3
Illustrative Examples of the Steps, Entities and Funding Techniques Involved in Shadow Credit Intermediation

	Function	Shadow Banks	Shadow Banks' Funding*
Step (1)	Loan Origination	Finance Companies	CP, MTNs, bonds
Step (2)	Loan Warehousing	Single and multi-seller conduits	ABCP
Step (3)	ABS Issuance	SPVs, structured by broker-dealers	ABS
	ABS Warehousing	Hybrid, TRS/ repo conduits, broker-dealers' trading books	ABCP, repo
Step (4)			
Step (5)	ABS CDO Issuance	SPVs, structured by broker-dealers	ABS CDOs, CDO-squared
Step (6)	ABS Intermediation	LPFCs, SIVs, securities arbitrage conduits, credit hedge funds	ABCP, MTN, repo
Step (7)	Wholesale Funding	MMMFs, enchanter cash funds, securities lenders, etc.	USD1 NAV shares (shadow bank "deposits")

*. Funding types highlighted in red denote securitised funding techniques. Securitised funding techniques are not synonymous with secured funding.
Source: Pozsar et al. (2010).

While shadow banks perform an economic role similar to that of traditional banks, which is to intermediate funds from surplus units to deficit units, a longer mechanism is involved. The shadow banking system alters the simple process of deposit-funded transaction conducted by commercial banks into a more sophisticated, securitisation-based, wholesale-funded lending process. Amplifying previous statements, Pozsar et al. also add that through this intermediation process, shadow banking transforms long-term risky loans into seemingly short-term credit-risk free, stable net asset value (NAV) shares that are issued by financial institutions requiring day-to-day liquidity, e.g., money market mutual funds. This critical part is pictured by the first and last links in Figure 2.2, which illustrates the flow of assets and funding of the credit intermediation mechanism by the shadow banking system.

Based on the seven steps of credit intermediation process exhibited in Figure 2.2, some intermediation chains may either stop after the sixth step already or even continue after the seventh step. For instance, supposing that a set of prime loans is converted from cash by a bound finance company to a bank-promoted seller for period warehousing, an intermediation transaction might end at "Step 2". Moreover, another factor that might affect the length of the credit intermediation chain is the quality of the underlying loan pool; the more adverse the quality, the more extensive the process will be. In other words, poor-quality long-term loans usually involve all seven or more steps of intermediation, whereas liquid and good-quality short- to medium-term loans involve merely three steps. This is required in order to enhance the quality of the underlying loans to the stringent requirements of money market mutual funds (Pozsar et al., 2010). The process of credit intermediation will always begin with creation and come to an end with wholesale funding, and a shadow bank emerges once in the practice.

Another way to comprehend the financial institutions categorised as shadow banks is to follow the FSB (2019), which proposed a two-step methodology to divide financial entities into NBFIs and shadow banks. The first step is to capture an aggregate measure of all NBFIs, referred to as the monitoring universe of non-bank financial intermediation (MUNFI). Here, MUNFI involves pension funds, financial associates, OFIs and insurance corporations. Next, the second step narrows the analysis to non-bank financial institutions that may present risks to financial stability, producing the FSB's "narrow measure" of NBFI. This phase commences by creating a subdivision of institutions which classifies MUNFI into five economic functions (EFs). Some institutions may be put into more than one EF.

In order to apply this EF approach in categorising NBFIs, regulators scrutinise non-bank financial institutions' activities, business models and related bank-like risks to financial stability and then distribute the selected institutional types into one or more of the five EFs. The methodology rejects institutions that are either not commonly part of an intermediation chain or part of which is yet to be engaged in important maturity transformation and/or leverage. The method embodies regulators' supervisory judgement due to the non-availability of data. Each EF encompasses a number of distinct institutional classes, and the financial stability risks arising from various entity types, as well as inside an entity type, may diverge.

The EF1 category contains collective investment vehicles (CIVs) which are known to have features that may expose them to runs. Most of the time, CIVs may be expected to perform as shock buffers in the financial system as costs from an institution's calamity or from unfavourable market conditions are distributed amid a wide group of heterogenous investors. But some CIVs exposed to maturity/liquidity transformation and/or leverage can be susceptible to runs in severe circumstances.

Furthermore, many entities in EF2 participate in loan provisioning which relies on short-term financing. The EF2 category includes finance companies that are frequently concentrated in fields such as auto finance, retail mortgage provision, consumer finance, equipment finance and commercial property finance. Institutions involved in these activities either compete with commercial banks or provide services in niche markets where banks are generally not active players, and usually they concentrate their loans in particular sectors on account of their expertise and other factors. Such behaviour is harmful as it may cause substantial risks if the areas they centre on are cyclical. Also, if these non-bank institutions are heavily reliant on short-term financing or are still dependent on parent corporations for financing and the parent corporations are in the same cyclical fields, such risks would be aggravated.

Moreover, in the EF3 category, financial institutions have a new way of utilising their short-term funding, which is by borrowing and lending securities and securing funding of client assets. Here, entities such as broker-dealers achieve many purposes, including supplying liquidity through market-making activities, providing short-term credit to their clients in wrapping their positions, providing investment advice to clients, facilitating trading activities, helping raise capital for corporates and publishing investment research. In addition, EF4 members help with the origination of credit, for instance, when financial guarantors extend various forms of guarantees to non-bank financial entities and commercial banks, in particular derivatives and off-balance sheet commitments. This credit preservation appears as full repayment to investors, even if the borrower cannot meet its obligations. From the borrower's perspective, a lender's creditworthiness is enhanced by the credit quality of the insurer creating a reduction in costs. Credit insurer and sellers of credit default swaps (CDS) promote credit creation through their activities, thereby improving their marketability.

Lastly, entities in the EF5 category influence the financing of financial institutions and securitisation-based credit intermediation. In this case, bank and non-bank financial intermediaries frequently adopt securitisation for capital management and financing objectives as well as boosting their lending portfolios. Aside from that, as a result of having the ability to transfer credit risk off-balance sheet, securitisation is able to reduce funding costs for financial institutions as well as facilitate the availability of credit to the real sector. But these profitable effects more often than not create excessive maturity/liquidity transformation, regulatory arbitrage and leverage in the system, which may later lead to more considerable risks in the financial system with less rigid loan guidelines. In this case, the securitisation market should be more conscious of unexpected declines in market liquidity, notably in terms of sophisticated securitisations. Furthermore, aside from EF, the second step also has other indicators to delineate whether a non-bank financial institution can be classified as narrow or not. These are the systemic risk indicators (SRs) which are defined as follows:

1. SR 1 – Maturity Transformation: Short-term liabilities are utilised to finance long-term assets in the credit provision by financial institutions.
2. SR 2 – Liquidity Transformation: The extent of liquidity transformation in the provision of credit within financial institutions.
3. SR 3 – Credit Risk Transfer. The balance sheet disclosure (e.g., commitments) provided by financial entities.
4. SR 4 – Leverage: The extent of leverage in financial institutions.

Furthermore, the FSB (2014) also states that financial institutions may not always be categorised as shadow banks if:

1. The NBFIs are subject to a relevant regulatory regime;
2. The financial activities are not generating systemic risks; or
3. Credit intermediation activities are not implemented.

Non-bank financial institutions in Asia can be broadly classified as (1) insurance companies and pension funds – this category is not considered to be part of conventional credit intermediation, (2) public financial institutions (PFIs) – this type of financial institution is owned by the government and commonly provides particular services, (3) OFIs – all remaining financial intermediaries that are not included in the above classifications. The topography of narrow-measure NBFIs in the ASEAN region is described in Table 2.4.

Table 2.4
Financial Institutions Categorised as Shadow Banks in Four ASEAN Countries

Entity	Country			
	Indonesia	Thailand	Malaysia	Singapore
Insurance companies and pension funds[1]				
Pension funds				
Public financial institutions				
Credit unions / Cooperatives (CUCs)				
Building societies[2]				
Structured finance vehicles (SFVs)[3]				
Primary dealers and portfolio managers				
Brokers[4]				
Money market corporations (MMCs)				
Pawnshops				
Mortgage corporations[5]				
Development financial institutions (DFIs)				
Microfinance institutions (MFIs)				
Finance companies				
Money market funds (MMFs) [6]				
Collective investment schemes (CIS)[7]				
Hedge funds[8]				
Trust companies				
Yellow = Identified as shadow banks				

Notes:

1. All surveyed members with insurance companies in their jurisdictions do not consider insurance company activities as shadow banking activities. An exception is that all members agree that insurance companies, to a certain extent, facilitate credit creation (i.e., EF4) via types of credit insurance and financial (mortgage) guarantees. Similarly, pension funds should not be categorised as shadow banking because they do not engage in credit intermediation.

2. In Malaysia, building societies are identified as shadow banking based on FSB indicators, as these institutions are involved in maturity/liquidity transformation, leverage and are primarily funded by short-term deposits (i.e. SR 1, SR 2, SR 4 and EF2). These institutions are not subject to any formal prudential oversight.

3. SFVs are not considered shadow banking in Indonesia as they are prohibited from certain activities, including the redemption of asset-backed securities or engaging in borrowing activities. Consequently, their capacity to carry out maturity/liquidity transformation is significantly curtailed.

4. In Malaysia, brokers are mainly funded by shareholders, while the margin loans granted by them to clients are on at-call basis. On the other hand, Thailand considers that brokers undertake a host of economic functions and display certain systemic risk indicators, albeit at minimal level. They classify brokers as shadow banking in line with the FSB's broader definition of shadow banking. Singapore also identifies brokers to be shadow banking as they intermediate credit with little or no prudential and supervisory oversight.

5. Only Malaysia and Thailand reported that their mortgage corporations are exposed to risks of maturity/liquidity transformation and leverage and are involved in facilitation of credit creation and securitisation (i.e. SR 1 and SR 2; EF 4 and EF 5). Malaysia and Thailand consider their mortgage corporations to be shadow banking based on FSB indicators, as they are involved in maturity and liquidity transformation, as well as leverage, and are only subject to limited prudential requirements (SR 1, SR 2 and SR 4). Mortgage corporations in Thailand, however, are allowed to engage only in securitisation.

6. Only Singapore and Thailand consider MMFs as shadow banking. Although Singapore and Thailand consider them to be shadow banking, they believe the risks are generally addressed within their existing regulatory or supervisory framework. Singapore points out that MMFs should be identified as shadow banking only to the extent they intermediate credit (i.e., placing assets backed by liabilities or pooled equity into credit instruments) and where there are little or no prudential regulatory standards and supervisory oversight. Thailand also noted that domestic MMFs only pose risks at a minimal level and all of which are mitigated by several regulatory measures. Indonesia does not consider MMFs as shadow banking. Indonesia considers that MMFs are subject to a supervisory and regulatory regime in its jurisdiction and do not constitute shadow banking. Moreover, these funds are required to comply with the general principle of fair value when valuing the securities held in their portfolio, thus making them less susceptible to runs.

7. Thailand and Singapore are considering CIS to be shadow banking. Singapore identifies CIS as potentially giving rise to maturity and liquidity transformation risks and categorises CIS as shadow banking but emphasises that the focus should be only on those that invest in credit instruments. Thailand also identified CIS as having similar risks and categorises CIS as shadow banking but considers that the degree to which CIS are susceptible to a run is minimal. Indonesia and Malaysia do not classify CIS as shadow banking primarily because risks posed by CIS are either minimal, mitigated or CIS are already subject to proper regulatory oversight. Indonesia is of the view that none of the systemic risk indicators are applicable to their CIS, which are subject to existing regulations that mitigate excessive risk taking. While Malaysia recognises that some large CIS may pose systemic risk due to the size the interconnectedness within the banking system, CIS in Malaysia are highly regulated and subject to reporting requirements and appropriate regulatory oversight.

8. Only Singapore provided data on hedge funds. Singapore believes that hedge funds should be categorised as shadow banking, but only to the extent these entities intermediate credit (i.e., placing assets backed by liabilities or pooled equity into credit instruments) and where there are no or little prudential regulatory standards and supervisory oversight.

Furthermore, based in an FSB report in 2019 (FSB, 2019), the relationship between MUNFI (USD185.0 trillion for the *29-Group*) and the EF-based narrow measure presented in this section (USD51.6 trillion) is illustrated in Figure 2.3. There are several steps in obtaining the narrow measure:

1. Insurance corporations, pension funds, financial auxiliaries and certain OFIs not classified as falling into one of the five EFs are excluded. These entities, which do not tend to directly engage in credit intermediation or have been appraised as not being involved in liquidity/maturity transformation, leverage and/or imperfect credit risk transfer, totalled USD122.3 trillion at end-2017.

2. Entities potentially incorporated into banking groups are excluded. These entities are already subject to prudential regulation and supervision, including maturity/liquidity transformation, leverage and inexact credit risk transfer, and are consequently excluded from the narrow measure. These banking groups usually contain bank-affiliated broker-dealers, finance companies and SFVs. Self-securitisation assets are also excluded from the narrow measure, as under prudential association rules they are regarded as banking groups' own assets. The amount of prudentially consolidated assets, including self-securitisation, as of end-2017 was USD9.0 trillion.

3. The statistical residual category, consisting of residuals created in some jurisdictions' national financial accounts (NFA), is eliminated from the narrow measure. These residuals are the difference between a jurisdiction's total OFI financial assets, as they are reported in sectoral balance-sheet statistics, and the sum of all known sub-sectors therein. While in theory this residual should be zero, in practice it is quite large in some jurisdictions. This may be the consequence of inconsistencies between "top-down" NFA estimation and "bottom-up" coverage of OFI sub-sectors, as well as challenges in aligning these two approaches and differences in data granularity.

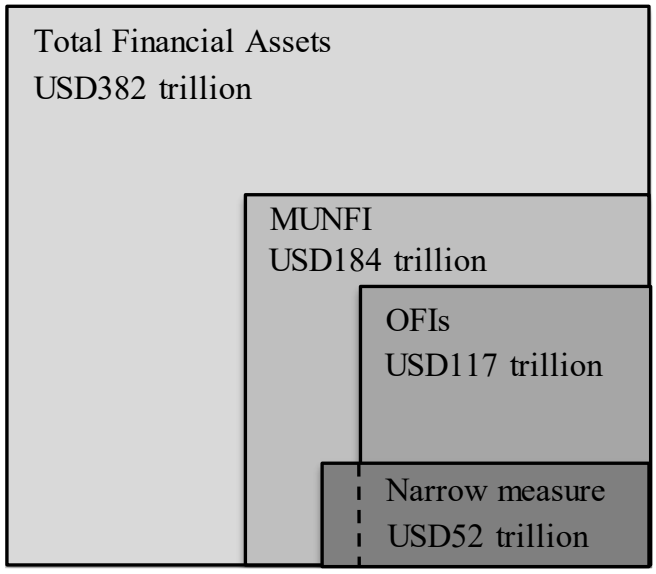
Figure 2.3 indicates that the narrow measure was USD51.6 trillion at end-2017. This is approximately equal to 28% of MUNFI (all NBFI), which is identical in magnitude to the 2017 monitoring exercise. The narrow measure grew by 8.5% in 2017, compared to a 7.1% growth rate for MUNFI. The narrow measure as a share of MUNFI varied significantly across jurisdictions, ranging from 3.3% to 75.9%, with the narrow measure averaging 27.9% of MUNFI. According to Nash and Beardsley (2015), this result – the expansion of non-bank lending – can be sourced to several factors, namely:

1. Regulatory arbitrage: Most of these regulations came into effect during the period from 2010 to 2013. The consistent theme in all of these regulations is that (1) they have made the "cost of doing business" more expensive for regulated banks and caused many to exit or downsize lines of business, and (2) products were forced to "re-price" due to new rules which led to the emergence of new players at lower prices. Interestingly, the new entrants are not subject to most of these regulations, putting them at an advantage versus the traditional players. Nash and Beardsley (2015) provide additional context on each of these asset classes and regulations. But it remains ambiguous as to how long this arbitrage will continue as regulators may be forced to act at some point.

2. Technology lowers barriers to entry: Big data analytics and the pervasive use of the internet for financial transactions have created opportunities for start-up tech companies to extend loans directly to consumers, offering a lower cost and sometimes more beneficial alternative to banks.

3. Favourable macro environment: The combination of historically low interest and delinquency rates for consumer loans has also contributed to credit creation, as investors search for higher yielding assets and new entrants are more comfortable with the risk profile of borrowers.

Figure 2.3
Monitoring Aggregates: Narrowing Down



Note:
1. Total financial assets in US dollar, MUNFI and OFIs are based on the 21+EA Group due to its broader sample. The narrow measure is based on data from the 29-Group, as the data from eight participating euro area jurisdictions are more granular than aggregate euro data from the European Central Bank (ECB). For the 29-Group, the corresponding aggregates are: total global financial assets (USD377.8 trillion); MUNFI (USD185.0 trillion); and OFIs (USD117.0 trillion).

Source: FSB (2019).

Table 2.5
Definition and Composition of the Narrow Measure at End-2017

EF	Definition	Typical entity types	Size (USD trillion)	Share (%)	Change in 2017[1] (%)
EF1	Management of collective investment vehicles with features that make them susceptible to runs	MMFs, fixed income funds, mixed funds, credit hedge funds, real estate funds	36.7	71.2	9.1
EF2	Loan provision that is dependent on short-term funding	Finance companies, leasing/ factoring companies, consumer credit companies	3.5	6.7	5.8
EF3	Intermediation of market activities that is dependent on short-term funding or on secured funding of client assets	Broker-dealers, securities finance companies	4.2	8.2	5.2
EF4	Facilitation of credit creation	Credit insurance companies, financial guarantors, monolines	0.2	0.3	4.4
EF5	Securitisation-based credit intermediation and funding of financial entities	Securitisation vehicles, structured finance vehicles, asset-backed securities	5.0	9.6	9.1
Unallocated[2]			2.0	4.0	9.7
Total			51.6	100.0	8.5

Notes:
1. Some exchange rate effects have been netted out by using a constant exchange rate (from 2017). Net of prudential consolidation into banking groups.
2. Unallocated category which captures OFIs that the relevant authorities assessed to be involved in bank-like financial stability risks from NBFI, but which could not be assigned to a specific EF.

Source: FSB (2019).

Moving on to shadow banking's interconnectedness with other sectors, it is well known that financial interrelatedness is invariably present in an integrated and open global financial system (FSB, 2019). While linkages between financial institutions may help to alter risks, connections can also facilitate in managing risks during stress periods. Interconnectedness has implications for financial soundness through credit risk and financing channels, chiefly because these approaches are essential to leverage and/or maturity/liquidity mismatches. As a result, connections among OFIs, banks and other non-bank entities can be important gauges of possible contagion channels.

Correlation can occur either directly or indirectly. Direct interconnectedness takes place when direct lending and investment is present between two counterparties, while indirect correlation develops when two entities have similar assets or when the market price of debt securities or their equity change. This argument fundamentally intensifies the direct domestic interconnections among OFIs, banks, pension funds, cross-border interrelatedness and insurance corporations.

Non-bank entities initiate the connection with commercial banks through two-way financing channels. OFIs gathered more loans from pension funds and insurance companies than from commercial banks. But financial system interrelatedness differs across regions and many of the authorities have reported higher OFI financing from traditional banks than from pension funds or insurance companies. For instance, in Europe, the interrelations between OFIs and banks are greater than the connections between OFIs and either insurance companies or pension funds. By contrast, OFIs in the United States appear to be more associated with insurance companies or pension funds than with traditional banks.

Furthermore, interconnectedness can be measured as a distribution involving total financial assets of the related entities. Gauged as a percentage of insurance companies and pension funds' assets, the numbers, at 28% and 24% respectively, are significant. Although pension funds, insurance companies and banks have cross-border connections, shadow entities display the broadest cross-border relationship to the whole financial world when calculated as a percentage of OFI total assets. While the interconnectedness between banks and OFIs was lower than that between the rest-of-the-world (ROW) and OFIs in aggregate, many regulators perceived higher OFI linkages to commercial banks than to the ROW.

Equally important, interconnectedness can also be calculated from the viewpoint of OFIs. This is done in order to expose the related matter of these OFI interlinkages. The interrelation between commercial banks and OFIs is wholly the reflection of traditional banks' interrelatedness with OFIs. This condition will be intensified when banks dominate a region; but it will become more crucial to OFIs than to banks at some point. FSB (2019) assesses a fraction of OFIs assets and finds that in 2017, the use of bank loans by OFI has slightly increased from 6.1% to 6.2%, whereas OFIs' liabilities to commercial banks declined slightly from 6.4% to 6.3%.

The FSB also states that bank loans to OFIs remain vital in several jurisdictions, at more than 10% of total OFI financial assets in eleven administrations and over 15% in five territories. In other words, banking sectors have a crucial role in financial systems by being the vital source of OFI funding.

As mentioned above, FinTech is used as a tool for the shadow banking system, because it entails all electronic products and services of the financial sector like credit and chip cards, home banking and mobile banking. FinTech relies heavily on internet-related technologies. For that reason, Accenture (2017) states that global investment in FinTech rose significantly from USD930 million in 2008 to more than USD40 billion in 2017. Ernst and Young (2017) pronounced that in 20 major world markets which are forecast to achieve 52% FinTech adoption, the infiltration of FinTech is larger at the wholesale level than at other market levels.

FinTech as a tool of shadow banking has accelerated the spread of the shadow banking system around the world. For instance, China's giant shadow banking system can be divided into three parts. The first segment consists of security, entrusted loan, insurance, private equity investment and money market funds; the second contains credit creation for small entities, financial assurance companies, investment corporations and other financial institutions; and the last part consists of chambers of trade and also encompasses the non-public financial system made up of entrepreneur clubs, internet finance and private banks (Han, Hus and Li, 2019). But shadow financing in China entails big risks as there is no integrated regulation overseeing the products. More specifically, there are at least four risks, namely bad assets at banks, the default of debt obligations on bonds, the so-called shadow financing and online financial services. Although new regulation has been drafted, if the scope of the regulatory system is either unclear or badly enforced, risks might spread rapidly and with a significant impact. Moreover, the relevant authorities which will be legally responsible for this part are still unclear (Nikkei Asian Review, 2017).

Besides FinTech, monetary policy also plays a role in developing shadow banking activities. Adrian and Shin (2008; 2010) argued that monetary policy is an important factor in affecting the balance sheets of financial intermediaries. The study by Angeloni, Faia and Lo Duca (2015) employed a structural VAR model and showed that a monetary policy shock had a notable and long-lasting impact on numerous bank risk measures. Moreover, using the VAR model, Nelson, Pinter and Theodoridis (2017) found that the monetary policy shock had a significant effect on the balance sheets of both regulated banks and the shadow banking sector. Using the econometrics model from Errico et al. (2014), Malatesta, Masciantonia and Zaghini (2016) showed that macroeconomic variables were the main determinants of loan growth to non-financial corporations.

2.2 Financial Technology and Its Role in Shadow Banking

As mentioned earlier, the concept of new forms of financial intermediation can be perceived as a financial intermediation activity conducted by one or more non-bank entities supported by technology. Financial technology or FinTech is frequently recognised as a recent amalgamation of information technology and financial services. But it appears that the affinity between technology and finance has a long history. As a matter of fact, technological and financial advancements have long been intertwined and mutually reinforcing. The Great Financial Crisis in 2008 proved to be a turning point and is undoubtedly one of the key components in FinTech's evolution into a new model. The broadest definition of FinTech is the utilization of technology in finance (Arner, Buckley and Barberis, 2016). This interpretation can be elaborated upon further by reference to three periods – FinTech 1.0, FinTech 2.0, and FinTech 3.0. In the first period, the influence of FinTech on finance could not be regarded as a "new thing" as it was established in parallel with first the telegraph in 1838 and then the first transatlantic cable in 1869, both of which contributed the essential infrastructure for the first vital phase of financial development in the nineteenth century. This era approximately occurred from around 1870 to the eve of the First World War. Later, the launch of the Automatic Teller Machine (ATM) by Barclays Bank in 1967 arguably marked the start of the modern development of today's FinTech. The purpose of the ATM was to prevent customers from going to their banks for the sole purpose of doing a simple transaction. This turned out to be hugely advantageous to

regulated financial institutions and led to a boon in investment in information technology (IT) products and services. Hence, banks not only boosted their own performance and role in the financial system, but also became a vital driver in the expansion of the IT industry. As a matter of fact, the banking sector is projected to increase its IT investment partly as a result of the modern transformation of FinTech. This era up until 2008 can be described as FinTech 2.0.

Nevertheless, the period since 2008 has seen a shift of perspective with the emergence of the FinTech 3.0 period. Newly established technology firms have started to supply financial services and products directly to corporates and households. This has happened because they possess the legitimacy and resources to provide financial services. In short, the definition of FinTech is no longer restricted to business models (e.g. peer-to-peer (P2P) lending) or particular areas but comprises the whole range of products and services which are customarily catered by financial institutions. While it is difficult to determine where and how the trend began, it is fair to say that the GFC starting in 2008, constituted a tipping point which has enhanced the evolution of the FinTech 3.0 period.

Schueffel (2016) tries to elaborate on the content of financial technology itself. In his study, he gathered much of the literature for comparative purposes. He found that many of the definitions are merely copies of others, allowing him to eliminate some of the definitions so as not to bias the results. By applying a semantic analysis, he then examined the similarity of the interpretations of FinTech that have been employed in the literature and revealed the major similarities. Focusing on the common principles embedded in these definitions, Schueffel extracted a new definition as the lowest common denominator, where FinTech is a new way of advancing financial activities by exercising technology in the process.

Table 2.6
Definitions of Term FinTech and Their Sources

No.	Authors	Definition
1.	Bettinger (1972)	FINTECH is an acronym which stands for financial technology, combining bank expertise with modern management science techniques and the computer.
2.	Micu and Micu (2016)	Financial Technology, also known as FinTech, is a new sector in the finance industry that incorporates the whole plethora of technology that is used in finance to facilitate trades, corporate business or interaction and services provided to the retail consumer.
3.	Shim and Shin (2016)	FinTech is an emerging financial services sector that includes third-party payment, MMF, insurance products, risk management, authentication, and peer-to-peer (P2P) lending.
4.	Maier (2016)	Driven by technological advances, new service models have developed in the financial industry which offer additional opportunities to customers. Under the common denominator "FinTech", these new businesses aim to challenge existing financial institutions by using technology to deliver value to the customer in an alternative way.
5.	Cizinska, Krabec and Venegas (2016)	FinTech is an economic industry composed of companies that use technology to make financial services more efficient.
6.	Loncarski (2016)	In addition to this, a particular evolution and use of technology in finance is disrupting traditional business models in financial markets, as well as bringing about new and unchartered risk territories.
7.	Shen and Huang (2016)	Internet finance, which is often referred to as "digital finance" and "FinTech" outside China, was coined by Xie and Zou (2012).
8.	Xie, Zou and Liu (2016)	Internet finance is a spectral concept. It covers all forms of financial transactions and financial intermediaries and markets, such as commercial banks, securities firms, insurance companies, and stock exchanges, to the scenario under Walrasian equilibrium (where neither financial intermediaries nor markets exist) caused by the impacts of internet technologies. And we think internet finance and FinTech are essentially different words for the same concept.
9.	Jun and Yeo (2016)	Recent advances in information and communications technology (ICT) have led to the rapid development and expansion of new and innovative financial services, often termed FinTech.
10.	Kim, Park and Choi (2016)	FinTech is a service sector which uses mobile-centred IT technology to enhance the efficiency of the financial system. As a term, it is a compound of "finance" and "technology", and collectively refers to industrial changes forged from the convergence of financial services and IT.

No.	Authors	Definition
11.	Xie and Zou (2013)	Beside indirect financing via commercial banks and direct financing through security markets, a third way to conduct financial activities will emerge, which we call "internet finance".
12.	Barberis (2014)	FinTech refers to the application of technology within the financial industry. The sector covers a wide range of activities from payments to financial data and analysis, financial software, digitized processes and, perhaps most well-known to the wider public, payment platforms.
13.	Wharton (2014)	FinTech is an economic industry composed of companies that use technology to make financial systems more efficient.
14.	Langley (2014)	Technology applied to financial services has a significant impact on our daily lives, from facilitating payments for goods and services to providing the infrastructure essential to the operation of the world's financial institutions.

Source: Schueffel (2016).

Based on this evolutionary analysis, Arner, Buckley and Barberis (2016) establish a comprehensive framework of the FinTech industry. They include five major fields: (1) investment and finance, (2) risk management and operations, (3) infrastructure and payments, (4) monetisation and data security, and (5) customer interface. -

1. Finance and investment:
   So far, the public, investors and regulatory bodies have all failed to focus on the actual purpose of FinTech by directing their attention to alternative financing mechanisms, particularly crowdfunding and P2P lending. Nevertheless, FinTech clearly progresses beyond this narrow scope to include financing of technology itself (e.g., via crowdfunding, venture capital, private equity, public offerings, listings, etc.). From an evolutionary perspective, the tech bubble phenomena of the 1990's is a clear example of the negative outcome arising from the intersection of finance and technology. In addition to sustaining the development of alternative financing mechanisms, FinTech is also increasingly involved in areas such as robo-advisory services.

2. Financial operations and risk management:
   These have been a major factor of IT spending by financial institutions, notably since 2008, as financial institutions have attempted to build better compliance systems to confront the massive volume of post-crisis regulatory changes.

3. Payments and infrastructure:
   Internet and mobile communication payments have always been FinTech's focus and driving force, particularly for financial deepening in developing countries. Similarly, infrastructure provision for securities trading and settlement and for OTC derivatives trading remains a significant aspect of the FinTech landscape and an area where IT and telecommunications companies are looking for opportunities to disintermediate traditional financial institutions.

4. Data security and monetisation:
   These are crucial subjects for FinTech as both FinTech 2.0 and FinTech 3.0 started to exploit the monetary value of data. After the GFC, the stability of the financial system has become more significant as digitisation has affected the nature of the financial industry by making it more vulnerable to cybercrime and espionage. Nevertheless, the innovations arising from FinTech can be beneficial to the financial industry, e.g., "Big Data" can be employed to enhance the efficiency and availability of financial services

5. Consumer interface:
   This is another area which will continue to be a major focus of traditional financial services and non-traditional FinTech developments. Generally, newly established IT and telecommunications companies are looking to directly compete with traditional financial services firms in this field. Interestingly, these firms thrive mainly in developing countries which provide a friendlier environment. Not only is competition welcomed and supported by economic agents, but so is the consumer interface which provides the facility for these tech companies to leverage off their pre-existing large customer bases in order to roll out new financial products and services.

To gain a better understanding of the advancements of FinTech in Asia, one has to move beyond simple investment figures: an assessment done by Accenture reports that of the USD12 billion new FinTech investment in 2014, just USD700 million has been invested in the Asia-Pacific region. One reason for this is that the growth rate of the market has been declining, which can be explained by several factors. Viewed from the institutional side, IT investment by commercial banks has declined to levels below those in the US and Europe. This could be because market conditions in Asia are not as competitive as in the US and Europe and the market is still densely concentrated in the hands of state-owned banks, which appear to have poor reliability and thus lower public trust in traditional banks. This provides an opportunity for non-bank entities to grow as the public switches to those institutions instead. On the infrastructure side, the provision of branch networks in the Asia Pacific region is still less developed than in the US or Europe. According to Arner, Buckley and Barberis (2016), FinTech 3.5 in developing countries is supported by strong fundamental forces, including: (1) young and digitally savvy populations, especially in China and India; (2) rapid growth of the middle class; (3) inefficient capital and financial markets; (4) scarcity of physical infrastructure related to banking; (5) behavioural predispositions favouring convenience over trust; (6) unexploited market opportunities; and (7) less stringent data competition and protection. These shifts are then amplifying the co-operation between a changing private sector looking to enlarge its financial services and a public sector seeking to derive the benefits of diversification in order to both boost economic growth and accelerate market reform. Arner, Buckley and Barberis (2016) conclude that the development of FinTech in Asia is not a recent post-crisis paradigm, but an amalgamation of regulatory and entrepreneurial forces.

Furthermore, in as far FinTech performs a role in the current revolution of the financial system, it is also to advance financial activity by improving its cost-effectiveness and efficiency. The main feature of FinTech is its capability to produce financial innovations – the creation of a modern banking and settlement system, the improvement of accounting systems, the origination of sophisticated (and complex) derivatives of credit and financial instruments as well as modern-day financial technologies – which are designed not only to boost profitability, but also to fundamentally alter the financial system itself. Buchak et al.

(2017) show that FinTech advances have failed to lower the costs of intermediation. With that in mind, their study illustrates that FinTech lenders charge higher interest rates than non-FinTech lenders. Despite the high prices, customers still profess a willingness to pay – reflecting the fact that FinTech lenders may provide more flexible services in intermediating loans. Concluding their study, Buchak et al. suggest caution: although FinTech lenders supply a push towards a fundamental adjustment of the financial sector by filling the gap left by commercial banks, they have managed to do so by having depended on implicit and explicit government guarantees as consumers.

On the other hand, Fuster et al. (2018) show that FinTech lenders are found to be more flexible in altering their supply than other lenders, such as converting the particular form of their mortgage loans as well as adjusting better to mortgage demand shocks. This suggests that innovation in technology may have boosted the efficiency of intermediation in the mortgage market. Moreover, Nash and Beardsley (2015) state that many large financial institutions are starting to leverage off advanced data analytics as well as technology involving anonymised and personalised data in favour of better serving customers, decrease fraud, preserve risk and ameliorate the process of underwriting. The possibility of utilising data analytics is supported by the following four important aspects:

1. Digital information is bolstering those small businesses, consumers and companies that progressively make use of accounting, online banking and other applications that capture a richer set of transactional data.
2. Access to structured data sets, including customised transactions data, which has grown with interconnectedness and data aggregation from cloud programs.
3. As a result, big data technology platforms have developed a cost-effective approach to evaluating huge data sets to better uncover behavioural effects and develop credit scoring algorithms.
4. Machine learning (ML) and artificial intelligence (AI) technologies are being used in order to automate the process of credit appraisal.

Banks, financial services firms and credit card companies have all gathered enormous data sets of previously unexploited historical transactions data and used them to enhance the traditional banking sector. New financial architecture and information technology procedures are designed to facilitate access to more extensive sets of data. While some industry participants note security, regulations and data governance as limitations, the wider tendency suggests that Hadoop adoption and the Data Lake concept are gaining momentum.

Additionally, according to Koutroumpis and Lafond (2018), technological progress has generated a roughly 30 times increase in workforce productivity from 1760 until now. The fastest technological expansion has been seen in the last 150 years – inventions such as automobiles, electricity, telephones and the internet have boosted productivity and output, increased welfare and promoted economic growth. Nevertheless, amid these positive impacts, banking entities are experiencing the greatest dangers associated with the growth of FinTech, particularly in terms of payments and money transfers. According to PriceWaterhouseCoopers (2016), about 24% to 28% of the traditional banking industry can migrate to non-financial institutions.

In order to prevent this number from going up, commercial banks must enhance competitiveness by actively implementing digital banking, notably in the financial asset trading sector, as it is strongly influenced by financial technology, and providing financial services through mobile and online platforms. Other than that, Azarenkova et al. (2018) uncovers another negative impact of the introduction of new financial technologies which can lead to the increasing possibility of a cyberattack – the major threat to financial stability. Supporting this, Bouveret (2018) developed a model built on the examination of numerous cybercrimes to estimate cyber-risk for the financial industry. The study suggests that total losses from cybercrime for the financial industry can reach 10% to 30% of total net income.

Advanced information technology permits financial market participants to generate more agreements in "dark pools" – this term captures the possibility that financial activity is done in the absence of data transparency. As a result, such activities do not convert savings into investment, escalate speculation, distort the pricing mechanism and increase risk-taking of the whole financial system (Azarenkova et al., 2018). As a consequence, the financial system changes as it has failed to preserve the characters of traditional markets. The advancement of artificial intelligence and its application to financial transactions can jeopardize the soundness of financial market as it can lead to ultra-low volatility in different types of investments given that the chances for investing in new financial technologies are limited to large companies, consolidation of firms, concentration of capital and monopolisation. The most substantial concentration of capital is deposited in the technology field. Still, spending on innovation in artificial intelligence is seen as more advantageous as it can boost the profitability of financial transactions. In about 25 years, artificial intelligence is projected to perform up to 99% of financial analyses, employing enormous data sets involving billions of economic players and forecasting the behaviour of economic agents and prices. A number of non-bank entities are also utilising AI to automate trading in diversified financial assets, automatically authorise credit and to detect financial fraud.

2.3 The Implications of New Forms of Financial Intermediation: Banks versus Non-Banks

2.3.1 Potential Benefits and Risks

Jagtiani and Lemiux (2016) demonstrated that advanced financial technologies over the last decade created greater competition in supporting various economic activities including small business lending. It also increased the share of local small business loans and encouraged people to start and develop businesses. Despite community banks competing with FinTech lenders, the opportunity for partnerships also exists, whereby FinTech can help customers access their accounts more easily and conveniently and banks can help provide capital for loans. Under certain conditions, this could lead to a fall in the bank's overall cost. Shadow banking uses reduced costs and the lower burden of regulation as the main arguments to expand their range and scope at the expense of commercial banks. FSB (2012) explained the difference between shadow banks and officially licensed banks, with shadow banks lacking access to a depositor base, sources of emergency liquidity from the central bank and public sources of insurance. Consequently, systemic risk can be created as a result of the lack of access to public liquidity or to the public sector in an emergency.

In a survey of their members, the FSB (2014) reinforced their previous research results by stating that there are two crucial potential risks emerging directly from the shadow banking sector: leverage risk and maturity and liquidity mismatch. Moreover, due to the development of technology, other risks, namely cyber risks, may arise other than leverage risks and maturity and liquidity mismatches. Cyber risks are considered one of the systemic risk problems arising from cyber incidents, or often referred to as cyber attacks (Boer and Vazquez 2017). In fact, India, Japan, Korea, Malaysia, Pakistan, the Philippines and Thailand identified either one of these risks as representing a substantial potential risk in their shadow banking sector.

Leverage risk. The procyclical nature of leverage implies that companies will most likely increase their leverage during good times and when credit conditions subsequently deteriorate, highly leveraged firms may become overburdened. Such a scenario could lead to the fire-sale of assets. A build-up of leverage in the shadow banking sector can be boosted by active market intermediation and the use of securities financing transactions such as repurchase agreements (repos) and securities lending. In contrast to the regular banking sector, the shadow banking sector may not be subject to regulatory caps (e.g., leverage ratio requirements) on their balance-sheet. Japan, Korea and Thailand regard leverage as posing a great risk to their shadow banking sectors. Leverage in securities firms was determined as the biggest shadow banking risk in Korea on account of its high growth rate in recent years.

Maturity and liquidity mismatch. Just like banks, some shadow banking institutions generate maturity and liquidity mismatches in their day-to-day operations. As short-term funding is used to support longer term investments, they are susceptible to similar liquidity and financing risks as are traditional banks. Any interruption in market conditions may have therefore a disadvantageous effect on the shadow banking sector.

Cyber risk. According to Cebula and Young (2010), cyber risk can be defined as operational risk which can cause problems in the confidentiality, availability, or integrity of information systems of information assets and technology. According to the Bouveret (2018), there are three direct impacts due to cyber attacks, namely (1) business disruptions that can prevent companies from operating, resulting in loss of profits; (2) fraud that can cause direct losses; (3) reputational effects and litigation costs arising from data breaches. The financial sector is a sector that has a high level of vulnerability to cyber attacks due to the dependence between financial institutions and the trust of their customers, as well as dependence on highly interconnected networks and critical infrastructure, so that it can have long-term transmission effects. Therefore, financial institutions need to have strong Information and Technology (IT) security in protecting customers as well as possible policy interventions to mitigate cyber-risk.

Potential risks originate from the interrelatedness between banks and shadow banking entities, such as direct credit exposures and funding interdependence on each other. Interconnectedness in the financial system may allow financial distress to cascade more readily between entities. The relationship with the traditional banking system creates transmission channels for financial stress from the shadow banking sector to the traditional banking sector and *vice versa*. But the traditional banking sector's vulnerability to risks in the shadow banking sector is less of a problem in Asian jurisdictions, where most financial systems are dominated by banks.

The risks resulting from spillovers from the shadow banking sector to the formal banking sector were recorded as a possible risk by Australia, India, Korea, Malaysia and the Philippines. Korea reported that this scenario had been rapidly escalating since 2005. Pakistan highlighted the shadow banks' reliance on traditional bank financing, with bank funding seen as a valuable source of funding for shadow banks to match their financial obligations as they fall due. Above all, shadow banking institutions in Pakistan such as leasing companies, investment banks and Modarabas are highly dependent on bank funding.

Wu and Shen (2018) report that a traditional bank involved in some form of shadow banking activity tends to take on more risks than other traditional banks that do not participate in such activities. On the plus side, banks could undertake securities and bond transactions whereas commercial banks are barred from such activities by regulations. Furthermore, their study shows that principled governance tends to reduce the effect of the positive linkage between risk-taking and shadow banking significantly.

Other than that, the shadow banking sector and commercial banks may have other relationships. For example, the study of Tan (2017) shows that in China's case, shadow banking improves the profitability of commercial banks. The study confirms that the non-interest income market has a greater level of competition than the deposit market and loan market, and that the profitability of commercial banks increases simultaneously with a reduced level of competition in deposit market. Han, Hus and Li (2019) studied the impact of corporates' shadow banking activities on business performance using regression analysis. They find that non-financial corporates' shadow banking business leads to a financial advantage seen from the view of the earnings structure, but simultaneously has a significantly negative effect on operating income. Overall, the activity of shadow banking on corporates increases operating income. Moreover, Serletis and Xu (2019) investigated the demand for banking and shadow banking services and concluded that the emergence of shadow banking had a part in increasing the stability of the money demand function. Moreover, their research argued that the money supply might be a better measure of the stance of monetary policy than the interest rate.

Stern, Makinen and Qian (2017) demonstrated that in a mobile phone subscription area, P2P lending as part of a shadow banking activity is wider, more extensive and better developed. As is well known, P2P lending facilitates the reaching out to isolated lenders and in so doing, P2P lending can help small business to develop but simultaneously may have a very large potential risk. Moreover, P2P platforms have a negative association with fixed-asset investments. By contrast, the average yield is positively related to the fixed-assets investments. In addition, the outstanding balance of P2P lenders in the mobile phone subscription region has a negative relationship with the size of the traditional banking sector. Tian et al. (2015) reviewed systemic risk in the Chinese shadow banking system, and the results show that trust companies were the main culprit of financial instability and commercial banks suffered the most adverse effect. Furthermore, to control systemic risk in the Chinese shadow banking, their paper argued that financial leverage of shadow banking institutions should be controlled. Using shadow banking data for 14 countries from 2001 to 2013, Hussain, Bao, and Fanli (2019) suggested that regulation should be created for the shadow banking system and its size should be controlled for the sake of financial system stability and in order to prevent a subsequent financial crisis.

2.3.2 The Systemic Risks Associated with New Forms of Financial Intermediation Activities

The new forms of non-bank financial intermediaries generated by shadow banking activities can be a significant source of systemic risk. After all, the Great Financial Crisis originated in the shadow banking sector in 2008. These risks may be amplified as they include the potential for excess leverage, amplification of procyclicality, instability of wholesale funding, modern-style bank runs, transmission of systemic risk and regulatory arbitrage and circumvention (Ghosh, Mazo and Robe, 2012). Furthermore, Ghosh, Mazo and Robe also find that the excess liquidity available in the shadow banking system has incentivised households to incur much higher debt levels because of less stringent loans conditions. Instead of the households' economic situation improving; this results in graver poverty and more bad loans, also draining capacity from the shadow banks. Besides that, the operating income in a firm that participated in shadow banking activities will be influenced by two intermediary variables, namely, investment scale and investment efficiency. However, the efficiency-improving effect on operating income is still smaller than the negative effect of investment in crowding out operating income (Han, Hus and Li, 2019). Concerning the systemic risk that can arise from the activities of shadow banks, Li, Hsu and Qin (2014) ran a stress test on the Chinese financial system and concluded that there is some risk of bankruptcies and potentially a risk of liquidity shortages. Based on their network analysis, Hsu, Li and Xue (2014) concluded that trust companies present a systemic risk and banks absorb most of this risk. Furthermore, in conjunction with monetary policy, Li and Wu (2011) found that shadow banks can negatively impact the effectiveness of monetary policy pursued by the central bank. They analysed the effects of the shadow banking system on monetary supply and concluded that securitised financial products behave like new money, which is not issued by the central bank, but is still affecting the central bank's money supply. Therefore, the implementation of easy or tight monetary policy by increasing or decreasing the benchmark interest rate would not be able to achieve the original goals due to the activities of the shadow banking system.

Assuming the insurance sector forms part of the shadow banking system, Diallo and Al-Mansour (2017) investigated the link between insurance and financial sector stability. Employing a GMM system-panel, this research argued that the insurance sector and financial stability have a significant negative relationship - with the shadow banking acting as a channel, the insurance sector is detrimental for financial stability, particularly for a country with a high level of shadow banking assets. In terms of the relationship to GDP, Hussain, Bao and Fanli (2019) showed that nominal GDP is more sensitive than real GDP to an increase in shadow banking. This causes the nominal economic indicator to grow more than the real one. Other studies, such as Haisen and Yazdifar (2015), investigated the impact of the shadow banking system on monetary policy in China and found that an increase in the size of the shadow banking system results in the increase in the money supply and CPI. Gabrieli, Pilbeam and Shi (2017) found that shadow banking works in an unusual way to boost the increase in the money supply but weakens the effect of restrictive interest rate-based monetary policy. This research shows the linkages between shadow banking size and central bank policy, more specifically, that an increase in the size of the shadow banking sector heightens the independence of its lending from the policies of the Peoples' Bank of China.

Furthermore, by creating and employing FinTech as a tool, shadow banks ameliorate their business environment, as FinTech makes it easier for shadow banks to transform and intermediate funds to private enterprises and local state-owned enterprises (SOEs). This new tool of financial intermediation might also boost economic growth as FinTech increases the speed and widens the coverage of capital circulation and distribution more effectively. Since the expansion of information technology, FinTech firms accounted for almost a third of shadow bank loan originations by 2015. FinTech lenders serve more creditworthy borrowers and are more active in the refinancing market. Furthermore, FinTech lenders also use different approaches in determining corresponding interest rates. Hence, they provide greater convenience for their borrowers. Navaretti et al. (2017) asserted that FinTech enhances competition in financial markets, provide services that traditional financial institutions do less efficiently or not at all and widen the pool of users of such services. But FinTech is unlikely to replace banks in most of their key functions. In most cases, FinTech simply provides a more efficient way to do the same transaction. Yet banks are well placed to adopt technological innovations and perform traditional transactions in a new and more efficient way themselves. Therefore, it could be argued that the role of FinTech in the financial sector is becoming more significant than ever. However, FinTech is unlikely to replace traditional banks or other financial institutions completely.

Although the application of FinTech in financial markets has been expanding very rapidly, its potential impact on financial institutions and banks is still unclear. The crucial question is whether and to what extent FinTech is influencing banks and other incumbent financial institutions. There could be several possibilities; either FinTech will create a healthy competitive process, enhancing efficiency in a market with high entry barriers, or it may cause disruption and financial instability.

In the case of a potential positive disruptive effect on financial institutions, Buchak et al. (2017) argued that the share of shadow banks has been steadily increasing over time due to the growth of financial technology. Based on Home Mortgage Disclosure data, the share of shadow banks has increased substantially, growing from roughly 30% in 2007 to 50% in 2015. Buchak et al. also estimated that the increased regulatory burden on traditional banks explained about 55% of shadow banking growth over that period, but that 35% of this dynamic was explained using financial technology. Indeed, it was found that financial technology outlets provided more convenience for borrowers. The authors observed an interest rate premium among the borrowers that valued this convenience more highly. Moreover, FinTech firms used superior statistical models based on big data to search for potential borrowers and were more capable of pricing mortgages appropriately. These innovations were mainly due to combining existing data or using other dimensions of data that are inaccessible to traditional banks. In conclusion, these trends explain why customers are becoming more and more engaged with a shadow banking system that is supported by financial technology.

In addition, Navaretti et.al (2017) argued that on account of the strong complementarities between banks and FinTech, convergence between financial technology and financial institutions such as banks could happen. On the one hand, banks have already started to incorporate digital innovations into their business models, allowing them to expand their range of activities. Large banks will likely be able to absorb and assimilate the digital innovations and converge towards a new type of modus operandi which bundles together financial services that are based on FinTech. On the other hand, a substantial

fraction (26.7%) of the P2P loan volume substitutes for personal loans issued by small commercial banks. This convergence is not new when it comes to technology firms. For example, Amazon, Apple, Facebook, Google and even Microsoft all started in different types of businesses (retail, computers and phones, social networks and search engines), but are now converging to a similar set of activities that mixes and combines all the initial areas of specialisation.

Furthermore, Vives (2017) argued that with the generation of new business models based on the use of big data, FinTech has the potential to disrupt established financial intermediaries and banks. The result of the application of these new techniques could lower the costs of financial intermediation and improve product quality and quantity for consumers. For example, FinTech facilities may help to better assess the creditworthiness of loan applicants when an institution screens them as well as improve the interface between financial clients and their service providers. Vives also quoted the Buchack et al. (2017) finding that the market share of shadow banks (that is, non-bank lenders) of the US mortgage market almost tripled in the period 2007-2015. At the end of that period, FinTech firms accounted for close to a third of shadow bank loan originations.

Knaack and Gruin (2017) highlighted the contrast between old and new finance, where the old financial system was characterised as elite-based and exclusive. Internet finance in contrast is driven by openness, simplification, fairness and freedom of choice. Internet finance in China took off in 2013 when the dominant internet companies made concerted moves to offer financial services; examples include Alibaba launching Yu'E Bao and Tencent unveiling its WeChat payment app. The digital financial services sector in China has grown significantly over the last few years. Two examples in particular serve to illustrate the significant overlap between internet finance and shadow banking: Yu'E Bao and P2P financing platforms.

Furthermore, Sheng and Soon (2016) noted that "leveraging on technology, shadow banking activities in China have increasingly become digitised, enabling them to scale up at low cost with wider geographical and market reach." Similarly, Chen (2014) argued that dominant companies such as Alibaba, being outside the current regulatory framework, have become a "huge shadow bank." Regarding the potential negative effect of financial technology on financial institutions, Buchak et al. (2017) reported that the growth of technology was an important force in the decline of traditional banks' market share over the last decade. The additional regulatory burden faced by banks has opened a gap that has been filled by shadow banks. Hence, their research suggested that financial technology related to online lending platforms has partially disrupted the mortgage market by offering increased convenience to borrowers.

But the expansion of FinTech innovations and the accompanying changes to the financial landscape will eventually bring with them new types of economic and financial risks. The regulator will face evolving implications of unprecedented systemic financial stability risks. For instance, FinTech lenders have the potential to undermine existing financial regulations. Braggion, Albert and Haikun (2018) analysed how the supply and demand of P2P lending in China by the lender RenredDai were affected by regulatory changes in loan-to-value ratios for conventional intermediaries. FinTech players have found that such restrictions on lending in traditional markets have increased the demand for P2P-type lending, since the price of credit remained unchanged. Since P2P lending is a

type of informal credit lending, Qin, Xu and Zhang (2014) investigated how much informal credit lending responded to monetary policy in the city of Wenzhou in China. The paper found that Whenzhou's informal lending market had been responsive to a number of factors representing monetary policy, national banking sector and local economic conditions. This study also implies that Whenzhou's market functioning could be guided by proper policy means. Meanwhile, Whenzhou lending market is a demand-driven market both in the short- and the long-run, although demand is also complementary to the formal bank lending market.

Subsequently, Navaretti et al. (2017) also found that the emergence of financial technology could be more "efficient" than traditional banks, but in a different and unrelated way. For example, financial technology will use information based on big data, not on long-term relationships; access to services is decentralised through internet platforms; there is no risk and maturity transformation; lenders and borrowers or investors and investment opportunities are matched directly. All of this means that there will be disintermediation as well as pure FinTech activities. In this case, these unbundled FinTech activities have limited scope. For example, it is difficult for platforms to offer diversified investment opportunities without keeping part of the risk on their books.

According to Pejkovska (2018), there are other potential threats related to the emergence of FinTech companies since they leverage the use of modern software and the internet to provide financial services at lower prices. Some very good complex and advanced examples of this include the blockchain and cryptocurrencies. Their anonymity and decentralised nature can be harmful as they can be used for illegal purposes such as money laundering, tax evasion and illegal transactions. Research by Atthey et al. (2016) illustrated the widespread use of bitcoin as a means of payment for purchasing drugs and weapons on dark-web platforms to the tune of USD11 billion. Due to the anonymous nature of bitcoin, parties involved in these illegal transactions cannot be identified. Such actions could further diminish the general public's trust in the financial services sector and worsen the already fragile reputation of the sector. Another potential threat is a cyberattack that can put bank customers' data privacy at risk. Atthey et al. (2016) also showed that contrary to their clients' beliefs, most company's cybersecurity systems were outdated. Hence, Pejkovska (2018) argued that the existence of FinTech should be "legitimised" and covered by suitable regulation. Otherwise, the lack of regulation may encourage risky behaviour.

2.3.3 Monetary Policy Transmission through the Asset Price Channel

Shadow banking activities are conducted differently from traditional banks. Nonetheless, these entities have a significant relationship with the banking system as shadow entities source their funding from banks, and banks in turn have not only provided these funds but also emulated some shadow banking business models and technology. In practice, shadow banking institutions should find it easier to attract customers since they are subject to fewer – if any – regulatory obligations than traditional banks. This benefits the shadow entities in originating varied financial products and services – thus creating new ways of financing. Furthermore, although shadow institutions are more exposed to runs as they do not benefit from emergency liquidity facilities provided by the authorities, these entities are also more protected from the negative impact of the monetary transmission channels (Falk, 2016).

Additionally, as policymakers tighten monetary policy, commercial banks start to reduce loan provisions to allow them to compete with shadow banks which face no such restrictions and can therefore sustain or even increase their lending. As a result, the impact of monetary policy is no longer fully comprehensible by the public. In other words, the influence of central banks over financial institutions is decreasing. This is supported by Boivin et al. (2011) who studied the evolution of the monetary transmission mechanism over time. The research examined the impact of monetary policy on the real sector aggregate variable which seems to have lessened in comparison with the earlier period. This development occurred as a result of a shift in the focus of policymakers and an adjustments of housing market credit qualities. Xiao (2018) continued this study and found that the rise of the shadow banking sector was a new factor that induced the weakening of monetary policy on the real sector. The study also asserted that monetary authorities were no longer adjusting the interest rate to induce financial institutions to follow suit, but to react to money supply changes originating from the shadow banks. Xiao also stated that when central banks raise interest rates, depositors will shift from regulated to unregulated entities, inducing a cutback in the stock of commercial bank funds. With more deposit inflows, shadow entities can enlarge their lending, which can compensate for the shrinkage in traditional bank lending.

2.4 Prospects for New Forms of Financial Intermediation

In the US, non-banks have always performed a key role in providing credit to consumers and businesses. Nonetheless, according to Nash and Beardsley (2015), there are basic questions as to whether the growth we have seen over the past few years is sustainable due to three factors:

1. Increased regulatory scrutiny as non-banks have become more important: Across several industries, among them insurance, a number of non-bank institutions are now being perceived as systemically important. Furthermore, outside of the systemic classification, there has been rapidly increasing regulatory scrutiny of non-banks such as the US mortgage loan company Ocwen Financial (OCN). Therefore, as the phrase goes, "if it looks and smells like a bank, it should be regulated like one."
2. Expansion into other asset classes.
3. Competitive responses from incumbent banks: Much of the literature shows that banks respond to the rise of new players in several ways: (1) reduce pricing to compete, (2) acquire or build similar platforms or (3) advocate for additional regulatory scrutiny leading to a "levelling" of the playing field.

A study by the Group of Thirty (2016) suggested that after growing rapidly in the years before the GFC, several of the riskiest forms of pre-crisis shadow banking have decreased thereafter. But both FSB (2019) and International Monetary Fund (2019) highlight the still enormous size of non-bank credit intermediation. They also advise that narrowly defined shadow banking activities – a term that has been proposed and subsequently adopted in an FSB study – have grown as a percentage of global GDP since 2011. The growth rate of the shadow banking-to-GDP ratio is still sizeable, especially in several emerging markets and most notably in China. A FSB report shows a slight uptick in shadow banking as a percentage of GDP since 2010. Again, within the FSB's five "economic functions" of shadow bank-type activities, the most brisk expanding segment is collective investment vehicles, with features that make them susceptible to runs.

At the same time, total real economy leverage – whether arranged through banks or non-bank intermediation channels – shows that there has been no deleveraging since 2008, but a continuous increase in global debt to GDP. Deleveraging by households has been replaced by widespread increases in advanced economies' public debt and by large increases in private sector debt in many developing economies. Sustained loose monetary policy in systemically important countries helps to carry the burden of existing debt stocks and also creates incentives for new debt growth. The growth in real economy leverage not only creates macroeconomic risks, but also makes it more essential to determine whether the particular way in which credit flows are intermediated or managed is enhancing the fundamental risk.

There are three particular concerns that have been identified by the Group of Thirty: (1) The boom in emerging market corporate debt, notably when denominated in foreign currency (usually the US dollar), (2) The role that asset managers play in amplifying the inherent potential volatility and procyclicality of capital market credit, especially in illiquid markets such as emerging market corporate debt, and (3) The impressive growth of leverage in China, which has been accompanied by the growth of non-bank credit intermediation channels.

The Group of Thirty ends their study by stating that the financial system itself may be stronger than before 2008, and that the consolidation of increasing global leverage and new forms of financial system risk indicate that the overall vulnerability to financial and macroeconomic instability is as great now as it was then. The primary reasons that led to this conclusion are, first, that the banking system itself has been made more resilient by the introduction of new capital and liquidity requirements. Second, tighter regulation of banks may have encouraged the shift toward non-bank forms of credit intermediation that have appeared since 2008. Third, the sizeable growth in non-bank credit intermediation has mainly been in forms that do not raise the same financial stability concerns as pre-crisis shadow banking, and the importance of the particular forms of shadow banking most involved in the 2007–2008 financial crisis has diminished. Moreover, there is some evidence that the interconnectedness between the banking system and other financial institutions has decreased. Fourth, as a result of the foregoing, the financial system and the element associated with the intermediation of credit flows are probably more resilient than in 2008, making it less likely that we will see self-reinforcing cycles of financial instability going forward. Fifth, as the aggregate level of leverage in the global economy continues to grow, the risks to macroeconomic stability can persist even if the financial system has become more resilient. And even where credit flows are regulated rather than intermediated, new forms of financial stability risks can arise. Therefore, while the specific form that risk has taken in the past may have been transformed, risks are as great now as they were before the crisis. Essential policy actions need to mirror both the severity of the risks and the specific forms that risk takes.

2.5 Regulation

According to FSB (2014), the regulatory approach applied to NBFIs relies on the character of the authorities that inspect them. In general, these authorities can be classified into two groups: (1) authorities with detailed regulatory directives and objectives such as financial regulators (e.g., central banks, prudential regulators, market conduct regulators)

and (2) authorities that do not have a specific regulatory mandate but embark on regulation of particular NBFIs as part of a wider mandate (e.g., government ministries and agencies). For NBFIs that are monitored by a financial regulator (or regulators), surveyed FSB members have pointed to several dimensions of regulatory policies and measures for monitoring NBFIs, such as:

1. Registration and approval of endowment of entity and activity;
2. Acceptable activities, instruments and investments;
3. Corporate governance;
4. Risk management, compliance and internal control systems;
5. Prudential standards, limits, restrictions on assets, capital, liquidity and leverage;
6. Transparency and public disclosure;
7. Market conduct; and,
8. Consumer, investor and depositor protection.

In the case of NBFIs supervised by government agencies, FSB (2014) suggests that they should be regulated under the remit of the legislation determined to establish and govern NBFIs and their activities, which mostly encompasses licensing requirements, standards for market conduct and governance. Besides the regulatory boundaries set out by the respective legislation, the regulatory method is closely connected to the developmental target of the respective government ministries and agencies. Therefore, policy instruments and measures can change between government bureaus and between jurisdictions.

According to FSB (2014), most jurisdictions in Asia possess the capability to gather data and information for the most of the NBFIs. Nevertheless, the applicability, the regulatory regime and the type of data and information collected varies between supervisors and within jurisdictions when dealing with different NBFIs. Some regulators stipulate that NBFIs collect data and information annually, while others only ask for data and information on an as-needed basis. The amount of data and information collected also differs between jurisdictions.

Nevertheless, in some jurisdictions, not all NBFIs fall under the continuous supervisory inspections that are typical for banking institutions. All jurisdictions report the ability to take administrative actions against NBFIs. Enforcement actions may be required in the event of non-agreement, violation of legislation or illegal actions. Two authorities have reported to the FSB that depositor, investor or consumer protection are available for every NBFI in their jurisdiction. But some jurisdictions stated that while there was no specific protection system for particular NBFIs, comprehensive protection regimes were available under the corresponding regulations. Only a few jurisdictions had far-reaching resolution regimes for all NBFIs. Generally speaking, jurisdictions did not have a comprehensive resolution regime for all the NBFIs and mentioned that this was an area that required further reform if and when needed. At present, some jurisdictions are aiming to develop resolution regimes.

The FSB's survey proves that participants continue to build up regulation and guidance on NBFIs. Some members launched various initiatives to focus on potential risks arising from the shadow banking system. The measures proposed up to now have been extensive – from increasing existing or announcing new regulations to address non-

bank financial entities, increasing coordination and cooperation, to extending legislative changes to allow authorities to collect vital data and information, and to carrying out other regulatory approaches to NBFIs. Based on the FSB survey, measures taken by members to support the existing regulatory framework include:

1. Indonesia reported that regulatory enhancements are in progress for insurance firms, finance companies and financial guarantee companies (FGCs).
2. Singapore has introduced amendments to its Collective Investment Schemes (CIS) Code to carry out additional safeguards on the use of financial derivatives and securities lending, to strengthen counterparty and collateral requirements and to enhance the registration and licensing regime for hedge fund managers.
3. In Malaysia, the Securities Commission Malaysia has strengthened its surveillance of CIS disclosures as well as its oversight over fund management companies. This involved the introduction of a Client Asset Report Requirement, performed by external auditors in conjunction with the statutory audit exercise. It has also implemented a comprehensive risk assessment methodology, which factors qualitative, quantitative and self-assessment components for fund management companies.
4. In the Philippines, proposals were being developed to improve prudential requirements for NBFIs, which involved corporate governance, exposure and capital adequacy requirements. The Philippines had also introduced new regulatory or supervisory requirements by enhancing monitoring and/or inter-agency coordination. Efforts in that country were ongoing to advance existing information sharing designs among the financial regulators in order to bolster regulation and supervision of financial conglomerates. Financial authorities were also developing accepted governance standards and adopting methods to establish consistent implementation.

Moreover, the FSB stated that some ASEAN authorities have initiated improvements to their legislative scheme to strengthen the oversight of NBFIs:

1. In 2013, Indonesia passed laws on microfinance institutions giving a mandate to the Financial Services Authority (OJK) to regulate and supervise microfinance institutions. The law was enacted in 2015.
2. Malaysia passed the new Financial Services Act 2013 which empowered Bank Negara Malaysia (BNM) to subject a NBFI to on-going regulation and supervision should an entity be deemed to pose, or be likely to pose, risks to financial stability. Meanwhile, the Central Bank of Malaysia Act 2009 accorded BNM with the necessary powers to collect information from NBFIs to facilitate financial stability assessments as well as issue orders requiring entities to undertake appropriate measures in the interest of financial stability.

2.6 Data and Methodology

There are three substantial objectives this study needs to achieve. The first is to uncover a coherent view of shadow banking activities in several Southeast Asian countries (Indonesia, Malaysia, Thailand and Singapore). In order to accomplish this goal, we will investigate and map the shadow banking activities in the respective ASEAN countries.

Thus, this study will be using the activity-based concept developed by Ehlers et al. (2018) as well as the narrow measure principle based on the five EFs and four systemic risk (SR) factors constructed by FSB (2019) to define the shadow banking system. The second objective of this research will be analysing the prospects of shadow banking activities in the respective Southeast Asian countries. The third objective is to understand the impact of monetary policy on shadow banks through the interest rate channel in those countries. To that end, not only will we employ the econometric model of Zhang and Wan (2017), but we will add a new variable, namely the exchange rate, since the open economic systems permit foreign investors to purchase shadow bank assets. Hence it follows that these purchases will affect the interest rate of shadow banks.

2.6.1 Data Description

Our sample is composed of the four ASEAN countries for the period from 2017 to 2019. Shadow bank interest rate data are collected from Bloomberg, while macroeconomic variables are constructed using the World Development Indicators database provided by the World Bank. Monetary interest rates come from different databases but are mainly sourced from the respective central banks. We begin by collecting the available monetary rates from central banks' annual reports and we complement them with those provided by the International Financial Statistics database of the International Monetary Fund.

2.6.2 Empirical Model

In order to achieve the third objective of this study, namely to understand the impact of monetary policy on shadow banks through the asset price or interest rate channel in each ASEAN country, we employed Zhang and Wan's (2017) empirical EGARCH model. The model specification is as follows:

$$r_t = \sum_{i=1}^{s} \phi_i r_{i-1} + Z_m' X_t^m + u_t,\ u_t \sim N(0, \sigma_t^2) \quad \text{..... (1)}$$

$$\ln(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j \ln(\sigma_{t-j}^2) + \sum_{i=1}^{p} \alpha_i \left|\frac{u_{t-i}}{\sigma_{t-i}}\right| + \sum_{k=1}^{r} \gamma_k \frac{u_{t-k}}{\sigma_{t-k}} + Z_v' X_t^v \quad \text{..... (2)}$$

where the endogenous variable, r_t, is the shadow banking interest rate. Equation (1) is the mean equation of the shadow banking interest rate series and equation (2) is the corresponding variance equation, where $\sum_{i=1}^{s} \phi_i r_{i-1} + Z_m' X_t^m$ represents the time-varying mean while σ_t^2 is the time-varying variance. The mean is assumed to show persistence in the shadow banking interest rate as well as in exogenous factors that should affect shadow banking, X_t^m. The exogenous control variables include the market-based interbank interest rate, the seven-day repo rate, the benchmark interest rates as the price-based monetary tool and the exchange rate. The administrative monetary policy tool consists of the central bank lending rate and the deposit rate. X_t^v is the exogenous variable for the variance equation, and γ_k is the asymmetric impact of positive or negative innovations on the standardised residuals.

CHAPTER 3

THE SCOPE, PROSPECTS AND IMPLICATIONS OF NEW FORMS OF FINANCIAL INTERMEDIATION FOR MONETARY POLICY IN INDONESIA

3.1 Background

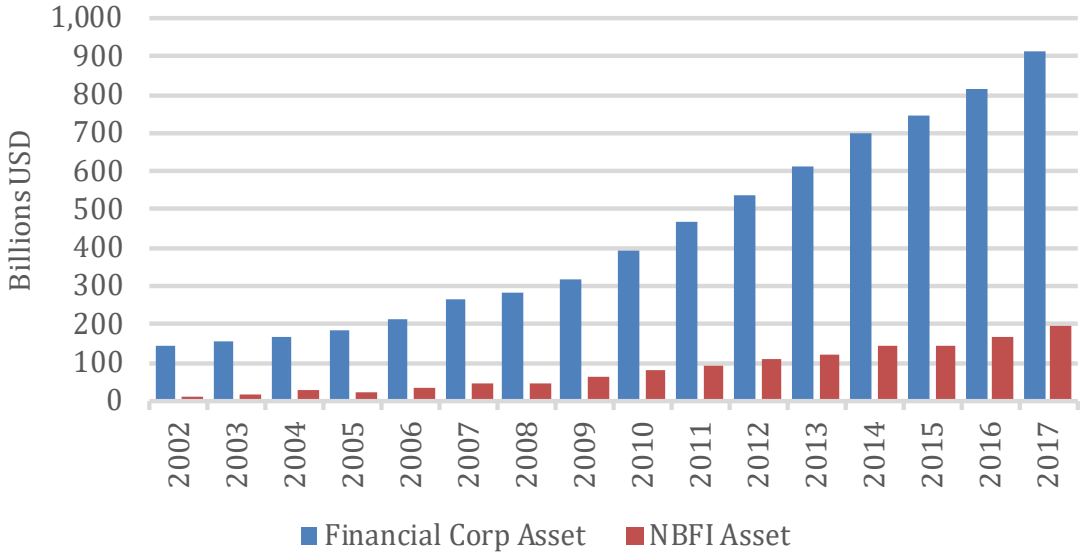
The world is currently seeing an unprecedented growth in technological innovation. In the last decade, low-cost sensors, rising computer power and faster broadband internet have boosted dramatic changes in consumer behaviour and business models. Interest in new forms of financial intermediation has increased due to recent developments and rapid advances related to the digital revolution 4.0. This trend has been followed by tremendous changes in the scope of, and prospects for, financial intermediation and its implication for monetary policy in Indonesia. One interesting phenomenon has been the conduct of banking activities via financial intermediation by non-bank financial institutions or what is known as shadow banking. These shadow banking institutions, frequently supported by financial technology (FinTech) may be defined as a new form of financial intermediation. This Chapter uses this concept to analyse the current condition of – and prospects for – new forms of financial intermediation by shadow-banking institutions in Indonesia.

In Indonesia, various non-bank financial entities, such as finance companies, insurance companies, pension funds, mutual funds, securities companies, private equity, hedge funds and the savings and loans cooperatives, have been involved in the practice of shadow banking (Ministry of Finance, 2013). However, shadow banking in Indonesia is currently still not as advanced as in developed countries, where non-bank financial institutions can securitise their financial assets and sell them to investors. In Indonesia, shadow banking activities, which channel credit to the economy, is predominantly undertaken by finance companies. The outstanding amount of credit disbursed by finance companies grew from IDR302 trillion in 2012 to over IDR427 trillion in 2018 Q2. The growth level, however, has slowed down from an annual growth level of 15.2% in 2013 to some 3.0% in 2018 Q2. While the growth of credit provided by finance companies is always lower compared to that disbursed by commercial banks, the outstanding level has been growing over time, steadily increasing to reach a proportion of close to 8.5% that of the outstanding credit by commercial banks.

Furthermore, the current digital transformation has simultaneously changed the behaviour of consumers and created new forms of demands (Nemet, 2009). This phenomenon has been accompanied by a significant increase in the number of FinTech providers. According to Accenture (2017), global investment in the FinTech area has increased substantially, from USD930 million in 2008 to more than USD40 billion in 2017. The total global FinTech transaction value is estimated at USD3,446 billion in 2017 and is expected to reach USD8,000 billion by 2022. With 80% of total transactions in 2017, digital payments dominated the total, as reported in the FinTech Report (2017).

The World Economic Forum (2015) projected that this disruption would not be a one-off affair. Instead, the effect will be uninterrupted. Therefore, business entities will be forced to innovate continuously. Furthermore, Davis et al. (2017) argued that for an emerging country like Indonesia, FinTech comes with both bigger opportunities but also bigger risks and negative implications than for developed economies. Financial technology has been utilised by regulated and unregulated financial intermediaries such as shadow banks. This can be seen from the share of shadow banking asset to total assets of financial corporations and GDP, which has risen from 2002 to 2017 (Figure 3.1).

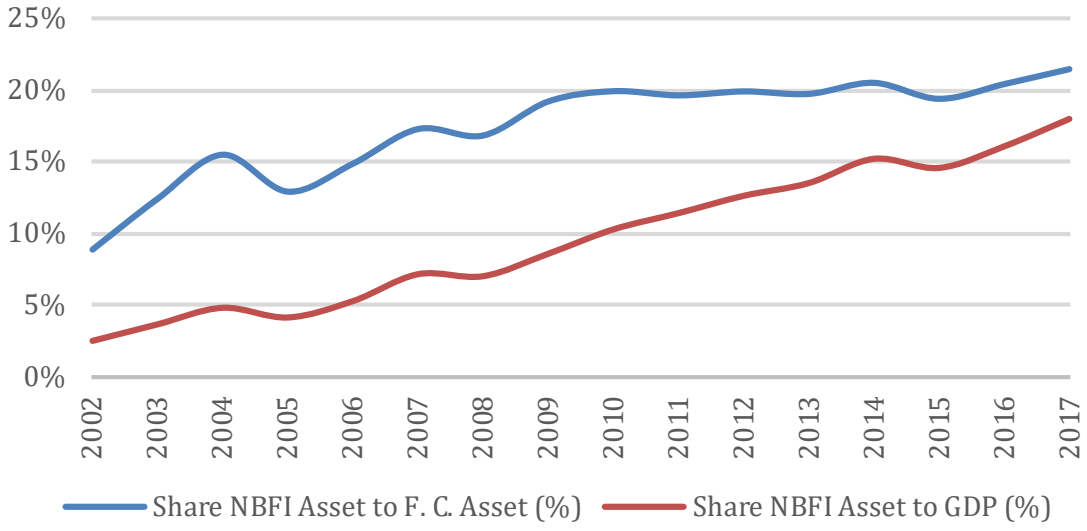
Figure 3.1
Financial Corporation and Shadow Banking Assets (2002-2017)



Source: FSB.

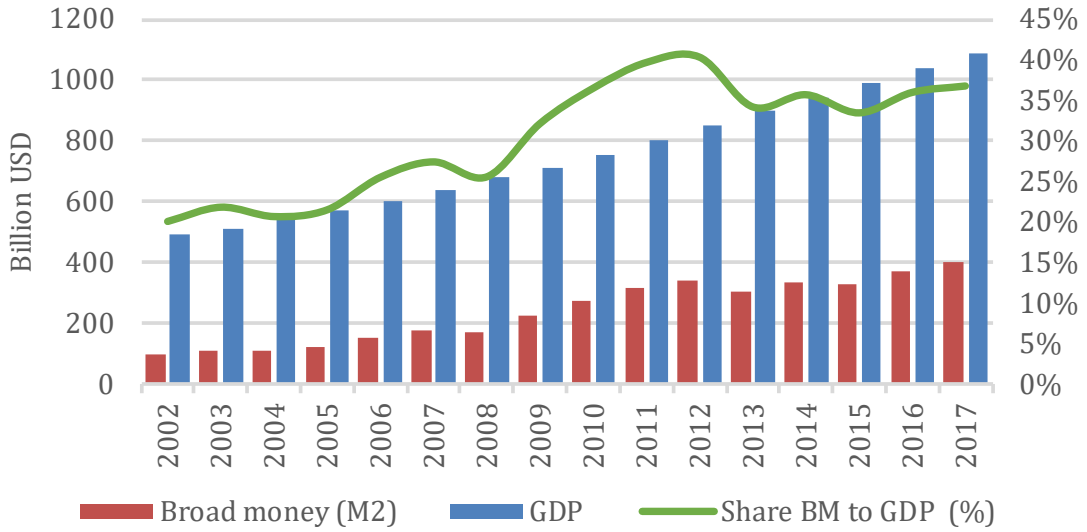
Figure 3.1 illustrates the trends of total assets of financial corporations and the shadow banking industry. We find that assets of financial corporations have increased from USD142.1 billion in 2002 to USD913.8 billion in 2017, with a marked tick-up in growth after 2010. Shadow banking asset (including insurance, pension funds, public financial institutions and other financial intermediaries) have increased from USD12.6 billion in 2002 to USD196.7 billion in 2017. Figure 3.2 reveals that the share of shadow banking assets to financial corporation assets has increased from 9% in 2002 to 22% in 2017, and the share of shadow banking assets to GDP has increased markedly from 3% in 2002 to 18% in 2017. Overall, the share of shadow banking to financial corporation assets and GDP has risen, which means that the participation of shadow banking in the Indonesian economy has also increased and might affect the monetary system. Taking a cue from the experience and the lessons from other countries such as China which has seen a much higher shadow-banking growth than Indonesia, shadow-banking activities in Indonesia must be regulated by strengthening reporting, monitoring, supervision and better integration of regulation into the existing framework.

Figure 3.2
Share of Shadow Bank Assets to Financial Corporation Assets and GDP in Indonesia, 2002-2017



Source: FSB and World Bank.

Figure 3.3
Indonesian GDP, Aggregate Broad Money (USD, Billion) and the Ratio of Shadow Banking Assets to GDP (%), 2002-2017



Source: World Bank (2018).

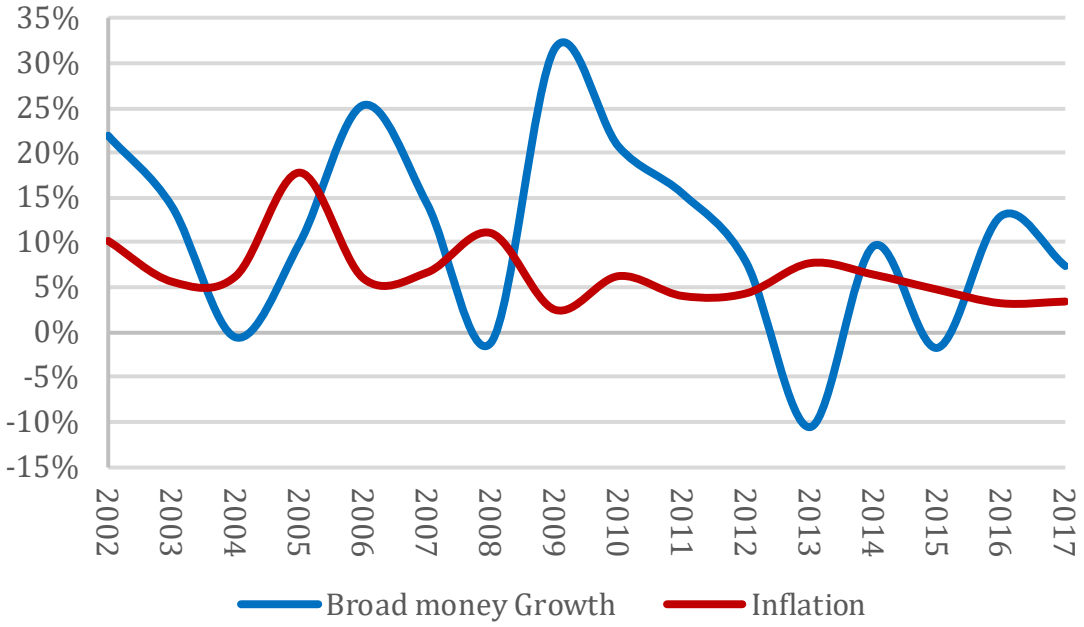
FinTech and shadow banking have grown dramatically, both for large- and small-scale of businesses. The increasing tendency of people to use new (digital) forms of financial intermediation will eventually affect microeconomic and macroeconomic dynamics, including the role of the central bank in economic system, as supported by Zhang and Wan (2017). These authors stated that monetary policy pursued by the central bank would no longer be effective in controlling the financial system. This could occur in case the demand for money was decreasing (Figure 3.3). Figure 3.3 illustrates GDP, broad money and the share of broad money to GDP. We can see that Indonesian broad money increased from

USD98.2 billion in 2002 to USD400 billion in 2017. Although broad money from 2002 to 2017 was lower than GDP, the share of broad money to GDP grew from 20% in 2002 to 37% in 2017. The increase in broad money reduced the velocity of money and, decreased the demand for money, could lead to inflationary pressures and a subsequent impact on the monetary system.

Figure 3.4 shows the growth of the broad money supply and the inflation rate in Indonesia from 2002 to 2017. Contrary to the previous statement, Figure 3.4 reveals that inflation has remained in the corridor given by the inflation targeting (IT) framework, meaning that it has not really been affected by the growth of broad money. Hence, it is not solely a monetary phenomenon. Moreover, the evidence shows that it might be time to reformulate the monetary policy framework as the financial environment has changed. More specifically, it has become more complicated and more varied in recent years. Furthermore, the wave of financial innovation and the massive growth in shadow banking entail difficulties and introduced complexities into the monetary system. As a result, controlling the broad money supply has become harder. The velocity of money and the money multiplier can be expected to decrease and may no longer be stable, which would contradict the basic assumption of the Fisherian quantity theory of money (Zhang and Wan, 2017).

Based on such developments, the need for comprehensive research to better understand new forms of financial intermediation from the macroeconomic and monetary policy perspective has become more urgent, timely and relevant. Although there exists research related to new forms of financial intermediation (especially in the shadow banking area), such analysis is lacking for Indonesia and the little that exists does not really offer a deep analysis for the specific case of Indonesia. For instance, FSB (2014) discussed the development of shadow banking in Asia (including Indonesia) and the FSB also monitors shadow banking more generally on an annual basis. Further, many researchers conduct studies of the shadow banking sector in other countries, most notably China. Notable studies include Ehlers et al. (2018), who attempted to map the shadow banking system in China, and Zhang and Wan (2017), who discussed the impact of Chinese monetary policy on shadow banking. Furthermore, a lot of research discusses shadow banking in general and does not focus on specific country cases. Hence, this study is intended to fill this gap by mapping the new forms of financial intermediation and discuss its scope, prospects and implications for Indonesia.

Figure 3.4
Broad Money (M2) Growth and Inflation in Indonesia, 2002-2017



Source: World Bank.

3.2 Macromapping of New Forms of Financial Intermediation in Indonesia

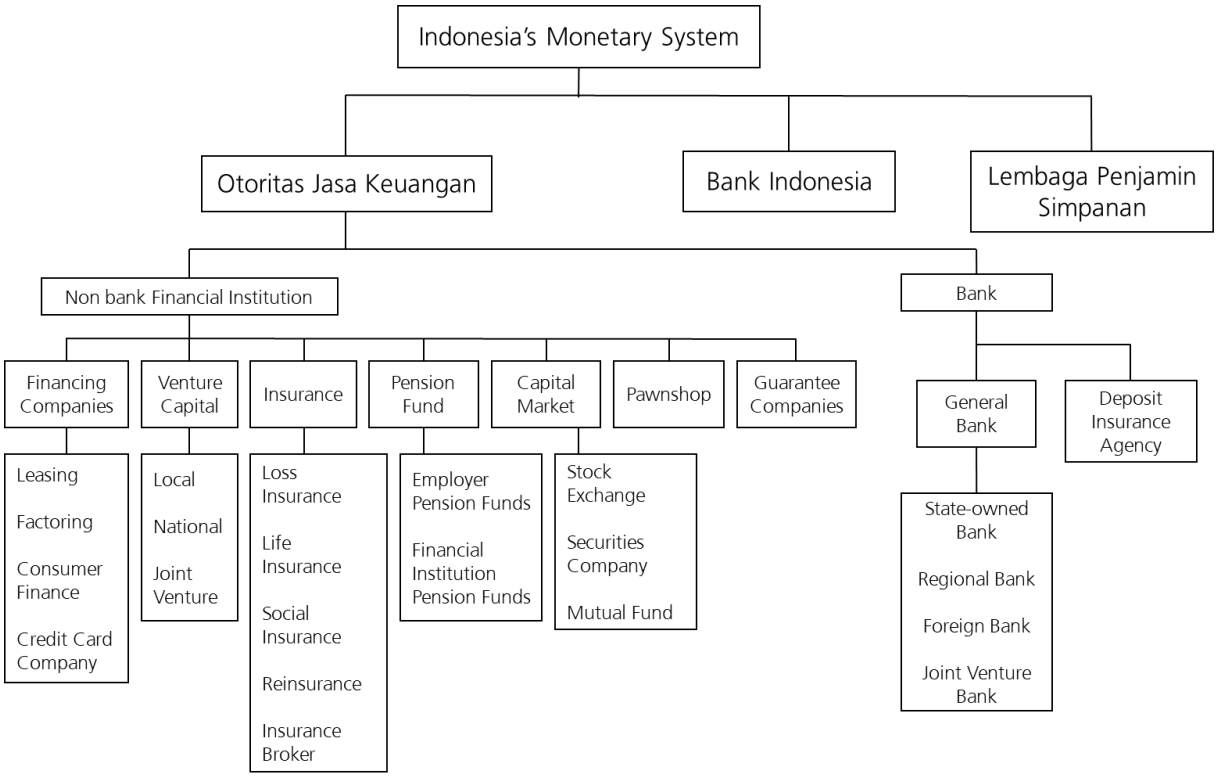
3.2.1 New Forms of Financial Intermediation in Indonesia

As mentioned before, financial intermediation has been conducted by non-bank financial institutions, which are also known as shadow banking institutions. This bank-like financial intermediation by shadow banking institutions is supported by Financial Technology (FinTech), which can be defined as a new form of financial intermediation. This new form of financial intermediation consists of intermediation performed by traditional shadow banking institutions, which is enabled by financial technology and genuine new forms of financial intermediation such as P2P lending and crowdfunding. In general, the definition of shadow banking always refers to the case of developed countries and is less suitable for developing countries such as Indonesia. Hence, this research is going to develop a definition of shadow banking that provides a comprehensive explanation of the characteristic structure of shadow banking in Indonesia. FSB (2012) states that shadow banking is "a credit intermediation involving entities and activities (fully or partially outside regular banking)." Regarding this definition, Otoritas Jasa Keuangan (OJK) issued a list of non-bank financial institutions that could be categorised as shadow banks. This is described in Figure 3.5.

It can be argued that the definition of shadow banking given by FSB (2012) is too general and broad. In consequence, it may make monitoring inefficient by capturing NBFIs which do not pose systemic risk. For that reason, FSB (2014) published a shadow banking report for the Asian region, including Indonesia. In this report the FSB stated more specific definitions of shadow banking by proposing a two-stage approach for monitoring the shadow banking system.

First, authorities should cast the net wide, looking at all non-bank credit intermediation to ensure that data-gathering and surveillance cover all the activities within which shadow banking-related risks might arise. Second, authorities should narrow the focus, concentrating on the subset of non-bank credit intermediaries where maturity or liquidity transformation and/or flawed credit risk transfer and/or leverage create important risks. Moreover, in order to follow up the two-stage approach in defining shadow banking, there are several additional criteria, such as the economic substance of NBFIs, the credit intermediation activities of NBFIs, the involvement of NBFIs in maturity/liquidity transformation, leverage and credit risk transfer, the connection of NBFIs with regulated financial entities, the creation of systemic risks by NBFIs, the extent to which systemic risks are mitigated, the existing prudential regulation of NBFIs, the regulatory regime in place and the adequacy of oversight, and the potential risk of regulatory arbitrage posed by NBFIs (FSB, 2014).

Figure 3.5
Indonesia's Monetary System



In order to examine the distinction between NBFIs and shadow banking, FSB (2014) identified two sets of indicators, beginning with the systemic risk indicators (SRs): maturity transformation, liquidity transformation, credit risk transfer and leverage. The proposed assessment framework developed by the FSB's work stream 3 to categorise shadow banking is based on five economic functions (EFs): management of collective investment vehicles with features that make them susceptible to runs, loan provision that depends on short-term funding, intermediation of market activities that depends on short-term funding or on secured funding of client assets, facilitation of credit creation, securitisation-based credit intermediation and funding of financial entities.

Furthermore, this report surveyed each Asian country, given that each country has different definitions of shadow banking, instruments and entities. For Indonesia, the FSB (2014) found that shadow banking exists where OFIs are involved in maturity transformation, leverage and credit risk transfer, not subject to prudential supervision and regulation, and their failure or distress would create systemic risk.

This Section begins by looking at shadow banking at the company-level by obtaining the balance sheet data of each entity from OJK. Based on the constituted balance sheets, we find that the important factors related to this study are cash in- and outflows as well as the allocation of assets of each shadow-banking entity. This facilitates the mapping of the shadow banking sector in Indonesia.

3.2.2 The Dynamics of Indonesian NBFIs

In order to build a comprehensive mapping model, we use the approach developed by Ehlers et al. (2018) for the case of shadow banking in China. China's shadow banking is not as complicated as shadow banking in the United States, because the steps involved in credit intermediation are fewer and there are not as many types of entities. Adrian and Ascarft (2016) suggested that the process of shadow banking credit intermediation in the United Stated comprises of seven steps. In contrast, shadow banking credit intermediation in China involves just one or two steps in the intermediation process. For this reason, shadow banking in Indonesia can be regarded as more similar to China, albeit with some minor differences.

Ehlers et al. (2018) developed a mapping model based on activities. It is divided into three parts: a creditor stage as a source of funding; a banking sector (banking and shadow banking) as the recipient of funding and as the source of transformation of several shadow-banking assets (which assumes the existence of relationships and linkages between regular banks and shadow banking entities); and the borrower stage where the shadow funding source ends. Each of these three stages of shadow credit intermediation has specific instruments for its activities.

To begin with, at the ultimate creditor stage, shadow banking is primarily funded directly by depositors or the investors who purchase its products. Therefore, bank-like credit intermediation more adequately describes shadow banking in Indonesia. As a result, collateralisation and securitisation is not required at this stage. For that reason, shadow banking in Indonesia has a structure more akin to that in China than the United States, owing to the fact that Indonesia displays a lack of collateralisation and securitisation on the liabilities side.

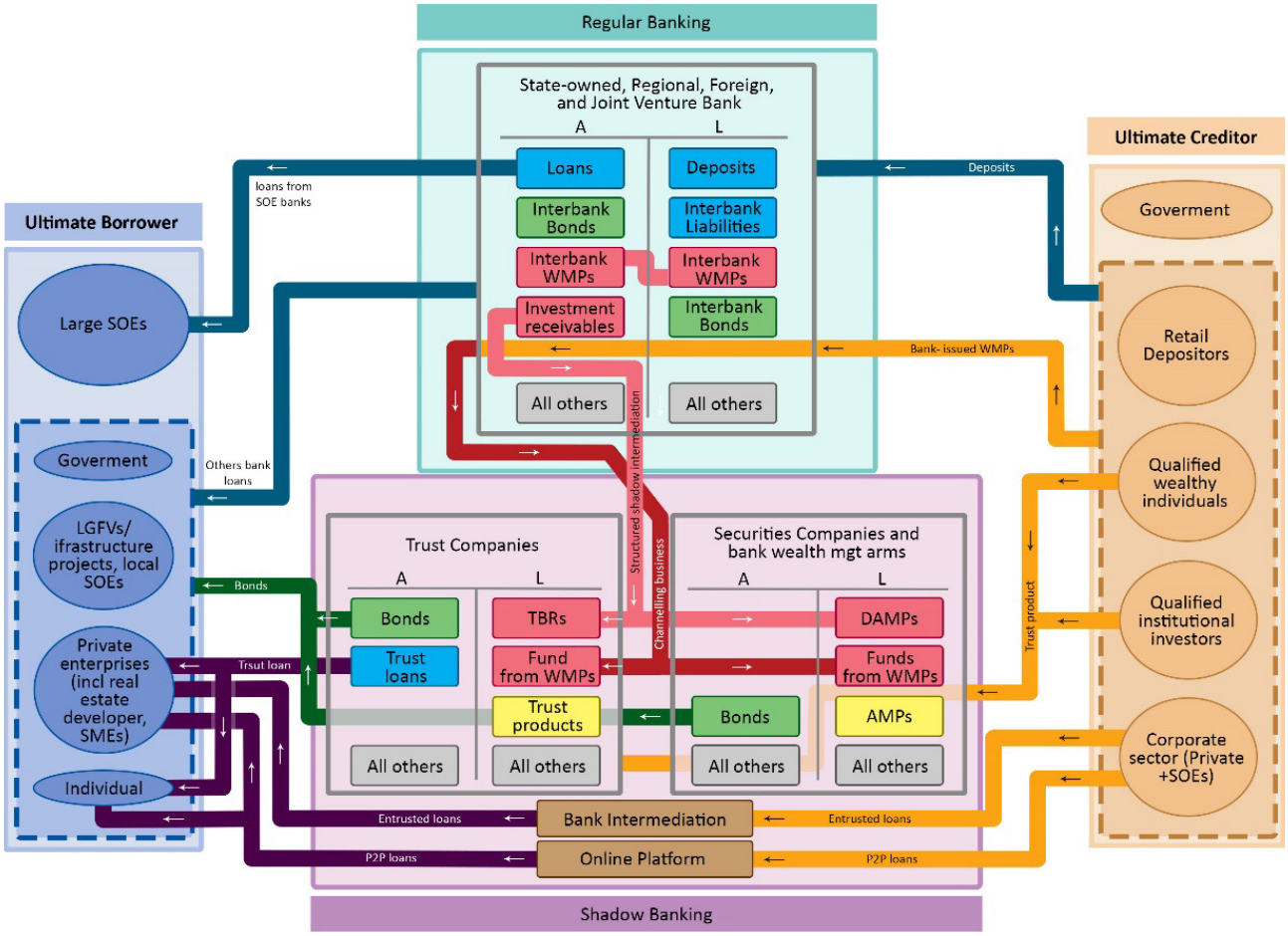
Furthermore, banks provide wealth management products (WMPs) that are seen as alternative saving instruments providing higher returns than traditional bank deposits/ savings. There are two main types of WMPs, which are the principal- or return-guaranteed WMPs that require full bank guarantees either on the principal or on the return. In practice, banks offer non-principal guaranteed WMPs without explicit bank guarantees which are not recorded on banks' balance sheets. In this case, companies usually hold the underlying investment of the non-principal guaranteed WMPs such as bank's investment or wealth

management assets. Practically, banks represent asset managers, charging fees to investors without being subject to regulatory restrictions. Besides WMPs, there are trust products that act as financial instruments similar to shadow credit that are issued by trust companies. In their financial activities, they also perform credit intermediation like commercial banks do. Trust companies offer the single investor several financial market instruments/services that function as trust products, including corporate securities, investment funds, pension funds and insurance products as well as collective investor trust products that have a larger number of underlying assets.

In Indonesia, shadow banking is not dominated by banks – this contrasts with China where banks do play a central role in shadow banking activities. However, banks still play some part in the shadow banking system in Indonesia. If the shadow banking entity is connected to a bank, the system may still be able to channel funds so that they are intermediated from banks to shadow banking entities. This activity boosts the shadow system's credit volume, because the funds thus raised are effectively redirected into shadow banking instruments by banks, which creates strong bonds between banks and shadow banking credit intermediaries. Besides the strong ties between banks and shadow banks, the growth of linkages between shadow banking savings instruments and capital markets, especially the bond market, is another vital recent phenomenon. In fact, these shadow banking savings instruments constitute an enormous portion of purchases of newly issued bonds and equities.

The stylised Indonesian financial institutions map given by Figure 3.6 is a modified version of the map created by Ehlers et al. (2018). The orange, pink, red and purple arrows depict the main shadow banking instruments and the resulting claims. Formal credit intermediation by banks is represented by the blue arrows. The green arrows stand for shadow credit intermediation through the bond market. In order to facilitate the analysis of the structure, we distinguish between three main stages of shadow credit intermediation. The ultimate creditor stage depicted on the right-hand side of Figure 3.6 represents the source of funding, consisting mainly of private and corporate depositors. The most relevant shadow savings instruments are represented by the orange arrows. At the intermediate stage (represented by the middle part of Figure 3.6), the funds received are then intermediated and transformed into different shadow banking assets. The various forms of shadow banking credit intermediation generate tight interlinkages (pink and red arrows) among banks and other shadow banking entities (trust companies and securities companies, including banks' wealth management arms). The ultimate borrower stage on the left-hand side of Figure 3.6 is the destination of shadow credit, represented by the purple arrows.

Figure 3.6
The Indonesian Financial Institution Map



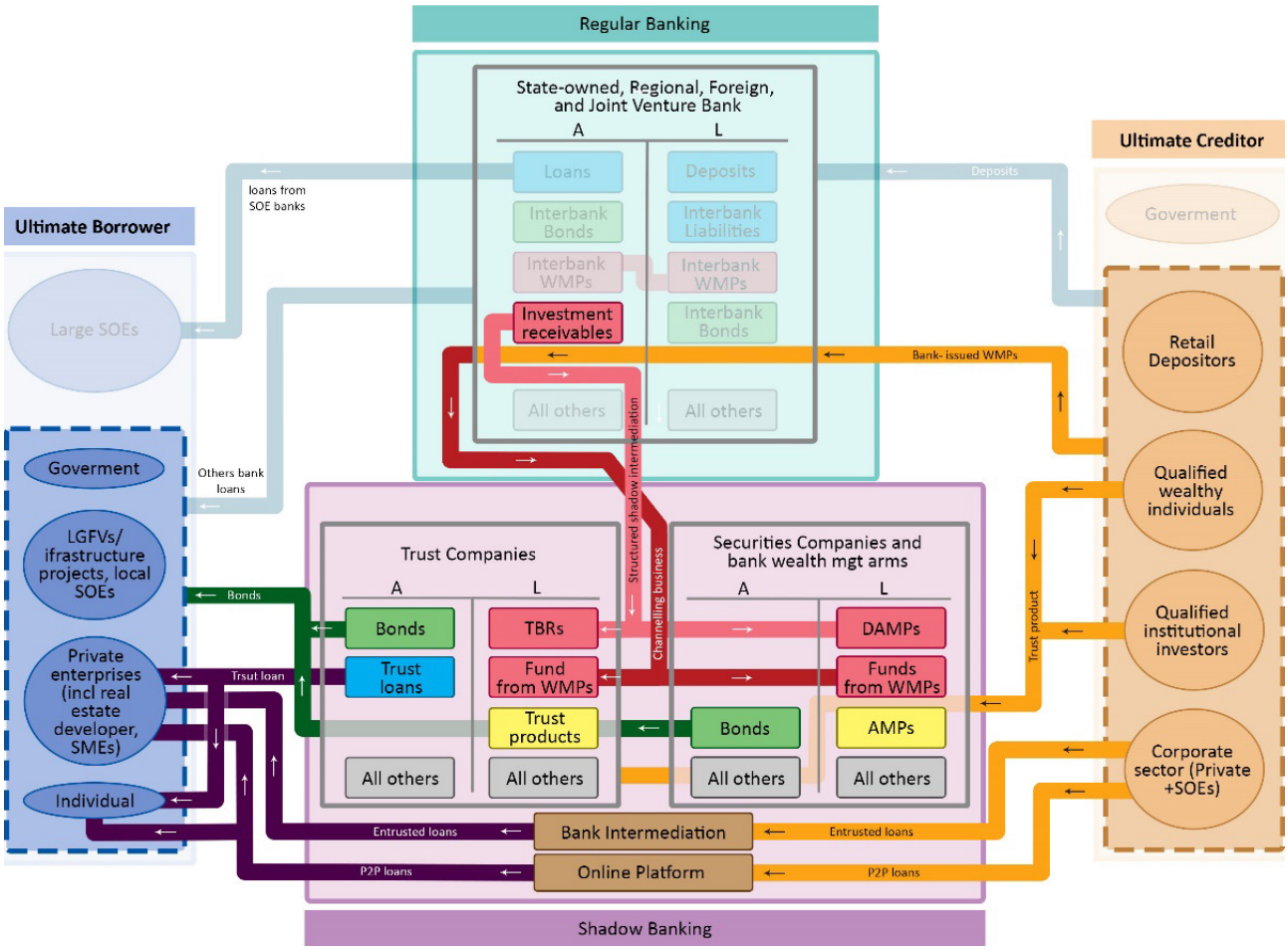
Source: This is a version of the mapping in Ehlers et al. (2018) that has been modified for Indonesia.

We hide the traditional banking activities in Figure 3.6 to highlight shadow banking activities in Figure 3.7. Even then, arrows remain, indicating that traditional banks remain involved in shadow banking activities as a source of funds for subsidiaries of the banking sector itself. Since shadow banking activities offer large benefits, and the banking sector is hampered by regulation, banks create subsidiaries in order to run their own shadow banking activities.

Many shadow banking activities occur in areas like insurance, pension funds, etc., but in this study, we are primarily looking at the investment managers as the ones who really conducts shadow banking activities, because they fulfil the FSB's criteria of narrow shadow banking.

Furthermore, online platforms are a completely new form of financial intermediation. There are still doubts as to whether this platform performs shadow banking activities or otherwise. Indonesia's Financial Services Authority, for example, stated that these platforms cannot be categorised as shadow banking entities because they do not raise funds, but only connect lenders and borrowers. Moreover, online platforms are subject to strict regulations that prevent them from engaging in shadow banking activities.

Figure 3.7
The Indonesian Shadow Banking Map



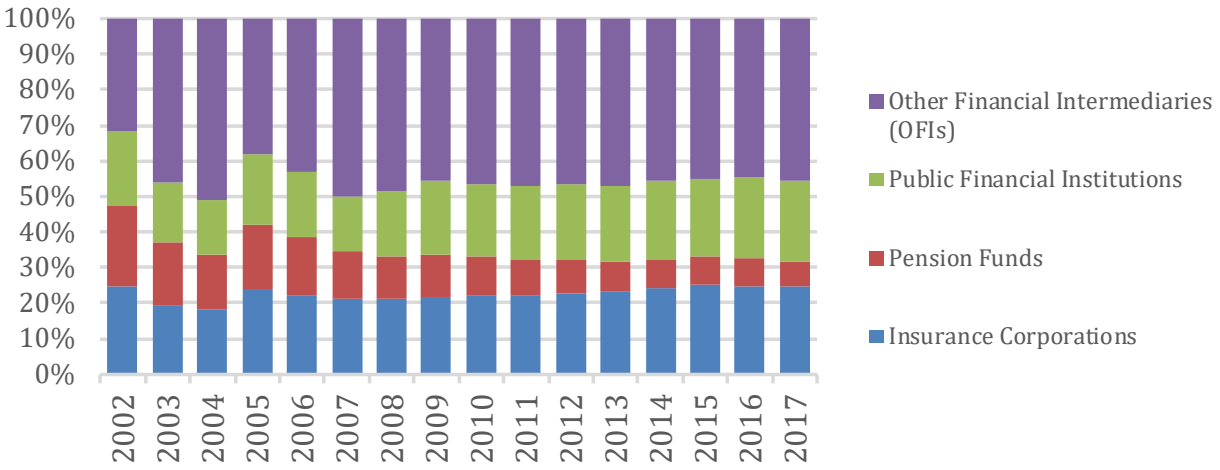
Source: This is a version of the mapping in Ehlers et al. (2018) that has been modified for Indonesia.

3.2.3 Shadow Banking Asset Composition

Figure 3.8 shows the composition of assets in the Indonesian shadow banking system, based on the disaggregated balance-sheet dataset released by the Indonesian FSA. The Figure illustrates the asset composition and its changes between 2002 and 2017. We find a diminishing share of pension fund assets, while the share of public financial institutions and insurance corporations has grown slightly. In addition, the share of other financial institutions (OFIs) has remained roughly constant. With a share of about 45%, OFIs[1] have the biggest asset proportion of shadow banking assets, followed by insurance corporations with 25%, public financial institutions (22%) and pension funds (8%).

1. Other Financial Intermediaries (OFIs) include investment funds, captive financial institutions and money lenders, broker-dealers, money market funds (MMFs), hedge funds, structured finance vehicles, trust companies, financing companies, real estate investment trusts and real estate funds, and central counterparties (FSB, 2018).

Figure 3.8
Financial Corporation Asset Percentage



Source: FSB.

3.2.3.1 Insurance Companies (EF4)

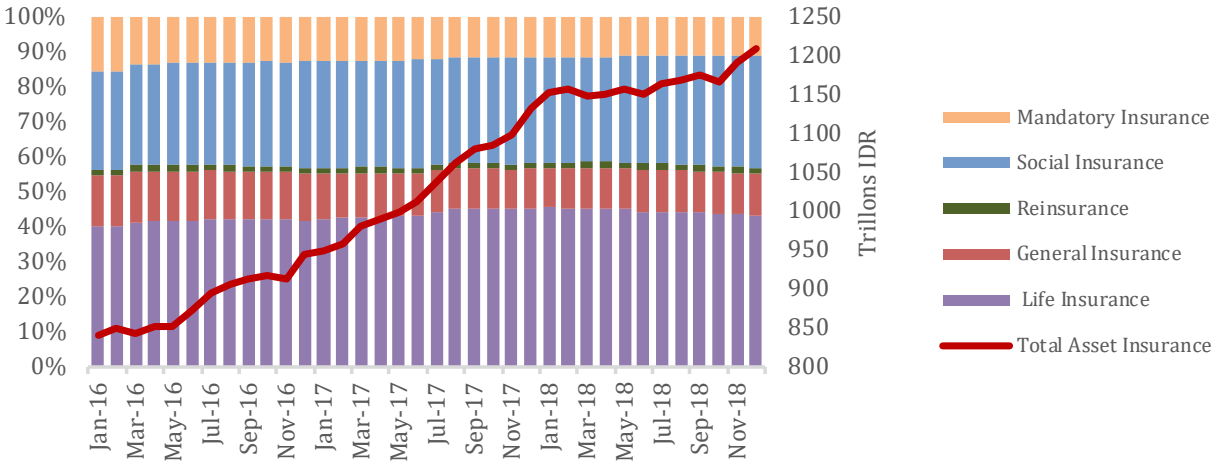
Insurance companies are those financial institutions that provide insurance policies to protect individuals or businesses against the risk of financial loss. For that purpose, insurance companies issue an insurance product with a premium to transfer the risk of a potential loss and the duty of care. Basically, insurance companies are a form of risk management to hedge against the risk of financial loss. Consider an individual or a company as a premium holder that use an insurance product to minimise the risk of an unmanageable loss, such as an accident, death, disease, etc. These kinds of risks are more prevalent in developing economics, so that insurance becomes more important. Furthermore, for a country that has frequent natural disasters, the need for insurance is increased and developing countries need to foster the creation and subsequent development of risk-sharing catastrophic insurance products.

A well-developed insurance market has a lot of advantages. Many economic theories and concrete evidence show that an insurance company's ability to share risks is needed to improve welfare and growth. In addition, a developed insurance market also reduces dependence on the government in providing guarantees against natural disasters. In addition, liabilities from insurance companies such as life insurance are long-term, so they can be used for long-term investments. Consequently, the accumulated assets under management by an insurance company have the potential to contribute to the development and growth of financial markets. Insurance companies have a very large impact on the development of domestic fixed income as well as equity markets. Because of this activity, insurance companies facilitate credit intermediation, which falls under Economic Function 4 of shadow banking activities as classified by the FSB (2018).

The typical business operations of insurance companies in Indonesia tend to have few savings elements, so insurance companies intermediate few long-term resources. As in most developing countries, the evolution of the insurance business in Indonesia has focused on the development of the insurance industry. In general, the relative aggregate size of insurance companies in Indonesia is still relatively small compared to other countries.

Figure 3.9 shows the growth of total assets of insurance companies in Indonesia and the composition of assets according to each type of insurance company. From January 2016 to December 2018, the assets of insurance company experienced an increase of IDR840 trillion to IDR1,210 trillion. Furthermore, the life insurance sector has the highest share of total assets of insurance companies in Indonesia. The proportion of total assets per sector are 43% for life insurance, 30% for social insurance, 13% for general insurance, 12% for mandatory insurance and 2% for reinsurance.

Figure 3.9
Proportion of Insurance Assets and Total Assets in Indonesia

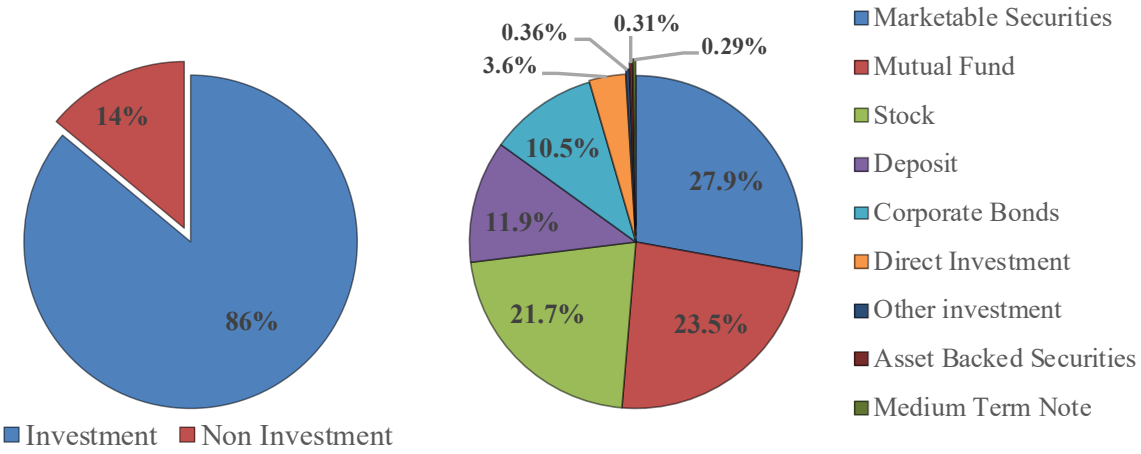


Source: OJK.

Figure 3.10 presents the composition of the insurance companies' assets at the end of March 2019, obtained from data published by OJK. We observe that 86% of insurance companies' assets are allocated in investment and the remaining 14% in non-investment activities. Some 27.9% of investment assets are allocated to state securities (bonds), 23.5% to mutual funds, 21% to shares, 11.9% to deposits, 10.5% to corporate bonds and 3.6% to direct investment. Meanwhile, medium term notes and asset backed securities were 0.29% and 0.31% respectively, i.e., well below 1%.

The allocation of 86% of insurance assets to investment is a form of indirect lending that could be classified as financial intermediation from either funders (the premium buyer) or the customers who want insurance companies to manage their assets. Although insurance companies do not bring together debtors and creditors, by steering the purchases of obligations or stock, this activity belongs to shadow banking activity.

Figure 3.10
Insurance Assets (Left-Hand Side) and Investment Asset Composition (Right-Hand Side), March 2019



Source: OJK.

3.2.3.2 Pension Funds (EF4)

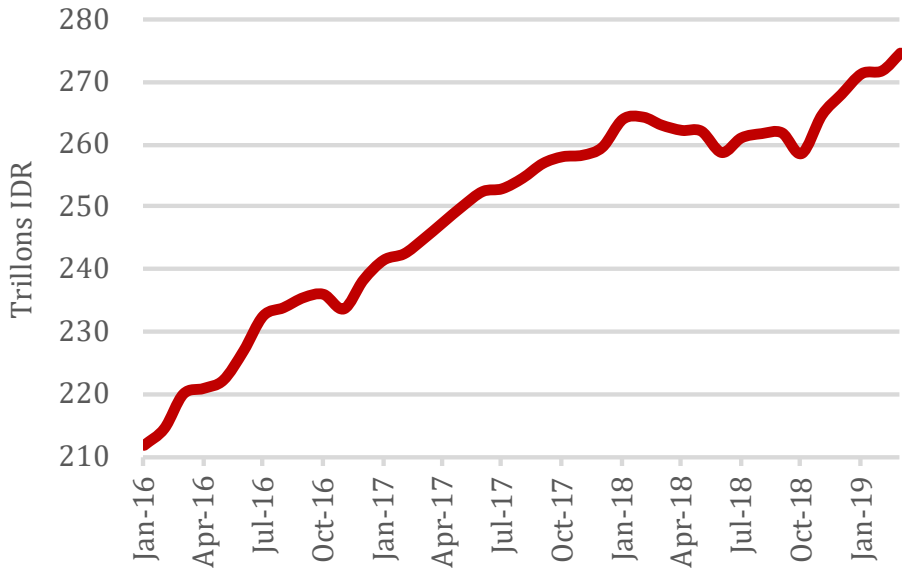
A pension fund is a form of financial scheme that provide retirement income. Pension funds play an important role as a source of income for retirees, thereby reducing the risk of old-age poverty. Hence, to achieve this objective, the pension fund system needs to be well-designed and sustainable. The attention given to the pension fund industry around the world has risen since the early 1990's in line with the greater emphasis on policy issues related to improving the benefits for the elderly in their retirement.

With the age group below 24 constituting around 40% of the population, and the age group between 25 and 43 representing another 43%, Indonesia is in a unique demographic position. The latter will contribute to the country's short-term economic development, but the situation will turn around since the average age is increasing rapidly. As time goes by, as fertility decreases and the standard of living increases, life spans will also likely increase which will in turn contribute to the further aging of the population. Therefore, it is essential for Indonesia to place attention on a pension system that can provide income security during retirement as the population is aging rapidly.

The business model of a pension fund rests on the existence of a "float": the contributor makes regular payments to the pension fund for a period of 30 to 40 years while in employment and does not draw down his pension until retirement, meaning that these payments will be available to pension fund companies for investment. Because of this, pension funds play an important role as an institutional investor from the perspective of the financial sector. If the pension system is well-structured, it can mobilise valuable long-term domestic resources. The overall effectiveness of capital in the economy is increased because of the pension funds' long-term investments. In fact, this activity occurs in Indonesia as well as many other developing countries. Because of this activity, pension fund companies facilitate credit intermediation, which falls under Economic Function 4 of shadow banking activities as classified by the FSB (2018).

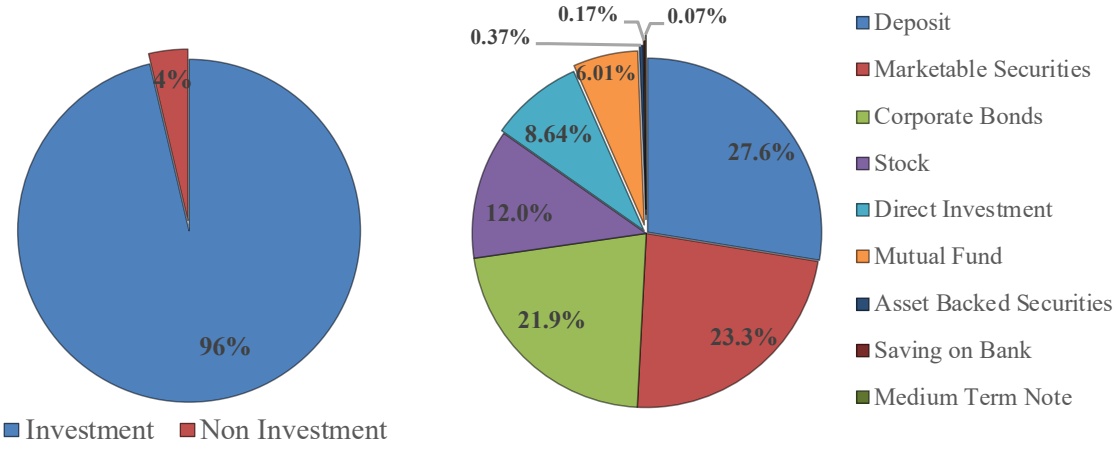
Figure 3.11 shows the growth of asset of Indonesian pension funds. Retirement assets increased from IDR212 trillion in January 2016 to IDR274.5 trillion in March 2019. Figure 3.12 shows the corresponding composition of assets of pension fund companies at the end of March 2019, derived from data published by OJK. As much as 96% of pension fund companies' assets are allocated to investment, and the remaining 4% in non-investment activities. Within investment assets, some 23.3% of assets are allocated to state securities (bonds), 6% to mutual funds, 12% to shares, 27.6% to deposits, 21.9% to corporate bonds and 8.64% to direct investments. In terms of other investments, roughly 0.1% went into medium-term notes, 0.4% into asset backed securities and 0.2% into cash and savings in banks. The allocation of 96% of pension fund assets into investments constitutes a form of indirect lending that could represent financial intermediation from funders (the premium buyers) or the customer who wants pension fund companies to manage their assets. Although pension fund companies do not bring together debtors and creditors, by channelling the funds into purchases the obligation or stock, this activity falls under the shadow banking activity.

Figure 3.11
Pension Fund's Asset Development



Source: OJK.

Figure 3.12
Pension Funds' Assets (Left-Hand Side)
and Investment Asset Composition (Right-Hand Side),
March 2019



Source: OJK.

3.2.3.3 Financing Companies (SR 1, SR 2 and EF 2)

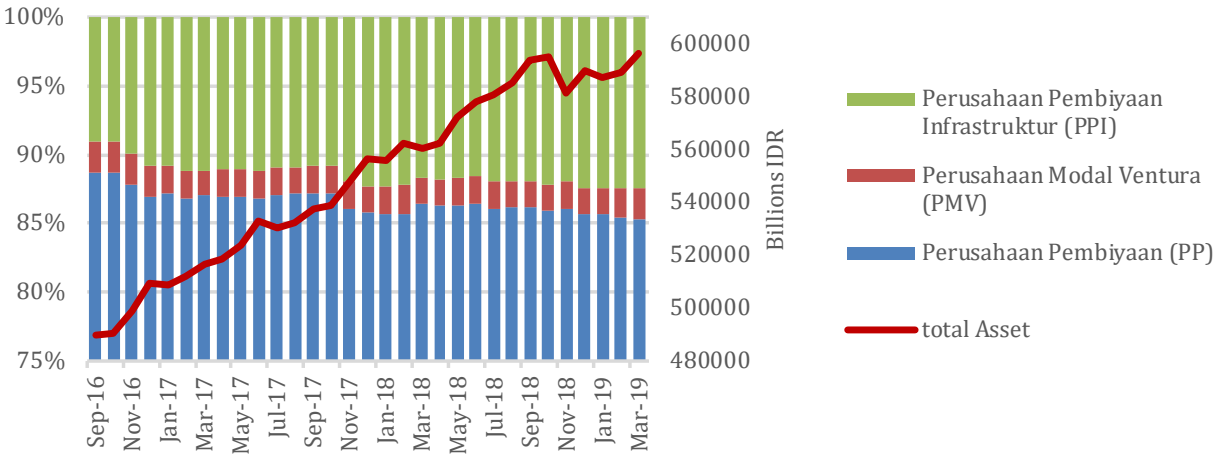
Financing companies, including other financial intermediaries, constitute the largest share of the shadow banking system in Indonesia. Figure 3.13 shows the development of financing companies' assets and the composition of each type of financing company. From September 2016 to March 2019, the highest proportion of total assets of financing companies, at 87%, was allocated to public financing companies. Furthermore, infrastructure financing companies and capital venture financing companies accounted for the remaining 11% and 2% respectively.

Figure 3.14 shows the proportion of the use of financing companies' assets. A relatively high proportion of 87% of financing companies' assets are used to conduct debt financing. These debt financing assets are allocated to various activities: 59% for multipurpose financing, 31% for investment financing, 5% for capital financing and 4% goes to other forms of financing. Moreover, 13% of total assets are used for other activities.

Financing companies do not channel shadow banking loans to corporate trust companies and insurance companies that engage in purchasing securities such as bonds and stocks as the means for shadow banking intermediaries (Figure 3.15). This can be seen from the small amount of assets allocated to the purchase of these instruments. Financing companies focus on channelling capital through debt financing. Furthermore, financing companies have liabilities on domestic banks (48%), foreign banks (28%), foreign NBFI (3.7%), domestic NBFI (0.3%) and securities issued (21%). Financing companies report dominant liabilities from banks which are supported by the issuance of securities as an alternative funding source. The latter can be purchased by other shadow banking companies, such as insurance companies (Figure 3.15).

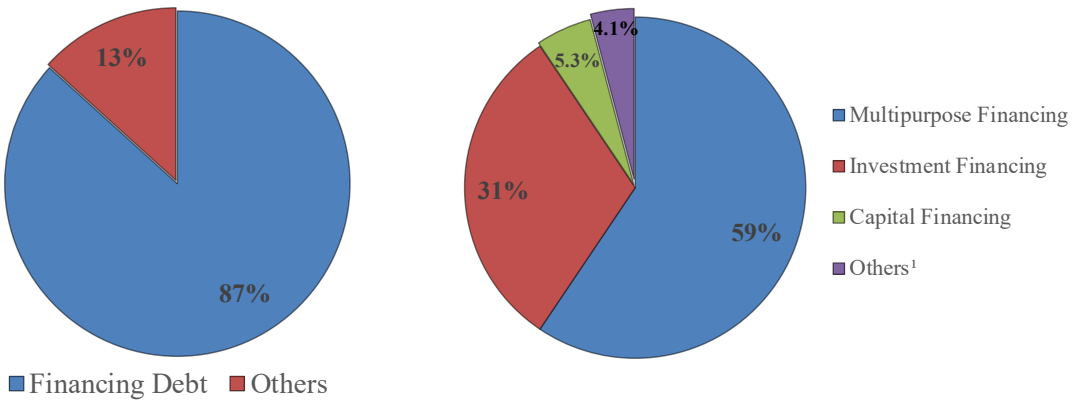
Based on the individual firms' balance sheet data as well as the classification from the FSB, we can define financing companies as financial institutions that perform shadow banking activities, since their capital (liabilities) is obtained from market funding and marketable securities, which they then transform into debt financing. Therefore, financing companies could be regarded as falling under Systemic Risk number 1 (maturity transformation), Systemic Risk number 2 (liquidity transformation) and Economic Function 2 (loan provision that is dependent on short-term funding).

Figure 3.13
Financing Company Assets



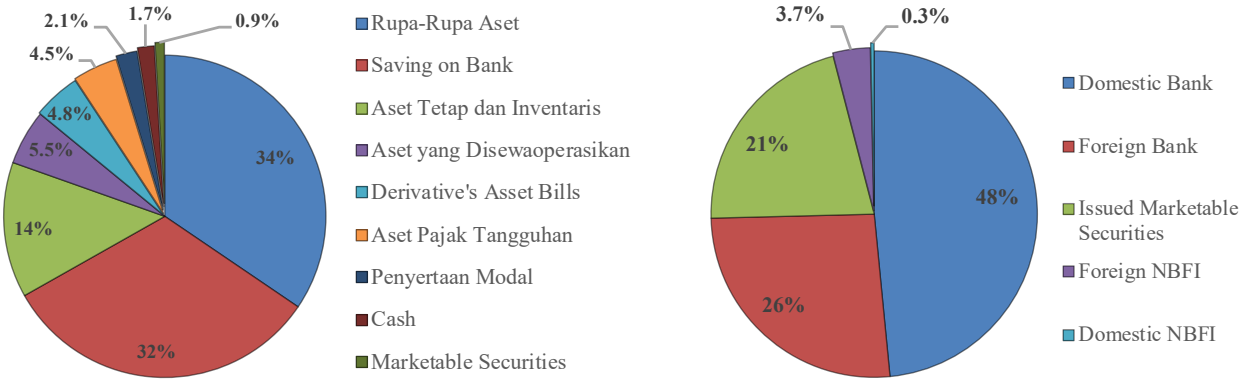
Source: OJK.

Figure 3.14
Financing Companies' Assets (Left-Hand Side) and Debt Financing Asset Composition (Right-Hand Side), March 2019



Source: OJK.

Figure 3.15
Other Asset Composition (Left-Hand Side) and Financing Companies' Liabilities (Right-Hand Side), March 2019



Source: OJK.

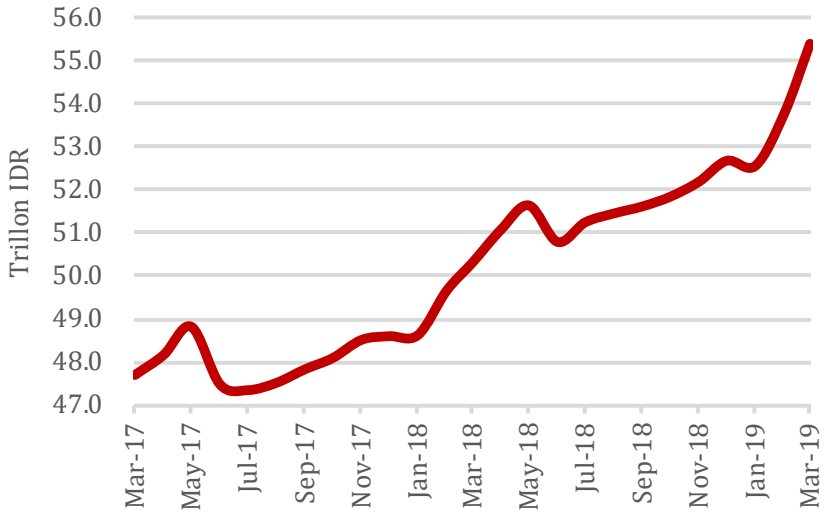
3.2.3.4 Pawnshop Companies (EF 2)

Pawnshop companies in Indonesia are dominated by government pawnshops, which account for 99% of total assets. For that reason, only government pawnshop companies will be discussed in this paper. Figure 3.16 shows the development of pawnshop companies' assets. Assets increased from IDR47.7 trillion in March 2017 to IDR55.4 trillion in March 2019. While very gradual, there is a still an upward trend throughout the period, indicating that the Indonesian pawnshop industry is expanding.

Figure 3.17 reveals that 77% of the total assets of pawnshop companies are allocated to loans, indicating that pawnshops behave like a bank. Other than that, the funding sources of pawnshop companies are dominated by banks with a share of 65%, and by issuing securities (22%) and medium-term notes (1.4%). In addition to the strong relationship with the banks, pawnshops also receive financing from the securities they issue.

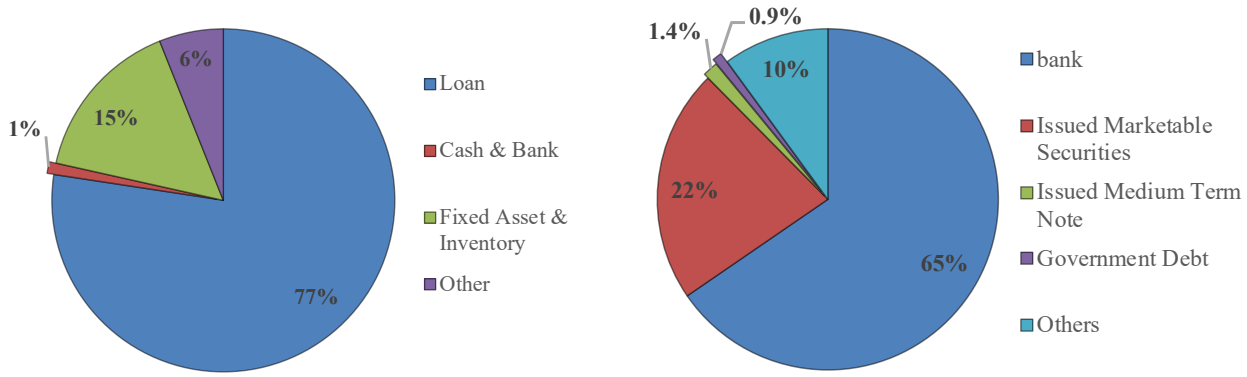
Based on the individual firms' balance sheet data as well as the classification from the FSB, we can define pawnshop companies as financial institutions that perform shadow banking activities. Their capital (liabilities) is obtained from bank funding, government and marketable securities which is then transformed into loans. Therefore, pawnshop companies fall under Economic Function 2 (loan provision that is dependent on short-term funding).

Figure 3.16
Pawnshop Assets, March 2017 to March 2019



Source: OJK.

Figure 3.17
Government Pawnshop Assets (Left-Hand Side) and Liabilities Composition (Right-Hand Side), March 2019

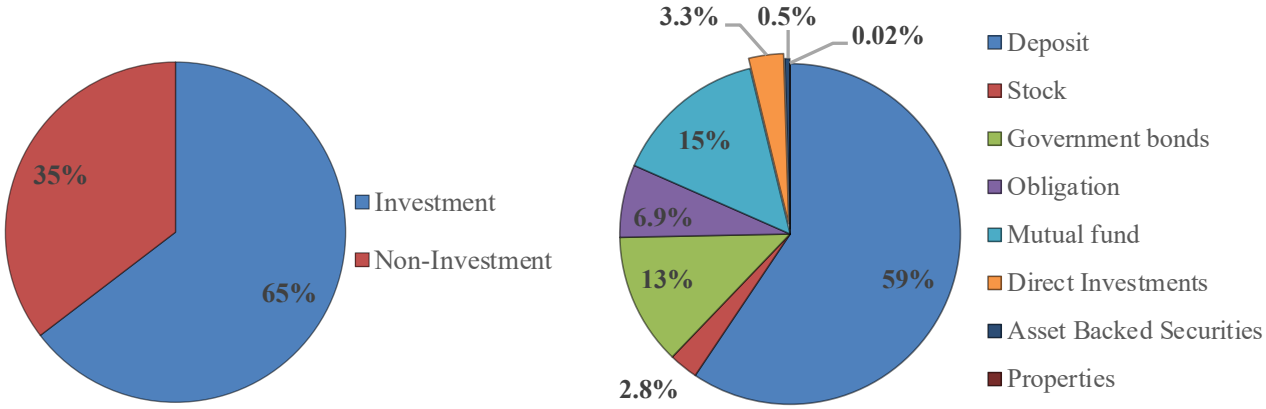


Source: OJK.

3.2.3.5 Guarantee Companies (EF 4)

Figure 3.18 shows guarantee companies' assets and investment composition. Guarantee companies allocated 65% of their total assets to investments. Other than that, non-investment assets are used for reserves and other purposes. From their total investment assets, guarantee companies allocated 59% to deposits, 15% to mutual funds, 13% to government bonds, 6.9% to corporate bonds, 3.3% to direct investments, 2.8% to stocks, 0.5% to asset-backed securities and 0.02% to property. A large portion of the assets of the guarantor company is entrusted to banks. Other investment destinations are mutual funds and government bonds, which means they represent a source of financing for shadow banking activities.

Figure 3.18
Guarantee Companies' Assets (Left-Hand Side) and Investment Composition (Right-Hand Side), March 2019



Source: OJK.

3.2.3.6 FinTech Lending (EF 2)

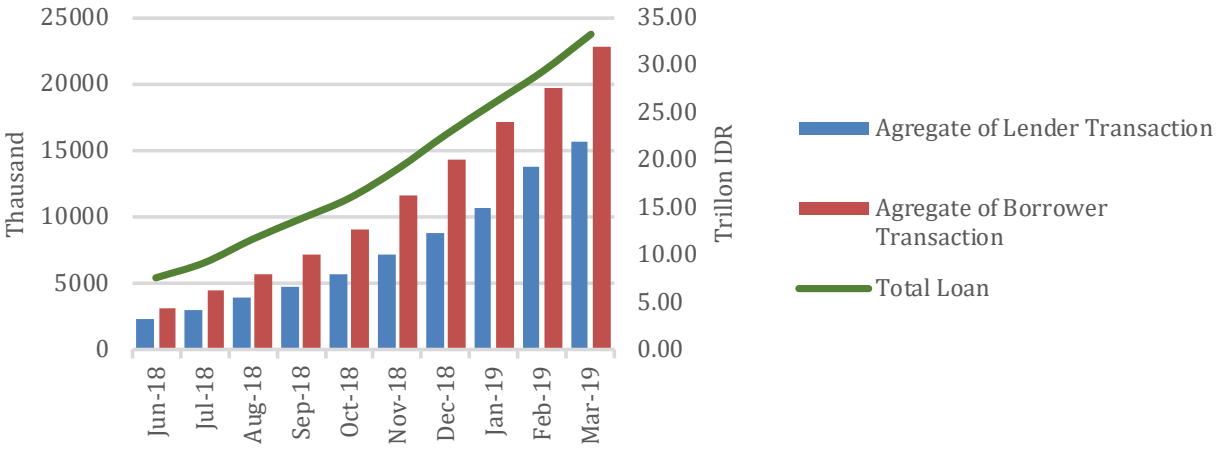
Both the development of technology and information systems and the number of internet users in Indonesia have increased dramatically. On average, there are 132 million active internet users in Indonesia who spend around 4 hours online every day. In 2018, there were 52% more internet users than in 2013, Indonesia could therefore be categorised as a digital country, which indicates the increased degree of local technology utilisation. Consequently, financial technology (FinTech) will continue to make inroads in Indonesia. This kind of innovation has already affected structural changes in terms of reducing costs, improving efficiency and inducing increased and more effective interoperability. In view of this, Zavolokina et al. (2016) convincingly argue that FinTech will have applications in many sectors and industries. This situation will compel the existing financial market to transform systems so as to better meet the demands and the needs of the public.

As mentioned above, Indonesia's environment encourages the rapid growth of the FinTech industry and heralds a bright future for the country, but it is still not easy to capture the profound practices of FinTech in Indonesia. Quantitative market data are lacking, other data and information are at best scattered and at worst scarce and very difficult to access by the public.

The rapidly growing FinTech lending in Indonesia can be categorised as one of the instruments of shadow banking intermediation. Figure 3.19 shows that aggregated FinTech lending transactions increased from 2.3 million in June 2018 to 15.7 million in March 2019. Furthermore, the aggregated borrowing transactions increased from 3.2 million in June 2018 to 22.7 million in March 2019. Total loans provided also increased from IDR7.6 trillion in June 2018 to IDR33.2 trillion in March 2019. Although FinTech lending in Indonesia has developed rapidly, it retains a narrow scope, focusing mainly on short-term lending to individuals. FinTech lending works as an intermediary function that brings together borrowers and lenders. As such, FinTech lending does not extend for more than two days due to regulations of the OJK. This limits the existence and management

of float funds, such that FinTech lending cannot be transformed into shadow banking. Nonetheless, FinTech lending could be classified to fall under Economic Function 2 (loan provision that is dependent on short-term funding) in the FSB's definition of shadow banking activity.

Figure 3.19
FinTech Lending in Indonesia,
June 2018 to March 2019



Source: OJK.

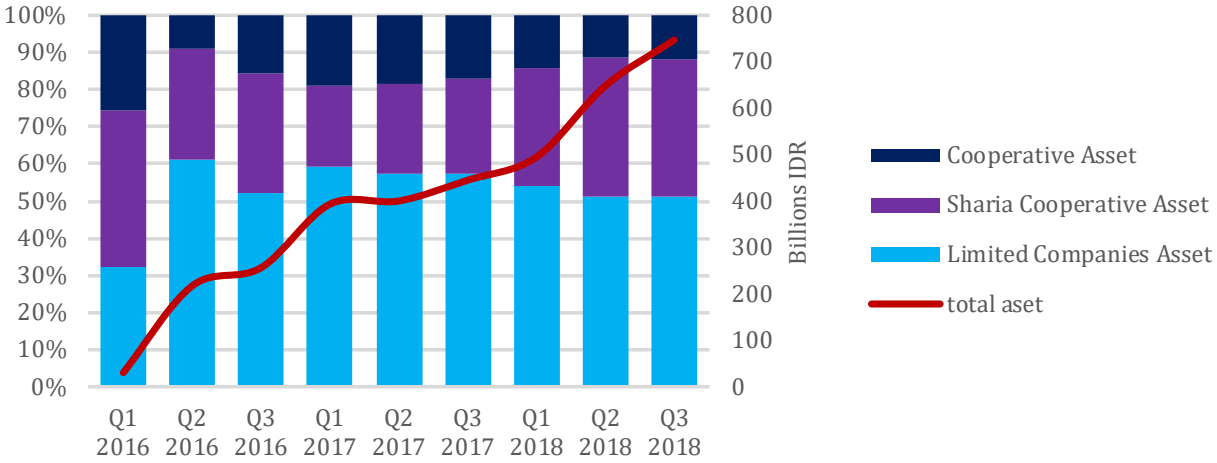
On the supply side, P2P lending platform providers have continued to grow, supported by strong innovation, wider access to mobile technology and the inflow of foreign investment, especially venture capital, over the past two years. As of the end of 2017, there were 87 technology-based loan and loan companies operating throughout Indonesia. However, this number is forecasted to increase to more than 164 FinTech companies. Up to April 2018, the OJK noted that 50 companies received business licenses, of which 34 were local companies and 17 foreign companies. OJK data up to September 2018 show that the distribution of funds through FinTech P2PlLending in Indonesia reached IDR13.83 trillion. On the demand side, Indonesian consumers are relatively open to risks, although the uptake of loans is still low. A Bank Indonesia study in 2017 found that consumers' perceived FinTech to be very competitive in terms of security, efficiency, convenience and speed compared to traditional banking (BI-DKMP, 2018).

3.2.3.7 Microfinance Companies

A microfinance institution provides small loans, savings accounts, checking accounts, micro insurance and payment systems targeted at small businesses and those segments of society that lack access to conventional banking and affiliated services. Microfinance in Indonesia is growing rapidly, as can be seen from the growth of total microfinance assets from IDR32.8 billion in 2016 Q1 to IDR748.34 billion in 2018 Q3 (Figure 3.20). Limited companies have the biggest share of these assets, followed by sharia cooperatives and ordinary cooperatives. A limited company (LC) is defined as a type of business structure in which the company limits the amount of liability of the company's shareholders.

Since the activity of microfinance companies focuses on financing, microfinance companies can be considered to generate systemic risk and fall under several of the FSB's Economic Function indicators. In general, though, they are subject to regulation and pose minimal systemic risk and regulatory arbitrage. Because of this, Indonesia does not consider microfinance companies as shadow banking institutions.

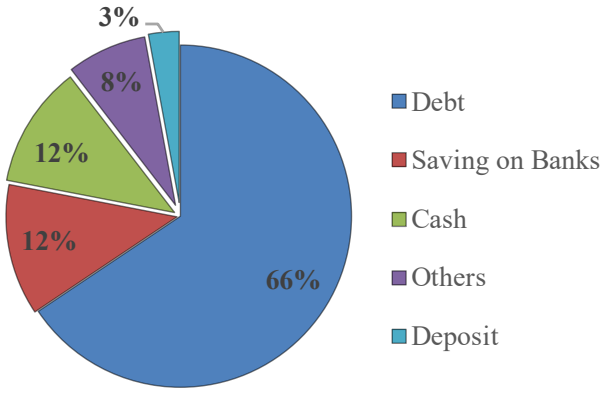
Figure 3.20
Microfinance Assets in Indonesia, 2016 Q1 – 2018 Q3



Source: OJK.

Figure 3.21 presents the composition of the cooperatives' assets. We find that cooperatives allocate most of their funds in the provision of debt (66%), followed by savings in banks (12%), cash (12%), deposits (3%) and others (8%). These numbers reveal that cooperatives are not directly involved in the funding of shadow banking activities.

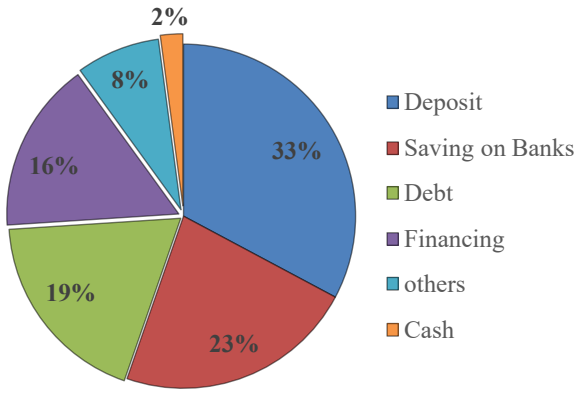
Figure 3.21
Cooperative Asset Composition at End-2018 Q3



Source: OJK.

Moving on, Figure 3.22 shows the asset composition of sharia cooperatives. The numbers show that sharia cooperative companies allocate some 33% of their funds in deposits, with another 23% in savings at banks. This enhances the relationship between sharia cooperatives and banks indirectly because sharia cooperatives provide financing to banks. In addition, sharia cooperatives also allocate 19% of their assets to debt, 16% to financing, 2% to cash and 8% to other instruments. This shows that sharia cooperatives are not directly involved in the funding of shadow banking activities.

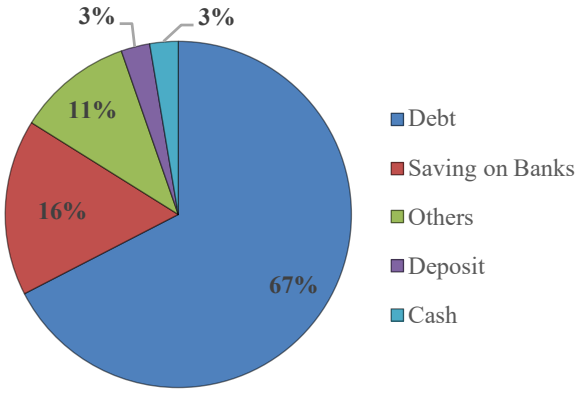
Figure 3.22
Sharia Cooperative Asset Composition at End-2018 Q3



Source: OJK.

Finally, Figure 3.23 shows the composition of limited companies' assets. The data show that limited companies allocate 33% to the provision of debt, 16% to savings, 3% to deposits, 3% to cash and 11% to other instruments. This shows that limited companies are not directly involved in the funding of shadow banking activities.

Figure 3.23
Limited Companies' Asset Composition at End-2018 Q3



Source: OJK.

3.2.3.8 Mutual Funds (SR 1, SR 2, SR 4, and EF 3)

A mutual fund is an investment company that pools money from shareholders and transforms them into investment products in a diversified securities portfolio. Mutual funds encompass professional management, convenience, liquidity, variety, diversification, affordability, transparent record-keeping, tight regulation and full disclosure. Since mutual funds are regulated by governments, every fund is obliged to fulfil standard operations, observe severe anti-fraud rules and publish all information for current and potential investors. Because of the legal obligations, investors are protected from abuse and fraud. As a result, mutual funds provide many advantages, above all simplicity, accessibility and affordability.

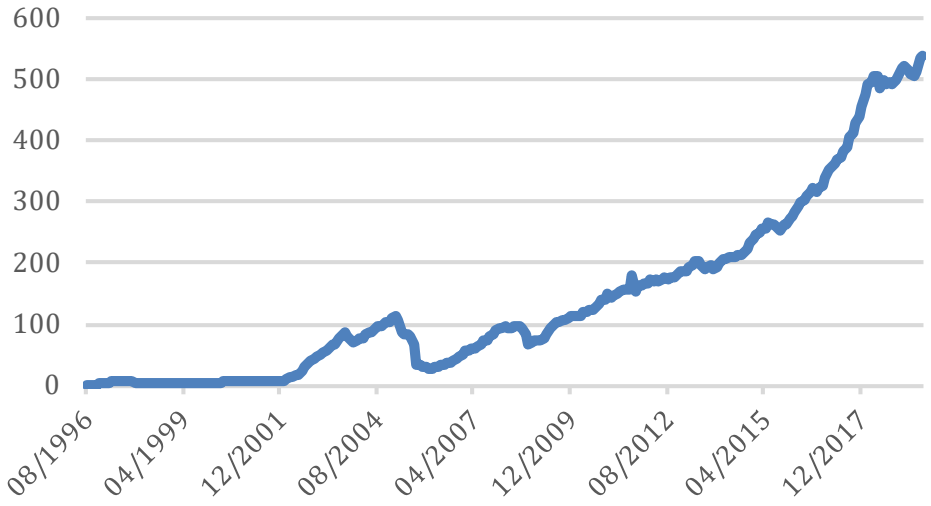
Mutual funds have a valuable role to play in the development of capital markets, not only because they are managed, regulated and supervised, but also because they create demand from a new set of investors. Since the launch of mutual funds in Indonesia in 1997, the sector has grown rapidly. Furthermore, the significant increase in fixed-income funds which invest mainly in government securities has led to two significant growth spurts, one after 2002 and another since 2009 (Figure 3.24). In Indonesia, there are five types of mutual funds, namely equity, fixed-income, money market, balanced-mixed and protected funds. Most of the investors in mutual funds are individuals. Figure 3.25 shows the percentage shares of the five types of mutual funds in the overall Indonesia mutual fund industry.

Professional investment management is one of the benefits for the investors who put money into a mutual fund. Investment management requires similar fixed costs as other services as well as annual administration fees. Other charges include fees for selling agents' services, custodial services and of course charges for fund management itself. Besides, fees are also used for covering the costs of legal counsellors, accountants, public notaries, administration, marketing, registration, transaction of securities, taxes and insurance.

Based on their functioning and the FSB's definition, we can classify financing companies' activities as shadow banking. Indonesia considers brokers as shadow banks since brokerage activities fall under Economic Function 3 (intermediation of market activities that is dependent on short-term funding or on secured funding of client assets) and Systemic Risk 4 (leverage). By contrast, Indonesia does not consider money market funds and collective investment schemes as shadow banking, although they perform token shadow banking activities falling under Systemic Risk 1 (maturity transformation), Systemic Risk 2 (liquidity transformation) and Systemic Risk 4 (leverage).

Collective-investment mutual funds are distributed indirectly by institutions such as commercial banks, insurance companies and brokers, and directly by the investment management companies themselves. Commercial banks have a share of more than 75% of the overall net asset value, which makes them the biggest player in this market. Many state-owned banks and insurance companies distribute collective-investment mutual fund products issued by their own investment management subsidiaries, since traditional banking institutions are restricted by regulation from launching their own collective-investment products. Foreign-owned commercial banks, which are often subject to less strict regulations, can offer many kinds of fund families which are distributed by different investment companies.

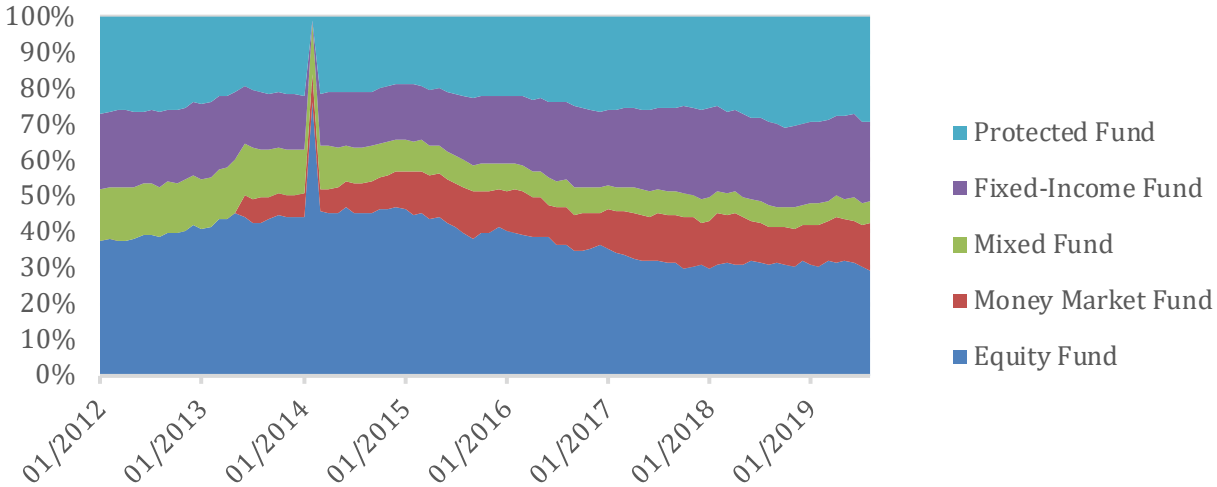
Figure 3.24
Total Mutual Fund's Net Asset Value



Source: CEIC.

The products issued by the investment management company must initially be offered at an identical value, which is a net asset value of IDR1,000 per unit, and the maximum number of units depends on the contract between the investment manager and the custodian bank. As long as the units of participation do not reach the maximum number, a collective-investment mutual fund can be continuously offered to the public. Furthermore, the mutual fund product has different minimal amounts pertaining to the initial subscription for each investment management company. Indonesia has five types of mutual fund products and Figure 3.25 shows the composition of mutual funds' net asset values.

Figure 3.25
Composition of Mutual Funds' Net Asset Value in Indonesia



Source: CEIC.

3.2.4 Shadow Banking Activities

Shadow banking occurs outside the regular banking system and therefore the regulatory perimeter. Using the broad definition by the FSB, we approximate the overall size of the shadow banking sector by combining the assets of other financial institutions (OFIs) and the investment fund sector, which includes money market funds and entities such as mutual funds, securities company and brokerages.

For the purposes of observing the shadow banking system, it is not enough to just pursue an "entity-based" approach, meaning that we simply look at the balance sheet data of each individual entity to derive the overall fund flows. Such a point of view neither captures the involvement, exposures and specific interactions between entities in the shadow banking system nor does it constitute proper risk analysis for the sector. Furthermore, the credit intermediation process might generate systemic risks accompanied by maturity and liquidity transformation, leverage or imperfect credit risk transfer. Besides that, the interconnectedness between the shadow banking system and the regular banking system may cause these risks indirectly.

Since the "entity-based" approach fails to capture the entire process happening in the shadow banking sector, we provide a wider analysis using an "activity-based" approach. This approach is more fully aligned with both shadow banking monitoring based on economic function as well as analytical and policy work on Securities Financing Transactions (STFs). Furthermore, the distinctiveness of financial stability risks is better captured by an activity-based approach.

3.2.4.1 Securities Financing Transactions

Securities financing transactions (SFTs) are a form of borrowing activity with secured features, which means that the borrower provides collateral to the lender, such as cash or securities. In case the SFT defaults, the borrower is the collateral giver and the lender is the collateral taker. The latter could therefore sell the securities in order to recover their money.

Repurchase agreements (repos), securities lending and margin lending transaction constitute a form of financial contract in SFTs. A repurchase agreement is a two-stage transaction: in the first leg of the transaction, a borrower sells securities to a lender and simultaneously commits to buy back the same securities in the second leg of the transaction at a future date. Securities lending works along the same lines, e.g., it is a transaction under which the borrower commits to return the same securities on an agreed date in the future. As a general contract typically, this contractual agreement entails the payment of a fee which is imposed on the borrower.

Repo markets

A repurchase (repo) agreement is a form of short-term borrowing, although the funding source is rather unstable and tends to dry up in case of a deterioration of market condition. The academic literature suggests that in periods of stress, the trading volume in the repo market remains relatively resilient (Boivin et al., 2015; Perignon et al., 2015).

Securities lending

A securities lending transaction constitutes one of the key elements of the shadow banking system, particularly in the case where collateral is cash. In this case, a kind of credit is created which suggests credit provision in the system. For instance, securities lending can occur with government bonds, corporate bonds and equity lending.

3.2.4.2 Derivatives

A derivative is a contract between two or more parties whose value is based on an agreed-upon underlying financial asset. Generally speaking, derivatives are secondary securities values of which are solely based on, or derived from, the value of the primary security they are linked to. Derivatives can be used to either profit from, or insure against, the possibility of leverage and the exposure to a diversity of markets.

Leverage

Leverage is an investment strategy that uses borrowed money to increase the potential return of an investment. The risk of the excessive leverage to the financial system can arise from procyclicality and contagion. In this process, price fluctuations in asset markets are potentially amplified by leverage in a procyclical way. This happens when liquidity transformation and indirect contagion combine.

Credit enhancement

Credit enhancement is a strategy for improving the credit risk profile of a business, which may be used to reduce the risks to the investor. Credit enhancement can contribute to the increase in credit intermediation through securitisation, credit default swaps (CDS), etc. Thus, it can increase the interconnectedness of each market participant. Therefore, credit enhancement should be considered for the purposes of assessing shadow banking risk.

3.2.5 Regulation

The presence of shadow banking entails potential risks that need to be mitigated. From our data analysis, the activities of shadow banking can be measured, and its potential risks identified. In Indonesia, such a risk assessment requires data sources such as regular reports, periodic surveys, thematic reviews, supervisory assessments and regular engagements with NBFIs (FSB, 2014).

Related to the approaches of risk assessment, various metrics such as the leverage ratio and maturity mismatches of assets and liabilities, are usually employed to undertake risk assessments by the relevant authorities for individual NBFIs at the individual entity level. Furthermore, to control shadow banking sectoral risks to the banking system, and especially to the financial system overall, central banks undertake macroprudential policies. This macroeconomic risk assessment typically requires the use of financial indicators like leverage, credit risk, asset prices and funding liquidity risk.

While potential risks are abundant, there are challenges in monitoring and mitigating shadow banking risks. The main challenge is the problem of collecting relevant data and information for the purposes of shadow banking risk assessments. Where the available quantitative information is limited, it will be difficult to scale the size of shadow banking activities and the degree of risk that is related to financial stability. Other than that, the deficiency of structured data is also an issue for monitoring and conducting risk assessments of NBFIs, especially for sectors that are dominated by small entities.

Policy actions is needed and indeed applied to diverse NBFIs in order to prevent the possibility of regulatory arbitrage. The effective collaboration among numerous domestic regulatory agencies is therefore needed. Furthermore, we need to consider not only the benefits of shadow banking activities or entities but also the inherent risks. The regulatory framework should be able to strike the right balance. In other words, the policy measures must be proportional so that they can address potential risks without restricting financial sector growth.

In Indonesia, shadow banks perform their activities through the purchase of securities and the provision of loans, thereby generating short-term safe debt for financial intermediaries through money market funds. These activities generate a maturity or liquidity transformation that could entail systemic risk for the Indonesian financial system. But shadow banking still lack supervision since a shadow banking institution is not a regular banking institution that is overseen by the Indonesian financial services authority (OJK). Moreover, a regulatory problem arises because of technological innovation and its impact on the regulatory system. The technological changes create vatious new entities, meaning it becomes necessary to continuously review the existing regulations and to reform regulations for the financial services sector as and when required (Wei, 2013). Furthermore, in the face of potential risks, shadow banking institutions have no access to usual sources of liquidity such as Bank Indonesia and the Indonesia Deposit Guarantee Company (LPS) (Poszar et al., 2013).

3.2.6 Surveillance Framework

Otoritas Jasa Keuangan (OJK) is the Indonesian financial supervisory agency that sets financial regulations and conducts financial supervision since its inception in 2011. Shadow banking implies a systemic risk, so authorities use an appropriate integrated supervisory model to mitigate crises and stabilise the financial system (Abubakar et al., 2016). This regulatory authority can take enforcement actions against NBFIs if necessary and provide protection for investors and consumers. For this purpose, OJK has the authority to issue regulations in order to address potential risks emanating from the shadow banking system and it continues to enhance regulations and supervision of NBFIs. As such, the authorities would continously improve current regulations or provide new regulations related to the non-bank financial entities/activities, strengthen inter-agency harmonisation and cooperation, extend legislative changes to empower authorities to gather the necessary data and information and implement other regulatory assessments of NBFIs.

With regard to FSB (2014), Indonesia has reported that regulatory enhancements are underway for insurance firms, finance companies and financial guarantee companies. This contrasts with capital markets and the conventional banking sector, which has very strict and detailed regulation already. Non-bank financial institutions are subject to multiple rules as presented in Table 3.1.

Table 3.1
List of Indonesian Regulations of Shadow Banking

No	NBFIs	Regulation
1	Insurance	Law No. 40/2014
2	Pension funds	Law No. 11/1992
3	Financing institutions	Presidential decree No. 9/2009
4	Pawnshop institution	Government regulation No. 51/2011
5	Deposit insurance institution	Law No. 1/2016
6	Indonesia's export financing institution	Law No. 2/2009
7	Secondary housing financing companies	Presidential decree No. 1/s009 and Presidential decree No. 19/2005
8	Social security agency	Law No. 24/2011
9	Microfinance institutions	Law No. 1/2013

Source: Abubakar et al. (2016).

However, there still remain business entities or financial service institutions performing intermediary activities that are not covered by the regulatory umbrella. Bearing in mind that the development of the shadow banking system will continue to grow rapidly, special entities offering intermediary services through electronic media are still not full covered by regulations and FSA supervision. There is a need therefore to integrate the regulations issued by the FSA with those of Bank Indonesia as the central bank.

3.3 Prospects for New Forms of Financial Intermediation

The prospects for shadow banking in Indonesia, especially as a new form of financial intermediation, are very promising but also challenging. As part of a global community, along with the worldwide tendency towards an unprecedented advancement in technology as reflected by lower costs, rising computer power and faster broadband internet, technological absorption in shadow banking will be unstoppable. Relative to other sectors, the financial sector is mostly ahead in terms of technology and innovation adoption. However, the financial sector industry is by its nature also sheltered by strict regulations. Lee and Shin (2018) have pointed out that FinTech is one of the critical innovations that has evolved at a high speed and is driven by information technology and regulatory relaxation. This phenomenon will force the banking and financial services industry to change and cut cost significantly, while at the same time try to provide more diverse and convenient services.

The phenomenon of heavy internet usage as a means of communication in Indonesia, with an increase of about 52% in the number of internet users between 2013 and 2018, is indicative of the rapid digital technology absorption by the Indonesian public. The growth of FinTech in Indonesia has become more prevalent in the last couple of years (Iman, 2018), especially in 2015, which saw a growth rate of 78%. Meanwhile, digital payments in Indonesia have reached a total transaction value of USD18 million in 2017. Furthermore, Alimirruchi and Kiswara (2017) pointed out that the development of FinTech was changing people's lifestyles, improving living standards and introducing society to new kinds of needs which encourage rapid development of mobile start-up payments.

The dramatic changes in both consumer behaviour and business models brought about by the use of technology in financial transactions have been triggered by disruptive innovations that introduced speed, convenience, easy access and efficiency. Innovations and solutions provided by digital technology in financial services have boosted the growth of business networks in Indonesia. The development of FinTech in Indonesia is rapidly making strides along with the establishment of the Association of FinTech in Indonesia (AFI) in September 2015.

Studies such as Putri (2019), Gomber et al. (2017), Ng and Kwok (2017) and Puschmann (2017) show that FinTech can potentially be the best economic solution because of the combination of technology and financial service features that are able change business models and reduce the barrier to entry. However, FinTech-based innovation in Indonesia does not always drive profitability, especially in terms of its return-on-equity (ROE) for a company, which implies inherent risks. It also has a significant influence on its return-on-assets (ROA).

Indonesia presents a unique situation for financial intermediation. According to Global Findex (2018), less than half of its adult population has an account in conventional banking institutions. According to Statista (2019), Indonesia is digitally dynamic, meaning that its population uses mobile phones and the internet extensively. By 2022, the number of smartphones and internet users is expected to increase by two-thirds compared to 2013. The number of mobile users is forecasted to be around 190 million in 2019. It is worth keeping in mind that even 120 million users would suffice to make Indonesia the third largest mobile market in Asia.

The above data indicate a significant gap between the supply and demand for credit, which presents a huge domestic market opportunity for FinTech enterprises to grow rapidly in Indonesia. For that reason, prospects for the continuing development of the digital economy in Indonesia are very promising. This is not only due to the higher demand for digital services that encourages innovation in digital companies, but also due to the strong commitment of the Indonesia government and its affiliated institutions, such as Bank Indonesia, the Financial Services Authority, the Ministry of Communication and Information and the Ministry of Trade. Better collaboration between these institutions could enhance the potential growth and prospects for new forms of financial intermediation. For instance, the development of the payment system infrastructure by Bank Indonesia and the enhancement of broadband speed by the Ministry of Communication and Information will increase the dynamics of FinTech, which in turn will support e-commerce growth that is regulated by the Financial Services Authority and the Ministry of Trade.

Based on the business-to-business (B2B) approach, the collaborative model between banks and FinTech, with a focus on peer-to-peer (P2P) lending, needs enhancement. In order to mitigate the disruptive effect of digital finance development on the overall financial system, this amplification could be based on theoretical perspectives as well as lesson learned from other countries.

Micro-, small- and medium-sized enterprises (MSMEs) contribute more than 60% of Indonesia's GDP. Indonesian FinTech, especially P2P lending, needs to focus more on financing MSMEs that are not only the primary focus or target of the credit market in Indonesia, but also one of the main means of enhancing financial inclusion, The prospects for new forms of financial intermediation will be discussed further in the next sections.

3.3.1 New Business Models

The unceasing innovation in technology, especially in finance, accelerates the emergence of new entities and instruments that are either directly or indirectly used in financial intermediation. In parallel, the regulatory environment for commercial banking is constantly becoming stricter. Therefore, the number of non-bank financial institutions is growing significantly, which obviously form part of the shadow banking sector. Consequently, the growth of the share of non-bank financial intermediaries (including shadow banking) could approach that of the United States (where shadow banking has a 50% share) and Europe (where shadow banking has a 40% share). Since the shadow banking system exists in a more unregulated environment, it will create systemic risks that must be mitigated.

Other than that, financial technology creates a very competitive environment, involving, for example, low-cost systems and customer-friendly solutions that can be easily accessed from anywhere. Financial technology will also employ Artificial Intelligence (AI) to gain better portfolio revenues and prevent fraud losses. This feature is currently not yet available for every product and the use of AI still needs to be develop, but it does not rule out the possibility in the future.

Concurrently with the presence of financial technology, extraordinary new types of businesses have arisen. For instance, simply by providing a platform in the form of a smartphone application, P2P lending can bring together lenders (investors) and borrowers. This can be regarded as a genuine innovation in the financial system. In addition, by using Big Data, such a platform can validate the feasibility of borrowers.

For now, the total funds collected in P2P lending activities are not that large. Considering the very rapid development so far, however, it is not impossible to imagine that this type of activity will become large and have a significant influence on the financial system in Indonesia. In that case, it will undoubtedly become one of the alternative sources of finance, as happened in Europe, where P2P lending has become the largest category of alternative finance with total assets of around EUR1 trillion. Generally speaking, money markets, capital markets and equity markets work along the same lines, and while they produce the same thing, it can be regarded as an "old" product. The involvement of technology, however, disrupts the process and forces the companies involved to use the technology and create more efficient processes. Thus, the impact on processes can be very fast with automation and AI.

Companies tend to use technology because of the abundance of data. Technology is included in all the processes and optimal decisions are based on data. A company involved will be willing to provide a larger budget to build and develop such technology. Therefore, the company will have to grow in line with the significant increase of savvy internet users in Indonesia.

3.3.2 FinTech Lending Risks and Benefits

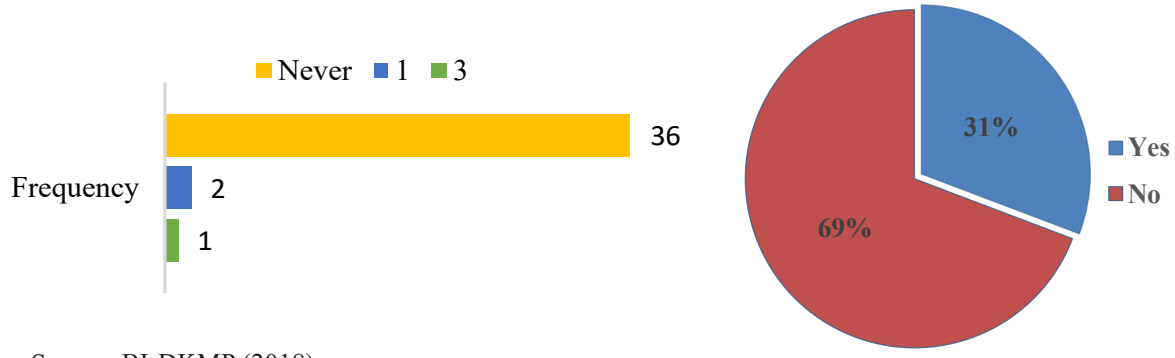
We have seen that FinTech has been making steady inroads into all financial sectors, in the process of creating new business models as we discussed earlier. One such business model that is the focus of this study is FinTech lending, which offers bright prospects with a number of potential benefits but also possible risks that might be of concern. As FinTech lending constitutes a genuine new form of financial intermediation, we will discuss the prospects for FinTech lending in more detail. We will also examine the risks and benefits further. While FinTech lending undoubtedly promises great benefits, it simultaneously also involves great potential risks.

3.3.2.1 FinTech Lending Risks

The development of FinTech lending can have both positive and negative effects on the stability of the financial system. Some positive impacts include more financial access, an increase in the speed of intermediation of financial institutions and higher efficiency. BIS (2018) showed that innovations in financial digitalisation encourage the expansion of financial access, including to customers who have not been served by conventional financial institutions. In addition, FinTech also promotes banking efficiency. On the other hand, the negative effects include the emergence of risks such as cyber risk, limited liquidity risk and credit default risk.

Cyber risk is the risk arising from the inclusion of technology in the financial system. One of the variants of cyber risks is a cyber-attack, which is potentially one of the most alarming of such risks. A cyber-attack can paralyse the platform and retrieve the personal data of the platform users. Furthermore, cyber-attacks can steal users' money or be used to commit other types of fraud. So far, however, this threat has not occurred according to the respondents who had experienced situations where the system went down. The incidence of cyber-attacks on FinTech lending platforms in Indonesia is very low (Figure 3.26). Furthermore, survey results reveal that only 30.8% of platforms had information security management in line with international standards, and 71.8% of FinTech lending platforms still rely on their own IT capabilities in preventing cyber-attacks (BI-DKMP 2018).

Figure 3.26
Frequency of Platform Cyber-Attacks and International Standard IT Security



Source: BI-DKMP (2018).

Hereinafter, liquidity risk arises from the platform that obtains its funding from private sources. Foreign capital ownership of the respondent platforms is still low (accounting for less than 19% of respondents), which increases the liquidity risk due to the relatively low capital outflows (BI-DKMP 2018). Technological developments enable rapid financial transactions, product development and increased linkages between economic agents. FinTech in Indonesia is also growing rapidly. Kearney (2017) showed that foreign investors view the Indonesian market as a bullish market, especially FinTech and healthcare, so that FinTech lending development is expected to accelerate going forward. At the same time, a relatively fast product development is often not anticipated by regulators. In addition, regulators need to find a middle way between regulatory aspects that mitigate risk without stymying innovation (Tsai and Peng, 2017). For that reason, there is the potential for the rapid development of FinTech that is not accompanied by the development of adequate regulation. FSB (2018) suggested continued attention to inter-country collaboration that encourages financial stability, innovation and risk mitigation. FinTech studies at the domestic level are still limited to regular reports on financial and banking system stability from various institutions, such as the OJK, LPS and Bank Indonesia.

3.3.2.2 Fintech Lending Benefits

FSB (2017) observed that although the starting point for FinTech lending was a platform that channels loans from individuals to individuals directly, several platforms obtained funding from institutional investors. By now the traditional P2P lending model has developed into a notary model, guaranteed-return model, balance-sheet model and invoice-trading model. In the United States, FinTech lending providers have even securitised assets to obtain additional funding. As such, a total of USD23.8 billion was issued in 96 P2P lending asset securitisations in 2017. Investment banks such as Goldman Sachs, Deutsche Bank and Morgan Stanley were the largest lead arrangers of these securitisations. This indicates that the development stages of FinTech lending are both accelerating and becoming more complicated.

Furthermore, previous research conducted by the BI-DKMP (2018) summarised some of the advantages of financial technology and the areas that can be expected to benefit the most. FinTech lending in general can increase credit access to people who are not reached by conventional banks. The increased use of technology also lowers transaction

costs and speeds up service. FinTech lending also increases returns for investors. Finally, FinTech lending diversifies financing products and innovates the credit scoring process and financing approval. Details of the benefits and areas that will benefit are reported in Table 3.2.

Table 3.2
Summary of FinTech Lending Benefits

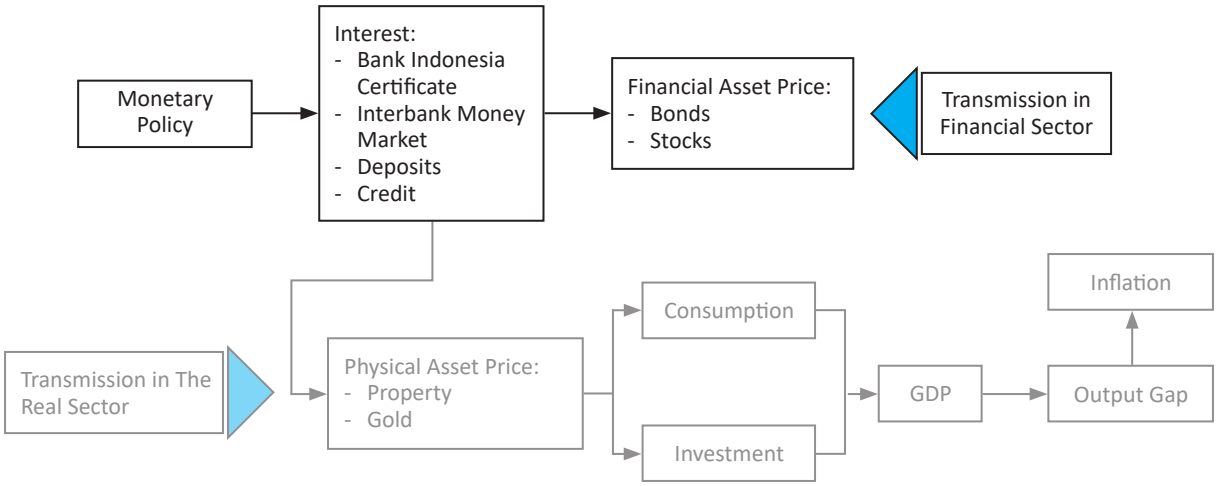
Source	Benefits	Business model
Balyuk (2016)	Financial inclusion	Customers segments
	Encourage refinancing	Value proposition
	Increase consumption for consumer loan debtors	Value proposition
Ulrich and Bholat (2016)	Increase credit access	Customers segments
	Lower interest rates	Value proposition
Jagtiani (2017)	Financial inclusion	Customer segments
	Lower interest rates	Value proposition
FSB and BIS (2017)	Financial inclusion	Customer segments
	Product diversification including financing efficiency	Value proposition
		Cost structure
	Low interest rates	Value proposition
	High return for investors	Key resources
BIS (2018)	Financial inclusion	Costumers segments
	Cheaper transaction fees	Cost structure
	Faster service	Key activities
	Reducing systemic risk from banks	Channels
	Innovating credit scoring and approval processes	Key activities

Source: BI-DKMP (2018).

3.4 Methodology

Another purpose of this study is to address the issue of the impact of monetary policy on shadow banking through the asset price channel. The potential transmission of monetary policy on shadow banking activity occurs through the asset price channel. Figure 3.27 illustrates the monetary policy transmission mechanism in Indonesia, which proceeds through Bank Indonesia's policy instrument, the interbank rate. The deposit rate influences financial asset prices and policymakers control shadow bank activity through this link. For that reason, we would like to run an econometric model to assess the influence of monetary policy on shadow banking.

Figure 3.27
The Monetary Transmission Mechanism in Indonesia



Indonesia has adopted Inflation Targeting (IT) as its monetary policy framework. This framework was formally adopted in July 2005, replacing the previous monetary policy framework of base money targeting. Under the IT framework, Bank Indonesia announces future inflation targets for specific periods. During each period, Bank Indonesia will evaluate whether the inflation projection is in line with the adopted target. If the inflation projection is no longer compatible with the target, Bank Indonesia responds with the monetary policy instruments at its disposal. At the operational level, the monetary policy stance is reflected in the setting of the policy rate (BI Rate) with the expectation of influencing money market rates and in turn the deposit and lending rates in the wider banking system. Changes in these rates will ultimately influence output and inflation.

3.4.1 The Impact of Monetary Policy on Shadow Bank Returns

Following Zhang and Wan (2017), we use the Exponential Generalised AutoRegressive Conditional Heteroskedasticity (EGARCH) model. The main reason for using the EGARCH model instead of other empirical models of conditional heteroskedasticity, such as the original GARCH model, is that it is better suited to the high-frequency data we employ. In addition, empirical results suggest that the EGARCH model fits the sample data better than the GARCH model in capturing the volatility of shadow banking asset price returns. The model specification is as follows:

$$r_t = \sum_{i=1}^{s} \phi_i r_{i-1} + Z_m' X_t^m + u_t,\ u_t \sim N(0, \sigma_t^2) \quad \text{..... (3)}$$

$$ln(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j ln(\sigma_{t-j}^2) + \sum_{i=1}^{p} \alpha_i \left|\frac{u_{t-i}}{\sigma_{t-i}}\right| + \sum_{k=1}^{r} \gamma_k \frac{u_{t-k}}{\sigma_{t-k}} + Z_v' X_t^v \quad \text{..... (4)}$$

where the endogenous variable, r_t, is the shadow banking interest rate, equation (3) is the mean equation of the shadow banking interest rate series and equation (4) is the variance equation, $\sum_{i=1}^{s} \phi_i r_{i-1} + Z_m' X_t^m$ represents the time-varying mean and σ_t^2 is the time-varying variance. The mean is assumed to show persistence in the shadow banking interest rate as well as in exogenous factors that should affect shadow banking, X_t^m (the exogenous control variable includes the market-based interbank interest rate as the price-based monetary tool, the seven-day repo rate, the benchmark interest rate as the administrative

monetary tool, the lending rate and the deposit rate) and we also include the nominal effective exchange rate (NEER) as a control variable. The term X_t^v contains the exogenous variable for the variance equation and γ_k is the asymmetric impact of positive or negative innovations on the standardised residuals.

3.4.2 The Impact of Monetary Policy on the Size of Shadow Banking Assets Under Management

Since the shadow banking interest rate is a general metric which covers the whole universe of shadow banking products, we thought it was important to examine the responses of specific shadow banking products with their respective asset allocations (debt securities, money market funds and equity) to the exogenous variables (interbank rate, policy deposit rate) to uncover the exogenous factors driving shadow banking asset growth. We employed an ARCH-GARCH model for this purpose because the data is not stationary at levels and displays conditional heteroskedasticity. The model specification is as follows:

$$a_t = \sum_{i=1}^{s} \phi_i a_{i-1} + Z_m' X_t^m + u_t,\ u_t \sim N(0, \sigma_t^2) \quad \text{..... (5)}$$

$$\sigma_t^2 = \omega + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 + \sum_{i=1}^{p} \alpha_i \sigma_{t-i}^2 + Z_v' X_t^v \quad \text{..... (6)}$$

where the endogenous variable, a_t, is the asset growth of specific shadow banking products (which is allocated mostly to debt securities, money market funds and equity), equation (5) is the mean equation of shadow banking asset growth, equation (6) is the variance equation, $\sum_{i=1}^{s} \phi_i r_{i-1} + Z_m' X_t^m$ represents the time-varying mean and σ_t^2 is the time-varying variance. The mean is assumed to show persistence in shadow banking asset growth as well as in exogenous factors that should affect shadow banking, X_t^m (the exogenous control variables include the market-based interbank interest rate as the price-based monetary tool, the seven-day repo rate, the benchmark interest rates as the administrative monetary tool, the lending rate and the deposit rate) and we also include the nominal effective exchange rate (NEER) as a control variable. The term X_t^v captures the exogenous variables for the variance equation.

3.5 Data Description

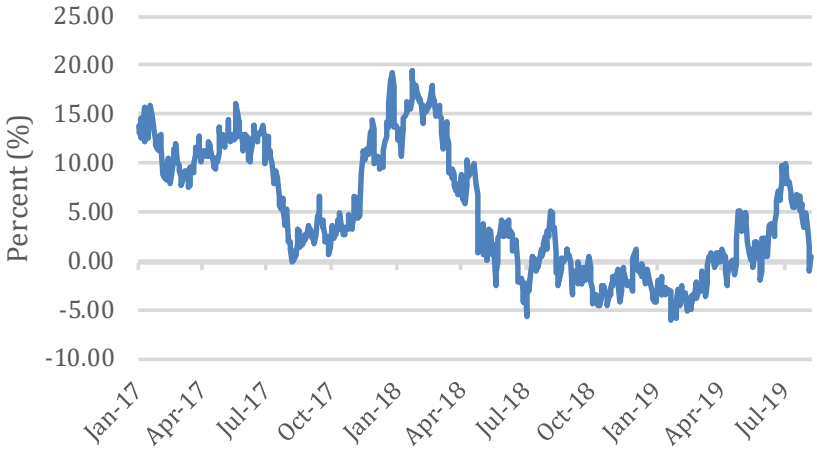
3.5.1 The Impact of Monetary Policy on Shadow Banking Returns

We selected data on the price NAV retail product from Schroders Indonesia and calculated the return for every product and also the weighted total return.[2] We calculate the return based on the annual yield (Figure 3.28). We employed 678 daily returns (based on a five-day week) from January 2017 to August 2019. Summary statistics for the underlying return series and other key interest rate are shown in Table 3.3, and together they provide a general idea of the data. In addition to having the Schroders return series as the endogenous variable, the exogenous control variables include the market-based interbank rate, the seven-day repo rate, the benchmark interest rate as the administrative monetary tool, the lending rate and the deposit rate.

2. We weighted the total return by assets under management.

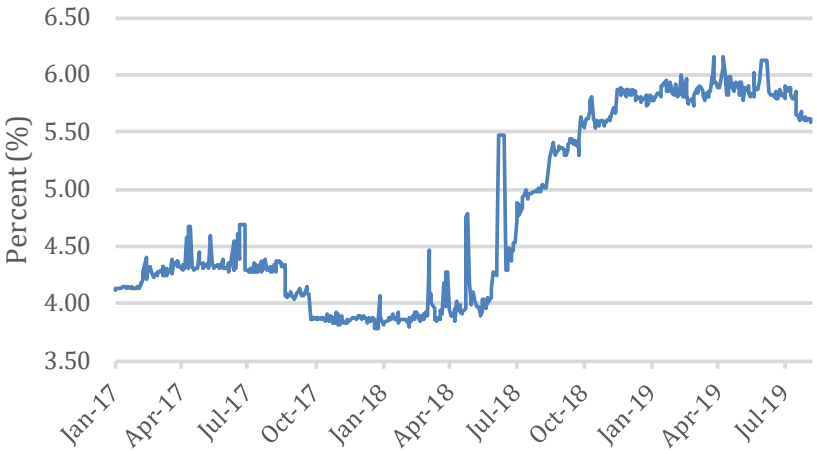
The most representative interbank interest rate is IndONIA. Introduced in early 2017, IndONIA is a daily reference rate based on the interest rates at which banks offer to lend unsecured funds to other banks in the Jakarta wholesale (or interbank) money market as shown in Figure 3.29.

Figure 3.28
Schroders' Annual Yield



Source: Schroders' Indonesia.

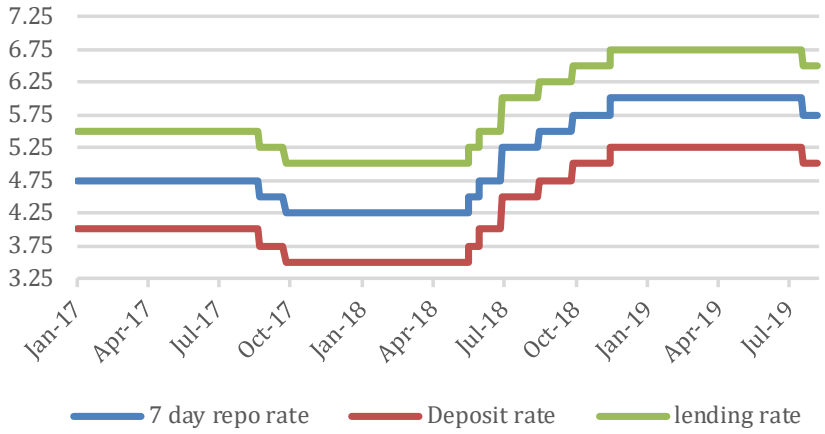
Figure 3.29
Interbank overnight average (IndONIA)



Source: CEIC.

The seven-day repo rate, the lending rate and the deposit rate in Indonesia display a very strong correlation because they move in tandem. For that reason, we will include them in the model one at a time rather than simultaneously to prevent biasing the results. Figure 3.30 shows quite clearly that the Indonesian seven-day repo rate, lending rate and deposit rate have a similar shape except for a level shift.

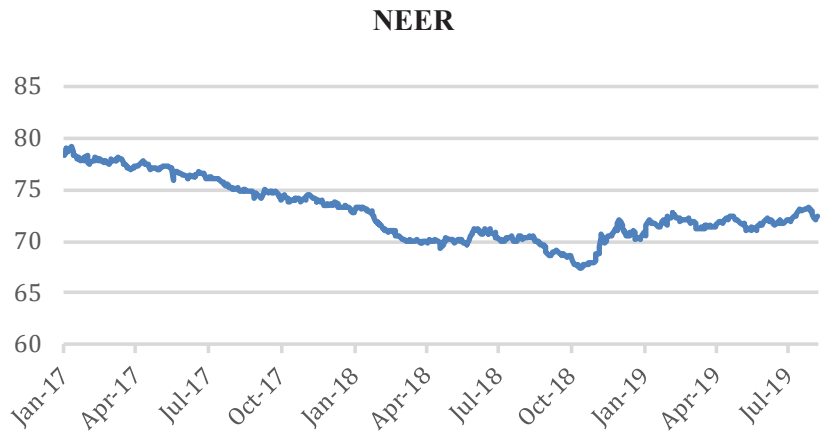
Figure 3.30
The Indonesian Seven-Day Repo Rate, Deposit Rate and Lending Rate



Source: CEIC.

Because Indonesia is a developing economy which is still affected by the exchange rate, we consider using the nominal effective exchange rate (NEER) as a control variable that may influence the returns of Schroders' Asset Management products. Figure 3.31 shows a time series of the Indonesian nominal effective exchange rate.

Figure 3.31
Nominal Effective Exchange Rate



Source: BIS.

Table 3.3
Statistics for the Yields and Interest rate

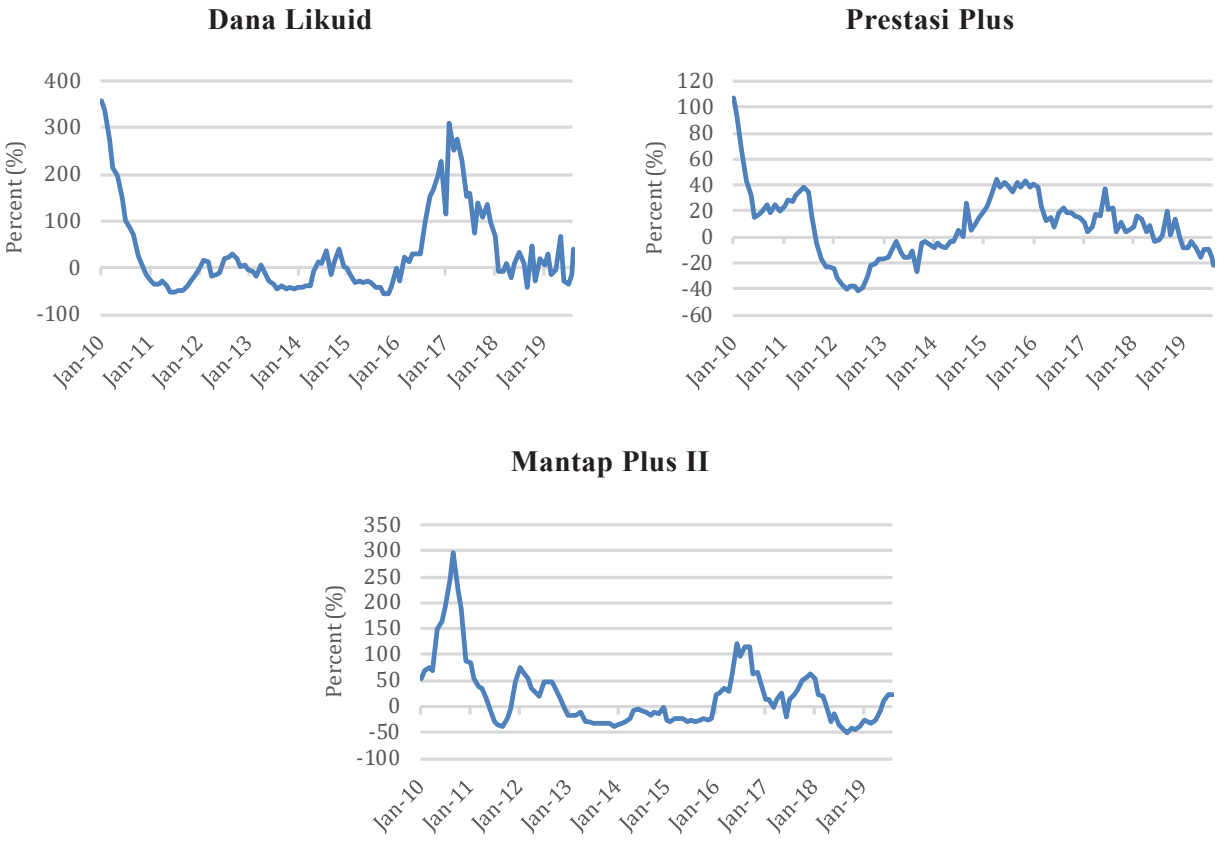
	Annual return	IndONIA	Repo	Deposit rate	Lending rate	NEER
Mean	5.01	4.79	5.07	4.32	5.82	72.82
Median	3.64	4.36	4.75	4.00	5.50	72.10
Std. Dev.	6.31	0.81	0.69	0.69	0.69	2.85

Notes: The mean is the average over the sample period, the standard deviation is over the sample period and the NEER enters the econometric analysis as the log difference.

3.5.2 The Impact of Monetary Policy on the Size of Shadow Banking Assets under Management

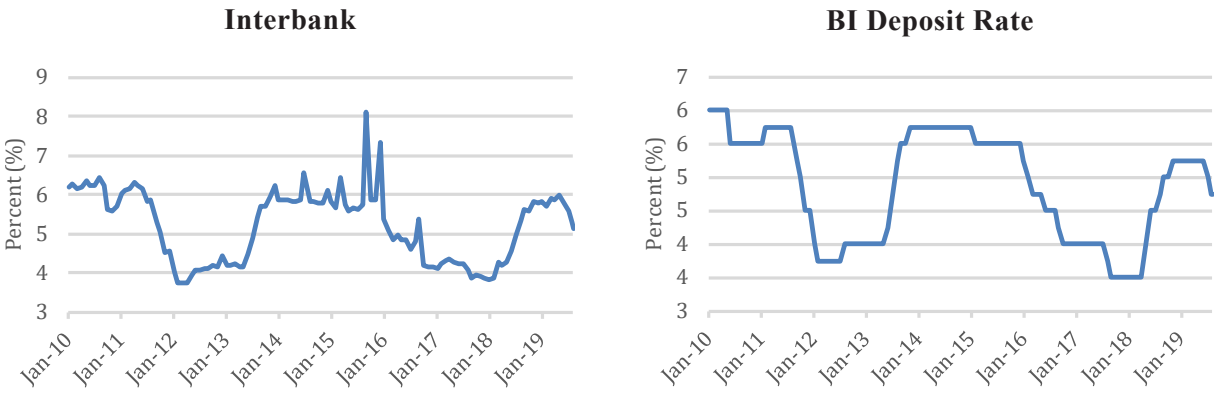
To evaluate the impact of monetary policy on the size of Schroders' assets under management, we selected several Schroders' products which allocated assets mainly in debt securities (Mantap Plus II), money market funds (Dana Likuid) and equity (Prestasi Plus). Because daily data on assets under management are not available in Indonesia, we use monthly data and consider the time period from January 2010 to September 2019 (Figure 3.32). Since the IndONIA rate is only available from 2017 onwards, we use the interbank one-day call money as well as the BI deposit rate (Figure 3.33).

Figure 3.32
Specific Schroders' Product Growth[3]



3. We use the annual growth rate of assets under management.

Figure 3.33
Interbank One-Day Call Money and BI Deposit Rate



Given that Indonesia is a developing economy which is still converging, we include the nominal effective exchange rate (NEER) as a control variable since it is plausible that the exchange rate has an influence on the growth of Schroders' assets under management for specific products. Figure 3.34 shows the time series of the NEER.

Figure 3.34
Nominal Effective Exchange Rate[4]

Source: BIS.

3.6 Estimation Results

3.6.1 The Impact of Monetary Policy on Shadow Banking Returns

We present the empirical results for the impact of monetary policy on shadow banking returns in this section. The best model is chosen by considering the significance of the model based on the statistical probability of various *F*-tests, the significance of the AR or MA coefficients used, the smallest log likelihood of the various estimated models and the minimised Akaike Information Criterion (AIC) and Schwarz (Bayesian) Information Criterion (SIC). As before, we selected an Exponential-GARCH (EGARCH) model. We assumed that the errors follow a normal (Gaussian) distribution. Before evaluating the best model, we ensure that all significant AR and MA coefficients are included. We find that the ARIMA (2,1,2) is the best model for the Schroders' return series. In addition,

4. The monthly series is constructed from end-of-period daily NEER data.

we make sure that there is neither residual serial correlation in the model nor is there remaining heteroscedasticity in the ARCH part. In other words, the EGARCH methodology can be used. We included the administrative monetary policy tools (benchmark lending rate, deposit rates, seven-day repo rate offered by the BI), followed by price-based policy tools (interbank interest rate: IndONIA).

Because the lending, savings and seven-day repo rates are highly correlated, we run them individually to see which one has the most significant effect on our independent variable. Since these three rates are only separated by a level shift, the estimation results are the same for all three variables. We therefore choose to display results for the seven-day repo rate because the latter better reflects the monetary policy tool. The results show that the repo rate has no significant effect on Schroders' yield. Remember that the results will be unchanged when we use either the lending or the deposit rate. In contrast to our result, Zhang and Wan (2017) found that the lending rate had a negative relationship with shadow banking asset returns. These results indicate that there is a relationship between central bank actions and the conditions of the retail credit market. This relationship should be positive, meaning that the policy serves as a guide for determining prices when shocks and distortions occur in the economy. But our negative relationship is counterintuitive and difficult to explain. Furthermore, our econometric results show that there was no significant relationship with the lending rate (which also applies to the repo rate and the BI deposit rate), which mean that monetary policy does not serve as a guide for shadow banks. A possible explanation is the lack of regulation in the shadow banking sector, which causes the lack of response of shadow banks to monetary policy.

Table 3.4
Estimation Results

Variable	Repo rate	Interbank rate
Mean equation result		
Constant	–0.000	–0.000
Interbank		–0.352
Repo	1.527	
NEER	0.034	0.054
AR(1)	1.440***	1.444***
AR(2)	–0.932***	–0.931***
MA(1)	–1.470***	–1.476***
MA(2)	0.917***	0.920***
Conditional variance equation		
ARCH(1)	0.286***	0.286***
GARCH(1)	–0.414**	–0.425**
Asymmetric effect	–0.050	–0.045

Note: We use the first difference of the repo rate because of the non-stationarity in the level of the series. We assume a residual normal error distribution. *, **, and *** denote statistical significance at the 10%, 5% and 1% level of significance respectively.

Finally, the interbank (IndONIA) rate has no significant effect on Schroders' yield either. This result indicates the absence of a link between central bank policy actions and conditions in the retail credit market. This outcome mirrors the estimation results in Zhang and Wan (2017), namely that Shibor has no significant effects on shadow banking asset returns in China. The results are different from the studies by He and Wang (2012) and Porter and Xu (2013), which employ the seven-day repo rate as the market-determined interbank interest rate and disregard Shibor. One possible explanation for the insignificant results for the interbank interest rates and retail returns is that the price-based monetary policy tool is not effective in influencing the shadow banking market due to a lack of connection between them. For administrative monetary policy tools, on the other hand, the elasticity of policy rate indicates an effective transmission of change in monetary policy to retail-market rates.

3.6.2 The Impact of Monetary Policy on the Size of Shadow Banking Assets under Management

This section presents our empirical result for the effect of monetary policy on the size of the shadow banking sector's assets under management. The best model is chosen by considering the significance of the model based on the statistical probability of various *F*-tests, the significance of the AR or MA coefficients used, the smallest log likelihood of the various estimated models and the minimised AIC and SIC. We choose to employ an ARCH-GARCH model. We assume that the errors follow a normal (Gaussian) distribution. Before evaluating the best model, we ensure that all significant AR and MA coefficients are included. We find that the best ARIMA model for each of the Schroders' specific products is the ARIMA (2,1,0) model for equity, the ARIMA (1,1,0) model for fixed income and the ARIMA (2,1,1) model for money market funds. In addition, we ensure that there is neither residual serial correlation in the model nor is there remaining heteroscedasticity in the ARCH part, so that the ARCH-GARCH methodology can be used.

Table 3.5
Deposit Rates Estimation Results

Variable	Equity	Fixed-income	Money markets
Mean equation result			
Constant	–0.000	0.006	0.012
Deposit	11.124***	–13.162	–21.783**
NEER	0.173	0.121	–0.072
AR(1)	–0.717**	0.178*	0.663***
AR(2)	0.566	–	0.163*
MA(1)	–	–	-0.967***
MA(2)			
Conditional variance equation			
ARCH(1)	0.241**	0.127***	0.283**
GARCH(1)	–	–	0.744***
Asymmetric effect			

Note: We use the first difference of the repo rate because of the non-stationarity in the level of the series. We assume a residual normal error distribution. *, **, and *** denote statistical significance at the 10%, 5% and 1% level of significance respectively.

In general, monetary policy affects market conditions, which simultaneously changes equity prices as well as the interest rates on money market funds. This might cause investors to reallocate their investments, which will in turn affect the size of Schroders' assets under management. Our econometric results reveal that the BI deposit rate has a positive effect on financial products that are mainly allocated to equities. A possible explanation is that when the BI deposit rate changes, it will cause a response in the retail deposit rate which causes the change in stock prices. In general, the deposit rate has a negative relationship with stock prices. When the deposit rate rises, it will reduce the stock price, which triggers investors into buying products that are mainly allocated in equities and increase assets under management.

Furthermore, the BI deposit rate has a negative effect on financial products that mainly allocate their assets in the money markets. When the deposit rate is reduced, the size of assets under management will also be reduced. One possible explanation follows from the fact that allocations in money markets are mostly invested in highly liquid instruments, such as highly rated debt-based securities with a short-term maturity and cash-equivalent securities. As a consequence, when the BI deposit rate is raised, it will increase the retail deposit rate and encourage investors to sell their highly liquid assets and place them in deposits instead. Moreover, the results show that the interbank rate has a negative effect on financial products that mainly allocate their assets in debt securities. In other words, when the interbank interest rate increases, it will decrease assets under management.

Table 3.6
Interbank Interest Rate Estimation Results

Variable	Equity	Fixed-income	Money markets
Mean equation result			
Constant	–0.001	0.001	0.009
Interbank	1.567	–5.114***	–4.251
NEER	0.059	0.095	0.342
AR(1)	–0.715**	0.216**	0.685***
AR(2)	0.587	–	0.138
MA(1)	–	–	–0.959***
MA(2)			
Conditional variance equation			
ARCH(1)	0.206	0.196***	0.283***
GARCH(1)	0.251	0.763***	0.750***
Asymmetric effect			

Note: We use the first difference of the repo rate because of the non-stationarity in the level of the series. We assume a residual normal error distribution. *, **, and *** denote statistical significance at the 10%, 5% and 1% level of significance respectively.

The coefficient of the results may appear large, but they are in line with the high growth rates of the specific Schroders' products. For instance, the growth rate for each product can exceed 100% in case of Dana Likuid (in the money markets) and reach as high as 300% for Mantap Plus II (debt securities). Overall, the growth rate is very volatile and in fact, can even be negative. Furthermore, the policy rate (BI deposit rate) and the interbank rate are relatively small, e.g., on the order of 4% to 8%.

3.7 Conclusion

The development of new forms of financial intermediation is proliferating. Since the definition of new forms of financial intermediation can be confusing, we characterise shadow banking activity through the use of financial technology, making it an intermediary activity outside the regular banking system. This development can be seen from the significant increase of shadow banking assets as a share of the total assets of either financial corporations or GDP. This evidence is accompanied by the rise in the ratio of broad money to GDP, which indicates that monetary policy has become less effective than before the rise of shadow banking.

In Indonesia, shadow banking entities can be classified into two groups, namely trust companies and security or wealth management companies. Trust companies include insurance, pension funds, microfinance, pawnshops, guarantee companies and FinTech lending. Non-bank financial institutions which perform shadow banking activities have interconnections with the regular banking system *via* funding and borrowing. There are also common trends in that regular banks establish subsidiaries which engage in shadow banking activities. In general, NBFIs that perform shadow bank activities conduct their operations through bond purchases and loans in the form of securities lending, repurchase agreements, credit derivatives and credit enhancements. NBFIs in Indonesia are not backed by Bank Indonesia for liquidity mismatches or the Indonesia Deposit Insurance Corporation (LPS) for bank liquidations. Nevertheless, shadow banking regulation is quite advanced, with the Financial Services Authority (OJK) overseeing the sector's activities. All NBFIs, barring the mutual fund companies in Indonesia, are carrying out shadow banking activities as classified by the FSB, but since they are covered by adequate regulations, NBFIs are no longer categorised as shadow banks.

Furthermore, the new forms of financial intermediation herald an undoubtedly bright future for Indonesia and the growing number of internet users. It encourages financial institutions to adopt financial technology and develop new forms of financial intermediaries. These trends are expected to lead to the development of broader and deeper varieties of financial products which could enhance financial inclusion. While the growth of this phenomenon is accompanied by substantial innovations and benefits, it also creates heightened risks which need to be mitigated. Consequently, this situation presents an opportunity for non-bank financial institutions to create various new products. In the absence of regulation and oversight by the authorities this may lead to regulatory arbitrage. Ultimately, NBFIs that are eliminated as being shadow bank entities can return as new forms of shadow bank entities.

Moreover, the rapid growth of new forms of financial intermediation has implications for the effectiveness of monetary policy. We use an econometric analysis to assess whether monetary policy instruments (policy deposit rate, policy lending rate, policy repo rate and interbank interest rates) influence the shadow banking system. We find that monetary policy does not have a significant impact on the shadow banks' returns (we use NAV from Schroders' Indonesia as a proxy for shadow banking returns). For Schroders' assets under management growth, however, the policy rate has an impact. More specifically, the BI deposit rate has a positive impact on a shadow bank's products which are allocated mainly in equities, and a negative impact on the products which are allocated mainly in money market funds. Finally, the interbank rate has an impact on products which are allocated mainly in debt securities.

3.8 Policy Recommendations

New forms of financial intermediation, which we define as new shadow banking activities if they are accompanied by financial technology, have proliferated significantly over time. While some of these activities are regulated by the Indonesian Financial Services Authority (OJK), there still appears to be a lack of regulations and supervision for these new entities, especially the ones who use and develop such technology. Thus, they can develop their business by exploiting regulatory arbitrage. Therefore, we recommend that the OJK and Bank Indonesia step up their efforts to improve regulations and supervision by bringing shadow banking entities under the regulatory umbrella, to better understand their business models as well as to obtain the data necessary to boost regulations or other policy responses.

CHAPTER 4

THE SCOPE, PROSPECTS AND IMPLICATIONS OF NEW FORMS OF FINANCIAL INTERMEDIATION IN THAILAND

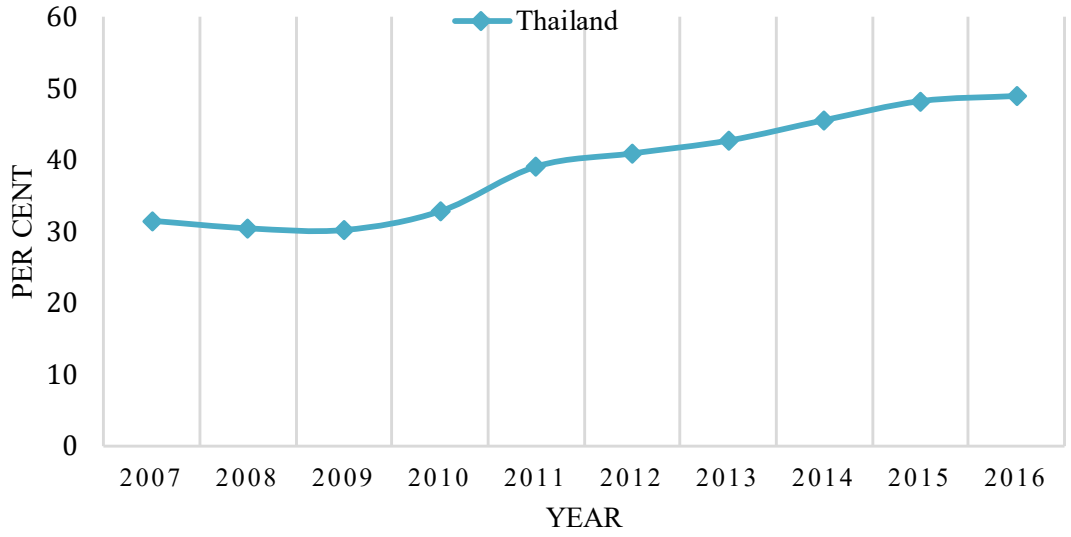
4.1 Background

It is widely known that financial technology has progressively altered intermediation from a mechanism that is performed by single financial entities to a process involving multiple institutions, each categorised by a higher degree of specialisation. Greater specialisation has been associated with a significant reduction in intermediation cost, which in turn has pushed financial activities into the "shadow banking" sector, which is a way to reduce or eliminate the costs associated with prudential supervision and regulation, investor disclosures and taxes (IMF, 2014). In particular, the emergence of regulatory arbitrage opportunities has led to the development of a set of intermediaries performing bank-like activities outside the perimeter of banking regulation, known as the shadow banking system.

The term shadow banking was introduced to the public in 2008 right after the onset of the great financial crisis. Many activities migrated into shadow banking areas and left the regular banking system on account of the arbitrage opportunities offered either by loopholes in the regulatory system or the mispricing of risk in complex models, generating incentives for certain activities involving securities and obligations (Allen, Goldstein and Jagtiani, 2018). Shadow banking can complement traditional banking activities by enlarging access to credit, sustaining liquidity and enabling better risk sharing, both in developing and advanced economies (Ghosh, Mazo and Robe, 2012). Credit creation and liquidity are then one of shadow banking's outcomes. At the same time, it has become a source of greater systemic risk because of the complexity of its product structures, operations outside of the banking sector, deficiency of legal clarity and insufficient control (Wang and Li, 2013).

The total size of the shadow banking industry in Asia remains difficult to estimate due to the lack of a clear definition of shadow banking and the scope of its activities. Asian countries do not possess a single definition of shadow banking and claim the right to the discretionary application of the global definition at a local level. For several ASEAN countries, however, notably Thailand, the World Bank has successfully collected some data that shows a growing proportion of shadow banks' total assets to GDP. The total assets of Thailand's shadow banks reveal that the country has one of the largest shadow banking sectors amongst its peers (Figure 4.1). The blue line shows an upward trend of the sector's size in relation to GDP, from 31.5% in 2007 to 48.9% in 2016. Furthermore, the increasing total assets of shadow banks in Thailand are in line with the growth in the level of assets.

Figure 4.1
Non-Bank Financial Institutions' Assets to GDP for Thailand, 2007- 2016 (%)



Notes: Total assets held by financial institutions that do not accept transferable deposits but that perform financial intermediation by accepting other types of deposits or by issuing securities or other liabilities that are close substitutes for deposits as a share of GDP. It covers institutions such as savings and mortgage loan institutions, post-office savings institutions, building and loan associations, finance companies that accept deposits or deposit substitutes, development banks and offshore banking institutions. Assets include claims on the domestic real non-financial sector such as the central, state and local government, non-financial public enterprises and the private sector.

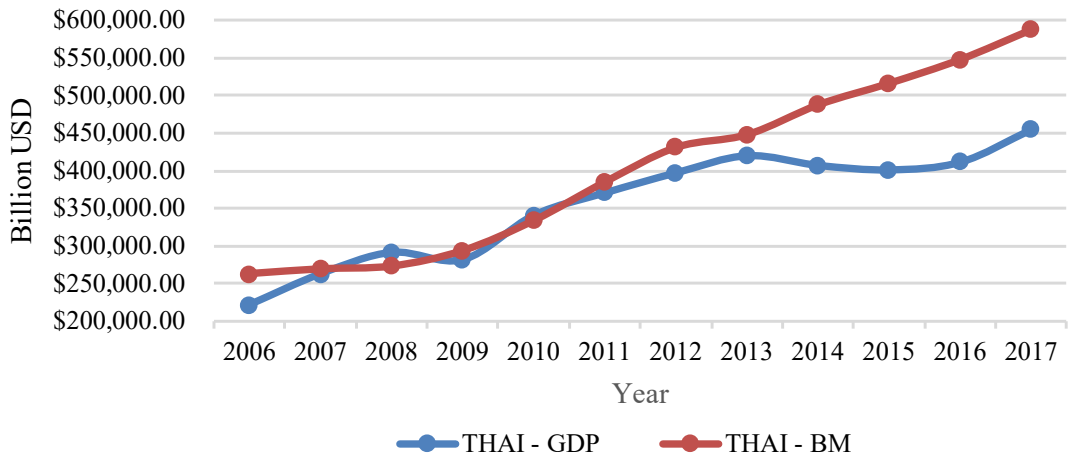
As we could not find the latest data on non-bank financial assets to GDP in Thailand, we adjusted the component to a more specific non-bank financial institution, namely mutual funds, which have the largest component of assets in the non-bank financial institution market. A mutual fund is a type of managed collective investment scheme that pools money from many investors to purchase securities. Data are taken from a variety of sources, including the Investment Company Institute and national sources.

Source: World Bank (2018).

Furthermore, in order to keep up with the modern era, shadow banks have started to take advantage of technological advances, namely financial technology (FinTech). The FinTech sector employs innovative technological solutions and customer-centred approaches more adroitly and skilfully than traditional banks to implement and leverage opportunities (Ansari and Krop, 2012; Christensen, 2013). FinTech in financial transactions aims to make these transactions quicker and easier compared to conventional financial transaction methods. Recently, the way consumers think and act has changed in line with the digital transformation to create new kinds of consumer demands (Nemet, 2009). Consequently, the number of FinTech providers has increased significantly over time. Accenture (2017) reported that global investment in the FinTech area has grown significantly from USD930 million in 2008 to more than USD40 billion in 2017. The total global FinTech transaction value is estimated at USD3,446 billion in 2017 and is expected to reach USD8,000 billion by 2022. The transaction value for 2017 was dominated by digital payments that amount to about 80% of all transactions, as reported by the FinTech Report (2017), based on data from Statista.com.

FinTech as a tool of shadow banking has accelerated the spread of the shadow banking system around the world. For instance, China is one of the countries that has a huge shadow banking system. The Chinese shadow banking system can be divided into three levels. The first level contains security firms, insurance, entrusted loans, money market funds, private equity investments, etc; the second level involves credit creation for small companies, investment corporations, financial assurance corporations and other quasi-financial institutions; and the third level encompasses the private financial system represented by private banks, entrepreneur clubs, chambers of commerce and Internet finance (Han, Hus and Li, 2019). However, shadow financing in China entails a big risk because there is no integrated supervisory control. This leads to at least four risks, namely bad assets at banks, defaults of debt obligations on bonds, the so-called shadow financing and online financial services. Although new regulations have been drafted, the regulatory system is still murky about how quickly risks might spread and what the likely impact will be. Moreover, the full extent to which a particular authority will be legally responsible for which part of this system is still unclear (Nikkei Asian Review, 2017).

Figure 4.2
Thailand's GDP and Aggregate Broad Money, 2006 – 2017 (Billion USD)

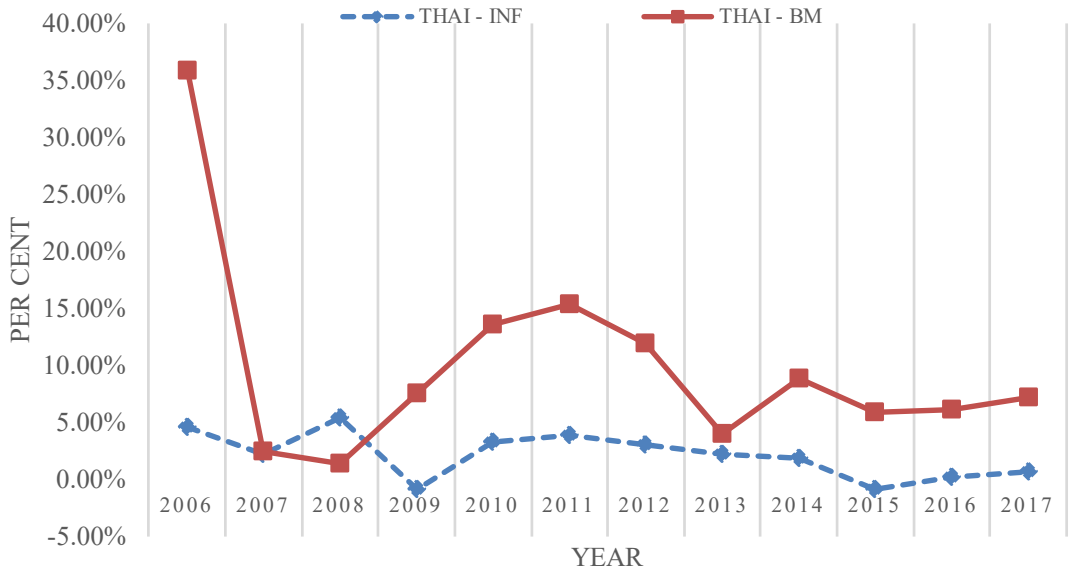


Notes: Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveller's checks and other securities such as certificates of deposit and commercial paper such as certificates of deposit and commercial paper.

GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current US dollars. US dollar figures for GDP are converted from domestic currencies using single year official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used.

Source: Wold Bank (2019).

Figure 4.3
Thailand's Inflation and Money Growth Rate, 2006 – 2017 (%)



Note: Inflation is measured by the consumer price index and reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.

Source: World Bank (2019).

FinTech and shadow banking have grown significantly for small-, medium- and large-sized enterprises. The tendency of people to use digital financial intermediaries more intensively will affect microeconomics and macroeconomics significantly, including the current role of the central bank. Supporting this statement, Zhang and Wan (2017) foresee that conventional monetary policy pursued by the central bank could become impotent in influencing the financial system. This can happen because the demand for money is no longer stable. Figure 4.2 shows GDP and the level of aggregate broad money in Thailand. Taking a closer look, we find that the growth rate of broad money (BM) is increasingly surpassing the growth rate of GDP. As a result, the ratio of BM to GDP in Thailand rose accordingly, from 34.6 in 2007 to 36.6 in 2011 and then peaked at 44.4 in 2016. Moreover, Figure 4.3 shows that since 2006, the expansion of M2 in Thailand has failed to follow one of the basic rules in monetary economics; that higher money growth translates into higher inflation. The red line representing the growth of M2 in Thailand is not in accordance with the blue dotted line that denotes the inflation rate. In 2008, the red line indicated an 8% increase in M2, whereas the inflation rate was decreasing from 5.5% to –0.8%. This implies that inflation and M2 have become unrelated – thus inflation is not entirely a monetary phenomenon. We also find that the Thai monetary aggregates are very unstable, as the money multiplier is endogenously determined by the behaviour of market participants. This evidence shows that it may be time to adjust the monetary policy framework in Thailand because the financial environment has changed dramatically in recent years. The rapid rise of shadow banking and the boom in financial innovation have introduced many complexities into the monetary system since 2008, thus identifying and

controlling BM has become harder. The money multiplier and the velocity of money are no longer stable, which argues against the basic assumptions of the Fisher quantity theory of money (QTM), making quantitative instruments less desirable and unreliable. As a result, the need for comprehensive research about new forms of financial intermediation from a macroeconomic and monetary policy perspective has become more urgent, timely and relevant.

4.2 Macromapping of New Forms of Financial Intermediation in Thailand

4.2.1 New Forms of Financial Intermediation in Thailand

A financial institution plays an important role as an intermediary for capital mobilisation and the allocation of economic resources. A well-developed, efficient and stable financial system is thus a vital prerequisite to support sustainable economic development. In Thailand, the financial system comprises a wide range of institutions, which can be grouped into three broad categories: banks, non-bank financial institutions (NBFIs) and specialised financial institutions (Shrestha, 2007). Banks include domestic commercial banks, retail banks, branches of foreign banks and subsidiaries while NBFIs consists of finance companies, *credit foncier* companies, cooperatives, insurance companies, securities companies, mutual funds, pension funds and asset management companies. The specialised financial institutions group comprises deposit taking and non-deposit taking specialised institutions as well as institutions for financial sector resolution. However, this study does not deliberate on shadow banking issues as currently debated on a global level. Instead, it focuses on the developments of NBFIs and their role in the financial system as well as in the transmission of monetary policy. Also, no clear distinction is made between banks and NBFIs due to the different approaches adopted in defining the non-bank financial intermediation system across the countries surveyed.

The Bank of Thailand (2017) has used the main definitions by the FSB (2012) and Claessens and Ratnovski (2014) as a first step for defining shadow banking and assessing subsequently how the Thai financial system conforms to these definitions. They state that Thai financial institutions can be divided into two different groups: depository and non-depository corporations. A depository institution is a financial entity that is legally allowed to accept monetary deposits from consumers, whereas a non-depository corporation is an intermediary organisation that facilitates transactions between savers and borrowers. Time deposits are, however, not accepted. These intermediaries source their lending activities through the sale of securities and insurance policies to the general population. The classification of their money supply falls under one or more definitions, typically "near money". Extending the previous study of Shrestha (2007), Bank of Thailand moved banks and specialised financial institutions into the depository corporations' bucket, while NBFIs were in the non-depository corporation group. The Bank of Thailand also define these terms in more detail by providing more examples. Besides banks and specialised financial institutions, saving cooperatives, credit unions and money market mutual funds are also classified as depository corporations. On the other hand, in terms of non-depository corporations, the Bank of Thailand is in line with previous interpretations. To provide further support, in Section 4 of the Financial Institution Business Act, B.E. 2551, the Bank

of Thailand states that "financial institution business" encompasses commercial banking business, finance business and *credit foncier* business and includes the undertaking of specialised financial institution business. The definitions and details of these entities are as follows:

1. "Commercial banking business" means the business of accepting deposits of money or accepting money from the public subject to withdrawal on demand or at the end of a specified period, and of employing such money in one or several ways such as granting of credits, buying and selling of bills of exchange or any other negotiable instruments, buying and selling of foreign currencies.

2. "Finance business" means the business of accepting deposits of money or accepting money from the public subject to withdrawal on demand or at the end of a specified period, which is not the accepting of deposits or money within the account subject to withdrawal by cheque, and of employing such money in one or several ways such as granting of credits, buying and selling of bills of exchange or any other negotiable instruments.

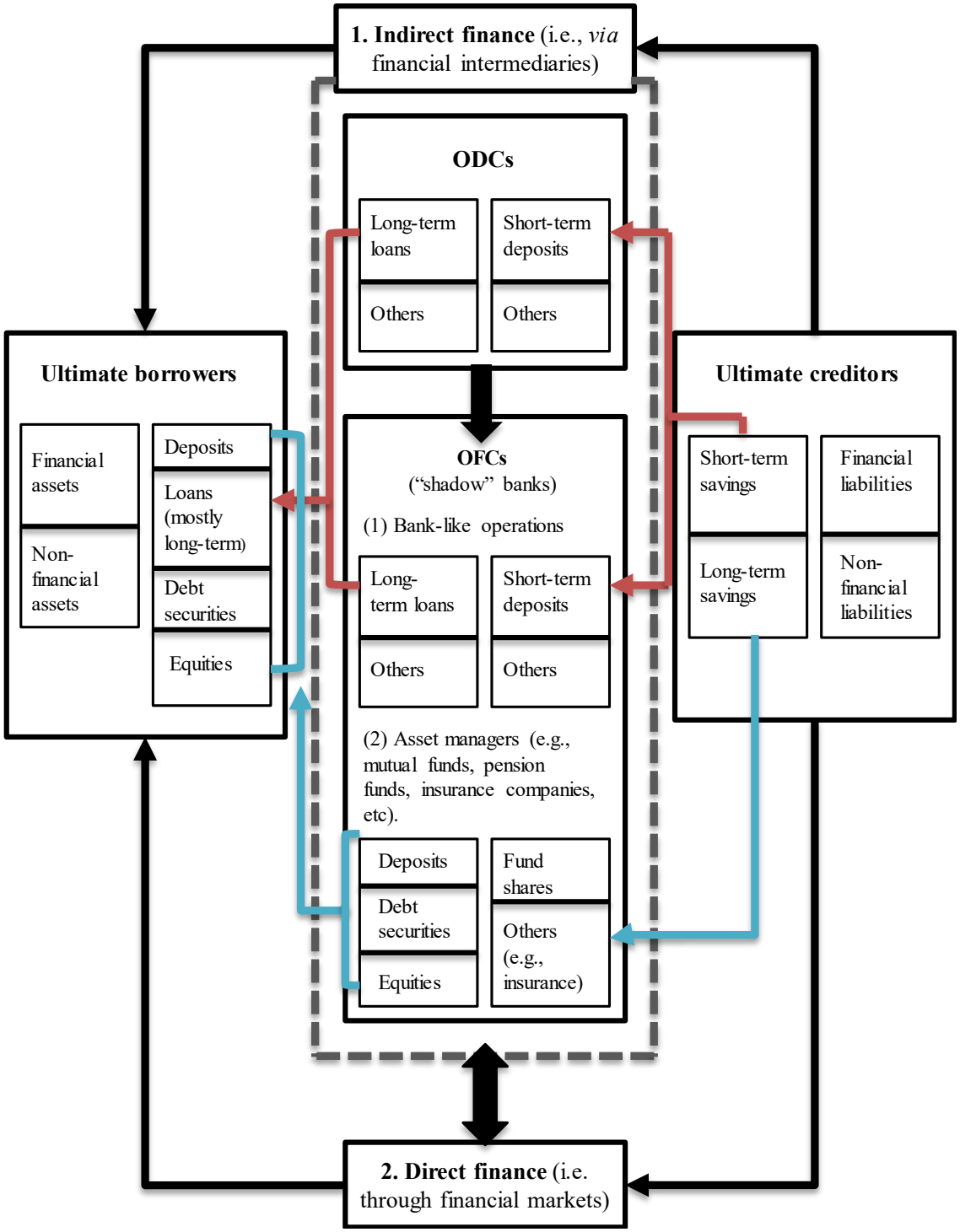
3. "*Credit foncier* business" means the business of accepting deposits of money or accepting money from the public subject to withdrawal at the end of a specified period and of employing such money in any matter as follows:
   a. Lending money on the security of mortgage of immovable property.
   b. Buying immovable property under contract of sale with right of redemption.

Following the global financial crisis that started in 2008, many regulators around the world have come to understand that NBFIs, which existed in the early 1990's to complement the traditional banking system, are a major source of systemic risk to the financial system through their significant role as a source of credit and liquidity in the economy as well as its interconnectedness with the banking system (Farid, 2013). In terms of lessons from the crisis, there have been increased efforts by policymakers around the globe, including Thailand, to gain a better understanding of the shadow banking system and to identify the informational needs to develop a robust monitoring framework. A more advanced study of the Thai case comes from Civilize et al. (2019), who point out that Thai shadow banks could also be referred to as "other financial institutions". In their study, they provide more examples of Thai financial institutions that could be classified as shadow banks, which are credit card and personal loan companies, mutual funds, pension funds, insurance companies, leasing companies, asset management companies, finance companies and securities companies. The authors then explain that the financial landscape in Thailand is comparable to the "Chinese version" that was mentioned earlier in Landau (2019), who divided the shadow banking system into two categories: "Chinese style" and "Western style". Briefly, the main differences between these two categories are that in China, shadow banking mainly consists of intermediation activities where banks play a central role as operators, while managing to keep the transactions off their own balance sheets – thus avoiding capital, liquidity and interest rate regulations. By contrast, "Western style" shadow banking is more complex. Deposit banks do not play the same critical central role. Instead, major actors are non-bank entities: money market funds, mutual funds, asset management companies and dealer banks.

Figure 4.4 presents a stylised diagram of the Thai financial system that traces the flow of funds from the ultimate creditors on the right-hand side to the ultimate borrowers on the left-hand side, with key balance sheet items included to highlight important linkages. The ultimate creditors are primarily households, which save surplus funds and place their savings with banks and asset managers. On the other hand, ultimate borrowers are mainly non-financial corporations that borrow funds to finance their business opportunities, and households that borrow to fund their various spending needs, which could be large purchases (e.g., housing) or even short-term liquidity needs. The main function of the financial system - channelling funds from creditors to borrowers – is central for a well-functioning economic and financial system, since entities with surplus funds (e.g., households) might not be those with profitable investment opportunities (e.g., firms). The existence of a financial system allows funds to be directed to more productive activities, thus promoting a more efficient allocation of capital in the overall economy.

Funds can flow from creditors to borrowers *via* two routes. In direct finance (at the bottom of Figure 4.4), borrowers can borrow from creditors directly in financial markets (e.g., by issuing financial securities or borrowing directly). In indirect finance, the channelling of funds from creditors to borrowers takes place through financial intermediaries. These financial intermediaries (in the centre of Figure 4.4) can be thought of as consisting of two parts: (1) other depository corporations (ODCs), which are mainly commercial banks and other financial institutions that take deposits; and (2) other financial corporations (OFCs), which consist of entities that conduct some form of lending operations like banks (e.g., credit card and personal loan companies) and entities that manage clients' assets (e.g., mutual funds, pension funds, insurance companies, etc.). In modern-day financial markets, it is important to differentiate between financial intermediation of ultimate creditors' short- and long-term savings, which are different in nature and often involve different groups of financial intermediaries. Ultimate creditors can be understood as performing two things with their savings: (1) they place their short-term savings with banks, mostly in the form of demand deposits, which in turn can be used by banks to finance loans; and (2) they invest their long-term savings with asset managers, which in turn invest the funds in financial securities issued by corporates, government and non-residents. Hence, intermediation of ultimate creditors' short-term savings mainly involves ODCs, while intermediation of ultimate creditors' long-term savings mainly involves OFCs.

Figure 4.4
Schematic Diagram of the Flow of Funds through the Financial System in Thailand



Source: Civilize et al. (2019).

In 2019, the FSB conducted a further investigation of shadow banking activity in several ASEAN countries, including Thailand. They describe and classify the activities of financial institutions based on two principles they established, namely "Economic Function (EF)" and "Systemic Risk (SR)". Briefly, EF 1 consists of financial institutions which have features that make them prone to systemic runs. In the financial system, these institutions may act as a shock absorber for costs arising from an entities' loss.

Nevertheless, some of these institutions are engaged in maturity/liquidity transformation and leverage can be affected by runs resulting from serious financial situations. In the case of Thailand, only collective investment schemes fall in this category. Moreover, many institutions in EF 2 take part in loan provision, which is strongly connected to short-term financing. Financial institutions falling into the EF 2 category tend to either compete with commercial banks or offer services in niche markets. If such action is done continuously, it could endanger the financial system as it may cause substantial risks. The Bank of Thailand has not found any financial institutions that should be grouped under EF 2. In the EF 3 category, financial institutions display a new approach to utilising their short-term funding, which is by lending and borrowing securities, and securing funding of client assets. Financial entities in this classification frequently possess several important objectives, including supplying liquidity through market-making activities, providing investment advice to clients, producing short-term credit to clients, supporting trading activities, assisting in the raising capital and publishing investment research. The Bank of Thailand has not labelled any financial institution in Thailand as EF 3.

Table 4.1
Shadow Banking in Thailand by Economic Function

Economic Function	Definition	Entities
EF 1	Management of collective investment vehicles with features that make them susceptible to runs	Collective investment schemes (CIS)
EF 2	Loan provision that is depend on short-term funding	–
EF 3	Intermediation of market activities that is dependent on short-term funding or on secured funding of client assets	–
EF 4	Facilitation of credit creation	Mortgage corporations, pension funds
EF 5	Securitisation-based credit intermediation and funding of financial entities	Structured finance vehicles, mortgage corporations

Source: FSB (2019).

At the same time, financial institutions in EF 4 support the origination of credit by expanding numerous designs of guarantees. This act is considered by investors as full repayment, even if the borrower cannot fulfil its responsibility. The Bank of Thailand initially grouped mortgage corporations and pension funds under the EF 4 category, although it stopped classifying pension funds as shadow banks later. Finally, EF 5 alters the financing of financial entities and securitisation-based credit intermediation. Here, bank and non-bank institutions often utilise securitisation for capital maintenance, financing objectives and bolstering their lending portfolios. Securitisation can reduce funding costs for financial institutions as well as enhance the availability of credit to the real economy. Although it seems profitable and promising, securitisation has other effects that can endanger the soundness of the financial system. For example, this process can create an excessive maturity/liquidity transformation, leverage and regulatory arbitrage,

which later on can lead to considerably higher risk in financial systems. With this in mind, the securitisation market should be much more conscious of unexpected deteriorations in market liquidity. In Thailand, financial entities classified as EF 5 are structured finance vehicles and mortgage corporations.

Table 4.2
Shadow Banking in Thailand by Systemic Risk

Systemic Risk	Definition	Entities
SR 1	Maturity transformation	Collective investment schemes (CIS), Mortgage corporations
SR 2	Liquidity transformation	Collective investment schemes (CIS), Mortgage corporations.
SR 3	Credit risk transfer	–
SR 4	Leverage	Mortgage corporations

Source: FSB (2019).

Aside from EF, FSB (2019) also establishes another indicator that can be utilised to define shadow banking activity, namely SR, described concisely as follows:

1. SR 1 – Maturity Transformation. Short-term liabilities are used to finance long-term assets in the provision of credit by financial institutions. In Thailand, CIS and mortgage corporations are known to have features that may lead to this type of systemic risk.
2. SR 2 – Liquidity Transformation. This indicator is defined as the extent of liquidity transformation supporting credit provision within institutions. The Bank of Thailand defines CIS and mortgage corporations as financial entities that are involved in this type of systemic risk.
3. SR 3 – Credit Risk Transfer. The balance-sheet disclosure (e.g., commitments) provided by financial entities. The Bank of Thailand has not designated any financial institution to fall into the SR 3 category.
4. SR 4 – Leverage. This indicator captures the extent of leverage in financial institutions. Mortgage corporations in Thailand are found to have significant SR 4 in their activities.

Table 4.3 below presents a brief summary of Thailand's financial institutions regarding their classification according to the EF and SR approaches. It shows that Thailand does not have data on certain financial institution categories, such as credit unions/ cooperatives, building societies, primary dealers, portfolio managers, money market corporations, pawnshops, development financial institutions, microfinance institutions, finance companies, hedge funds and trust companies. Moreover, there are other financial institution categories like insurance companies, pension funds and public financial institutions that are specifically not considered as engaged in shadow banking activities by the Bank of Thailand. The remaining institutions, such as structured finance vehicles, brokers, mortgage corporations, money market funds and collective investment schemes are then classified as financial institutions that do carry out shadow banking activities in Thailand.

Table 4.3
Non-Bank Financial Institutions in Thailand

Entity	Identified as Shadow Banks	SR and EF	Notes
Insurance companies	No		Thailand does not consider insurance company activities as shadow banking entities.
Pension funds	No		Thailand does not include pension funds in the shadow banking category as they do not engage in credit intermediation.
Public financial institutions (PFIs)	No		Thailand does not consider PFIs as shadow banking entities because they do not create significant systemic risks or are guaranteed by the government.
Credit unions/ cooperatives (CUCs)	No		Thailand does not report having these institutions in the country.
Building societies	No		Thailand does not report having these institutions in the country.
Structured finance vehicles (SFVs)	Yes	EF 5	Thailand considers SFV's activities as shadow banking since they pose minimal risk.
Primary dealers and portfolio managers	No		Thailand does not report having these institutions in the country.
Brokers	Yes		Thailand deems that brokers undertake a host of economic functions and display certain systemic risk indicators, albeit at a minimal level. They classify brokers as shadow banking in line with the FSB's broader definition of shadow banking.
Money market corporations (MMCs)	No		Thailand does not report any data for these institution in the country.
Pawnshops	No		Thailand does not report any data for these institution in the country.
Mortgage corporations	Yes	SR 1, SR 2 and SR 4	Thailand considers their mortgage corporations to be shadow banking based on the FSB indicators, as they are involved in maturity and liquidity transformation, as well as leverage, and are only subject to limited prudential requirements.
Development financial institutions (DFIs)	No		Thailand does not report any data for these institution in the country.

Entity	Identified as Shadow Banks	SR and EF	Notes
Microfinance institutions (MFIs)	No		Thailand does not report any data for these institution in the country.
Finance companies	No		Thailand reports having these institutions in the country yet does not classify them as shadow banking.
Money market funds (MMFs)	Yes		Thailand considers them to be shadow banking, but believes the risks are generally addressed within their existing regulatory or supervisory framework. Thailand also notes that MMFs only pose minimal risks, all of which are mitigated by several regulatory measures.
Collective investment schemes (CIS)	Yes	SR 1, SR2 and EF 1	Thailand identifies CIS as having similar risks and categorises CIS as shadow banking but considers that the degree to which CIS are susceptible to a run is minimal.
Hedge funds	No		Thailand does not report any data for these institution in the country.
Trust companies	No		-

Source: FSB (2019).

4.2.2 The Development of New Forms of Financial Intermediation in Thailand

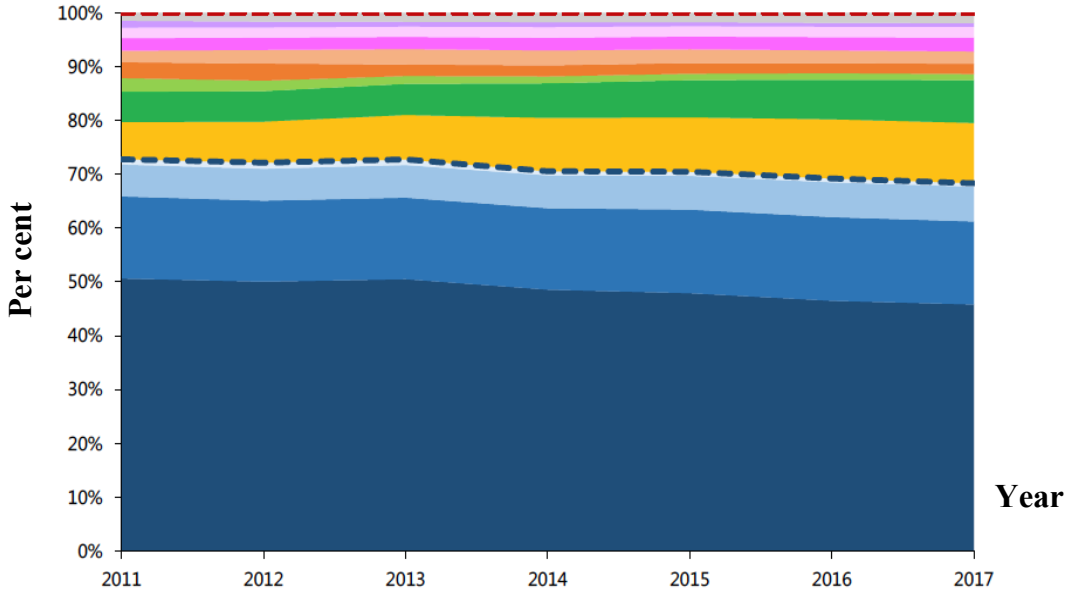
Over the past decade, the Thai banking sector has remained the main channel of financial intermediation, especially for the private sector, by competing for most of the deposits and loan business. In terms of participants, the four largest domestic commercial banks have maintained their dominance as financial intermediaries for households and firms, and thus have preserved their strong influence on the passthrough of monetary policy to the economy.

However, changing economic and financial conditions, in part arising from exceptionally low global interest rates following the GFC, a prolonged period of accommodative domestic monetary policy and actions by the government, have generating changes in the Thai financial system. Among these changes, two important adjustments have affected the effectiveness of monetary policy transmission. First, domestic financial markets have gained in importance as alternative places for the private and public sectors to save and raise funds. Second, SFIs, which are effectively instruments for government policy implementation that facilitate and support fiscal policy, have been as active in loan extension and deposit mobilisation as the commercial banks. While their growing importance supported the Thai economy during the GFC, this has, in turn, affected the interest rate adjustments made by commercial banks in the following period.

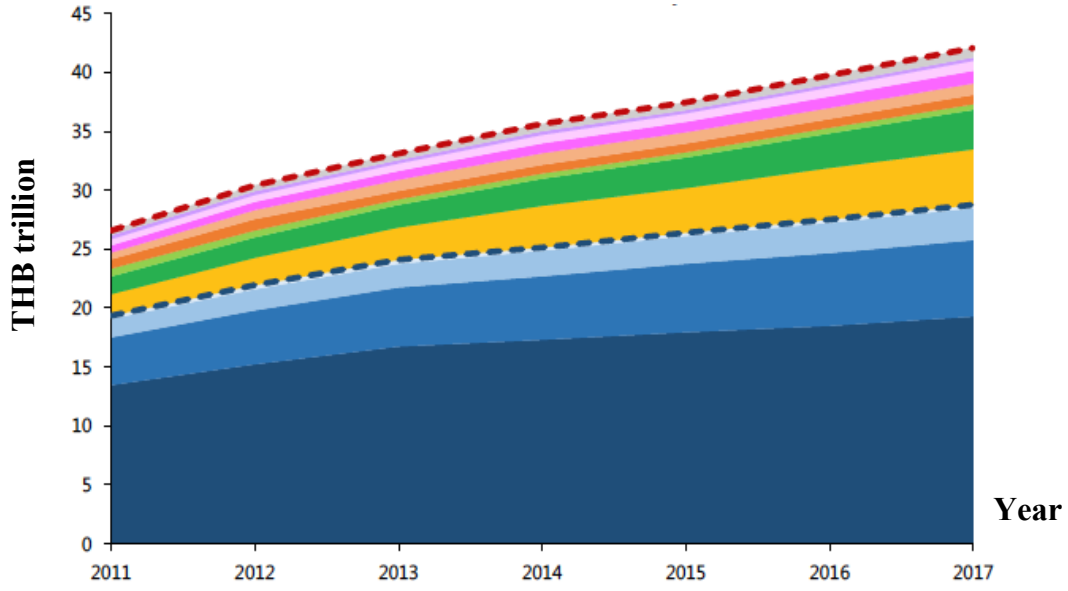
Figure 4.5 shows the institutional structure of Thailand's financial system by asset size from 2011 to 2017. Based on the Civilize et al. (2019) classification, financial institutions (FIs) are OFCs (non-blue regions) and ODCs (blue regions). Figure 4.5 gives the impression of a diversified financial ecosystem. Traditional banks dominate in terms of assets, with outstanding assets of THB19.3 trillion in 2017 (45.8% of total FI assets). Despite commercial banks' domination, non-bank entities have been growing rapidly. OFCs' assets have almost doubled from THB7.2 trillion in 2011 to THB13.3 trillion in 2017. The growth rate of non-banking institutional assets is almost twice as high as that for commercial banks, assets of which have increased from THB13.5 trillion in 2011 to THB19.3 trillion in 2017. With an increase of 14.4% and 12.2% respectively over the 2011-2017 period, mutual funds as well as life insurance companies recorded the fastest growth in the OFC sector. OFCs have also substantially gained in terms of asset share at the expense of commercial banks. In 2011, life insurance companies and mutual funds made up 6.9% and 5.6% of total FI assets respectively. Six years later, in 2017, their contribution had increased to 11.2% and 7% of total financial entity assets. On the other hand, the share of traditional banks has decreased from 50.6% to 45.8% of total financial institutions' assets over the same period. These developments, which have been evolving for many years, demonstrate structural adjustments in intermediation activities, with prospects progressively favouring OFCs, notably life insurance companies and mutual funds.

Figure 4.5
Composition of Thai Financial Institutions System 2011-2017

(a) Percentage of Thai financial institutions assets



(b) Size of Thai financial institutions assets



- Commercial banks
- Savings cooperatives and credit union cooperatives
- Money market funds (MMFs)
- Life insurance companies
- Leasing companies
- Provident funds
- Asset management companies
- Depository corporations (ODCs)
- Specialized financial institutions (SFIs)
- Finance companies
- Mutual funds (excluding MMFs)
- Non-life insurance companies
- Credit card, personal loan, and nano finance companies under regulation
- Government pension fund
- Other
- ODCs plus other financial corporations (OFCs)

Source: Civilize et al. (2019).

Furthermore, to get a better sense of the definition of each entity operating in the Thai financial intermediary sector, Table 4.4, based on Bank of Thailand (2019), shows the list of institutions in Thailand's financial system as well as a brief explanation of their activities.

Table 4.4
Definition and Scope of Businesses Activities of Various Financial Institutions in Thailand

No.	Financial Institution	Definition
1.	Commercial Bank	Serve as the intermediaries that allocate funds from depositors and loan out to household and business sectors. The commercial bank category can be divided into different forms: commercial banks (universal banks), retail banks, foreign commercial bank subsidiaries and foreign commercial bank branches.
2.	Special Financial Institution	Established within specific laws, whose objectives is to serve government policies in promoting economic development and supporting investment. Other objectives are to provide financial assistance to farmers, farming groups and agricultural cooperatives in order to stabilise incomes or improve the quality of farmers' lives or those of their families.
3.	Government Saving Bank (GSB)	The objective of this institution is to provide deposit services to retail depositors and to promote savings for students and the general public.
4.	Government Housing Bank (GHB)	In the short-term, to provide housing loans to the public, and for entrepreneurs to develop land and housing projects. Long-term, for the purposes of building, buying or providing housing.
5.	Export-Import Bank (EXIM)	The objective is to promote and support exports, imports and investment, both domestically and internationally. This institution is under the supervision of the Ministry of Finance.
6.	Finance Company	A business that raises funds from the public in the form of promissory notes (P/Ns) and employs such funds in several forms for investment purposes, including commerce, development, purchases, consumption and housing.
7.	Credit Foncier	The business of accepting money from the public in the form of promissory notes (P/Ns) and employing such money in several ways, such as granting credits by mortgaging immovable property, accepting immovable property on consignment, etc.
8.	Saving Cooperative and Credit Union	Established on a voluntary basis by members that generally consist of people with a common bond (e.g., the same occupation or residence, etc.), where the operating funds of the cooperative are periodically contributed by members. Such contributed funds are then loaned out (at a fixed rate of interest) to support other members who need funds. The return from the loans will be contributed to members in the form of interest, dividends or other benefits, etc.
9.	Pawnshop	A business that offers secured loans up to THB100,000 per customer, with items of personal property serving as collateral. The collateral can be redeemed within a certain contractual period of time.
10.	Money market mutual fund	A type of mutual fund that mainly invests in bank deposits, short-term debt with a repayment period not exceeding one year (i.e., Treasury bills, bills of exchange, P/Ns) and Government bonds or corporate debentures with a repayment period not exceeding one year.

11.	Mutual Fund	A well-managed investment entity that seeks the highest returns given a certain amount of risk investors wish to take. A mutual fund is suitable for retail investors who want to invest in cash and capital markets but lack financial knowledge, investment experience and/or have limited financial resources, etc.
12.	Insurance	Insurance can be divided into two business lines, which are: 1) Life insurance provides insurance against the loss of, or damage to, either an individual or a group of individuals, where the insurer promises to pay a designated beneficiary in exchange for a premium, upon the death, disability or critical illness of the insured person. 2) Non-life insurance is divided into four broad areas, which are fire insurance, auto insurance, marine insurance and miscellaneous insurance.
13.	Provident Fund	A form of fund set up voluntarily between the employer and employees, where the assets of the fund consist of money contributed by both employer and employees. The creation of a provident fund can be regarded as a type of benefit for employees, where the assets of this fund will be managed by a professional fund management called an "Asset Management Company (AMC)". The benefits derived from the professional management of the fund are proportionately distributed to members of the fund.
14.	Credit Card and Personal Loan Company	A non-depository business that provides credit in various forms, for example credit card, personal loans, etc.
15.	Asset Management Company	Established to manage the non-performing asset of financial institutions.
16.	Securities Company	Conducts various types of securities business, namely brokerage, dealer, underwriter, investment advisory, private fund management, etc.
17.	Money Changers	This business falls under the supervision of the Ministry of Finance and the Bank of Thailand.

Source: Bank of Thailand (2019).

Table 4.5 displays the recent development of Thai financial entities from 2017 until 2018 in a more detail. It reveals that the Thai financial system continues to be dominated by depository corporations with a share of 68.4% and 68.3% in 2017 and 2018 respectively. This category contains commercial banks, which has the largest percentage of assets, specialised financial institutions, saving and credit cooperatives as well as money market mutual funds. The latter perform similar functions to mutual funds, although the Bank of Thailand puts them in different buckets. Briefly, a mutual fund is an asset management company which aims to help investors achieve the highest profit under a certain amount of risk, whereas a money market mutual fund is a type of mutual fund which usually invests in bank deposits as well as short-term debt with a repayment period not exceeding one year – this is why the Bank of Thailand classifies it as a depository corporation, as it is engaged in saving products. On the other hand, with 31.6% and 31.7% in 2017 and 2018 respectively, Thai non-depository corporations have less than half of total depository assets. We find that mutual funds have the largest share of total assets in this category with 11.2% in 2018. Next comes insurance companies with 9.1% of assets. Other financial institutions included in this classification are leasing companies, credit card and personal loan companies, provident funds, government pension funds, asset management

companies, agricultural cooperatives, pawnshops and securities companies. With mutual funds exhibiting the largest share, we will focus on them for the purpose of our study. There are four dominant companies in Thailand, which are Kasikorn Assset Management Company with a 20% share of AUM, SCB Asset Management with 18%, BBL Asset Management with 14% and Krung Thai Asset Management with another 14% (Fitch, 2019). Based on the asset positions, we choose Kasikorn Asset Management Company to represent all shadow bank entities in Thailand.

Table 4.5
Financial Institutions in Thailand, 2017 – 2018

Financial institution in Thailand End-2017	Number		% of total assets of financial institutions	
	2017	2018	2017	2018
Depository Corporations	–	–	68.4	68.3
Commercial Banks	30	30	45.9	45.6
Specialized Financial Institutions	6	6	15.5	15.3
Saving Cooperatives and Credit Unions	1,986	1,995	6.5	6.9
Money market Mutual Funds	40	37	0.6	0.6
Non-depository corporations	–	–	31.6	31.7
Mutual Funds	1,437	1,376	11.2	11.2
Insurance Companies	86	83	9.1	9.0
Leasing Companies	796	851	1.9	1.9
Credit Card and Personal Loan Companies	37	39	2.3	2.4
Provident funds	401	380	2.6	2.7
Government Pension Fund	1	1	2.0	2.0
Asset Management Companies	41	52	0.7	0.7
Securities Companies	55	47	1.0	0.9
Agricultural Cooperatives	3,588	3,426	0.6	0.6
Pawnshops	617	660	0.2	0.2

Source: Bank of Thailand (2019).

4.3 Prospects for New Forms of Financial Intermediation in Thailand

In cooperation with the Ministry of Finance (MoF), the Bank of Thailand (BoT) has determined targets and critical assignments for developing the financial sector in Thailand. This is implemented through the Financial Sector Master Plan (FSMP), which is divided into three stages: FSMP I, FSMP II and FSMP III. The first stage of FSMP (2004-2008) aims to improve the efficiency and stability by focusing on rationalising the structural aspects of the financial system. While still enhancing the effectiveness of the financial system, the BoT added the promotion of financial access and enhancing the financial infrastructure, most notably in risk management, to the second stage of the plan under FSMP II (2010-2014). After the attainment of the plans embodied in FSMP I and II,

the structure of the Thai financial institutions system should have become more robust in terms of the types of entities and range of businesses while stability, financial access and efficiency continue to develop.

However, there are some imminent challenges from both international and domestic developments, for instance, an aging society, regional convergence, global regulatory reforms, urbanisation and the rapid growth of the digital economy. These developments create both opportunities and challenges for the Thai financial system. To ensure that financial institutions would be capable of managing these trends and continue to support growth in an ever complicated economy, the BoT devised FSMP III to be carried out over the period from 2016 to 2020. This third stage of the plan has been carefully vetted by experts from various sectors, including the Financial Institutions Policy Committee. Not only that, but the BoT also consulted with the banking sector and the real sector as well as other government agencies.

The essential concept of FSMP III is to encourage a competitive system for Thai financial institutions, which reinforces more diverse demands at fair and accurate prices, develops local businesses and investments and enables the maintenance of financial and macroeconomic stability. The "inclusive, connected, sustainable and competitive" FSMP III contains four fundamental actions:

1. Improve the efficiency of the financial system, bolster electronic payments and financial services by developing new technological innovations and boosting the competitiveness of financial service providers to assist market growth.

2. Assist local businesses and investment connectedness by enhancing the breadth and depth of the Thai financial system in order to hasten financial assimilation under the ASEAN Economic Community (AEC) and other regional economic initiatives. Basic steps designed to facilitate and reduce restrictions of commercial banks' international enlargement include, for instance, the formation of Qualified ASEAN Banks (QABs), the expansion of cross-border financial infrastructures and the establishment of acceptable financial environment among bordering countries to promote international investments and trade in the Greater Mekong Subregion (GMS).

3. Provide considerably more financial access such that all individuals and entities are able to easily and efficiently access financial services in line with their demands, bringing about sustainable economic growth.

4. Broaden the financial infrastructure with the purpose of achieving FSMP III's vision. Vital infrastructures such as financial expertise, consumer protection, financial professional development as well as the proper regulation and supervision of financial entities, are essential in this regard. Additionally, supervision and financial laws will be strengthened in compliance with international requirements to assure the stability of financial system.

Other aims are to promote the adoption of electronic banking and payment services in government, business and retail sectors under the concept of "Banking anywhere, anytime" (digitisation) by developing the necessary infrastructure and environment which will foster faster and more efficient electronic transactions. The BoT will encourage financial institutions, including banks and non-banks as well as other service providers, to

offer different electronic financial products and services, which will better meet customers' demands. Furthermore, with the goal of increasing the operational efficiency of financial institutions, the BoT will also promote the creation of internal working processes, a proper risk management database and a unified IT system. Joint infrastructures, such as fraud monitoring systems for controlling cyber risk, will also be installed with a view to reducing the cost and operational duplication in the system.

In addition, the BoT has done an assessment of the Thai financial sector that revealed gaps in the arrangement of financial services, in particular in the areas of variety and reach of services. Other than that, the BoT is also confronted by new challenges as well as opportunities, namely the increasing role of non-bank financial institutions in supplying electronic financial services, financial integration and the regional economic forces. In addressing this, the BoT will evaluate a suitable financial landscape and scrutinise the role of existing and new participants to ensure that the financial system continues to be healthy, efficient, resilient and capable of supporting financial and economic growth.

To promote greater financial access, individuals and businesses of all sizes (small, medium and large corporates) should be able to quickly and easily access financial services according to their needs. This will ultimately lead to sustainable economic growth, motivating the BoT to strengthen the development of financial services and products for customers' needs, notably as Thailand is rapidly turning into an aging society. Additionally, the BoT will bolster financial access, for instance by supporting the growth of potential association-based financial service communities and expanding the number of access points of service, such as the internet and smart phones.

To boost banking branch networks to reach and help people living in inaccessible areas, the BOT will introduce further regulations, for instance:

1. Promote financial entities' service distribution channels to boost flexibility by promoting the development of forms and varieties of services, support agent banking and include more diverse channels.
2. Support the authorisation of electronic services, notably for payment and transfer services, a better accommodation and lower costs for customers, reduced transaction fees and "shoe leather costs" to the branches.

Other policies in this regard will encourage financial entities to provide essential financial services to the public at reasonable prices, for instance, advocating for financial entities to lower ATM card fees and encourage E-Wallet accounts which can be utilised to manage basic transactions at moderate fees.

In addition, enlarging the number of programmes for community-based financial entities as well as improving their legal status, will also ensure that they are able to effectively provide financial services. The design and processes for managing and promoting the growth of community-based financial entities will be evaluated with a view to assuring systemic and prudential supervision together with continuous market operations. SFIs, such as Government Savings Banks (GSBs) and the Bank for Agriculture and Agricultural Cooperatives (BAAC) will be strengthened to play a role in these attempts. As a benefit to community-based financial institutions when it comes to managing financial transactions

as well as serving as agent for financial entities, the BoT will legalise those which are operating illegally, motivate financial entities to provide services and products aimed at retirement savings and support the expansion of the retirement and pension fund system to ensure that the elderly have sufficient income and competent financial services appropriate to their age group. The BoT will try to extend pension coverage for the entire labour force, which can be accomplished by:

1. Encourage financial institutions to develop and provide financial services and products for retirement, such as financial services for the elderly as well as long-term investment/ savings products.

2. Encourage compulsory provident funds and pension systems by promoting the provision of retirement funds for employees who are not protected by a pension arrangement and for those who are willing to grow their retirement savings. These customers may voluntarily set and combine their investments in the funds. The BoT also encourages public companies to arrange pooled or individual provident funds and persuade their workers to sign up. These plans will generate more retirement savings choices for employees and make them more consistent with the programmes in other regions. Additionally, the government has formed the National Savings Fund (NSF) and encourages membership applications as a way for workers and the self-employed in informal categories without any government benefits to collect pensions sponsored by the government.

Another area is the promotion of financial access for small- and medium-sized enterprises (SMEs) and develop their resources: SMEs' access to credit will be enhanced by improving necessary SMEs databases in the financial system in order to increase access to funding. The BoT will also support credit extension to SMEs by financial institutions and alternative source of funding.

1. Restrict efforts to extend the categories of assets licensed as loan collateral. Following the Business Security Act, the BoT will analyse the regulations on the types of assets that can be classified as loan collateral by financial institutions. For instance, when arranging the loan loss plan, the expense of the borrower's collateral may be subtracted from the loan value, capturing in detail the soundness of the asset amount. Moreover. the BoT will collaborate with related parties from both the private sector and government to establish clear procedures for evaluating the value of collateral assets that are realistic and can be coherently employed, such as for real estate assets.

2. Promote the role of the Thai Credit Guarantee Corporation (TCG) in guaranteeing loans for SMEs. TCG should be encouraged to issue credit guarantees based on the risk level of borrowers or financial institutions that require the guarantees. TCG should also offer multiple products to support high-risk SMEs with high-growth potential and supporting roles in the country's development, such as those involving innovation and start-up businesses.

3. Explore the possibility of establishing an e-Claims system for Thailand to record and synchronise business and tax payment data for SMEs. Such a system will reduce SMEs' operating costs, such as document preparation and record-keeping, and will enable financial institutions to access business and financial transaction information of SMEs more easily, helping in the loan approval process.

4. Promote other procedures of fundraising such as venture capital and crowdfunding in order to offer alternative ways of funding for SMEs, notably in the initial (start-up) phase of business. At present, SMEs can secure some funding through crowdfunding in the form of reward-based participation or donations without having to require the regulators' permission. Equity crowdfunding can be obtained based on regulations established by the Securities and Exchange Commission (SEC). Other relevant agencies partnering with the BoT are currently examining P2P lending to decide how to support this kind of financial transactions as well as design an adequate regulatory scheme in the future.

5. Support financial entities to use the continuous banking principal by merging social and environmental aspects into their procedures. For instance, particular products can be suggested to create SMEs that are responsible for the environment, as well as those which generate environmentally friendly goods.

Similar attempts for creating market-based funding exist for large companies. In this case, the BoT will cooperate with the relevant institutions to advance and support an appropriate environment for capital preservation in the private sector and bolster the Capital Market Development Plan. Allowing the private sector to access the bond market will boost access to loans more efficiently. While the bond market saw robust growth over the past five years, the total number of corporates that tapped bond markets in Thailand only amounted to 200 out of the 600 companies that are listed on the Thai Stock Exchange. In addition, only 20% of private firms have publicly listed corporate bonds. These two stylised facts indicate significant room to grow.

In this case, the BoT will support related companies by supporting the bond market as a suitable choice for raising capital for the private sector. This can be done by advising the business sector about the rules and regulations of issuing corporate bonds, notably for corporates which have the potential for issuing bonds, as well as encouraging the public sector to originate long-term government bonds on an ongoing basis. Other attempts involve supporting liquidity in the secondary market and promoting bond issuance in order to produce ample liquidity and variety.

In order to fulfil FSMP III's vision, the main aim is to create financial infrastructure (otherwise known as enablers). Key infrastructures in the financial system will be developed, such as adequate training of finance professionals, financial literacy, consumer protection and the legal infrastructure to enhance risk management and the operation of financial institutions. In addition, regulation and supervision will be strengthened in line with international standards to ensure the stability of the overall financial system. The BoT will instruct consumers about the range of financial services and products available. Customers should have an excellent understanding of financial services and products in order to make informed decisions in accordance with their degree of risk aversion and preferences. One aspect of this policy is to expand competencies in supervising financial institutions' market conduct. Moreover, the BoT will serve as the auditor in order to ensure that financial entities rigorously obey the relevant rules and regulations, as well as earnestly respond to customers' requests for problem resolution. With that aim. The BoT will arrange a working group to analyse and potentially re-evaluate the supervisory scheme for market conduct.

The fulfilment of FSMP III will greatly benefit both the economy and the financial system in Thailand. Financial entities and other providers will be able to efficiently function under proper levels of competition. They will have the capacity to supply services that meet consumers' needs and encourage individuals, business sectors and economic growth. This will generate more efficient financial activities and lower financial costs, hence improving Thailand's competitiveness. In addition, FSMP III will encourage comprehensive growth by improving financial access for individuals and businesses through various channels with low fees and charges. This in turn will generate opportunities for better education, jobs and quality of life as well as business development. In parallel with this, the continuous advancement of financial literacy will assist businesses and individuals to have more competent financial management and be able to choose financial services and products that better match their needs. Moreover, in order to ensure the soundness and safety of the financial system as well as enhance the confidence of businesses and individuals, the BOT will engage in supervision and customer protection.

The BoT understands that while some parts of FSMP III can be achieved individually by either the MoF or the BoT, collaboration between the relevant parties from the public and the private sector is essential in accomplishing the desired outcomes. Indicators which display the achievement of FSMP III, such as the percentage of Thai households using financial services and the capital adequacy ratio, will be assessed and monitored by the BoT itself. Consequently, the results of FSMP III will be presented to the Minister of Finance and the Financial Institutions Policy Committee.

4.4 Regulation

Domestic financial institutions are crucial components which promote the smooth functioning of the financial system. They operate as financial intermediaries, allocating funds to and gathering deposits from the real economy, managing risks, providing financial advice to consumers and ensuring the payment of services and goods. Hence, it is important to make sure that financial entities operate in an effective and transparent manner. They must also possess an appropriate risk management system in order to avoid any losses on depositors' funds. In Thailand, the BoT has the authority to regulate and supervise financial institutions. This is in accordance with the following financial laws:

1. The Financial Institutions Business Act B.E. 2551, the Act Amending the Emergency Decree on Asset Management Company B.E. 2541 and Act B.E. 2550 monitoring finance companies, commercial banks and *credit foncier* businesses.

2. Other laws, for example, the Declaration of the Revolutionary Council No. 58 regarding the surveillance of financial businesses (e.g., personal loans and credit card companies).

These laws allow the BoT to be in charge of examining and overseeing Thai financial institutions such as commercial banks, retail banks, foreign bank subsidiaries, foreign bank branches, *credit foncier* corporations, finance companies, foreign financial institution representative offices, asset management companies, foreign means of payment businesses, service providers under the payment system act as well as some non-bank financial operators, namely personal loan businesses, credit card companies and E-Payment businesses.

In addition, the MoF has put the BoT in charge of investigating Specialized Financial Institutions such as the Government Savings Bank, the Government Housing Bank, the Islamic Bank of Thailand, the Bank of Agriculture and Agricultural Cooperatives and the Small- and Medium-Sized Enterprise Development Bank of Thailand. Finally, the BoT is also mandated by the Credit Information Business Act to oversee the National Credit Bureau.

Table 4.6
Regulation of Non-Bank Financial Institutions in Thailand

No.	Financial Institution	Definition
1.	Finance Company	Such businesses are established in accordance with the Financial Institutions Business Act, B.E. 2551 and under the supervision of the BoT.
2.	Credit Foncier	The Credit Foncier business is registered under the Financial Institutions Business Act, B.E. 2551 (2008) and supervised by the BoT.
3.	Saving Cooperative and Credit Union	Saving Cooperative and Credit Unions are under the supervision of the Board of National Cooperative Development in accordance with the Cooperatives Act, B.E. 2542.
4.	Pawnshop	Such businesses are established in accordance with the pawnshop Act, B.E.2505 and amended under the supervision of the Ministry of Interior.
5.	Money Market Mutual Fund	Open-ended mutual funds with a portfolio duration of not more than three months are under the supervision of the Securities and Exchange Commission in accordance with the Securities and Exchange Act, B.E.2535 and amendments thereof.
6.	Mutual Fund	Such funds are under the supervision of the Securities and Exchange Commission in accordance with the Securities and Exchange Act, B.E.2535 and amendments thereof.
7.	Insurance	Insurance businesses are under the supervision of the Office of Insurance Commission in accordance with the Life Insurance Act, B.E.2535 and amendments thereof as well as the Non-Life Insurance Act, B.E. 2535 and amendments thereof.
8.	Provident Fund	Provident funds are under the supervision of the Securities and Exchange Commission in accordance with the Provident Fund Act, B.E. 2530 and amendments thereof as well as the Securities and Exchange Act, B.E.2535 and amendments thereof.
9.	Credit Card and Personal Loan Company	This type of business in under the supervision of the BoT in accordance with the Declaration of the Revolutionary Council No. 58 and the Financial Institutions Business Act, B.E. 2551.
10.	Asset Management Company	Such companies are supervised by the MoF in accordance with the Emergency Decree on the Asset Management Company, B.E.2541.
11.	Securities Company	These companies are under the supervision of the Securities and Exchange Commission in accordance with the Securities and Exchange Act, B.E.2535 and amendments thereof.
12.	Money Changers	Money changers are granted licenses to provide foreign currency exchange services in accordance with the Exchange Control Act, B.E.2485. This business is under the supervision of the MoF and the BoT.

Source: Bank of Thailand (2019).

In order to stay current in terms of financial institutions' supervisory policies. The BoT adheres to five principles, which are:

1. To ensure that financial entities perform vigilantly and nurture strong risk management systems, the BoT decrees criteria to make sure that financial institutions have sufficient quality capital to fulfil international guidelines to guard against potential negative shocks on their operations. The BoT also establishes laws regarding credit risk, operational risk, liquidity risk and market risk that must be followed by each financial entity. Furthermore, traditional banks are also obligated to follow the supervisory concepts appropriate to their risk profiles.

2. To bolster the efficiency of Thai financial institutions, the BoT promotes an unbiased level of competition and ensures that surveillance activities and financial regulations do not stymie improvements in efficiency and overall market growth. In this regard, the BoT has created the Fnancial Institutions Development Plan, approved financial business authorisation and set a clear scope for the business of financial institutions.

3. To guarantee stable leadership at financial institutions, the BoT ensures that leaders, management and personnel of financial entities operate their duties conscientiously and with care. The case of commercial banks highlights the roles and responsibilities of board structures, directors, internal audit and internal control and information transparency and disclosures.

4. To guarantee that financial institutions act fairly to the public, notably their clients, as well as disclose all relevant information, the BoT possesses the power over market conduct regulations to manage financial entities on issues such as cross-selling and financial trades in order to protect consumers, support the openness of financial services and assure fairness for all affected parties. In this instance, the BoT concentrates more on conserving fundamental consumer rights such as the right to freely pick financial products and services, the right to register complaints, the right to obtain truthful information as well as the right to be rewarded in case of fraudulent loss.

5. The BoT also requires that financial entities routinely submit reports and data for administrative purposes. In case financial institutions have any queries regarding regulations, rules, and report submissions, they may contact the officers of Committees and Groups about financial institutions' surveillance and regulation.

As part of the BoT's ultimate responsibility, several financial entities assist in the surveillance of old policies as well as the passing of new policies. These institutions include:

1. The Financial Institutions Policy Committee (FIPC), which has the task of setting regulations, prudential policy and administrative practices to ensure the soundness and safety of financial entities. The FIPC orchestrates policies regarding financial entities, the termination of financial entities' branches and regulations on them being launched, financial ratio requirements to which financial institutions must adhere to and provide opinions regarding the creation of new financial entities. The FIPC also monitors the BoT's role as the provider of banking services to financial entities and in surveillance.

2. The Payment Systems Committee (PSC) is responsible for setting regulations regarding payment and interbank clearing systems in order to ensure soundness, safety and efficiency. The PSC is also permitted to monitor the BoT's operations in promoting or establishing the formation of a payment system.

The BoT's departments, namely Financial Institution Policy and Supervision Groups have several objectives, including:

1. To formulate advanced strategies and policies for financial institution and payment systems. This is assigned specifically to the Financial Institutions Policy Group department and by doing so, the BoT allows the department to issue regulations and rules in order to ensure the safety of payment systems and financial entities as well as analyses, track and supervise the performance of financial trades.

2. To examine, analyse and oversee risk management systems and the performance of each financial entity as well as study permission requests from financial entities. In this case, the BoT designates the Supervision Group to perform this task. In addition, this Group can take actions within a specific timeframe if any financial entity runs into operating or financial distress.

3. To collaborate with other regulators. Since the linkages between external and domestic monetary systems are getting tighter and stronger in light of financial globalisation and ongoing financial and technological innovations, particularly for financial transactions in the form of capital flows, the BoT has partnered with other authorities to enhance the effectiveness of its policies. Within Thailand, the BoT collaborates with the Deposit Protection Agency, the Stock Exchange of Thailand, the Office of Insurance Commission, the Securities and Exchange Commission. Further afield, the BoT has partnered with the relevant authorities and central banks of other regions. The shapes of collaboration differ but include medium- and high-ranking management discussions and both information and staff exchanges.

4.5 The Impact of Monetary Policy on Shadow Banks through the Asset Price Channel in Thailand

To represent Thailand's shadow banks, we use Kasikorn Asset Management's financial products observed from 2017 until 2019, as it holds the largest amount of shadow banking assets compared to other shadow banking entities in Thailand's financial system. Using both administrative and policy interest rates, we try to examine the monetary implication for shadow banking's price formation as well as the growth of total assets. Kasikorn's yields and total assets are collected from Bloomberg, while macroeconomic variables are gathered from the World Bank, Bloomberg and the BoT – more specifically, the deposit, lending and policy rates are from Bloomberg and the BoT, whereas the exchange rate is constructed using data provided by the IMF. We begin by collecting the available administrative and policy rates from central banks' annual reports and complete them by those provided by Bloomberg. The exogenous control variables involve (1) interest rates (the interbank rate to measure the price-based monetary policy tool; the BoT policy rate was chosen as the benchmark monetary policy tool; and the lending and deposit rate represent administrative monetary policy tools) and (2) the nominal effective exchange rate (NEER). To avoid the very high correlation between the interest rates, we include them in the model one at a time to see which one has the most significant effect on our dependent variable. We use the natural logarithm of the NEER data.

In order to fulfil the third purpose of this study, which is an evaluation of the impact of monetary policy on shadow banks through the asset price or interest rate channel in each ASEAN country, we employed Zhang and Wan's (2017) empirical EGARCH model.

Before going further, we made sure that our data are in a form that is applicable with the research model by examining the autocorrelation and partial autocorrelation functions of Kasikorn Asset Management' returns and assets as well as the exogenous control variables at conventional levels of significance. Both the autocorrelation and the partial autocorrelation function of Kasikorn Asset Management' returns and assets display a decaying pattern, even after 36 lags, which shows that returns are non-stationary at levels and contain a unit root. We check the autocorrelation and partial autocorrelation functions in the first difference and results shows that all variables are stationary after differencing and do not contain a unit root. The model specification is as follows:

$$r_t = \sum_{i=1}^{s} \phi_i r_{i-1} + Z_m' X_t^m + u_t. \quad u_t \sim N(0, \sigma_t^2) \quad \text{..... (7)}$$

$$\ln(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j \ln(\sigma_{t-j}^2) + \sum_{i=1}^{p} \alpha_i \left|\frac{u_{t-i}}{\sigma_{t-i}}\right| + \sum_{k=1}^{r} \gamma_k \frac{u_{t-k}}{\sigma_{t-k}} + Z_v' X_t^v \quad \text{..... (3)}$$

where the endogenous variable, r_t, is the shadow banking yield/interest rate, equation (7) is the mean equation of the shadow banking interest rate series, equation (8) is the variance equation, the term $\sum_{i=1}^{s} \phi_i r_{i-1} + Z_m' X_t^m$ represents the time-varying mean and σ_t^2 is the time-varying variance. The mean is assumed to show persistence in the shadow banking interest rate as well as in the exogenous factors that should affect shadow banking, X_t^m (the exogenous control variables include the market-based interbank interest rate as the price-based monetary policy tool, the seven-day repo rate, benchmark interest rates as the administrative monetary policy tools and the lending as well as the deposit rate), X_t^v is the exogenous variable for the variance equation and γ_k is the asymmetric impact of positive or negative innovations on the standardised residuals. To determine the optimal lag structure of the GARCH (p, q) model, we derive the model based on the autocorrelation (ACF) and partial autocorrelation (PACF) functions. The plot of the squared correlogram helps us to identify the lag order of the underlying model. The variant of the GARCH model used here is the Exponential-GARCH (EGARCH) model, which can accommodate asymmetric effects in the data, while the integrated GARCH (or IGARCH) model is representative of the symmetrical model. The best model is chosen based on the significance of various models according to a series of F-tests, the number of significant AR or MA coefficients and the AIC and SIC criteria. In addition, the diagnostic ARCH-LM test is also performed on the best model chosen, so that the classical estimation assumptions are met in the estimated model.

Administrative Monetary Policy Tools: Benchmark Lending Rate, Deposit Rate and Policy Rate

The ultimate objective of every central bank in the world is to implement monetary policy for the attainment of financial stability to support the sustainable growth of the economy. Since 2000, the BoT has carried out monetary policy in accordance with the Flexible Inflation Targeting Framework – a regime embraced by many central banks throughout the world. The framework places great emphasis on sustaining price stability by setting of explicit inflation target in conjunction with supporting economic growth and maintaining financial stability. The BoT also states that its mission to sustain an inflation rate together with a predetermined target hinges on the clarity, transparency and accountability of monetary policy. These will eventually improve its credibility – a pivot element for the achievement of monetary policy in practice.

The MPC implements monetary policy while adhering to the flexible inflation targeting framework which combines the attainment of price stability with supporting economic growth and enhancing financial cohesion. The MPC's ambition is to achieve a proper balance between each monetary objective, all the while being vigilant in applying the appropriate monetary policy tools to assure price stability and sustainable economic growth while avoiding threats to financial stability. The adjustment in its policy rate will affect the economy with long and variable lags through five channels, one of which is proceeds *via* asset prices. Broadly speaking, the monetary policy transmission mechanism through the asset price channel can be described as follows: when central banks lower the interest rates, it makes savings less appealing compared to investment in other assets.

Therefore, an interest rate cut would stimulate demand for assets as well as their prices. This boosts the wealth of businesses and households, subsequently leading to higher consumption. At the same time, the higher prices of property increase the value of collateral that can be pledged to banks. As a result, households and businesses may find it easier to obtain mortgage approval from financial institutions. Furthermore, a boost in the value of a firm encourages them to raise more capital for the purpose of enlarging the business. As a result, spending in investment also grows. The expansion in consumption and investment will eventually enhance economic growth and inflation. In short, the policy rate adjustment will, ultimately, have an impact on economic activity, such as private consumption, investment, imports and exports and prices of goods and services.

Nevertheless, since the emergence of shadow banking in the financial system, the Flexible Inflation Targeting Framework is perhaps no longer affecting money supply growth in Thailand. To support this claim, Table 4.7 shows that the deposit rate is not significantly affecting the dependent variable, which are the returns of Kasikorn Asset Management Company. This implies that a change in the central bank's monetary policy instrument has no effect on the returns of Kasikorn Asset Management Company. Furthermore. The lending rate also fails to significantly impact the dependent variable. By contrast, the policy rate variable shows a positive result, meaning that when the BoT tightens the policy rate, the return of the company will increase. To this extent, the results show that monetary policy in Thailand is not effective in influencing the returns of shadow banks.

We also employed Kasikorn Asset Management's total assets under management as a new dependent variable in order to gain new perspectives regarding the impact of monetary policy on shadow banking entities' total assets. As we can see from Table 4.7 for total assets, while positive, the lending rate variable does not show a significant result as the probability value (p-value) of 0.34 does not allow us to reject the null hypothesis that the coefficient is zero. This implies that the lending rate is positively affecting the growth of total assets, but not significantly. The results for the deposit rate are similar to the lending rate in terms of significance, but with a negative coefficient. In other words, when the deposit rate increases, the growth of total assets falls. Compared to other feasible models, the AIC and SBC are minimised for this EGARCH model, making the latter the preferred model. Similar to all other variables, the policy rate is also not significantly affecting the growth of total assets under management. The coefficient is once again positive, meaning that if authority increases/decreases the policy rate, the growth of total assets will also increase.

Furthermore, in order to strengthen the examination regarding the types of assets most affected by the independent variables, we specify a variant of the model by dividing total assets into three categories – those assets representing equity, fixed income and money markets. We categorise each of Kasikorn Asset Management's products based on the dominant type of assets, e.g., equity, fixed income or money market. We then estimate separate models for each type of asset and the following independent variables – lending rate, deposit rate, policy rate and the Bangkok Interbank Offered Rate (BIBOR). For equity-based assets, we find that the lending rate does not significantly affect the growth of the equity part of total assets. The results also a indicate negative impact from the lending rate on growth, meaning that when the lending rate increases by 1%, equity-based assets would fall by 2.39%. However, the deposit rate affects the growth of equity in a different manner. In this case, the effect on the growth of equity-based total assets is positive, although once again insignificant. This implies that when the authority increases the deposit rate by 1%, the growth of equity-based total assets would increase by 4.78. For the policy rate, the results are negative and insignificant. When the policy rate is increased by 1%, the growth would fall by 0.72. The latter result points to some risks, since it indicates that the policymaker is no longer able to affect the growth of equity-based shadow banking assets in Thailand.

Following equity-based assets, we turn our attention to fixed income-based assets as the new dependent variable, results for which are given in Table 4.8. We find that the lending rate does not significantly affect the growth of fixed-income total assets. The estimated coefficient, while insignificant, is positive, indicating that when the lending rate increases by 1%, fixed income-based assets would rise by 0.73. The next independent variable is the deposit rate, which has a negative and insignificant impact on the growth of fixed income-based assets. If the deposit rate were to be increased by 1%, fixed-income total assets would decline by 5.91. By contrast, the estimated coefficient for the policy rate is positive. Although once again insignificant, this denotes that when the policymaker increases the policy rate by 1%, the growth of fixed-income total assets would increase by 2.14. Considering this fact, the Thai policy rate may no longer be able to affect the growth of fixed-income shadow banking assets.

The final alternative dependent variable is the growth rate of money market-based total assets. Table 4.8 shows that the lending rate is negatively affecting money market total assets. This implies that if the authorities increase the lending rate by 1%, the growth of money market total assets would significantly decline by 4.79. Similar to previous results, the deposit rate affects the growth of money market total assets negatively and insignificantly. If the policymaker increases the deposit rate by 1%, the growth of money market-based total assets would fall by 40.46. Finally, for the policy rate, Table 4.8 presents a negative and insignificant result. When the policy rate is increased by 1% by the policymaker, growth will significantly decline by 10.53. This is sizeable and implies that the policymaker is still capable of impacting the growth of Thai money market's total assets through the asset price channel.

Table 4.7
EGARCH(0,2) Estimates: Impact of Exogenous Variables on Kasikorn Asset Management

Dependent Variable	Return				Total Assets			
Independent Variable	Lending Rate	Deposit Rate	Policy Rate	BIBOR	Lending Rate	Deposit Rate	Policy Rate	BIBOR
	EGARCH(0,2)	EGARCH(0,2)	EGARCH(0,2)	EGARCH(0,2)	EGARCH(0,2)	EGARCH(0,2)	EGARCH(0,2)	EGARCH(0,2)
Mean Equation Results								
Constant	–0.001	–0.001	–0.001	–0.001	–0.001	–0.002	–0.001	–0.001
NEER	1.530	–5.084	1.147	–0.723	0.418	0.409	0.417	0.407
Exogenous	0.514	0.445	0.279	0.405	6.599	–0.247	7.023	0.653
AR(1)					0.398	0.433	0.041	0.436
AR(2)					0.173	0.175	0.013	0.174
AR(3)								
AR(4)								
MA(1)	–0.014	–0.013	–0.012	–0.013	–0.383	–0.419	–0.030	–0.422
MA(2)					–0.235	–0.231	–0.066	–0.229
MA(3)								
MA(4)								
Variance Equation								
Constant	–7.550	–7.583	–7.568	–7.603	–9.901	–9.889	–9.871	–9.887
ARCH(1)	–0.048	0.010	–0.063	0.012	0.150	0.150	0.121	0.148
ARCH(2)	–0.924	–0.922	–0.873	–0.903	0.099	0.098	0.100	0.097
Asymmetric Effect	0.149	0.195	0.165	0.196	0.122	0.136	0.125	0.135
Diagnostic Test								
R-squared	0.014	0.014	0.013	0.014	0.026	0.015	0.021	0.015
Adjusted *R*-squared	0.004	0.004	0.003	0.004	0.018	0.006	0.013	0.006
Log-likelihood	1793.733	1808.099	1791.453	1806.845	2394.769	2390.984	2392.883	2391.008
Akaike information criterion	–5.109	–5.150	–5.102	–5.146	–6.840	–6.829	–6.835	–6.829
Schwarz criterion	–5.057	–5.098	–5.050	–5.094	–6.768	–6.757	–6.763	–6.758

Table 4.8
EGARCH(0,2) Estimates: Impact of Exogenous Variables on Kasikorn Asset Management

Dependent Variable	Equity				Fixed Income				Money Market			
Independent Variable	Lending Rate	Deposit Rate	Policy Rate	BIBOR	Lending Rate	Deposit Rate	Policy Rate	BIBOR	Lending Rate	Deposit Rate	Policy Rate	BIBOR
	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)	EGARCH (0,2)
Mean Equation Results												
Constant	–0.001	–0.001	–0.001	–0.001	–0.003	–0.003	–0.004	–0.003	–0.002	–0.002	–0.002	–0.002
NEER	–0.211	–0.211	–0.209	–0.212	0.668	0.684	0.473	0.668	0.431	0.439	0.425	0.397
Exogenous	–2.393	4.784	–0.724	0.753	0.729	–5.911	2.137	0.002	–4.785	–40.460	–10.532	12.555
AR(1)					–0.662	–0.655	–0.074	–0.661	1.216	1.214	1.216	1.215
AR(2)					–0.723	–0.720	–0.586	–0.721	–1.001	–1.001	–0.998	–1.004
AR(3)					–0.378	–0.375	–0.681	–0.377	0.737	0.741	0.732	0.742
AR(4)									–0.667	–0.670	–0.664	–0.670
MA(1)	0.108	0.105	0.104	0.104	0.588	0.578	–0.033	0.587	–1.167	–1.166	–1.167	–1.166
MA(2)	–0.074	–0.074	–0.073	–0.072	0.482	0.479	0.428	0.480	0.872	0.874	0.867	0.875
MA(3)					0.153	0.147	0.701	0.152	–0.561	–0.566	–0.554	–0.567
MA(4)					–0.306	–0.307	–0.222	–0.306	0.546	0.550	0.542	0.548
Variance Equation												
Constant	–9.667	–9.678	–9.677	–9.677	–9.064	–9.066	–9.027	–9.065				
ARCH(1)	0.108	0.111	0.111	0.111	0.213	0.220	0.151	0.214				
ARCH(2)	0.132	0.143	0.143	0.143	–0.069	–0.074	–0.122	–0.069				
Asymmetric Effect	0.096	0.097	0.095	0.095	–0.081	–0.085	–0.084	–0.082				
Diagnostic Test												
R-squared	0.018	0.016	0.016	0.016	0.103	0.103	0.145	0.103	0.039	0.039	0.039	0.039
Adjusted *R*-squared	0.012	0.0103	0.010	0.010	0.091	0.091	0.134	0.091	0.024	0.024	0.024	0.024
Log-likelihood	2321.82	2321.545	2321.4	2321.442	2130.873	2131.067	2146.994	2130.85	699.896	700.029	699.921	699.941
Akaike information criterion	–6.618	–6.617	–6.616	–6.616	–6.083	–6.083	–6.129	–6.083	–1.968	–1.968	–1.968	–1.968

Price-Based Monetary Policy Tools

For price-based monetary policy tools, we examined the interbank interest rate, using both the BIBOR rate as well as the policy rate. Results show that neither of the two variables has a significant effect on the dependent variable, although they display different outcomes. This outcome is in line with the previous study by Zhang and Wan (2017). They analysed financial conditions in China focusing on the activity of shadow banks. In their study, they chose Yu'E Bao interest rates to represent the dependent variable. The authors find that neither the Shanghai Interbank Offered Rate (SHIBOR) nor the repo rate exert a significant influence on retail interest rates, indicating that Chinese interbank interest rates are not firmly established. They also state that this outcome is worrying for the authorities as it indicates that the SHIBOR is not an effective price-based monetary policy tool. Furthermore, the negative coefficient associated with the BIBOR variable indicates that if the Thai interbank interest rate declines, the return on Kasikorn Asset Management will rise and *vice versa*.

According to Zhang and Wan (2017), one probable reason for the weak relationship between shadow bank and interbank interest rates is the absence of a connection between the shadow bank credit market and the interbank market. The dominant participants in the interbank market are large traditional banks that provide loans to big SOEs, whereas SMEs, most of which have accounts in the shadow bank credit market, are proliferating. Again, the difference in funding behaviour between SMEs and SOEs can partly explain the disconnection. Depending merely on price-based tools to operate monetary policy is perhaps insufficient, as this approach will not be fully transmitted to the real sector.

Because traditional banks face barriers in removing SMEs from the shadow bank credit market as well as the interbank market, shadow interest rates can be expected to stay unresponsive. Zhang and Wan also state that if interbank interest rates have just a short-term, say one-week, impact on the shadow market rate, the full transmission of monetary policy will be hard to accomplish. In conclusion, the study proposes that it is currently perhaps too soon to support a complete conversion to price-based monetary policy alone. A partial conversion involving a combination of price- and quantity-based tools might be more practical.

We employed Kasikorn Asset Management's total assets under management as a new dependent variable to gain new insight for the impact of monetary policy on shadow entities' total assets. Based on the results, neither the interbank interest rate nor BIBOR showed a significant effect on the growth of total assets, although both effects were positive. This indicates that if the interbank interest rate increased by 1%, the growth of total assets would decrease by 0.65.

Finally, in order to strengthen the examination regarding the types of assets most affected by the independent variables, we divided total assets into three categories – equity, fixed income and money markets. We then analyse Kasikorn Asset Management products based on the dominant type of asset, whether it be equity, fixed income or money markets. We estimate the effects of several independent variables, which are the lending rate, deposit rate, policy rate and BIBOR. For equity-based assets, we find that the lending rate did not significantly affect the growth of total equity assets. Turning to BIBOR, the results indicate that BIBOR has a positive and insignificant effect on the growth of equity-based

total assets. When the policymakers raise the BIBOR interest rate by 1%, equity assets would be increasing by an (insignificant) amount of 0.75. In addition to the equity asset variable, we repeated the estimation with fixed income-based assets as a new dependent variable. The results in Table 4.8 reveal that the lending rate did not significantly affect the growth of total fixed income assets. Ultimately, Table 4.8 depicts that the Thai interbank interest rate has a positive (and insignificant) effect on the growth of fixed income-based total assets. When the interbank interest rate is increased by 1%, fixed-income assets would rise by an (insignificant) amount of 0.001. The third and final dependent variable is the growth of money market based total assets with results in Table 4.8. We find that BIBOR is positively and insignificantly impacting the growth of money market-based assets. This means that if the authorities increase the BIBOR interest rate by 1%, the growth of money market assets will increase by an (insignificant) amount of 12.56.

4.6 Conclusion

Since the definition of new forms of financial intermediation is still under debate, we describe a new form of financial intermediation as shadow banks followed by the use of financial technology. Shadow banking is an intermediary financial activity that operates outside of the traditional banking system. The alleged beneficial impact of shadow banking can be perceived from the undeniable growth of shadow banking assets as a share GDP. We also find that this sector is growing in line with the ratio between the growth of broad money and the inflation rate, indicating that monetary policy may no longer be as effective as before in impacting the economy. This finding underscores the necessity for research in this area.

The Thai financial system comprises a wide range of institutions, which can be grouped into three broad categories: banks, non-bank financial institutions (NBFIs) and specialised financial institutions (Shrestha, 2007). Banks include domestic commercial banks, retail banks, branches of foreign banks and subsidiaries, while NBFIs consist of finance companies, *credit foncier* companies, cooperatives, insurance companies, securities companies, mutual funds, pension funds and asset management companies. The group of specialised financial institutions comprises deposit taking and non-deposit taking specialised institutions as well as institutions for financial sector resolution. NBFIs total assets-to-GDP ratio in Thailand has risen to reach a high amongst the country's peers. Moreover, since the mutual fund market holds the largest asset share in the overall financial market, we use this institution to illustrate the role of shadow banks in Thailand. The mutual fund market is dominated by the leading domestic banks. The top four asset managers are Kasikorn Asset Management Company (with a 20% share of assets under management), SCB Asset Management (18%), BBL Asset Management (14%) and Krung Thai Asset Management (14%). Shadow banking activities, as classified by the FSB, is mostly performed by Thai NBFIs. However, since the latter are covered by the appropriate regulatory regime, do not conduct credit intermediation and the risks they generate from their activities do not pose systemic risks, they are no longer categorised as shadow banks.

The prospect for new forms of financial intermediation has been planned and prepared for by the BoT using FSMP III. Some of FSMP III's objectives are to improve the efficiency of the financial system, bolster electronic payment and financial services by developing new technological innovation and boost the competitiveness of financial service providers and thus assist market growth. In so doing, the BoT heavily encourages

financial institutions to provide more diversified electronic financial products and services. Nevertheless, the growth of these shadow banking institutions also has a negative impact since they can create systemic risks that need to be mitigated. Using monetary policy rates, we examine the effect of the policy rate on one shadow bank entity's returns as well as the growth of assets under management. Based on our estimation results, the changes in administrative and price-based monetary policy tools did not affect the shadow banking interest rate and the growth of assets under management in Thailand. Administrative or quantity-based monetary policy tools are represented by the policy rate, lending rate and deposit rate, whereas price-based monetary policy tools are captured by the interbank interest rate.

4.7 Policy Recommendations

The growing proportion of shadow banks' total assets to GDP shows that shadow banking has become a sector that has a significant impact on the Thai economy. Over time, shadow banks in Thailand have begun to take advantage of technological advances, namely financial technology (FinTech). The influence of FinTech in shadow banking activities in Thailand as new forms of financial intermediation has proliferated, and as such special regulations and supervision are needed to manage this development, given the substantial risks that can arise from cyber-attacks. In Thailand, the Bank of Thailand (BoT) has the authority to regulate and supervise financial institutions. However, there still appears to be a lack of regulation and supervision for these new entities and activities to protect customers. Therefore, we recommend several policy frameworks: (1) Bringing NBFIs under the same regulatory control as banking entities, therefore improving regulation and supervision of NBFI entities and thus understand their business models better; (2) Establishing a guarantor institution to oversee the funds of non-bank entity customers; (3) Developing a synergistic relationship between the authority and the shadow bank, so that it can provide individual control over the shadow banking activities in Thailand.

CHAPTER 5

THE SCOPE, PROSPECTS AND IMPLICATIONS OF NEW FORMS OF FINANCIAL INTERMEDIATION IN MALAYSIA

5.1 Background

Shadow banking began to evolve and develop in the early 1990's, with the aim of complementing the traditional banking system through alternative sources of credit and liquidity. The existence of shadow banking came to the world's attention with the Great Financial Crisis (GFC) in 2008, which resulted from the failure of regulators and market participants to truly understand the ultimate impact of financial mechanisms, especially shadow banking mechanisms that negatively impacted the business and economic cycle. More recently, regulators have started to think about regulations and providing the right framework for countries to manage the systemic risks arising from the growth of shadow banking.

According to the narrow definition of shadow banking in FSB (2017), shadow banking can be defined as "credit intermediation involving entities and activities (fully or partially) outside the regular banking system". That definition includes all forms of credit outside the banking system. Later, the FSB expanded the definition of shadow banking to cover "a system of activities and entities in the environment involved in credit intermediation where infractions of the prudential requirements occur in whole or in part, or there are differences from those applied to the banking system".

But "credit" seems to be unable to capture all of the broad shadow banking activities. Even more so, the rapid growth of technology makes shadow banking activities more varied and includes a wider range of financial activities. Therefore, it may be the case that shadow banking is linked to financial intermediation. The ECB (2012), for example, suggested a more complex definition of shadow banking: "shadow banking refers to activities related to credit intermediation, liquidity and maturity transformation that takes place outside the regulated banking system".

Lending costs have been observed to fall when shadow banks enter the financial system at large and become a core business of the traditional banking system through credit intermediation, which involves maturity, liquidity and credit transformation (Pozsar et al., 2010). But concerns about systemic risk have arisen since there are potential maturity and liquidity transformation activities, leverage and flawed credit risk transfers between banks and shadow banking entities. On the other hand, regulatory arbitrage (FSB, 2011) has led to a rise in the number of shadow banking entities that are able to evade banking regulations in their activities.

The period since the onset of the GFC has been marked by an era of digitalisation, occasionally referred to by the concept of industry 4.0, where technological developments, such as the Internet of Things (IoT), artificial intelligence (AI) and big data, have influenced not only people's behavioural patterns but also business development more

widely. Financial innovation creates a high demand for financial services, makes financial markets more competitive and drives financial institutions to be more efficient and develop new financial products and services. Consumers are no longer satisfied with either the duration of the transaction process or the high costs of traditional banking products such as payments, deposits and loans. These trends are accompanied by the expansion of formal financial services both in banking and non-bank technology-based institutions. Innovations in financial technology (FinTech) have greatly facilitated the entry of new players, such as e-commerce, gaming and messaging services firms in the financial services industry, threatening to erode margins. This has transformed the shadow banking system of old into a "new form of shadow banking", where technology in the form of FinTech products are combined with shadow banking activities.

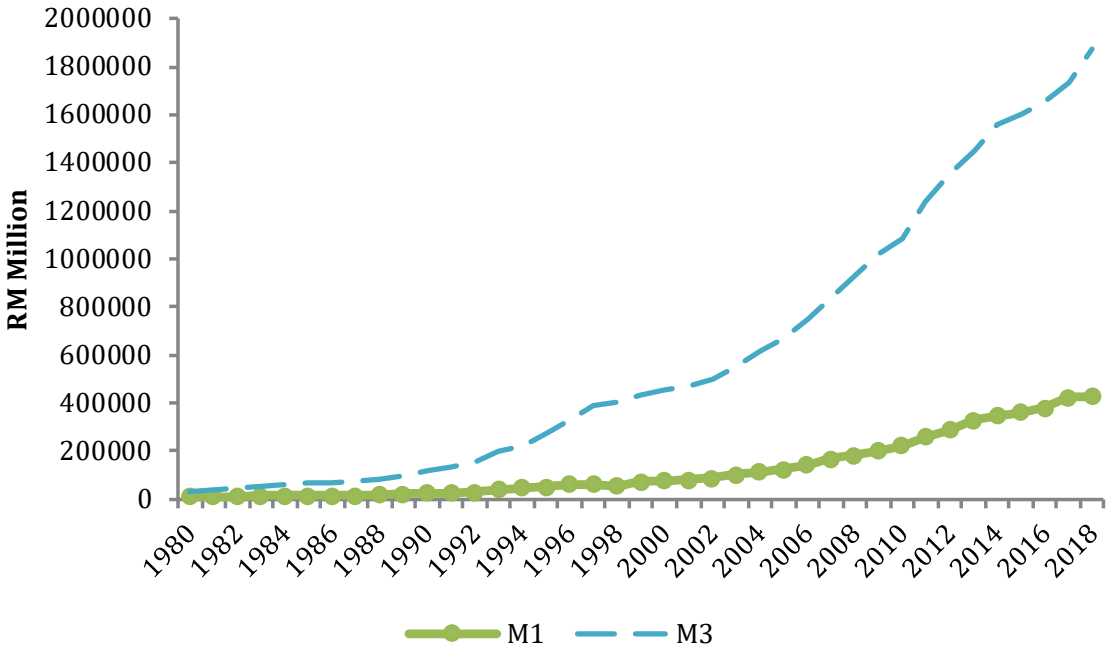
FinTech's impact on shadow banking has several advantages. To begin with, wider data dissemination makes disintermediation more possible and the supply chain more integrated on account of the direct relationship between the borrower and the lender, which will be the case even for relatively small transactions. Technology as well as the existence of regulatory shortcomings and lags make shadow banking at best less regulated and at worst unregulated. This allows transactions to become faster and enables easier access at lower costs, thereby meeting the needs of consumers at all levels of society. Shadow banking activities can be carried out without a physical office, lowering the operational costs of the shadow banking entity and making production more efficient and products more customised.

Sadly, the regulatory shortcomings mean that turnover of FinTech firms will be a lot higher, with entities both entering and leaving the market at a high rate. Risks in financial markets rise as a result, leading to elevated default risk and rendering the protection of borrowers more at risk. Also, the development of shadow banking activities has led to the existence of asset bubbles, or at least a higher sensitivity of the financial markets to rapidly rising asset prices. The increase in money creation has led broad money (M3) to increase faster than income.

In general, the practice of shadow banking in Asia is different from that in the US and Europe, where it is relatively smaller compared to the more dominant banking sector. The general lack of complexity in the Asian market means that shadow banking products play less of a role in the financial system in Asia. Most of the shadow banking activities in Asia represent traditional finance provision in the form of loans to specific economic segments (Farid, 2013).

In Malaysia, shadow banking is defined differently from the definition offered by the FSB. There, the definition of shadow banking was expanded to include all activities and entities that are considered to pose risks to the financial system. To reflect the more specific nature and role related to the growth of entities in particular and shadow banking activities in general, Bank Negara Malaysia (BNM) includes several traditional factors. In addition to the risk factors recommended by the FSB, such as maturity and liquidity transformation, imperfect credit risk transfer, leverage and concerns about regulatory arbitrage, BNM also considers other factors, such as the size and complexity of the activities, lack of substitutability and interconnectedness with the banking system (FSB RCG, 2014).

Figure 5.1
Growth in the Malaysian Money Supply, 1980-2018

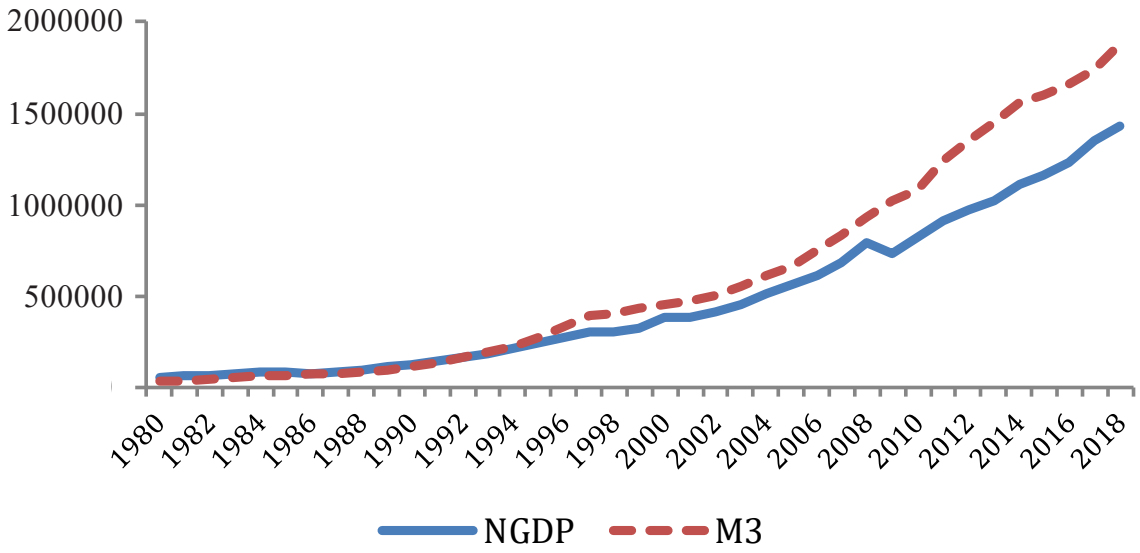


Source: BNM.

Shadow banking activities in Malaysia play a vital role in assisting banks in the development of the economy and completing gaps in the Malaysian financial system. Based on Figure 5.1, shadow banking activities began to enter the Malaysian financial market in the 1990's, resulting in the growth of broad money (M3) outstripping that of narrow money (M1).[1] Until 2018, the gap between M1 and M3 was MYR1,448,090 million, almost five times the equivalent amount of narrow money. One of the main drivers for the rapid increase in M3, especially after the GFC, was the support from FinTech. This demonstrates the growing interest and confidence of households in saving their money in other banking institutions other than traditional banks.

1. Based on the IMF's Dissemination Standards Bulletin Board (DSBB), the definition of money in Malaysia is M1 = Currency in Circulation + Demand Deposits; M2 = M1 + Narrow Quasi-Money; M3 = M2 + Deposits Placed with Other Banking Institutions. Malaysia uses M3 rather than M2 as broad money, which refers to the sum of deposits/interest-bearing instruments (including Islamic banking deposits and instruments) placed by the non-bank private sector with investment banks.

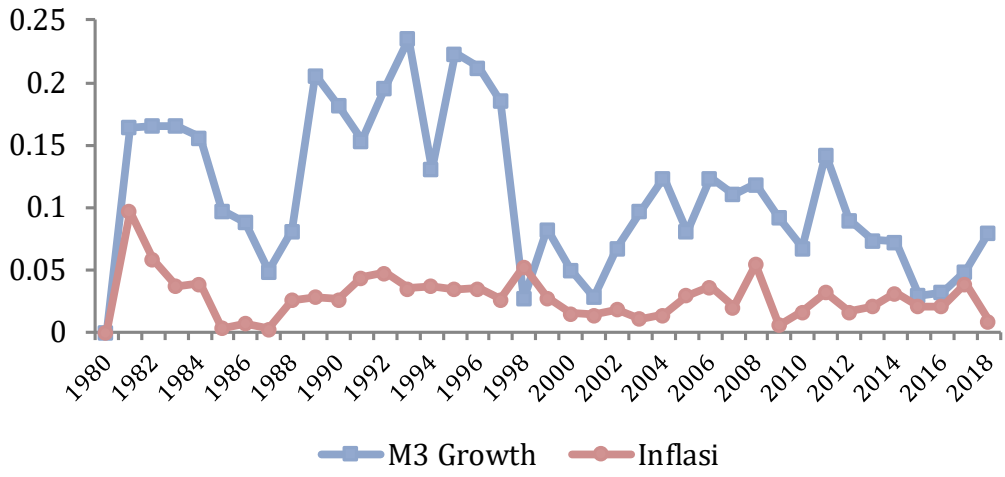
Figure 5.2
The Level of Gross Domestic Product (GDP) and Broad Money in Malaysia, 1980-2018



Source: BNM.

Figure 5.2 shows that for Malaysia, the growth rate of M3 far exceeded GDP growth, especially after the 2008 GFC. The ratio of M3 to GDP increased from 0.57 in 1980 to 1.32 in 1998 and then 1.38 in 2008, although it had been falling over the period from 2015 to 2018. In fact, the ratio stood at 1.31 in 2018. These numbers indicate that the gap between M3 and GDP has been widening. As a result, monetary aggregates have been very unstable, suggesting that money multipliers were determined endogenously by the behaviour of market participants. Figure 5.3 reveals that before 1998, the gap between M3 growth and inflation was quite large but that the difference began to decrease after 1998. We also find that M3, which is multiplying, translates into high inflation and *vice versa*. That being said, the movements of M3 growth and inflation were not in the same direction in 2018.

Figure 5.3
M3 Growth and Inflation in Malaysia, 1980-2018



Source: BNM.

The rapid development of innovations of sophisticated instruments due to financial liberalisation over time and the increasing need for financing has led to changes in asset securitisation in Malaysia. Efforts by the government to transform the Malaysian bond market have made it one of the largest in Southeast Asia, even though asset securitisation contributed only a small portion of credit intermediation by Non-Bank Financial Institutions (NBFIs). In its digital evolution index for 2017, the Fletcher School (2017) awarded a Malaysia a "Stand Out" ranking that translates into the country being amongst the digital elite. This ranking shows that the country is both highly digitally evolved and advancing quickly and reflects the rapid evolution of digital economic activities in Malaysia.

The link between shadow banking and the banking sector is unavoidable. One consequence of this, which has been borne out by the GFC, is that shadow banking is a source of systemic risk. The latter arises either directly, from the benefits the shadow banking system obtain through the credit supply chain into the economic system, or indirectly through the interlinkage with the regular banking system. It therefore becomes necessary to mitigate the potential build-up of risks through an appropriate monitoring and regulatory framework. In this Chapter, we provide a mapping of the shadow banking system in Malaysia and evaluate whether monetary policy is still able influence shadow banking decision-making.

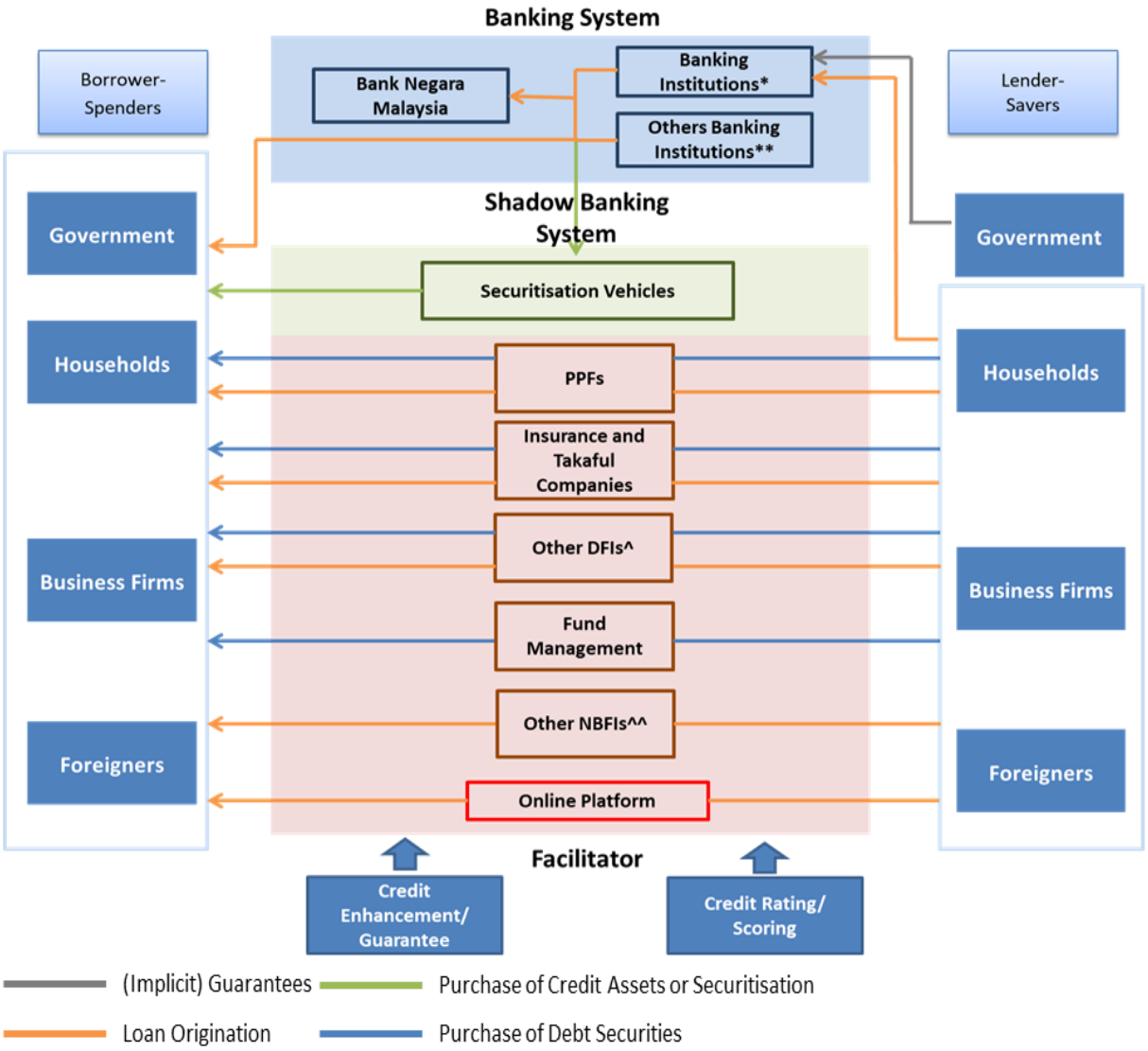
5.2 Macromapping of New Forms of Financial Intermediation in Malaysia

5.2.1 New Forms of Financial Intermediation in Malaysia

Adhering to the FSB's broad definition of shadow banking, Malaysia is expanding its understanding of shadow banking by following conditions within its financial system. In Malaysia, shadow banking is defined as "a system of credit intermediation that involves entities and activities outside BNM's regulatory capture". Malaysia classifies entities performing financial intermediation activities into several categories: (1) investment in equities; (2) loan origination; (3) investment in debt securities; (4) securitisation; (5) issuance of credit guarantee or enhancement; and (6) issuance of credit scoring or rating. Credit intermediation activities comprise (2) to (5) (Figure 5.4).

Credit intermediation activities can occur through two channels. First, the direct credit extension. In this case, borrowers and suppliers of funds are connected directly through the entity that carries out loan origination or the purchase of debt securities. Second, through part of the credit intermediation chain, where credit issued through loan origination will be transformed into Asset-Backed Securities (ABS) through securitisation activities and will be distributed to suppliers of funds. In addition to using credit intermediation activities, there are non-bank entities in Malaysia that carry out activities outside of credit intermediation. Even so, these entities still perform financial intermediation activities related to systemic risk and the financial system. In addition, they will be subject to oversight by various authorities, such as the provision of equity funding and credit scoring or rating. BNM also includes credit scoring or rating in financial intermediation because it facilitates the credit intermediation process and is subject to oversight by the Malaysian Securities and Exchange Commission.

Figure 5.4
The Map of Bank and Shadow Bank Activities in Malaysia



* Banking Institutions comprise commercial banks, islamic banks, finance companies, investment banks

** Other Banking Institutions include discount houses, representative office of foreign banks

^ Other DFIs refers DFIs that are not regulated by BNM under the DFI Act 2002

^^ Other NBFIs include leasing companies, factoring companies, venture capital companies, Cagamas, major non-bank credit providers

Note: NBFI: Non-Bank Financial Institution, PPF: Provident and Pension Fund, DFI: Development Financial Institutions

Source: BNM.

To monitor the universe of NBFIs and to reduce risk factors due to the anticipated rise in large and complex NBFIs in the future, the FSB replaced the term "shadow banking" by "non-bank financial intermediation" in October 2018, and included insurance and pension fund entities in the NBFI category. Therefore, in this analysis, the definition of "shadow banking" or "non-bank financial institutions (NBFIs)" refers to the FSB's definition of MUNFIs. To examine whether an entity falls into shadow banking activities, FSB (2014) identified two sets of indicators. The first is the systemic risk indicator (SR): maturity transformation (SR 1), liquidity transformation (SR 2), credit risk transfer (SR 3) and leverage (SR 4). The second is based on the FSB's framework that defines shadow banking based on five economic functions (EFs): management of collective investment vehicles with features that make them susceptible to runs (EF 1), loan provision that is dependent on short-term funding (EF 2), intermediation of market activities that is dependent on short-term funding or secured funding of client assets (EF 3), facilitation of credit creation (EF 4) and securitisation-based credit intermediation and funding of financial entities (EF5).

5.2.2 The Development of New Forms of Financial Intermediation in Malaysia

Shadow banking in Malaysia has changed from traditional credit activities, which previously only served as an intermediary between the end suppliers and end borrowers of funds, to an extended credit intermediation chain that involves the matching of many entities and activities through the movement of the supply and demand for funds. Progress in financial markets allows banks or entities owned by banks to play a role in this chain.

Banks can engage with entities or shadow banking activities through their exposure to the provision of funds or lending and wholesale funding markets. In terms of liabilities, bank involvement can occur either through credit or NBFI debt securities held by banks. The evolution of the market structure enables financial intermediation to create opportunities for non-bank companies to perform essential functions in carrying out securitisation activities, such that the role of traditional banks will be increasingly diminished (narrow banking).

But this becomes possible if banks change their organisational structure such that the shadow banking entity is an expansion of the bank. To adapt to changes, many banks integrate with non-bank entities under a bank holding company (BHC) structure, giving the non-bank subsidiaries an increasingly important role in their activities.

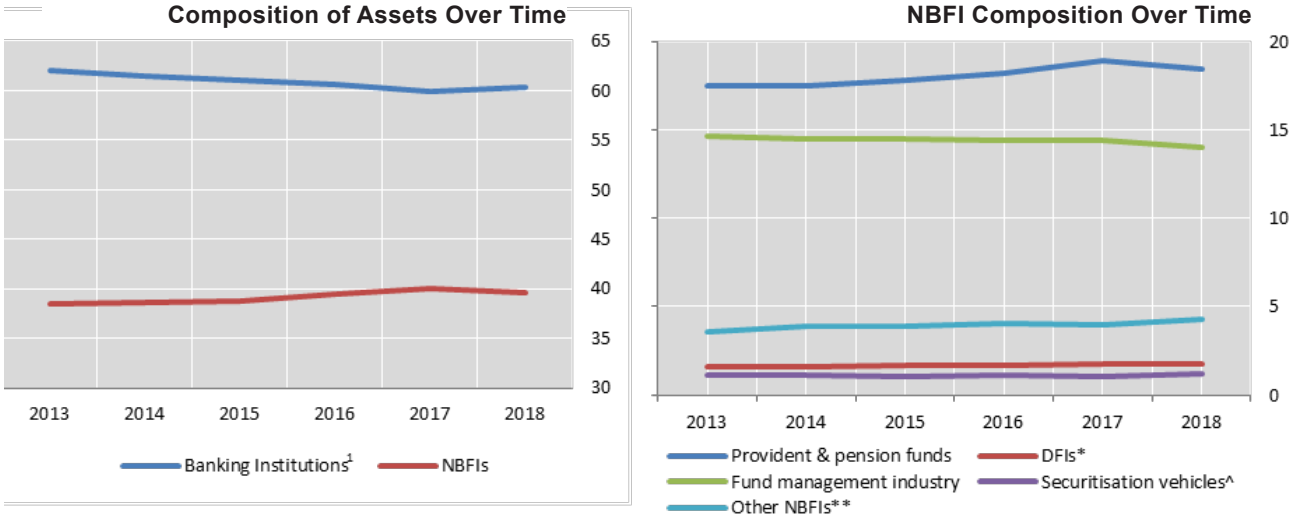
Based on Pozsar et al. (2010), banks take a step into the shadow banking system by decomposing the simple process of deposit-funded, hold-to-maturity lending into a more complex, wholesale-funded, securitisation-based lending process. Because of explicit support and authority from the centre (bank), the bank-based intermediation entity is more robust on account of its liquidity guarantee in the form of access to the central bank's discount window and credit guarantees in the form of protection of intermediaries' liabilities, such as deposit insurance.

Unlike the shadow banking system structure in the US and Europe, which is relatively complex both in terms of activities and entities, the shadow banking system in Malaysia is much less complicated and smaller than the banking system. According to Carmichael and Pomerleano (2002), NBFIs in developing countries are more driven by deeper financial

markets and overcoming legal and regulatory shortcomings. This contrasts with developed countries, where the growth of NBFIs is driven by a specialisation of non-bank activities. It is worth keeping in mind that the causes of the financial crisis that occurred in 2008 were mainly caused by regulatory arbitrage in developed countries (Liang and Reichert, 2012). Shadow banking in Malaysia includes: (1) insurance and takaful companies; (2) provident and pension funds; (3) other DFIs; (4) the fund management industry; (5) securitisation vehicles; and (6) other NBFIs.

Figure 5.5
The Composition of the Malaysian Financial System

In Percent



1. Banks, DFIs regulated under DFIA 2002, insurance companies and non-bank credit card issuers.

* Refers to other Development Financial Institutions (DFIs) that are not regulated by the Bank under the Development Financial Institutions Act 2002 (DFIA 2002).

** Refers to Co-operatives, Leasing & factoring companies, Building society, pawn brokers, money lenders, non-bank provider of education financing, non-bank providers of hire purchase financing, government-owned trustee company, and social security organization.

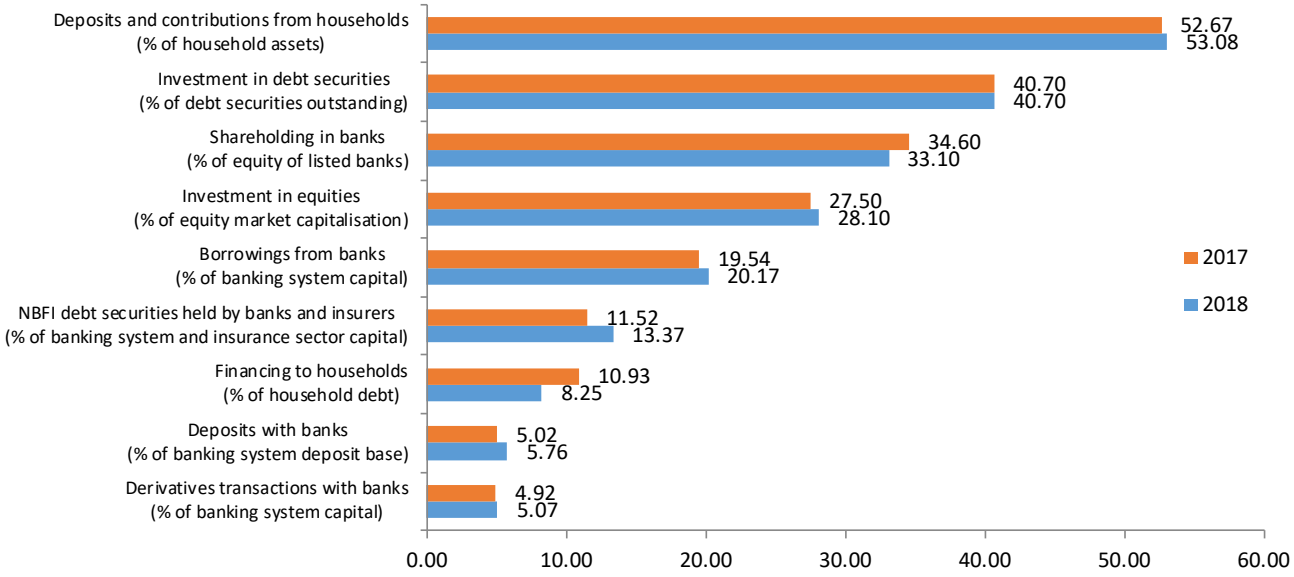
^ Refers to outstanding asset-backed securities and asset size of national mortgage corporation.

Source: BNM.

Figure 5.5 shows the size of shadow banking in comparison to conventional banking institutions. With a share of 60.3% in 2018, banking institutions, which include banks, DFIs regulated under DFIA 2002, insurance companies and non-bank credit card issuers, were still the largest and most significant providers of funds in the financial system. However, based on data from Bank Negara Malaysia, the share has been decreasing – it stood at 73.0% in 2000. From 2014 to 2017, the percentage share of bank institutions decreased by an average of 0.5 percentage points per year, even though it showed an uptick of 0.4 percentage points in 2018.

After the financial crisis, NBFIs continued to increase their share of assets to total assets in the Malaysian financial system, particularly compared to banks. In aggregate, the market share of NBFI assets is quite significant, reaching 39.7% in 2018. Based on BNM data, this reflects a gradual increase from the 27.0% share of NBFIs in the financial system in 2000. Provident and pension funds and the fund management industry make up the most significant portions of total NBFI assets in Malaysia, accounting for 18.4% and 14.0% of total assets in the Malaysian financial system in 2018 respectively. The share of NBFIs in the Malaysian financial system continues to see steady growth, with an average annual increase of 0.4 percentage points from 2013 to 2017. In 2018, however, the overall share of NBFIs decreased by 0.41 percentage points, mainly on account of the share of provident and pension funds and the fund management industry decreasing by 0.4 and 0.4 percentage points respectively. The growth of NBFI assets in the financial system illustrates how NBFIs have begun to deepen and expand their presence in the Malaysian financial system, indicating perhaps that they play a complementary role in the financial system by slowly replacing the function of banking institutions in Malaysia.

Figure 5.6
Interlinkages of NBFIs with the Financial System

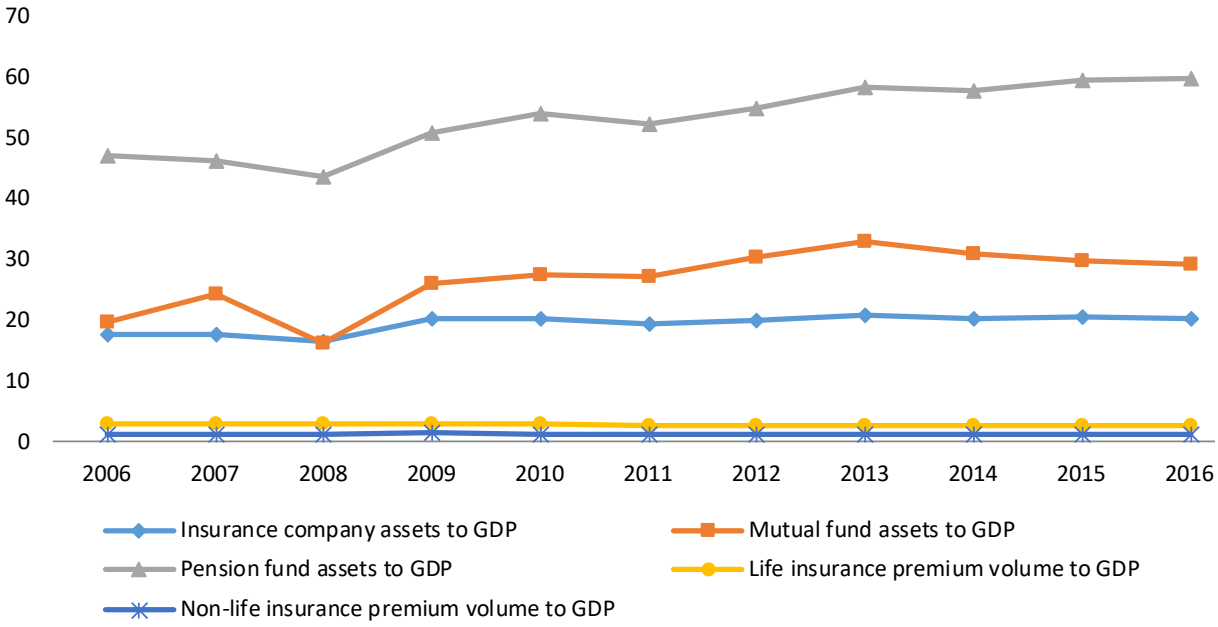


Source: BNM.

Figure 5.6 shows the link between NBFIs and the financial system in Malaysia. The dependence of funding on NBFI intermediary activities from bank loans grew by 5.2% over the past three years, from 15.0% in 2015 to 20.17% in 2018. On the other hand, credit risk for banks is generally quite low. At around 53% in 2017, shadow banking's function as an intermediary non-banking institution in Malaysia has played a significant role for the household sector, but the contribution of NBFIs to household debt is still quite low at approximately 8.3% (Figure 5.6). The channel for transmitting NBFI risks to the financial system can be seen through the ownership of financial assets by NBFIs and equity investments in domestic banks. Judging from the relationship between shadow banking and the banking sector, the complexity of shadow banking activities in Malaysia is still low. This is due to shadow banking's dependence on the capital markets and bank loans to fund their small intermediation activities, lowering the NBFIs' risk profile in Malaysia.

The Global Financial Development Database includes total assets of NBFIs to GDP. These data are available for provident and pension fund assets to GDP, mutual fund assets to GDP, insurance company assets to GDP, life insurance premiums to GDP and non-life insurance premiums to GDP. Over the past decade, the development of pension fund and mutual fund assets in Malaysia has shown rapid growth and has contributed significantly to GDP. Pension funds' holdings in 2016 accounted for 59.9% of Malaysian GDP. The equivalent share of assets to GDP in 2006 was only 47.1%. Besides, the share of mutual fund assets to GDP in 2016 was 29.1%, up from 19.7% in 2006 (Figure 5.7).

Figure 5.7
Total Assets of Non-Bank Financial Institutions to GDP (%)



Source: IMF.

Insurance and Takaful Companies

Based on the FSB's classification, insurance and takaful entities are included in NBFIs, because some insurance corporations may be engaged in credit intermediation activities if they obtain the approval of the bank to pledge or charge any of its assets or securities, which results in maturity or liquidity transformation. Furthermore, by providing credit enhancements, they can also engage in credit creation activities. By offering insurance to credit and financial guarantees (mortgages), with certain limits, insurance has been facilitating credit creation activities (EF 4) by providing credit enhancements or writing puts on credit assets. In Malaysia, insurance companies are regulated directly by BNM, meaning they are considered to have the same level of protection as banks.

Provident and Pension Funds

In Malaysia, provident and pension funds (PPFs) accounted for the largest share of NBFIs, making up 46.4% of total assets of NBFIs and 18.4% of total financial system assets as at end-2018. PPFs, such as the Employment Provident Fund (EPF) and the Retirement Fund (Incorporated) (KWAP), are governed by their individual laws and monitored by the Ministry of Finance, while private pension funds are under the Securities Commission Malaysia's (SC)

supervision. The increase in PPF's share in Malaysian NBFIs continued from 2014 to 2017, with an average annual growth of 0.4 percentage points, with the most significant increase in 2017 of 0.7 percentage points. In 2018, however, PPFs' share decreased slightly to 18.4%.

Although deposits in the banking system continue to grow, deposits by PPFs began to moderate one the eve of the GFC in 2006, while deposits by other NBFIs began to grow at a slower pace during the crisis. Even so, PPFs remain a major provider of liquidity in the financial system in Malaysia, especially for banking institutions through the placement of their deposits. Aside from deposits, PPFs also plays a role in the movement of capital and bond markets by channelling liquidity. After the onset of the GFC in 2008, the return on assets (ROA) as well as PPFs' return on equity (ROE) increased significantly.

Malaysia's pension system consists of the civil service pension scheme, the fund of the armed forces (LTAT), social security organisation, employment provident fund (EPF) and social pensions. The most prominent players in the PPF sector in Malaysia are the Employment Provident Fund (EPF) and Retirement Fund (Incorporated) (KWAP). EPF is the managing entity of the national pension fund scheme for individuals employed in the Malaysian private sector and public sector. Employees and their employers make compulsory contributions based on the Employees Provident Fund Act 1991.

There are two basic structures for pension programmes in Malaysia, namely defined benefits (DB) or defined contributions (DC). Defined benefits are retirement programmes where the employer is responsible for paying a stream of benefits determined by a formula to a retired plan member and for bearing the risk if the programme's assets do not adequately fund the benefits. By contrast, defined contributions are programmes in which the interests of members are equal to the value of the accumulation of contributions of employers and employees in the accounts of members, and members who incur a loss if the accumulated assets are not able to provide sufficient funds for retirement.

PPFs' activities can pose a potential liquidity risk (SR 2) from asset reallocation errors that occur under restrictions if members are allowed to divert funds over a short time period. Some PPFs allow individuals to withdraw the amount invested for a short period, either in cash or as a transfer to other funds. In addition, PPFs can also lead to the potential build-up of leverage (SR 4), because of their involvement with derivatives or investing in less liquid assets.

Development Financial Institutions

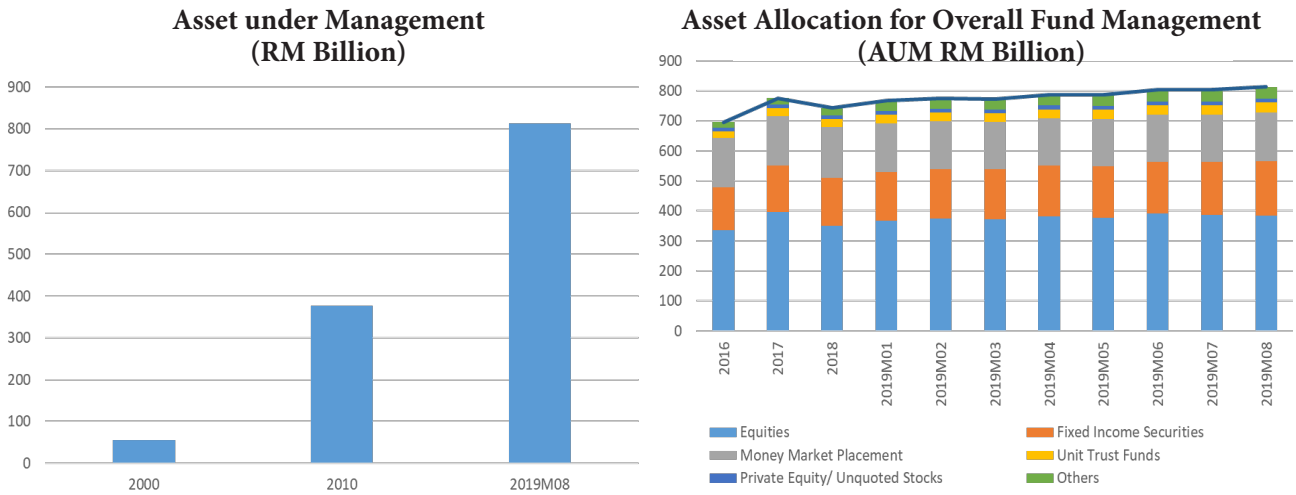
In Malaysia, Development Financial Institutions (DFIs) are specialised financial institutions established by the Government to carry out specific tasks in developing and promoting specific sectors that are considered both critical and strategic for the socio-economic development of the country. These sectors include agriculture, small- and medium-sized enterprises (SMEs), infrastructure, maritime, export-oriented sectors as well as capital-intensive and high-technology industries. DFIs play a role in equipping the banking sector to meet gaps in financial services and product supply to strategic areas aimed at building the long-term economy. There are two types of DFIs in Malaysia, namely those falling under the Development Financial Institutions Act 2002 (DFIA 2002) and those that are not regulated by BNM under DFIA 2002. Of the 13 DFIs in Malaysia, six are regulated under DFIA 2002 while the remaining seven are not.

The share of DFIs not regulated by DFIA 2002 in the Malaysian financial system is quite small. Neither did the evolution of DFIs in Malaysia see significant growth. In fact, it was quite stagnant over the past five years. In 2013, DFIs accounted for only 1.6%, which increased by just 0.2 percentage point to 1.8% in 2018. Based on the FSB report, DFI activities in Malaysia originate maturity/liquidity transformation risk and leverage. In addition, they are involved in the provision of loans that depend on short-term financing and the facilitation of credit creation, so that they are included in SR 1, SR 2, SR 4 as well as EF 2 and EF 4. But the fact that some DFIs are subject to prudent supervision while other DFIs are not falling under DFIA 2002 only occupy a small portion of Malaysia's financial system, effectively reduces some of those risks.

Fund Management Industry

Rising innovation has pushed cash pool activities in Malaysia to develop along with the increasing need for household and corporate financing. Besides PPFs, the fund management industry seems to be the most substantial part of NBFIs in Malaysia. Overall, its share of total assets of NBFIs and total financial system assets in Malaysia at end-2018 was 35.3% and 14% respectively. The Securities Commission Malaysia plays a role in regulating and preserving the fund management industry in Malaysia. The growth of the fund management industry in Malaysia is on a declining path, which can be seen from the average annual growth rate of –12% over the past six years. Figure 5.8 shows assets under management in Malaysia, which have experienced a significant increase from MYR55.2 billion in 2000 to MYR813.58 billion in August 2019. The largest asset allocation in Malaysian fund management is in equities (47.2% in August 2019), followed by fixed income securities (22.2%) and money market funds (20.2%).

Figure 5.8
Assets under Management in Malaysia

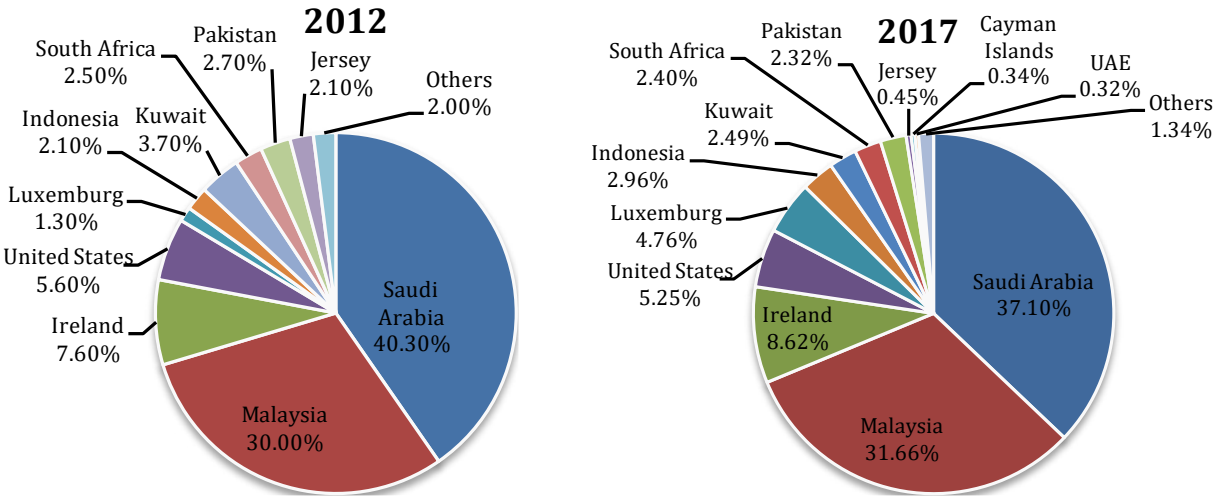


Source: Securities Commission Malaysia.

Two developments are worth pointing out. One, a strategic encouragement of the Malaysian authorities has been reflected in the development of the domestic capital markets. Two, Malaysia operates a dual financial system, which has boosted the demand for Islamic funds in the country. In fact, Malaysia has the largest global market for Islamic funds after Saudi Arabia. Figure 5.9 shows the market share of Islamic funds' assets

over the last five years: the percentage of Islamic funds' assets in Malaysia is still the second largest in the world and has increased from 30.0% in 2012 to 31.7% in 2017. The equivalent number for Saudi Arabia, which has the highest amount of Islamic funds' assets in the world, decreased from 40.3% in 2012 to 37.1% in 2017.

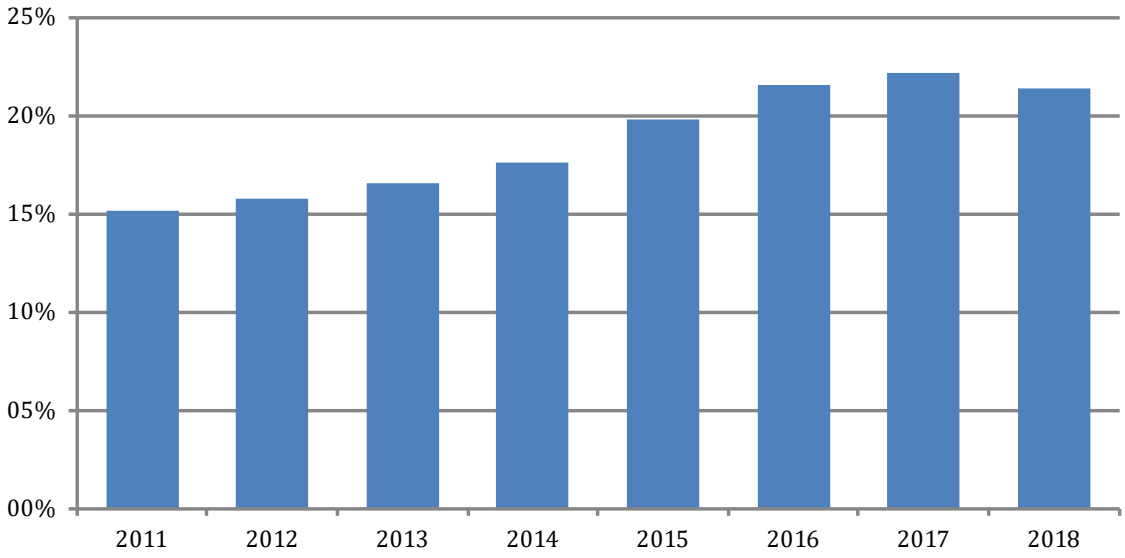
Figure 5.9
Share of Global Islamic Funds' Assets, 2012 and 2017



Source: Securities Commission Malaysia.

In Malaysia, Islamic assets under management grew modestly. The market share of Malaysian Islamic assets under management has shown gradual growth over the years. As such, Islamic AuM accounted for 15.2% of Malaysia's total fund management industry in 2011, rising to 21.4% in 2018 (Figure 5.10). But from 2017 to 2018, the share of Malaysian Islamic AuM fell by 0.8 percentage points.

Figure 5.10
Share of Islamic Assets under Management (%), 2011-2018



Source: Securities Commission Malaysia.

The size of the fund management industry in Malaysia is due to several factors, including the role of unit trust funds (UTFs) as a means for households to accumulate wealth, both directly through investments in securities or indirectly through savings in the EPF scheme. In contrast to money market funds (MMFs) in the US, UTFs in Malaysia do not transmit large shocks to the financial system, mainly due to their long duration.

Table 5.1
Composition of Household Sector Assets in Malaysia, 2013-2017

	Deposits	Unit Trust Funds (Fixed and non-fixed rate)	Equity holdings	Insurance policies*	EPF contributions	Housing wealth
2013	18.14%	9.93%	9.16%	3.20%	15.94%	43.64%
2014	18.00%	9.37%	8.15%	3.17%	16.35%	44.95%
2015	17.93%	8.89%	7.60%	3.20%	16.73%	45.65%
2016	17.87%	8.66%	7.16%	3.21%	17.00%	46.10%
2017	16.68%	9.28%	6.86%	3.16%	16.70%	47.32%

* Surrender value
Source: BNM.

Based on the composition of household assets (Table 5.1), UTFs only accounted for a share of 9.3%. Moreover, their average annual growth rate was negative from 2014 to 2016, followed by a sizeable increase of 7.2% in 2017. In 2017, UTF accounted for 9.3% of the composition of household assets, with an average negative annual growth rate from 2014 to 2016, followed by a sizable increase of 7.2% in 2017. UTFs in Malaysia played an important role in providing financial liquidation because, in addition to depositing capital in the form of deposits, the composition of households placing their deposits in UTF is quite large and increasing. In fact, it exceeded the household's share in equity holdings in 2017. Based on the economic function of the asset management industry, which acts as the management of the client's cash pools, they possess features that make them susceptible to runs (EF 1). In addition, the Malaysian fund management industry is exposed to the risks of maturity transformation, liquidity transformation and leverage (SR 1, SR 2. and SR 4).

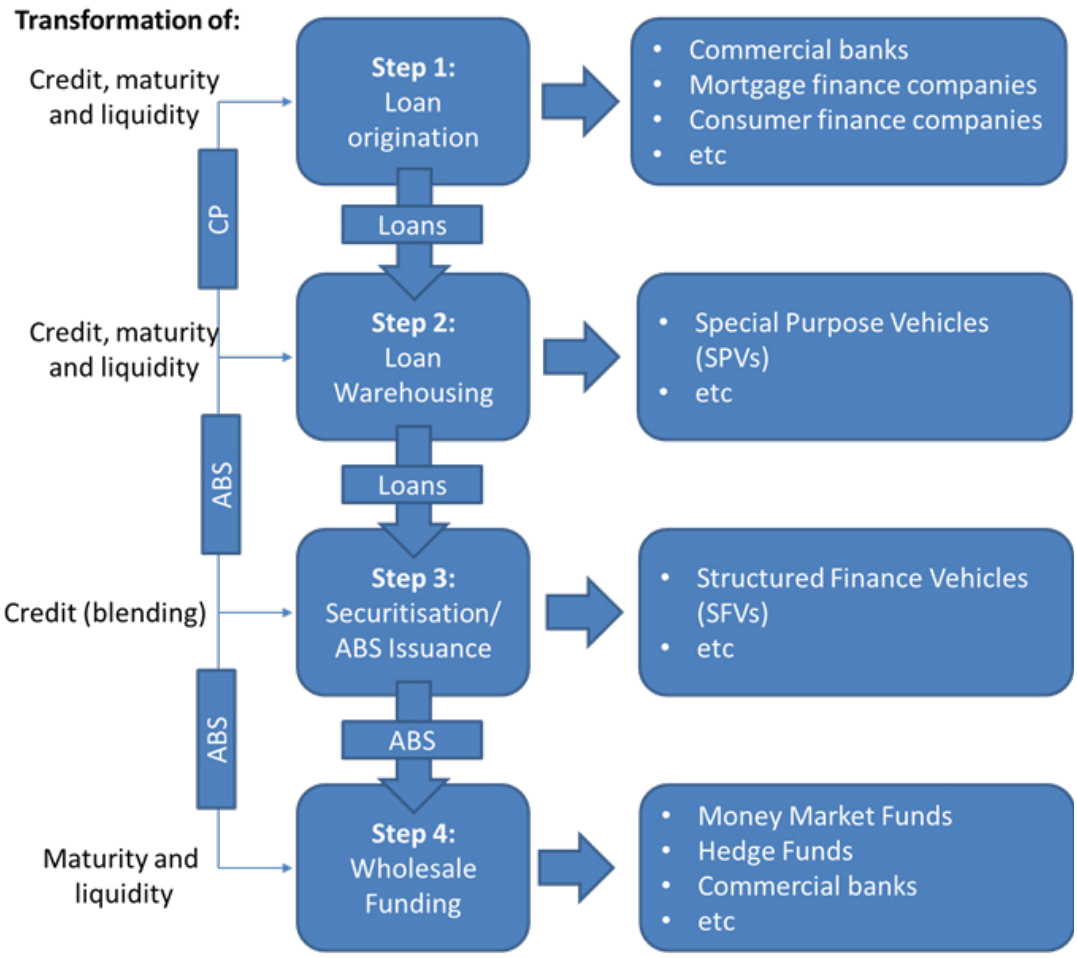
Securitisation Vehicles

Securitisation activities involving bonds are also growing rapidly in Malaysia, mainly due to the government's continuous efforts over the past two decades to turn the Malaysian bond market into the largest bond market in Southeast Asia (Farid, 2013). Even so, the share of activities by securitisation vehicles in Malaysia over the past six years has continued to be small. The low securitisation can be explained by the significant role of banks in the provision of both financial liquidity as well as traditional loans and the purchase of plain vanilla debt securities and equities. The share of securitisation vehicles in the Malaysian financial system is quite small. Moreover, the growth rate of Malaysian securitisation vehicles did not experience a significant increase. Instead, it was quite constant over the last five years. In 2013, securitisation vehicles accounted for only 1.6%, and this share increased by 0.1 percentage points to 1.1% in 2018.

The issuance of asset-backed securities (ABS) in Malaysia is dominated by Cagamas MBS Berhad, which is a subsidiary of the national mortgage company Cagamas Berhad. The latter, founded in 1986, is a government-owned business entity engaged in mortgage financing, initiated the growth of commercial mortgage-backed securities (CMBS) in Malaysia. Cagamas MBS, which is a national mortgage company that bridges long-term investors and mortgage lenders, acts as a Special Purpose Vehicle (SPV) by issuing financial instruments to capital market players. Although the products are asset-backed securities supported by Treasury housing loans, this fact makes the product safer compared to ABS issued privately. This is because Treasury housing loans are only provided to Government employees and are based on monthly salary deductions.

For the time being, complex market-based funding structures, such as structured investment vehicles (SIVs) and asset-backed commercial paper conduits involving maturity or liquidity transformation, are still rare in Malaysia (Figure 5.11). This, therefore, reduces the potential for shocks due to the vulnerability of NBFIs, which can cause a drying up in market liquidity. This is exactly what happened in several developed countries, especially the US, during the great financial crisis. In Malaysia, Securitisation Vehicles are identified as shadow banking because they carry out securitisation and fund the activities of financial entities (EF5).

Figure 5.11
Credit Intermediation Chain in Malaysia



Source: BNM.

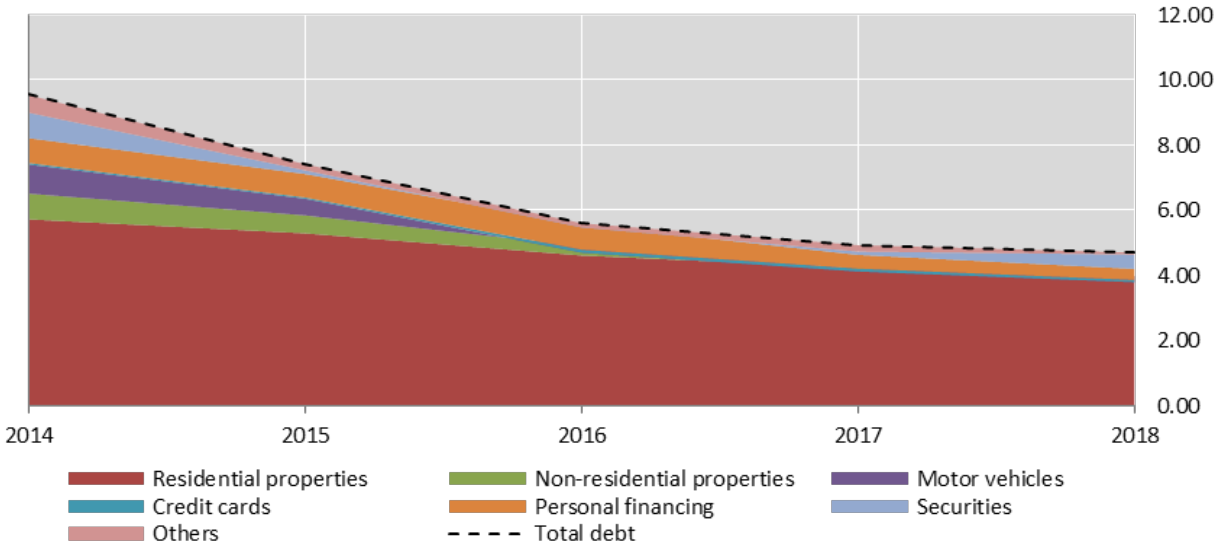
Other Non-Bank Financial Institutions

Apart from banking, another big source of traditional personal financing in Malaysia comes from the provision of credit by non-banks, with a sizable portion occurring via credit extension. Non-bank credit providers include co-operatives, leasing and factoring companies, building societies, pawnbrokers, money lenders, non-bank providers of education financing, non-bank providers of hire purchase financing, government-owned trustee companies and social security organisations. That fact notwithstanding, banks are still the major providers of household credit financing, which is followed by the Treasury for financing the purchase of properties and cars (BNM, 2013). The main purpose of non-bank credit occurs as the primary source of financing in specific segments of the population, such as debtors in middle- and low-income groups or to finance small businesses.

In Malaysia, although cooperative activities are considered to pose risks arising from maturity and liquidity transformation as well as leverage (SR 1, SR 2 and SR 4), loan provision activities are funded through member contributions that rely on long-term financing and are regulated by the Malaysian Cooperative Societies Commission, so that cooperative activities in Malaysia are not classified as shadow banking.

Figure 5.12
Household Sector – The Contribution to Growth in Debt

In Percent



Source: BNM.

In addition, a brokerage entity is not considered to be engaged in shadow banking activities because shareholders fund most of the activities carried out by brokers and clients are given margin loans upon request. FSB concluded that brokerage fell under EF 3, because it was performing intermediation activities that rely on short-term funds, in addition to which it has the potential to leverage risk (SR 4). Based on the SR 1, SR 2, SR 4 and EF 2 indicators, building societies in Malaysia are identified as shadow banking, because these institutions carry out activities in maturity or liquidity transformation and short-term deposits primarily fund leverage.

Besides, there is no formal prudential institution that oversees the activities and institutions of building societies. Pawnshops in Malaysia have limited primary assets (gold) and usually only carry out activities on a small scale aimed at meeting retail needs. The rather limited and simple activity by pawnshops means they have low leverage (SR 4), so the risk they pose is not systemic. Therefore, pawnshops are not categorised as shadow banking in Malaysia. Based on FSB (2014), leasing and factoring companies are considered primarily funded by short-term deposits (EF 2).

The real estate market is quite attractive to households in Malaysia. We can see from Figure 5.12 that residential properties contribute the most to household debt growth. Although the growth in debt for residential properties has declined, household sector growth has also fallen in all aspects. In Malaysia, banks face stiff competition from NBFIs such as savings and loan associations, mortgage banks and credit societies. According to Carmichael and Pomerleano (2002), demographic developments are the dominant factor for growth of the real estate market. The impetus for the construction of new homes comes from population growth and wealth, followed by increased urbanisation and housing investment. The high level of competition in the real estate market is also inseparable from regulatory arbitrage which makes financing companies and non-bank real estate development agencies enter the market and compete with banks and insurance companies in providing mortgage loans. But in terms of financing for the household sector, which includes personal financing, property financing and credit cards, the market share of non-bank credit providers remains small compared to the extended market share of funding by banks, accounting for around 2% of the total financing disbursed to households (Figure 5.12).

The large housing market in Malaysia has created a commensurate demand for mortgage financing. This leaves mortgage companies exposed to risks arising from the transformation of maturity and liquidity. Moreover, leverage is involved in facilitating credit creation and securitisation (SR 1, SR 2 and SR 4; EF 4 and EF 5). Based on the FSB criteria and the limited prudential requirements for this type of financial activity, mortgage companies are included in the shadow banking category.

New Forms of NBFIs: Online Platforms

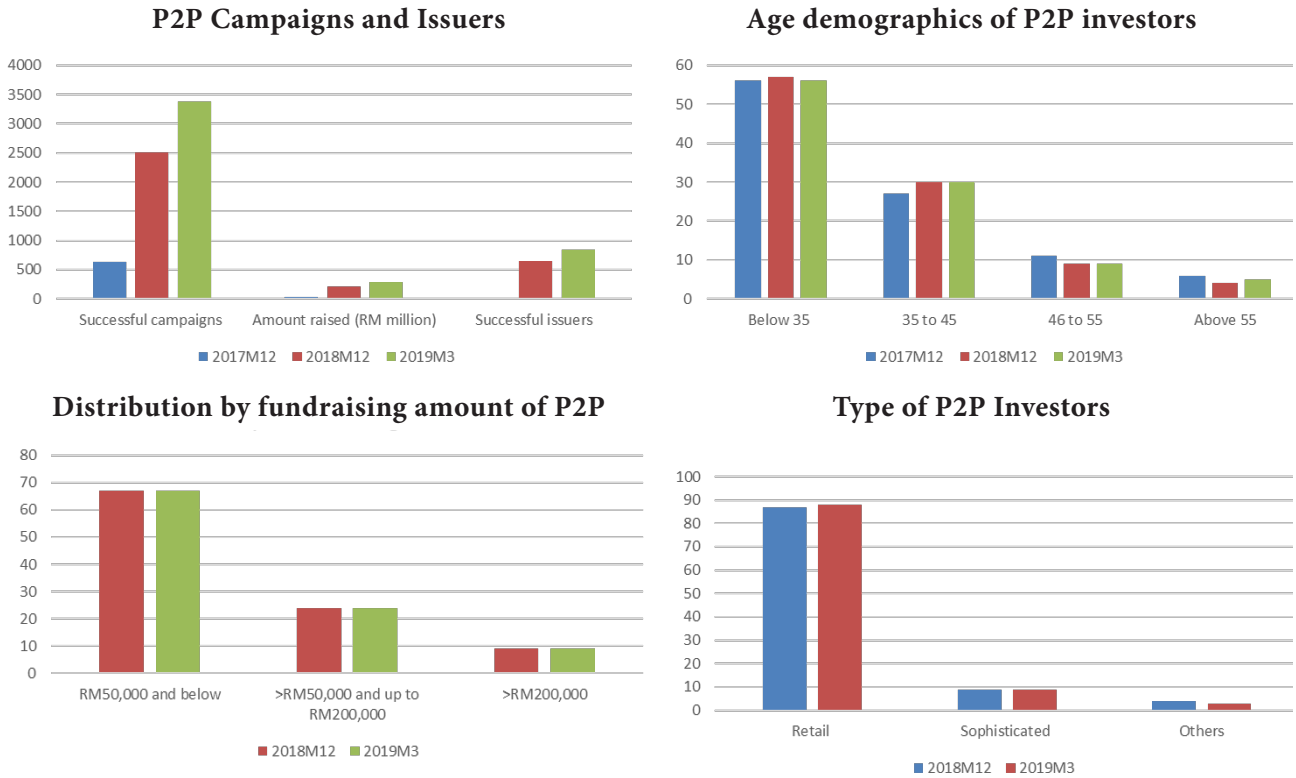
The framework in support of FinTech in Malaysia began in 2015 when the SC initiated the formation of an industry network group called aFINity (Alliance of FinTech Community), which is meant to encourage more advanced financial innovations and a deepening of the capital market in Malaysia. Through aFINity, which is an industry-led FinTech support group, the SC promotes the development of FinTech by providing policy and regulatory clarity, as well as being a forum for FinTech discussions with other relevant authorities and government agencies, so that FinTech entrepreneurs can develop value chains from the design of solutions and business arrangements to commercialise innovation.

In Malaysia, the number of online or financial technology (FinTech) non-bank entities extending credit or facilitating credit creation through peer-to-peer lending or crowdfunding has been growing. The barriers to accessing capital market financing by small companies, especially micro-, small- and medium-sized enterprises (MSMEs) and start-up in this era of digitalisation, led the SC to release a legal framework to encourage

and improve access to finance for FinTech institutions. With the Securities Commission Malaysia's release of the legal framework on Equity Crowdfunding (ECF) in February 2015, Malaysia became the first ASEAN country to do so. At that time, seven of the 27 registrants as ECF operators were selected as "recognised market operators".

The development of FinTech in Malaysia continued with the SC issuing a legal framework on peer-to-peer (P2P) debt financing in August 2016. This new framework introduced an alternative channel to obtain funding for small companies through fundraising in the capital markets based on sophisticated technological advancements. Both platforms have stimulated the interest of young investors, especially those aged 35 years and younger, while most investors on both platforms are retail investors. This shift in participation from the traditional stock market to the online platforms can be gauged from the size of the involvement of young investors in the Malaysian Stock Exchange, which is only around 20%.

Figure 5.13
Development of P2P in Malaysia

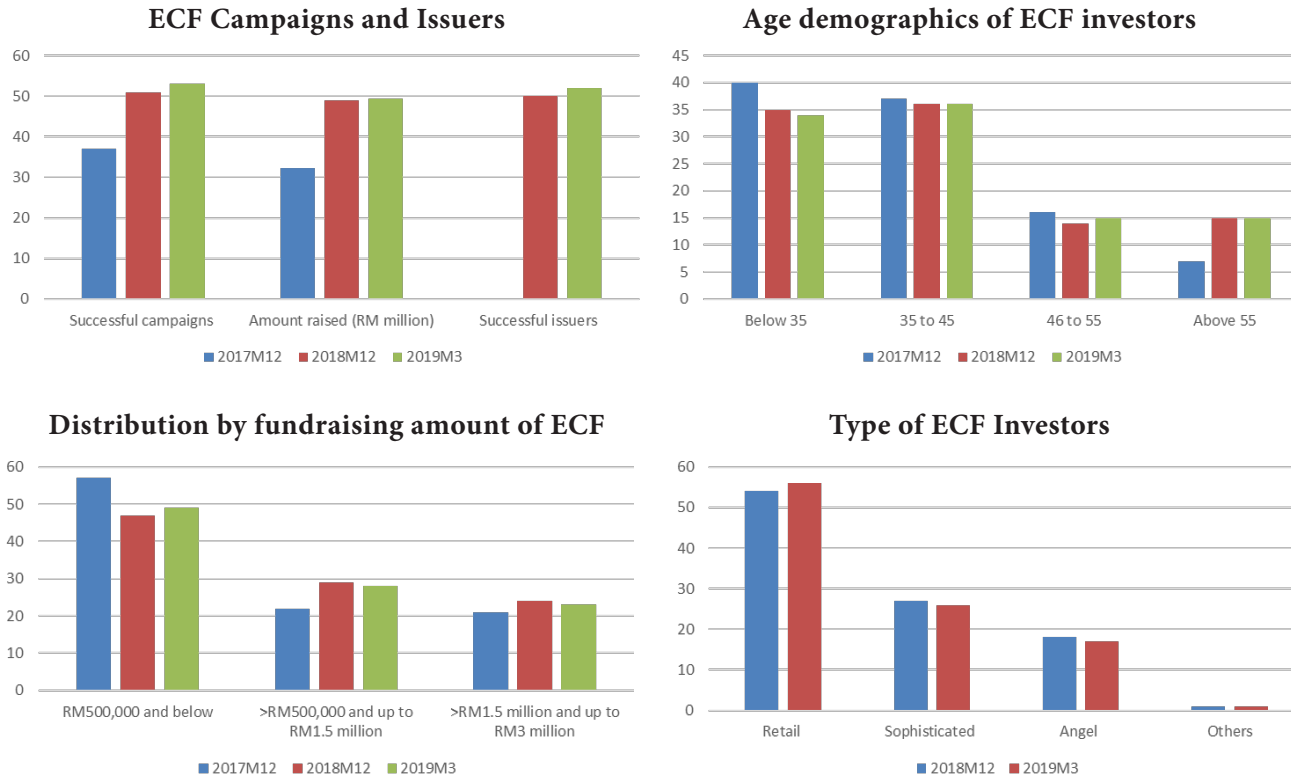


Source: Securities Commission Malaysia.

Besides forming aFINity to facilitate access to investment management industry services for retail investors, SC launched the Digital Investment Management (DIM) framework in May 2017. The initial idea was that investors could access and enjoy professional services from portfolio managers. This scheme was intended for high net worth (HNW) investors only. But the DIM regulatory framework expanded its reach by enabling all communities in Malaysia to offer automated portfolio management services, without regard to their net worth or income level. In other words, retail investors from all walks of life can invest at low costs and affordable prices without having to sacrifice investor protection.

Based on the SC report, crowdfunding is defined as a form of fundraising. Originally, funding for business ideas and business operations could only be obtained by collecting money from family and friends. Now, the same funding to support a business venture, project or a cause can be obtained from a global community through an online platform. In Malaysia, there exist two broad categories of crowdfunding, which are investment- and non-investment-based. Investment-based crowdfunding consists of Equity Crowdfunding (ECF) and P2P financing, both of which are regulated by the SC. In contrast, non-investment-based crowdfunding could be charity or reward-based crowdfunding and for this category, the SC does not have restrictions.

Figure 5.14
Development of Equity Crowdfunding in Malaysia



Source: Securities Commission Malaysia.

ECF is a type of crowdfunding that is based on long-term investment using technology to reach the market. The emergence of ECF has changed the dynamics of capital markets because it allows ordinary investors to enter the wealth-creation arena, which previously was limited to venture capitalists (VCs) and angel investors. It facilitates access to capital, which benefits entrepreneurs and small businesses. This platform, together with the related regulatory reform, allows private companies with local legal entities to offer their shares to the public. This allows newly created companies as well as SMEs to access alternative funding sources to grow their businesses.[2] Previously, private companies in Malaysia were generally not allowed to offer their shares to the general public.[3] The ECF framework has benefitted both borrowers and funders, who can provide alternative funding sources for start-ups and SMEs as well as opportunities to diversify the investment products of

2. The Capital Markets and Services Act (CMSA) 2007.
3. Section 15(1)(c) of the Companies Act 1965.

investors. Therefore, the existence of the ECF was accompanied by the democratisation of finance and much higher financial inclusion in Malaysian capital markets. The ECF framework was launched in February 2015 by the SC with six ECF platforms registered at the Synergy and Crowdfunding Forum (SCxSC), comprising Alix Global, Ata Plus, Crowdonomic, Eureeca, pitchIN and Propellar Crowd +.

To keep financial activities in the field in Malaysia safe and well-regulated, the SC proscribed certain restrictions which are contained in the Capital Markets and Services Act (CMSA) 2007:

1. **The operation of the ECF platform is carried out by Market Operators registered with the SC**. Operator must ensure that the issuer is hosted by the platform regulations agreed to by SC so that the investor's pool of funds is protected in a trust account until the purpose of the agreement is fulfilled.

2. **One company can only be hosted by one platform at a time**. The company is only allowed to collect up to MYR3 million in a period of twelve months, regardless of how many projects it has, with a maximum capital of MYR5 million, after which it can no longer seek further funding on an ECF platform.[4]

3. **There are limits to the total amount of investment by investors**. In light of investor expenses for all and the high risks associated with the ECF platform for investors, especially for novice investors, the following rules apply:

   a. **Sophisticated Investors**[5]

      Investors belonging to this group are not bound by the restrictions regarding the amount of investment;

   b. **Angel Investors**[6]

      This group has a maximum investment limit of MYR500,000 with an investment period limited to twelve months;

   c. **Retail Investors**[7]

      For groups that include investors with a limited capital base, the maximum total investment is MYR5,000 per issuer, with a total of less than MYR50,000 in a twelve-month period.

Unlike the ECF, which is an online fundraising platform with equity investment products, P2P is medium-term crowdfunding with investment note products. As such, investors receive several regular payments according to a predetermined payment schedule, which can be monthly or quarterly. P2P financing provides another option for business owners to obtain funding at relatively lower costs compared to traditional sources such as bank loans, or by giving up control of their business operations through equity sales.

4. It does not include the company's capital contribution, or any funding obtained *via* private placement.
5. Persons referred to in Part I of Schedules 6 and 7 of the CMSA.
6. For the purposes of the SC's ECF framework, such an investor is defined in the Guidelines on Recognised Markets as "an investor that is accredited by the Malaysian Business Angels Network as an angel investor".
7. Persons who are not sophisticated investors.

In April 2016, the SC introduced the regulatory framework for P2P financing. Six P2P financing platforms registered at the Synergy and Crowdfunding (SCxSC) Forum, namely B2B FinPAL, Ethis Kapital, FundedByMe Malaysia, Manage Pay Services, Modalku Ventures (Funding Societies) and Peoplender (Fundaztic). In a sense, the operation of P2P financing is very similar to the issuance and subscription of corporate bonds or even bank loans. One difference in P2P funding for companies is that business risk assessments are not conducted by traditional credit rating agencies, but rather by the P2P financing platform operators who have their own risk assessment criteria.

Like the ECF, P2P financing also has certain limitations set by the SC:

1. **The operation of the P2P financing platform is carried out by the operator platform registered with the SC**. Platform operators serve as market providers and serve as intermediaries, so operators must ensure that fundraisers follow the rules and provide appropriate rating scores. Should the fundraiser rating indicate a high risk of default, the operator will set a higher level of financing, with a maximum financing rate of 18% per year without prior consultation with the SC.
2. **There are no funding restrictions imposed on businesses that use the P2P financing platform**. Before the funds are released, however, a company needs to raise at least 80% of the financing target amount. If the incoming funds exceed the target amount, then the money will either be returned or the additional offer can be reject, as the case may be, following its rules.
3. **There are no investment restrictions imposed on investors**. For sophisticated and angel investors, the P2P platform does not provide funding limits, but retail investors are encouraged to limit their investment to a maximum of MYR50,000 at any time.

Table 5.2
Differences between P2P Financing and Equity Crowdfunding (ECF) in Malaysia

Details	P2P Financing	ECF
Investment instrument	Investment notes	Shares
Nature of investment	Debt-like features; the fixed amount of periodic repayments of capital and interest (or profit)	Equity and dividends will be declared when profits are made
Rights of investors in case of insolvency	Creditor	Shareholder
Who can invest	Everyone	Everyone.
Limits on investment	**Sophisticated investor** No limit **Angel investors** No limit **Retail investors** The maximum investment is MYR50,000 on any P2P platform at any time	**Sophisticated investor** No limit **Angel investors** Maximum of MYR500,000 within a twelve-month period **Retail investors** The maximum investment is MYR50,000 per company, with a total amount of less than MYR50,000 within a twelve-month period

Who can raise funds?	**Locally registered** - Sole proprietorships - Partnerships **Locally incorporated** - Limited liability; partnerships - Private companies - Unlisted public companies	Locally incorporated private companies[8]
Limits on fundraising	No limit on fundraising	MYR3 million within twelve months On top of that the maximum capital is MYR5 million and entities can only utilise the ECF platform once; after that, the company can no longer seek further funds on an ECF platform
Minimum amount to be raised to constitute successful campaigns	At least **80%** of the target amount must be allocate Any amount exceeding the target amount shall not be kept	The target amount must be **fully met** for fundraising to be released to companies seeking funding.
Who can operate platforms?	Only SC-registered operators can operate P2P financing platforms	Only SC-registered operators can operate ECF platforms
What are some of the inherent risks	- Default - Lack of liquidity - Fraud	- Business failure - Lack of liquidity - Fraud

Source: *The Reporter*, Securities Commission Malaysia (2017).

Innovations in P2P financing and crowdfunding continue to spawn a rapidly increasing number of entities. Beginning in 2018, the FSB started to discuss including online platforms in the technology-based non-bank entity group, as they provide credit or facilitate credit creation (FinTech credit). The FSB classifies most online platform entities under EF 2, reflecting the fact that they are making loan provisions that depend on short-term funding.

5.2.3 Regulation

The increasing integration of the banking, securities and insurance markets has led to a shift in regulation of the financial sector from the traditional sector-by-sector approach to supervision in a broader and more encompassing manner. The surveillance of the securities markets is still separate and is conducted by the Securities Commission (SC) as a statutory body entrusted with the responsibility of regulating and systematically developing the capital market in Malaysia. Banking supervision, on the other hand, is conducted by the central bank (BNM). However, Bank Negara Malaysia must ensure the safety and health of financial institutions in Malaysia by applying best practices, sound governance and appropriate risk management in its supervisory functions. A holistic review of the supervisory and financial management functions to achieve higher levels of efficiency and effectiveness in integrating the supervisory role has supported BNM's realignment in this regard. One consequence has been a realignment of the Department of Supervision, which

8. Companies incorporated under the Companies Act 1965 (and subsequently Companies Act 2016).

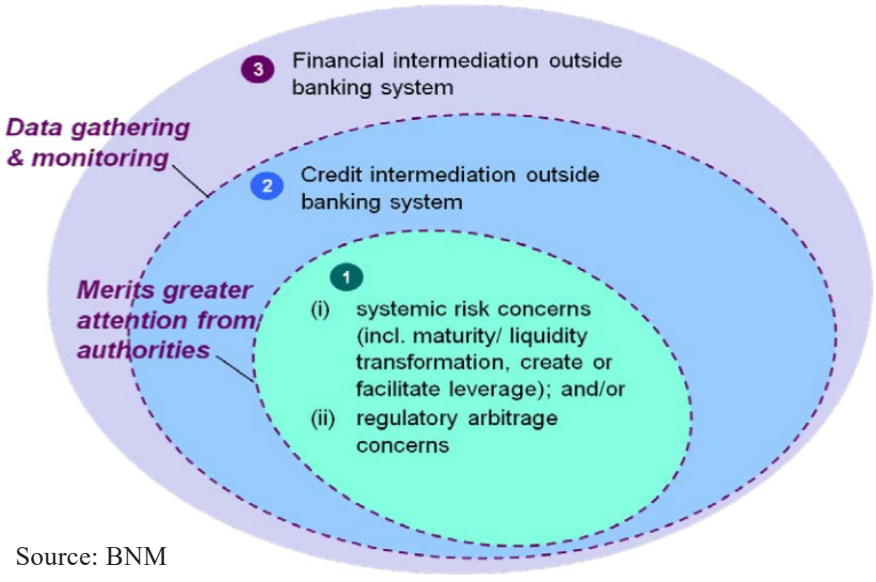
has moved towards supervision along functional lines and types of institutions, allowing BNM to identify trends and vulnerabilities that arise as a result of NBFI activities. The Supervision Department has three responsibilities:

1. **Financial Conglomerates Supervision**, which encompasses the supervision of domestic financial conglomerates;
2. **Banking Supervision**, which includes supervision of foreign banks, independent investment banks and all sharia banks including sharia banking branches of domestic banks;
3. **Insurance and Takaful Supervision**, which is tasked with overseeing insurance companies, reinsurance companies, takaful operators, reclaim operators and international takaful operators.

The rapid development of integrated finance, the complexity of banking activities and the emergence of new entities in credit intermediation gave rise to new risk factors and sustainable changes in the financial landscape. These developments require us to expand risk assessments, both at the level of individual institutions and for the system as a whole. Therefore, BNM created specialised risk units on credit, markets, operational issues, insurance and technology risk in the Supervision Department. Their duty is to monitor and examine developments and risk trends in the financial system, as well as to serve as the regulatory and supervisory body of non-bank financial institutions (NBFIs).

The growth of shadow banking in Malaysia cannot be separated from the role of the government in developing the financial system. The rapid development of shadow banking, accompanied by technological innovations, makes regulatory planning dynamic and varied for the different entities. Building a monitoring framework for a stable shadow banking system in Malaysia is a big challenge for the surveillance of the shadow banking system in Malaysia. Referring to the high-level principle approach that has been proposed by the FSB, Bank Negara Malaysia (BNM) developed a supervisory framework for shadow banking in Malaysia (Figure 5.15).

Figure 5.15
Surveillance Framework for Shadow Banking



Source: BNM

Based on its shadow banking supervision framework, BNM has grouped entities included in the shadow banking group based on their activities into three levels or circles. Circle 1 contains entities that require more extensive supervision from the authorities, mainly because of the potential to generate systemic risk based on the close relationship with the banking system, which includes exposure to bank funds entering shadow banking entities, placement of deposits at banks and the size of financial institutions owned. In addition, they perform activities that have the potential to result in maturity or liquidity transformation, create or facilitate leverage and regulatory arbitrage. Entities with large balance sheets pose substitutability problems. Moreover, Circle 1 also includes entities that have the power to move markets through their substantial participation in the capital and money markets. In other words, entities in Circle 1 are NBFIs classified into narrow shadow banking based on the FSB (OFI) criteria.

In Circle 2, we find entities that are involved in both direct credit extension and those that act as part of the credit intermediation chain but do not yet give rise to potential systemic risk. Most NBFIs belong to this group. On a positive note, supervision of entities in Circle 2 can be enhanced to make it an integral part of the surveillance framework through data collection and monitoring. The remaining financial institutions are in Circle 3, which includes entities outside the definition of shadow banking, but that are still part of financial intermediation by their channelling of capital flows from suppliers to end users of funds, such as institutional investors providing equity funding and venture capital investment. Private equity and Venture Capital describe non-bank entities that facilitate the implementation of the credit intermediation process.

Table 5.3
The Information Required to Evaluate the Entity's Risk Profile

Information Required/Risk Profile	Types of Information
Information about the facilitation of assessment on the magnitude of the interlinkage of financial institutions and the position of market risk	• The allocation of the asset at cost and market value, as well as at local and foreign currencies • The concentration of assets in a specific industry • The derivatives' positions and their off-balance-sheet data • The magnitude of exposures to the repurchase agreement (repo) market • The size of borrowing from banks or other financial institutions • The magnitude of credit exposures over financing granted and investment in private debt securities (PDS) • The growth of analysis on the profile and concentration of contributors to fund
Information about the risk position of liquidity	• The maturity profile of assets and liabilities • The analysis of asset-liability mismatches • The share of assets held in liquid assets • The reserves of cash • The cash-flow position • The determinants of income and expenditure

Source: BNM.

To support the implementation of this framework and to strengthen its operating capacity, BNM has improved the legislative framework through the Central Bank of Malaysia Act 2009. The latter empowers BNM to collect information about non-bank entities outside its regulatory perimeter, so that it can monitor and, if and when needed, reduce risks that arise in the financial system as well as provide direction for financial stability. In addition, to supervise entities that are not under BNM's supervision, but that are involved in financial intermediation activities, regulatory gaps were addressed by the 2013 New Financial Services Act (FSA) and the 2013 Islamic Financial Services Act (IFSA). The latter two legislative measures allow for the imposition of rules and supervision by BNM if a non-bank entity is deemed to create systemic risks that might pose a potential danger for overall financial stability. BNM's summary of the information needed to assess an entity's risk profile is shown in Table 5.3.

Another boost to BNM's supervision of NBFIs comes from enhanced cooperation arrangements between institutions, which establish more policy coordination and implementation, both through formal and informal channels. Examples include memoranda of understanding (MoU) and periodical engagements. BNM has coordinated with the Securities Commission Malaysia and the Malaysian Cooperative Societies Commission through the signing of MoUs.

5.3 Prospects for New Forms of Financial Intermediation

5.3.1 The Digital Agenda for Malaysia's Capital Market 2016

The well-diversified financial system in Malaysia has led to a high level of activities in various forms of credit diversification. In the Malaysian environment, such transactions are not only offered by banks through mobile banking (m-banking) but also through non-bank services. Moreover, the stringent lending regulations by banks after the 2008 GFC presented new opportunities for online platform lenders to fill the gap. This diversification has created lower costs and encouraged competition in products and services, both among non-bank credit partners and the banking sector, to create a more efficient and innovative payment landscape, given the growing demand by users. Fund managers and asset-management companies also developed innovations that encouraged public demand for their services, such as the use of robot-advisors. On top of that, securities brokers introduced online brokerages to boost profits.

The rapid growth of FinTech in Malaysia led to the Securities Commission Malaysia's (SC) publication of the Digital Agenda for Malaysia's Capital Market in 2016. The agenda contained the SC's vision for developing a FinTech industry for the Malaysian capital market holistically. It included the identification of four strategic objectives in facilitating digital technology and innovation throughout the capital market with three regulatory principles for managing risks, engaging markets and educating investors. Figure 5.16 shows a snapshot of SC's digital agenda.

Figure 5.16
The Digital Agenda for Malaysia's Capital Market in 2016

Source: BNM.

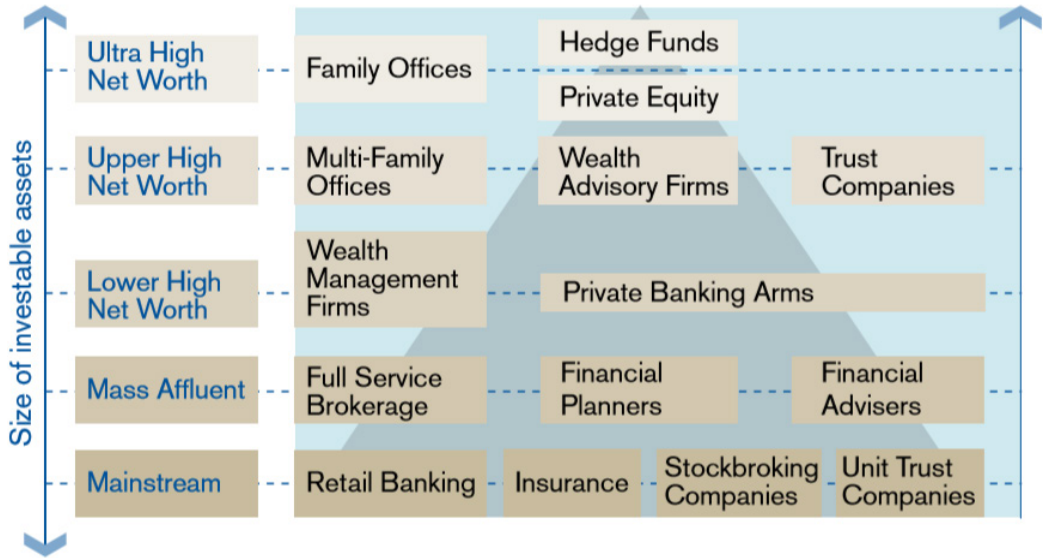
5.3.2 Financial Sector Blueprint 2011-2020

The growth of new frontier industries through innovative small- and medium-sized enterprises (SMEs) is one of the factors driving the high-income economy. But limited financing is a severe financial problem that needs to be addressed. Therefore, start-up companies require a funding ecosystem that is more diversified, vibrant and sustainable. A much higher amount of progressive and dynamic risk capital is needed, as well as substantial financing beyond that provided by traditional banking, to achieve all of these aims, especially in light of the large extent of diversification that has happened in the financial sector recently. These trends will expand credit intermediation activities through NBFIs, meaning that risk and vulnerability profiles will shift from banks to NBFIs. Moreover, the fact that household debt dominates the NBFI loan portfolio creates potential risks in the future. In response, Bank Negara Malaysia (BNM) has to ensure that lending activities, especially personal financing, shareholders and management of non- bank financial institutions (NBFIs), do not remain their main focus going forward. An investigation of risk profile factors will be necessary to identify risks that will arise in NBFI portfolios such as:

1. **The types of products and services offered by NBFIs**, so that risk priority resource supervision can be determined, as well as the demands of businesses and individuals.
2. **The scope of location and markets served by NBFIs** to determine the risk for each customer under the entity's management and reach a wider range both at the regional as well as the international level.
3. **Non-bank entity funding sources**, so that risk mitigation can be undertaken to reduce the cost of doing business in Malaysia and create a sustainable, strong and conducive financial ecosystem.

BNM introduced the 2011-2020 Financial Sector Blueprint (FSBP), which is a 10-year strategic plan that maps the future direction of the Malaysian financial system and outlines a transition to a high value-added and high-income economy. The blueprint provides a vision for the future Malaysian financial sector, allowing it to move forward to the next phase of more competitive and integrated environment, while also meeting increasingly complex and diverse economic needs. Figure 5.17 presents a wealth management landscape for Malaysia based on the Financial Sector Blueprint 2011-2020.

Figure 5.17
Wealth Management Landscape in Malaysia



Source: Financial Sector Blueprint 2011-2020.

The blueprint also provides BNM's recommendations to achieve its goal by 2020, which is to encourage the Malaysian financial sector to reap the benefits of a high value-added, high-income Malaysian economy. In addition, the resulting growth needs to be translated into the inclusiveness and sustainability of productivity gains and innovation, so that they can play a vital and competitive role in the financial growth of emerging Asia. There are three characteristics the financial sector needs to achieve:

Source: Financial Sector Blueprint 2011-2020.

The Financial Sector Blueprint 2011-2020 prioritises three primary efforts as the focus of financial sector reform to address the challenges of global financial markets, namely:

a. **Strengthening the resilience of financial institutions**

The evidence for consolidation, restructuring and rationalisation amongst domestic financial institutions in Malaysia attests to the development of larger-scale institutions and encourages investment in the technology and innovation sectors. When underpinned by improvements to safeguard and risk management systems, as well as strengthened governance structures and regulations, these institutions should be more resilient and be able to regenerate capital structures and absorb loan losses which, going forward, fosters the competitiveness of domestic financial intermediaries.

b. **Developing the domestic financial infrastructure**

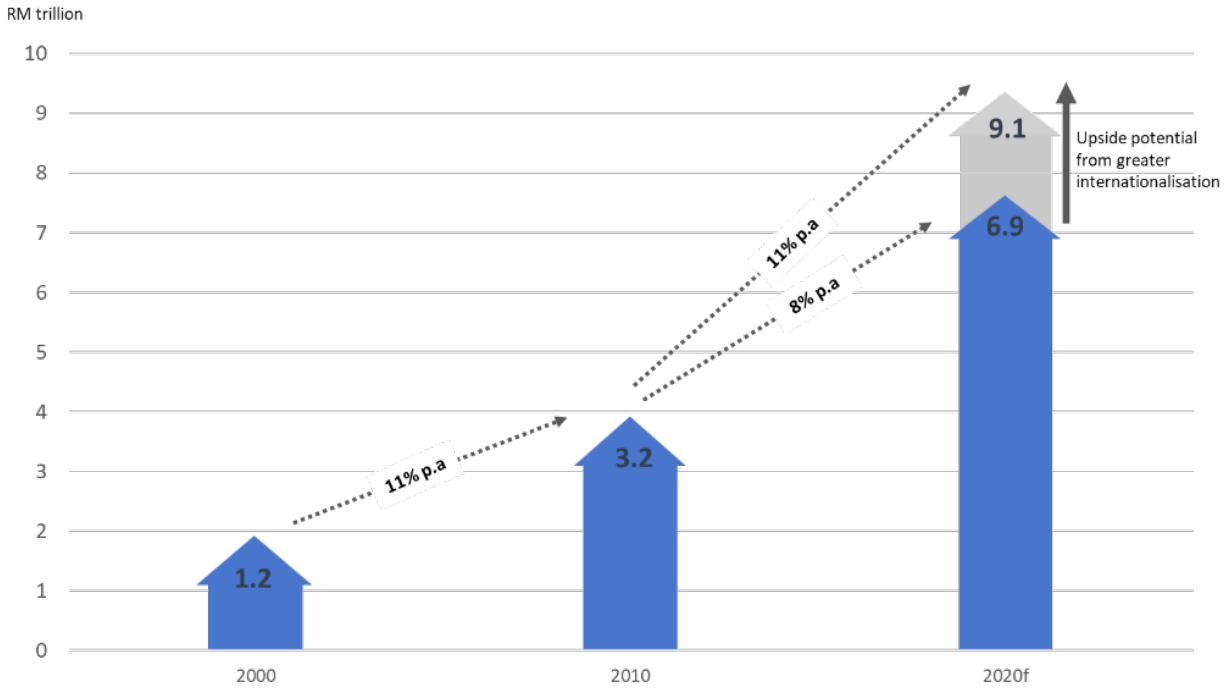
The growth of domestic debt securities markets and the robustness of payment and settlement systems are crucial factors in supporting the development of the intermediation function in the financial system.

c. **Improving the financial stability framework of Bank Negara Malaysia**

Strengthening the financial system framework and regular governance are under the aegis of Bank Negara Malaysia, which focuses on potential risks and preventive actions to avoid shocks that may arise in the financial system.

In addition, a recommendation in the Financial Sector Blueprint 2011-2020 encourages the development of activities outside the banking system, such as non-bank credit and financial intermediation activities. The latter can be supported by the promotion of credit reports, which integrate credit information from various sources and provide a health assessment of consumer credit behaviour to avoid default. In future, efforts will be made to expand the collection of information by entering credit information from non-bank financial institutions, telecommunication companies, utilities and other relevant sources coming from authorised credit reporting agencies.

Figure 5.18
Size of the Financial System in Malaysia*



* Proxied by loans outstanding, equity market capitalisation and bonds outstanding.
Source: Capital Market Masterplan 2 and Bank Negara Malaysia.

In addition, the Blueprint also offers innovative financial solutions to support the growth of the Islamic fund and wealth management industry to meet the increasingly diverse and sophisticated investment demands and make Malaysia a regional and international centre for Islamic funds and wealth management.

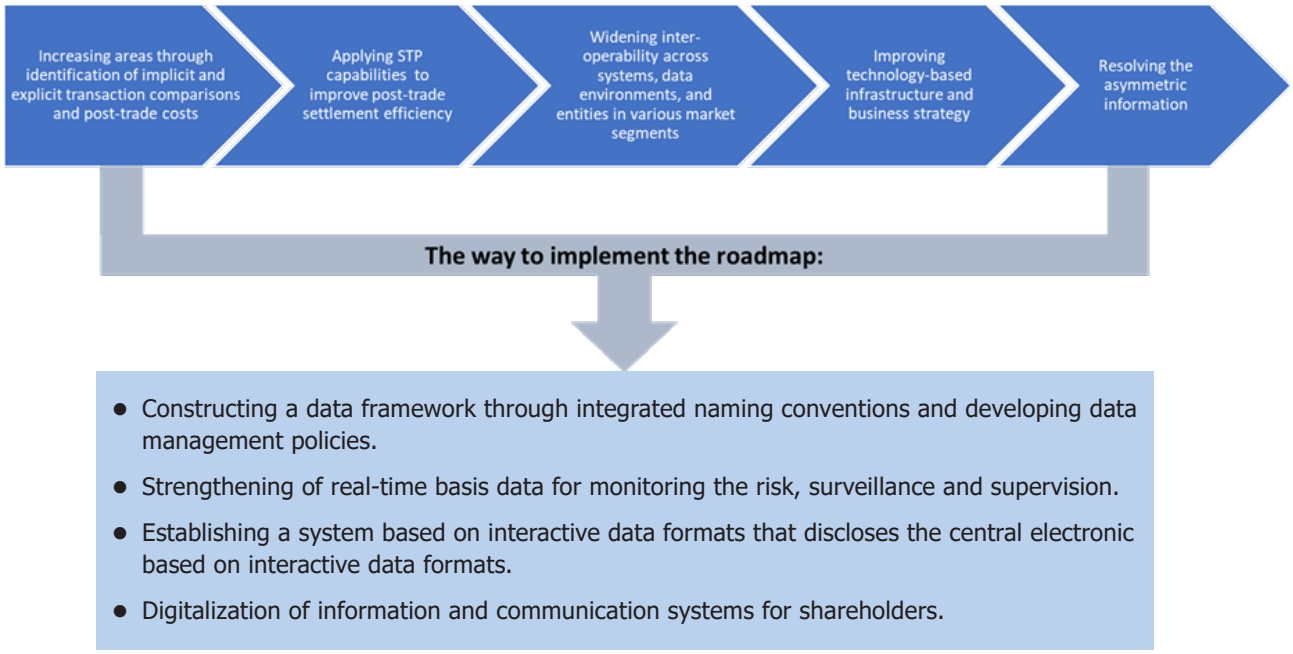
5.3.3 Capital Market Masterplan 2

Capital market intermediaries perform the important role of connecting customers with products. The long-term development of the capital market requires certainty about the direction and higher transparency among market participants. In this regard, the more volatile and complex environment necessitates providing solid foundations for the capital markets of the future. As such, the strengthening of the capital market in Malaysia can be seen as overcoming the fear of a repeat of the shocks that occurred in the aftermath of the great financial crisis.

The Capital Market Masterplan 2 (CMP 2), released by the Securities Commission Malaysia in 2011, is a continuation of the CMP 1 (2001-2010) which provided direction for the challenges in making capital market intermediaries more comprehensive by 2020. The aim was to provide common standards for traditional intermediaries and create oversight and regulatory capacity supported by risk control. This went hand in hand with the emergence of new business model facilities that could simplify the rules and processes in the capital markets.

The Securities Commission Malaysia wanted to create services that have a wider range of value-added services, so that intermediation can innovate and be more competitive in meeting consumer demand in a highly electronic environment, both in terms of cost, efficiency, convenience, product adjustments, advice and necessary service. In the future, CMP 2 estimates that the Malaysian capital market environment will transform to be high-technology, In so doing, there is a need to increase information capacity and information technology-based infrastructure (IT), necessitating a clear and holistic roadmap to reduce the required outlays for technology investment. Figure 5.19 depicts the roadmap of CMP 2.

Figure 5.19
Roadmap of Capital Market Masterplan 2



Source: Capital Market Masterplan 2 (2011).

5.4 The Impact of Monetary Policy on Shadow Banks through the Asset Price Channel in Malaysia

5.4.1 Data Description

Recent innovations have led to FinTech products that diversify the channels for conducting credit intermediation by NBFIs. The high supply and demand for shadow banking products resulting in new forms of financing have increased the price sensitivity for households, SMEs and large companies. This makes choosing the appropriate interest rate in determining the transmission mechanism of shadow banking crucial. Although PPF is the largest NBFI in Malaysia, it is not deemed to fall under narrow shadow banking (OFI) according to the FSB. This is because its activities are not considered to create potential systemic risk. Thus, the market behaviour of a shadow banking entity can be seen through the asset management industry, which accounts for the second highest share of NBFI assets. In Malaysia, the growth of the asset management industry has been fast and haphazardly, leading to a lack of both transparency and regulation. As a result, the returns on net asset values (NAV) are probably a more accurate indicator of the shadow banking interest rate.

We take one of the largest asset managers in Malaysia, namely Affin Hwang Asset Management Bhd, as representing the entire market. It was one of the top-three domestic players in 2018: its size has grown rapidly was managing over MYR47 billion in assets for retail and professional clients at the end of December 2018. Of the many funds that Affin Hwang has under management, a total of 38 funds are registered with the SC. Notwithstanding some problems, such as limited data, aggregate size and close relationship to the credit market, Affin Hwang's returns probably serve as the best proxy for Malaysia's shadow banking interest rate. It is an appropriate indicator for the market-based interest rate that is determined by the supply and demand sides of the market.

To examine the determinants of shadow banking interest rates in Malaysia, we use the NAV of Affin Hwang as the dependent variable. We select data on the daily retail return from 2 January 2017 to 5 September 2019, which includes 699 daily observations on the effective annual returns based on Affin Hwang NAV. Using Bloomberg, we find just 24 funds under management of Affin Hwang Asset Management Bhd. For that reason, we use the total assets of those 24 funds as a standardised weighted NAV. The weighted average provides us with a time series of daily observations of the effective annual return. Furthermore, to investigate the effects of monetary policy instruments on shadow banking entities, we use the asset growth of Affin Hwang Asset Management's retail funds to be the dependent variable. We analyse two types of funds of Affin Hwang's assets, namely Affin Hwang Select Dividend Fund to capture the funds based on equity and Affin Hwang Aiiman Income Plus Fund to obtain the funds based on fixed income. The Affin Hwang Select Dividend Fund had 91.96% invested in equity in December 2019, while the Affin Hwang Aiiman Income Plus Fund had 85.26% in corporate obligations and 7.91% in government obligations.

The exogenous control variables include (1) interest rates (the interbank rate to measure the price-based monetary instrument, BNMs Overnight Policy Rate (OPR) as the benchmark monetary instrument, and the lending and the deposit rate as the administrative monetary instruments) and (2) the nominal effective exchange rate (NEER). To counteract the high correlation coefficient between the interest rates. We include the interest in the model one at a time to ascertain which one has the most significant effect on our dependent variable. We use the natural logarithm of NEER data.

Table 5.4
Summary Statistics for Various Variables (in %)

	Effective Annual Return	OPR	Deposit Rate	Lending Rate	Interbank Rate	NEER	Effective Annual Equity Asset	Effective Annual Fixed Income Asset
Mean	-0.062	3.119	2.869	3.369	3.089	85.390	12.537	13.575
Median	-1.285	3.000	2.750	3.250	3.000	86.510	12.380	7.553
Std. Dev	3.371	0,125	0.125	0.125	0.123	2.199	5.144	14.442

We investigate the autocorrelation and partial autocorrelation function of Affin Hwang's returns and the exogenous control variables in levels: the autocorrelation and the partial autocorrelation function of Affin Hwang's returns and Affin Hwang's assets

displayed a decaying pattern, even after 36 lags, which show that returns were non-stationary at levels and contain a unit root. We then check the autocorrelation and partial autocorrelation function in first differences and the results show that all variables are stationary in first differences and do not contain a unit root.

5.4.2 Empirical Model

This section addresses the third purpose of this study, which is to assess the impact of monetary policy on shadow banks through the asset price channel in Malaysia. We once again follow Zhang and Wan (2017) by employing the empirical EGARCH model. The model specification is as follows:

$$r_t = \sum_{i=1}^{s} \phi_i r_{i-1} + Z'_m X_t^m + u_t. \quad u_t \sim N(0, \sigma_t^2) \qquad \text{..... (9)}$$

$$ln(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j ln(\sigma_{t-j}^2) + \sum_{i=1}^{p} \alpha_i \left|\frac{u_{t-i}}{\sigma_{t-i}}\right| + \sum_{k=1}^{r} \gamma_k \frac{u_{t-k}}{\sigma_{t-k}} + Z'_v X_t^v \qquad \text{..... (10)}$$

where the endogenous variable, r_t, is Affin Hwang's returns, equation (9) is the mean equation of the shadow banking interest rate, equation (10) is the variance equation, the term $\sum_{i=1}^{s} \phi_i r_{i-1} + Z'_m X_t^m$ represents the time-varying mean and σ_t^2 is the time-varying variance. The mean is assumed to show persistence in the shadow banking interest rate as well as in the exogenous factors that could affect shadow banking. X_t^m contains the exogenous control variables, X_t^v represents the exogenous variables in the variance equation and γ_k is the asymmetric impact of positive or negative innovations on the standardised residuals.

5.4.3 Empirical Results

5.4.3.1 Affin Hwang's Returns

In this Section we present the empirical results of the effect of monetary policy instruments on Affin Hwang's returns. The best model is chosen by considering the significance of various estimated models from the statistical probability of a sequence of *F*-tests, the significance of the AR or MA coefficients used, the maximised value of the log-likelihood function and the minimised value of the AIC and SIC criteria. We choose the best model from either the GARCH or Exponential-GARCH (EGARCH) specification. Before evaluating the best model, we must ensure that all significant AR and MA coefficients are included. The best ARIMA representation for Affin Hwang's returns is an ARIMA(1,1,1) model. Finally, we ensure that there is no serial correlation in the model, and that there is heteroskedasticity in the ARCH effect test, so that the ARCH-GARCH method can be used.

Table 5.5 reports the evaluation of the GARCH and EGARCH models. The estimation results that we show only pertain to the exogenous OPR and interbank rate variables. As such, we do not show the exogenous deposit and lending rate variables. In Malaysia, the interest paid on deposits is set at 25 basis points below the OPR, while interest charged on lending is 25 basis points above the OPR. Because of this, the estimation results will be the same as the estimation results using only the OPR variable. In this study, the best model of each exogenous variable (interest rate and NEER) uses the GARCH model. In fact, the best model for the OPR, the lending rate, the deposit rate and the interbank rate is

the GARCH(1,1) model. To ensure that our model is robust, we conduct a diagnostic test of heteroskedasticity, namely the ARCH-LM test, to check whether the classical assumptions about the model residuals applied.

Based on the estimation results, the OPR, lending rate and deposit rate are negatively and statistically significantly affecting Affin Hwang's returns, suggesting that the asset management firm determines the interest rate representing the administrative monetary policy instrument (lending rate). The negative relationship between Affin Hwang's returns and the administrative monetary policy instruments means that any increase in the latter will drive down Affin Hwang's returns. The results are in accordance with the theory of the transmission mechanism through the asset price channel, where monetary policy influences changes in asset prices. If the central bank conducts monetary policy, it will reduce the market price of the company's assets, causing corporate returns to decrease. But changes in Malaysian retail returns are not determined by changes in the interbank rate as the price-based monetary policy instrument.

Table 5.5
GARCH Estimates for Affin Hwang's Returns

Variable	Policy Rate		Interbank Rate	
	EGARCH(1,1,1)	GARCH(1,1)	EGARCH(1,1,1)	GARCH(1,1)
Mean Equation Results:				
Constant	0.000	0.000	0.000	0.000
Policy/Interbank rate	-0.635**	-0.638**	0.119	0.092
NEER	0.012	0.007	0.008	0.005
AR(1)	0.905***	0.903***	0.905***	0.904***
MA(1)	-0.825***	-0.827***	-0.829***	-0.831***
Variance Equation:				
Constant	-1.652	0.000	-1.100	0.000
ARCH(1)	0.159	0.077*	0.134	0.071*
Threshold Effect				
Asymmetric Effect	-0.051		-0.038	
GARCH(1)	0.879***	0.822***	0.921***	0.844***
Diagnostic tests:				
R-squared	0.049	0.049	0.048	0.048
Adjusted *R*-squared	0.038	0.040	0.037	0.039
Log likelihood	3409.623	3411.951	3409.155	3411.396
F-statistic	4.449***	5.111***	4.379***	5.012***
Akaike info criterion	-9.758	-9.767	-9.757	-9.766
Schwarz criterion	-9.699	-9.715	-9.698	-9.714

Notes: Statistical significance is assessed in the basis of the probability or *p*-values. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Our results mirror those in Zhang and Wan (2017), which is that lending rates as administrative monetary policy tools affect retail interest rates in China, based on Yu'E Bao interest rates. At the same time, the results are different from He and Wang (2012) and Porter and Xu (2013), who advocated for the use of the seven-day repo rate as the market-determined interbank interest rate and disregarded the SHIBOR. A possible explanation for the insignificant results for the interbank and retail interest rates is that the price-based monetary policy tool is not capable of driving the shadow banking market because there is a lack of connection between them. For administrative monetary policy tools, the results suggest that the elasticity of the policy rate is such that it transmits effective changes in monetary policy to retail-market rates.

5.4.3.2 Affin Hwang's Assets

In this section, we present our empirical results for the effect of monetary policy tools on Affin Hwang's assets of retail funds. The latter are divided into two types of funds, namely equity and fixed income funds. Similar to the case of Affin Hwang's returns, the best model is chosen by considering the significance of various estimated models from the statistical probability of a sequence of *F*-tests, the significance of the AR or MA coefficients used, the maximised value of the log-likelihood function and the minimised value of the AIC and SIC criteria. We choose the best model coming from either the GARCH or Exponential-GARCH (EGARCH) specification.

Before evaluating the best model, we must ensure that all significant AR and MA coefficients are included. The best ARIMA representation for Affin Hwang's equity fund assets is the ARIMA(3,1,3) and the best ARIMA representation for Affin Hwang's fixed income fund assets is the ARIMA(1,1,1) model. Finally, we ensure that there is no serial correlation in the model, and that there is heteroskedasticity in the ARCH effect test, so that the ARCH-GARCH method can be used.

Table 5.6
GARCH Estimates for Affin Hwang's Equity Fund Assets

Variable	Policy Rate		Interbank Rate	
	EGARCH(2,1,1)	GARCH(2,1)	EGARCH(1.1,1)	GARCH(1,1)
Mean Equation Results:				
Constant	0.000	0.000	0.000	0.000
Policy/Interbank rate	-0.911	0.270	1.214***	0.853**
NEER	0.095*	0.149**	0.159***	0.127**
AR(1)	1.773***	0.014	0.021	-0.862***
AR(2)	-1.737***	-0.032	-0.029	0.160
AR(3)	0.907***	0.880***	0.923***	0.700***
MA(1)	-1.780***	0.047	0.030	0.911***
MA(2)	1.786***	0.059	0.058	-0.026
MA(3)	-0.919***	-0.890***	-0.931***	-0.587***
Variance Equation:				
Constant	-4.296***	0.000***	-3.215***	0.000***
ARCH(1)	0.205***	0.072*	0.195***	0.115***
Asymmetric Effect	0.061**		0.074***	
GARCH(1)	0.642***	1.145***	0.730***	0.636***
GARCH(2)	-0.006	-0.531***		
Diagnostic tests:				
R-squared	0.037	0.026	0.042	0.037
Adjusted *R*-squared	0.019	0.009	0.025	0.022
Log likelihood	2972.309	2979.176	2976.865	2981.628
F-statistic	2.016*	1.544*	2.467***	2.411***
Akaike info criterion	-8.513	-8.536	-8.529	-8.546
Schwarz criterion	-8.422	-8.451	-8.444	-8.467

Notes: Statistical significance is assessed in the basis of the probability or *p*-values. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5.6 shows the estimation results of the GARCH and EGARCH models for Affin Hwang's equity fund assets. In this study, the best model for each exogenous variable (interest rate and NEER) is the EGARCH model. Because the asymmetric effects are significant, the best model for the OPR, the lending rate, the deposit rate and the interbank rate is the EGARCH(2,1,1) model, which translates into EGARCH with GARCH(2) and ARCH(1). To ensure that our model is robust, we conduct a diagnostic test of heteroskedasticity, namely the ARCH-LM test, to check whether the classical assumptions about the model residuals apply.

The results show that the interbank interest rate has a significant effect on equity fund assets, which means that the interbank interest rate is an effective price-based monetary policy tool to influence the inflow of equity fund assets of Affin Hwang. The reason is that the interbank interest rate is the rate of interest charged on short-term loans made between Malaysian banks to ensure commercial banks' business liquidity. It provides a framework for short-term monetary policies that are more price-based, such that the interbank market becomes the most important channel of liquidity trading and supports transparent and stable pricing mechanisms.

In addition, equity fund assets are more sensitive to changes in equity prices. For that reason, the central bank needs to ensure the continuity of financial markets through the provision of liquidity. A stable short-term monetary policy is required for the unimpeded transmission of the benchmark monetary policy signal and a reduction in market volatility. In contrast, the OPR, as the policy benchmark interest rate, has no significant effect on equity fund assets. This imperfect transmission points to the fact that the policy rate is still not well established.

Based on the estimation results, the interbank interest rate is positively and significantly affecting Affin Hwang's equity fund assets, suggesting that the asset management firm determines the size of its assets based on the level of price-based monetary policy tools. By contrast, the OPR, lending rate and deposit rate do not affect equity fund assets. The positive relationship between Affin Hwang's equity fund assets and price-based monetary policy tools means that any increase in the interbank rate will drive Affin Hwang's equity fund assets higher. This result is in accordance with those in Nelson et al. (2015), Xiao (2017) and Elliott et al. (2019), who examined the impact of changes in monetary policy on money market funds' (MMFs) asset growth in the United States.

These authors showed that monetary policy positively and significantly affected MMF assets in the US when the federal funds rate was increased. The finding that MMFs will increase their holdings of commercial papers and ABCP is driven by the fact that a monetary contraction induces commercial bank deposits to migrate from the banking sector, which should make money market funds experience inflows. This shift of funds could be a result of the imperfect competition in the deposit market between commercial banks and MMFs. Based on Kashyap et al. (1992) and Calomiris et al. (1995), a firms' mix of external financing leads to a shift from bank loans to commercial papers when a tighter monetary policy is imposed.

Table 5.7 shows the results of the GARCH and EGARCH models for Affin Hwang's fixed income fund assets. The best-fitting model for each exogenous variables (interest rate and NEER) is the EGARCH model, with the best specification for the OPR, lending rate, deposit rate and interbank rate being the GARCH (1,1) model, i.e., a model with one GARCH(1) and one ARCH(1) term. To ensure that our model is robust, we conduct a diagnostic test of heteroskedasticity, namely the ARCH-LM test, to check whether the classical assumptions about the model residuals apply. The results show that none of the interest rates have a significant effect on fixed income fund assets. A possible explanation for the insignificant results is that the monetary policy tools are not effective in impacting the shadow banking market because of an imperfect transmission mechanism.

Table 5.7
GARCH Estimates for Affin Hwang's Fixed Income Fund Assets

Variable	Policy Rate		Interbank Rate	
	EGARCH(1,1,1)	GARCH(1,1)	EGARCH(1,1,1)	GARCH(1,1)
Mean Equation Results:				
Constant	2.030	0.000	0.416	0.000
Policy/Interbank rate	1.709*	0.242	–0.201	–0.192
NEER	0.020	–0.123*	–0.067	–0.122*
AR(1)	1.000***	0.975***	1.000***	0.975***
MA(1)	–0.997***	–0.920***	–0.997***	–0.919***
Variance Equation:				
Constant	–2.328***	0.000**	–2.355**	0.000**
ARCH(1)	0.296***	0.107*	0.322***	0.109*
Asymmetric Effect	–0.159		–0.150	
GARCH(1)	0.797***	0.843***	0.795***	0.841***
Diagnostic tests:				
R-squared	0.047	0.047	0.051	0.047
Adjusted *R*-squared	0.036	0.037	0.040	0.037
Log-likelihood	2733.503	2744.140	2736.171	2744.227
F-statistic	4.209***	4.828***	4.624	4.822***
Akaike info criterion	–7.818	–7.851	–7.825	–7.851
Schwarz criterion	–7.759	–7.799	–7.767	–7.799

Notes: Statistical significance is assessed in the basis of the probability or *p*-values. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

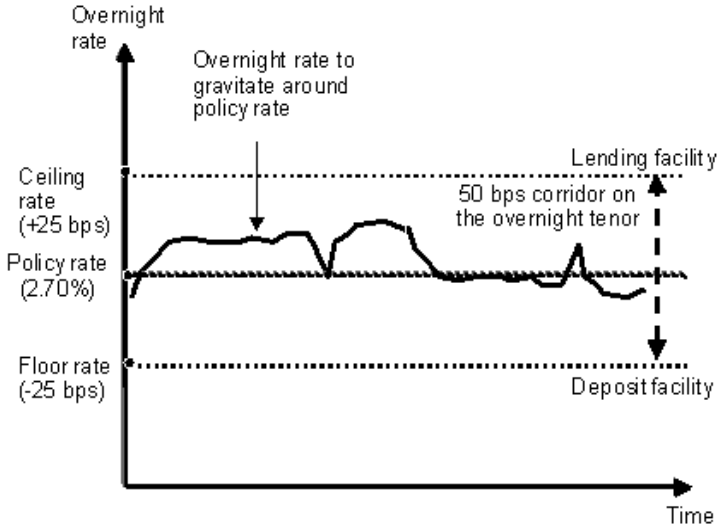
Although we represent all shadow banking entities and activities through the lens of Affin Hwang Asset Management as one of the largest asset management companies in Malaysia, these results obviously cannot be generalised to assess the overall efficiency of monetary policy tools for shadow banking, because each entity in this sector will have different characteristics and thus responses to monetary policy tools.

5.4.4 The Monetary Policy Framework in Malaysia

Malaysia's central bank has two main monetary policy goals, which are to achieve low and stable inflation and preserve the purchasing power of the Malaysian ringgit. To accomplish these goals, Bank Negara Malaysia (BNM) requires a monetary framework. The central bank has changed the framework several times in response to domestic and foreign financial and economic conditions. Beginning in the early 1970's, BNM determined that its primary operating target, as the basis for adjusting Malaysia's economic conditions in light of financial liberalisation and innovation, would be a broad measure of the monetary aggregates (M3). However, monetary aggregates failed to maintain the stability of core

economic indicators in Malaysia when financial reforms took place, raising doubts about the continued effectiveness of M3 as a policy target. Therefore, monetary aggregates were substituted by an interest rate-targeting framework in 1989, which was accompanied by a switch of the moving target to interbank rates, thereby emphasising short-term interest rates as a policy indicator.

Figure 5.20
The Interest Rate Framework in Malaysia



Source: BNM (2004)

When BNM implemented interest rate targeting as the official monetary policy in Malaysia, they made three changes to the instrument. First, a new Base Lending Rate (BLR) framework was implemented with the 3-month interbank rate as the main instrument. Second, BNM modified the BLR framework by changing it to interest rate targeting with a fixed exchange rate in September 1998. In addition, BNM also instituted capital controls to maintain financial stability in Malaysia in response to the currency crisis that occurred in the East Asian region. Finally, BNM introduced a new interest rate framework, with the Overnight Policy Rate (OPR) as its main monetary policy instrument on 23 April 2004. While this change was expected to bring about pricing efficiency of banking institutions, it did not change monetary policy, which affects the general level of domestic interest rates. This new policy framework was intended to strengthen the effectiveness of policies in achieving the low and stable inflation target in Malaysia. The OPR was expected to become a new reference rate which has a stronger relationship with other interest rates.

Some changes in the new interest rate framework are:

(1) A change in the monetary policy instruments from the 3-month interbank rate to the Overnight Policy Rate (OPR), where OPR serves in a dual role as a signalling device to indicate the monetary policy stance and as a target rate for the day-to-day liquidity operations of the central bank. Changes to the OPR will be the primary reference in determining changes in the level of other interest rates in the markets.

(2) Malaysia makes the OPR the sole operating target, whereby BNM will target the overnight interbank rate so it can be ascertained as to what level of liquidity is appropriate to influence the overnight interbank rate to approach the OPR.

(3) BNM establishes an Overnight Operating Corridor and Standing Facilities around the OPR at ± 25 basis points around the OPR. Figure 5.20 illustrates the corridor system, which manages the volatility of overnight interest rates.

BNM adheres to an interest rate framework as the monetary policy framework rather than the inflation targeting framework, since the latter is considered too "restrictive" to carry out policy goals in light of the vulnerability of the Malaysian economy to external shocks and exchange rate fluctuations. For this reason, Malaysia chooses to adopt "inflation anchoring", which is a different process but with the same goal of inflation stability. The reasons why "inflation anchoring" is chosen are:

1. In order not to limit oneself, monetary policy is only adjusted according to the single target of price stability. Otherwise, the focus would have been too wide, thus providing too much focus, making it difficult to achieve objectives and ignoring other essential risks.

2. Based on practical experience, high inflation rates occurring in Malaysia are generally driven more by shocks outside of the monetary realm, such as shocks to global oil prices.

5.5 Conclusion

Unlike the shadow banking system structure in the US and Europe, which is relatively complex both in terms of activities and entities, the shadow banking system in Malaysia is relatively less complicated and smaller than the banking system. In Malaysia, the growth of shadow banking cannot be separated from the role of the government in developing the financial system. Once again, shadow banking in Malaysia complements the role of banking institutions in the financial system. Shadow banking in Malaysia began to grow in the 1990s, resulting in the growth of broad money (M3) exceeding that of narrow money (M1). Up to 2018, the size of M3 in Malaysia was almost five times that of M1. Apart from financial entities outside the banking sector, the transformation that has taken place in traditional credit activities in Malaysian banks has expanded the credit intermediation chain, thereby enabling banks or entities owned by banks to enter into shadow banking activities.

The rapid growth of FinTech in Malaysia also affects the NBFI component of the financial system, creating new technology in old non-bank entities or establishing new entities that are based on FinTech, such as peer-to-peer financing and equity crowdfunding. In conjunction, these trends make non-bank financial institutions not only more powerful but also a rapidly expanding sector of the financial system. The rapid growth of Malaysian M3 after the 2008 GFC reflected the entry of FinTech, a move that has increased both the interest and the confidence of households in saving their money in other financial institutions. To determine the future direction of shadow banking growth in Malaysia's capital market and to counter the transformation towards high-technology, strong regulations are needed to keep shadow banking growth in check. The risks arising from the collapse of non-bank entities will likely cause systemic risks due to the interconnectedness of banking institutions and non-bank institutions. In extremis, this can cause bank runs and result in a financial crisis. Such crises increase the burden on the national budget, which is financed by public taxes, so that a robust regulatory framework of monetary policy that influences

the activities of NBFIs is required. BNM has initiated an agenda as well as master plans towards that goal, such as the digital agenda for Malaysia's capital market in 2016, the Financial Sector Blueprint 2011-2020 and the Capital Market Masterplan 2.

Malaysia defines shadow banking or non-bank financial institutions (NBFI) as "a system of credit intermediation that involves entities and activities outside BNM's regulatory capture". NBFIs in Malaysia are supervised and regulated by Bank Negara Malaysia (in the case of insurance and takaful companies as well as DFIs under DFIA 2002), the Securities Commission Malaysia (in the case of the fund management industry, securitisation vehicles and factoring companies) and several government institutions. In aggregate, the market share of NBFI's assets, equal to 39.7% of total assets in the financial system in 2018, is sizable. The sector saw steady growth over the past two decades: the share of NBFIs in the financial system was only 27.0% in 2000 according to BNM data. Provident and pension funds and the fund management industry make up the largest portion of total NBFI assets in Malaysia. These two industries accounted for 18.4% and 14.0% of total assets in the Malaysian financial system in 2018 respectively.

To evaluate the effect of changes in monetary policy on shadow banking in Malaysia, we use the effective annual returns of one of the largest asset management firms in Malaysia, namely Affin Hwang Asset Management Bhd, as a proxy for the domestic shadow banking interest rate. We include several exogenous control variables for interest rates: interbank rates to measures price-based monetary policy tools, BNM's Overnight Policy Rate (OPR), the lending and the deposit rate to measure administrative monetary policy tools and the nominal effective exchange rate (NEER). Results suggest that the OPR, lending rate and deposit rate are negatively and statistically significant in affecting Affin Hwang's returns, suggesting that the asset management entity determines the interest rate based on the level of administrative monetary policy tools. At the same time, changes in retail returns in Malaysia are not defined by changes in the interbank rate as the price-based monetary policy tool, which means that the price-based monetary policy tool is not effective in controlling the shadow banking market. This is most likely due to the lack of connection between those two markets. For administrative monetary policy tools, we find that the elasticity of policy rate causes effective transmission in monetary policy to retail-market rates.

Finally, to ensure the robustness of the effects of monetary policy tools on shadow banking entities, we use two types of funds in Affin Hwang's assets, namely the Affin Hwang Select Dividend Fund to capture funds based on equity and Affin Hwang Aiiman Income Plus Fund that reflects funds based on fixed income products. Results suggest that the interbank rate is positively and statistically significan in affecting Affin Hwang's equity fund assets, indicating that the interbank interest rate is an effective price-based monetary policy tool to influence the inflow of equity fund assets of Affin Hwang. In other words, there is a close connection between changes in the interbank rate and equity fund assets. Turning to Affin Hwang's fixed income fund assets, however, none of the interest rates has a significant impact. We conclude that monetary policy tools are not useful in controlling the shadow banking market, because there is imperfect transmission between them.

5.6 Policy Recommendations

The Malaysian government recognizes the essential importance of building a strong financial sector. Strict supervision and adequate regulations are needed to maintain a stable and strong financial sector, especially with the proliferation of financial technology which has developed significantly over time in shadow banking institutions and activities. The Malaysian government and Bank Negara Malaysia (BNM) continue to adjust the regulatory framework to facilitate fintech growth. In Malaysia, fintech companies have to adhere to regulated licensing and marketing requirements by BNM and the Malaysian Securities Commission (SC). Although BNM and SC have regulations for fintech, there are no designated regulations or individual licenses for fintech companies in Malaysia. Requirements and licensing depend on the nature of the fintech business. Considering the rapid development of technology, both in fintech entities and in non-bank entities, cybersecurity has become very important for the protection of consumers. While some of these activities and entities are regulated by BNM and SC and guidelines exist on the management of cyber risk (SC-GL / 2-2016), there appears to be still a lack of regulation for the guarantee of customer funds in non-bank entities.

Furthermore, given the increasing number of fintech companies offering smart contract development services in Malaysia, special regulations and supervision are needed for this. Again, there appears to be still a lack of regulations and supervision for these as there are no specific laws governing the use of independent contracting (smart contracts) in Malaysia. Therefore, several policy frameworks are recommended to Malaysian authorities for consideration: (1) Cybersecurity - strengthening regulations, supervision, and risk management, especially in guaranteeing customer funds in non-bank entities; (2) Optional policy tools - identification of NBFIs that are considered to be risky shadow banks so that specific oversight and regulations can be initiated for these entities. Therefore, an optional policy tool menu can be introduced that can reduce stability risks; and, (3) Information integration - efforts to share information between relevant authorities to form a policy framework for NBFIs.

CHAPTER 6

THE SCOPE, PROSPECTS AND IMPLICATIONS OF NEW FORMS OF FINANCIAL INTERMEDIATION FOR MONETARY POLICY IN SINGAPORE

6.1 Background

The revolution in information technology (IT), often referred to as digital revolution 4.0, has resulted in innovations that are increasingly visible and influence most people's lives. Many individuals and businesses have subscribed to internet services to benefit from the expanding range of products, services and information that is available on the internet. These developments are shaping social lives and behaviours and affecting the way that people work and the role of the citizen within society. It is also affecting production and consumption in both the business and financial sectors. These trends are combining to further develop financial areas such as the large and growing number of digital banks, in payments, financing as well as lending within the community, which can substitute for traditional banking functions.

The explosive growth of the internet and mobile internet provide a powerful support for internet finance in many countries around the world, including ASEAN countries. This is particularly the case for Singapore, which has seen a tremendous expansion in this area. Based on the *Global Information Technology Report* from the World Economic Forum (2016), its outstanding performance is highlighted by the fact that Singapore ranks first in the world in three of the four sub-indexes (Environment, Usage and Impact). This performance is driven by top spots in several pillars: political and regulatory environment (number two in the world), business and innovation environment (first in the world), skills (first in the world), government usage (first in the world) and social impact (first in the world). To a large extent, this ranking is the result of the strong government commitment to the digital agenda, including its Smart Nation programme. Narrowing the scope to mobile activities, a survey from Global Web Index in Singapore's Digital Report January 2019 reported that 92% of internet users used internet mobile phones to send messages followed by watching videos, mobile map services and playing games. Mobile banking finished in fifth position with 64%. Among the internet users, the majority stated that they understood using online financial services in mobile banking, purchasing items online (54%) and making mobile payments (36%). This shows that other financial intermediaries are potentially well represented in Singapore, which contributes to the country's status as a leading financial centre in the region and beyond.

Different from other ASEAN countries, however, the assets of shadow banks in Singapore amounted to just 10% of GDP in 2014, while the assets of OFIs were slightly below 100% of GDP. Overall, the share of shadow banks is substantially smaller compared to the 600% ratio of banks' assets to GDP (Hoffman, 2017). According to Hoffman (2017), OFIs in Singapore are a good representation of the shadow banking sector as NBFI includes money market funds (MMFs), hedge funds, private equity funds, exchange-traded funds

(ETFs), other investment funds (OIFs), broker-dealers, structured finance vehicles (SFVs), insurance companies and finance companies that have substantial volumes. According to Stein (2010) and Pozsar et al. (2013), the securitisation process is often regarded as the most harmful aspect of shadow banking in financial markets. Looking at the structural characteristics of shadow banking, Table 6.1 provides a summary of the differences among traditional banks, shadow banks and market-based finance.

Table 6.1
Summary of Structural Characteristics of Credit-Based Intermediation

Characteristics:	Traditional Banking	Shadow Banking	Market-based Finance
Key Risk Transformation	Liquidity, maturity and leverage	Credit enhancement, liquidity, maturity and leverage	Less emphasis on credit enhancement and less opaque compared to. shadow banking
Institutions involved in Intermediation	Single entity	Can be many entities interconnected through collateral chains and credit guarantees	Single/few entities
Formal Ex-Ante 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 and ABCP Conduit	Bond mutual fund, distressed debt or PE partnership, direct lending by pension fund
Main Form of Liabilities	Debt and deposits, wholesale and retail-financed	Debt, mainly wholesale financed	Highly diverse short- and long-term debt and equity, retail and wholesale financed
Key Resulting Financial Stability Risk	Systemic risk (institutional spillovers)	Systemic risk (institutional spillovers)	Shift in price of risk (market risk premia)

Notes: CDO = collateralized debt obligation; CNAV = constant net asset value; MMF = money market fund; ABCP = asset-backed commercial paper; PE = private equity.
Source: IMF (2017).

In addition, the merger between financial services and technology called Financial Technology, or more popularly termed "FinTech", also plays a role in the new digital age, as it is being increasingly harnessed in shadow banking or by non-bank financial intermediaries (NBFIs). Due to the simple process and (in many instances almost instantaneous) online assessment, FinTech in the financial system is utilised by many unbanked citizens and SMEs to obtain bank loans. In Singapore, attempts are made for the collaboration and synergy among all stakeholders to promote FinTech as part of its Smart Financial Centre approach rather than as a potential source for technology disruption

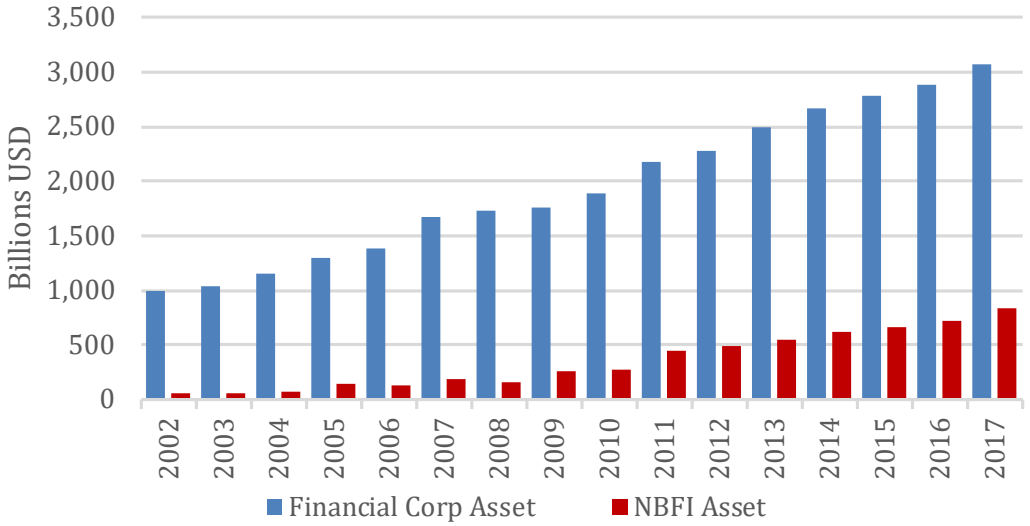
(MAS, 2016). This policy sets Singapore apart from other ASEAN countries, such as Malaysia, Indonesia and the Philippines. The existence of shadow banking, especially FinTech, entails downsides for the development of the macroeconomy. For instance, the significant presence of peer-to-peer-lending leads to an enhanced interconnectedness in the financial sector that can ultimately manifest itself in contagion that transmits adverse outcomes from one institution to other institutions. Other potential implications include an increase in procyclicality that causes greater herding behaviour when firms all use the same algorithmic trading model and excess volatility that can lead to liquidity problems as a result from the overreaction to news (Ewijk, 2018). According to International Monetary Fund, the shadow banking system have inherent risks that pose threats to financial stability from the complex collateral intermediation that repeatedly channels funds in the market-based financial system (Singh, 2014) and Chen (CFA Institute, 2015).

On the one hand, research has established that FinTech can enhance creativity, foster competition between new start-ups and established players and provide financial inclusion, i.e., access to financial services for large "unbanked" part of the population. FinTech also allows for the scaling up of businesses to get easy financing, while P2P lending with advanced technology offers competitive benefits such as speeding up the processing of transactions, simplicity, enhanced product features (Oxera Economic Council, 2016) and better risk modelling and estimation opportunities from using advanced methods, including artificial intelligence and big data (Ewijk, 2018).

FinTech hubs in Singapore may also potentially displace their mainstream banks, financial institutions and humans as providers of financial services and volume growth respectively. The surge in shadow banking activity also contributes to the greater volatility of outstanding money by creating inflation. Therefore, this phenomenon will drive several changes in the scope, prospects and implications for monetary policy globally.

Referring to China's experience of using wealth asset management product, this Chapter looks at Singapore's asset management industry represented by Temasek Holdings. This choice is supported by a MAS survey of Singapore's asset management industry, which had strong growth over time and 19% expansion to reach USD2.4 trillion in 2017. A general overview that illustrates the trends of assets of financial corporations and shadow banking is presented in Figure 6.1. We can see that assets of financial corporations have increased from USD988.0 billion in 2002 to USD3,070.6 billion in 2017. Shadow banking assets, on the other hand, have risen from USD50.8 billion to USD828.5 billion over a decade. These sets of numbers indicate that shadow banking assets are roughly 27% lower compared to commercial banks, even though Singapore's overall financial assets grew slightly.

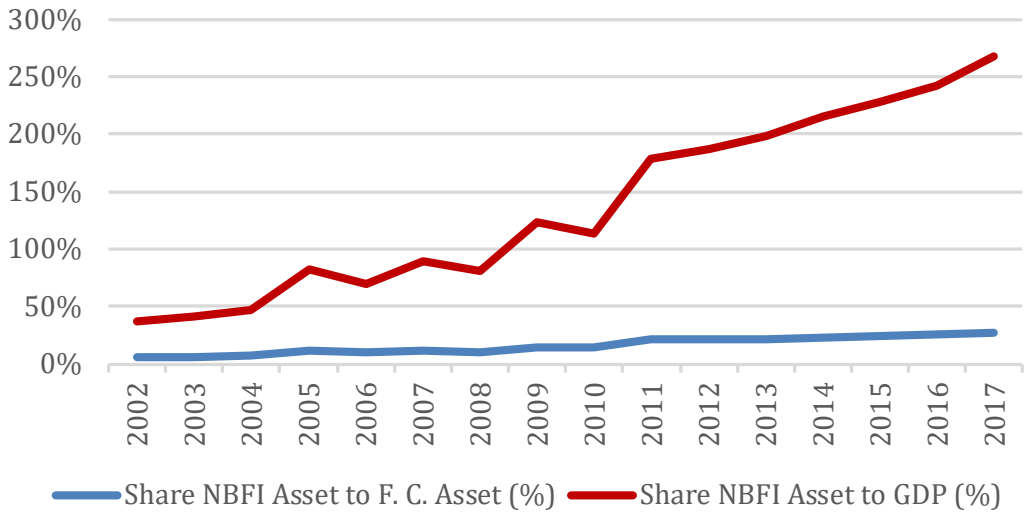
Figure 6.1
Financial Corporations and Shadow Banking Assets, 2002-2017



1. Commercial banks and Central Bank
2. Insurance, pension funds and other financial intermediaries.

Source: FSB (2018).

Figure 6.2
Share of Shadow Bank Assets to Financial Corporation Assets and GDP

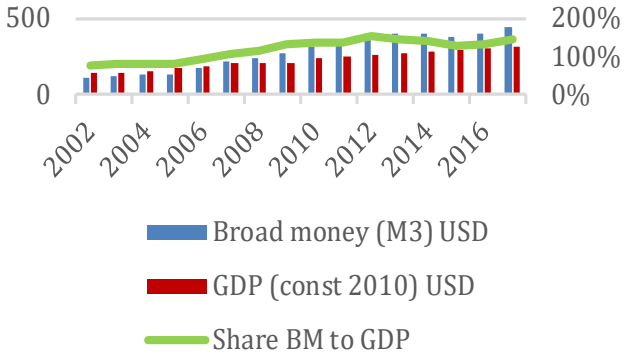


Source: FSB and World Bank (2018).

In addition, Figure 6.2 reveals that the share of shadow banking assets to financial corporations' assets grew from 5% in 2002 to 27% in 2017. By contrast, the share of shadow banking assets-to-GDP increased significantly from 37% in 2002 to 267% in 2017. This positive relationship between the share of shadow banking assets to financial corporation assets and GDP means that the participation of shadow banking in the economy of Singapore may, in consequence, affect the monetary system, particularly in channelling funds to the unbanked parts of society. By heeding the lessons from other countries like China, which has seen much higher growth of shadow banking compared to Singapore,

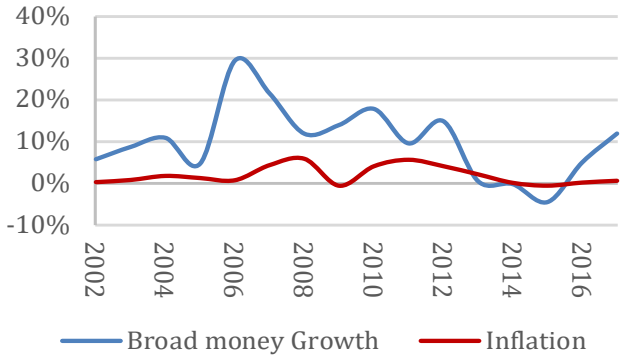
forward-looking policy responses to the growth of shadow banks may be required in terms of integrating, reporting, supervising and strengthening existing regulations.

Figure 6.3
Singapore GDP, Aggregate Broad Money and Ratio of Broad Money to GDP, 2002-2017



Note: M3 in USD billions, share in per cent.
Source: World Bank (2018).

Figure 6.4
Broad Money (M3) Growth and Inflation, 2002-2017



Source: World Bank (2018).

Even though a recent phenomenon, FinTech and shadow banking have grown significantly, both at the microeconomic scale for households and businesses as well at the macroeconomic scale. The increasing tendency of people to use new forms of (digital) financial intermediaries will eventually affect microeconomic and macroeconomic dynamics more broadly, including the role of the central bank in the economic and financial system. As asserted by Zhang and Wan (2017), the financial system is no longer sensitive to monetary policies pursued by the central bank. Figure 6.3 illustrates the development of GDP (in constant 2010 prices), broad money and the ratio of the two. Broad money in Singapore in this context is measured as M3 and consists of saving deposits and currency in the central bank, transferable deposits and electronic currency, foreign currency transferable deposits, commercial papers, travellers' cheques and various money market instruments such as share in mutual funds and certificates deposited by banks. The magnitude of broad money has increased from USD108.5 billion in 2002 to more than USD400 billion in 2017. We note that over the decade under observation, broad money in Singapore exceeded GDP, which was equal to USD213 billion in 2007 and USD441 billion in 2017. The ratio of broad money-to-GDP grew from 78% in 2002 to 143% in 2017. The substantial increase in broad money affects the velocity of money and may lead to inflation, which in turn may impact the monetary system.

Figure 6.4 shows broad money growth and inflation in Singapore from 2002 to 2017. Contrary to the statement in the previous paragraph, Figure 6.4 shows that inflation was broadly stable and seems not to have been affected by the growth of broad money. Hence, this is clearly not a monetary phenomenon. Still, the evidence shows that it might be time to reshape the monetary policy framework because the financial environment has changed in recent years. For example, the surge in financial innovation and the substantial growth in shadow banking entail problems and introduce complexities into the monetary system. As a result, controlling broad money has become harder. The velocity of money and the money multiplier will increase and may no longer be stable, which contradicts the

basic assumption of Fisher's quantity theory of money (Zhang and Wan, 2017). Based on such developments, the need for comprehensive research on understanding the new forms of financial intermediation from the macroeconomic and monetary policy perspectives is urgently needed and highly relevant at this time.

For example, as mentioned above regarding the risks, FinTech lenders command an interest rate premium for their services due to their use of different algorithms in personalising loan origination and pricing, which is meant to bring about greater convenience for the borrowers. This contrasts with the common belief that technology can lower costs and prices. Shadow banking activities often face riskier dimensions from the perspective of the structural characteristics. First, they can involve extensive transformation of risk characteristics through complex structuring. Second, shadow banking is linked with a lengthy collateral chain. Third, shadow banking institutions have difficulties in formally accessing official sector backstops in the same manner of a traditional deposit-taking bank. Lastly, the principal liabilities of shadow banking products are debt-financed in wholesale markets.

The above explanations support some researchers' arguments, such as Carmichael and Pomerleano (2010) that factors driving growth in shadow banking are liquidity transformation, credit transformation and high leverage. Other significant factors contributing to the growth in this activity are the current low-interest rate environment, which translate into low short-term funding costs, and regulatory arbitrage. It is only by understanding the factors that influence the development of shadow banking as a new form of financial intermediation that the central bank will be able to put in effect a monetary policy that is appropriate for a macroeconomy with Singapore's shadow banking characteristics.

6.2 Macro Mapping of New Forms of Financial Intermediation in Singapore

6.2.1 New Forms of Financial Intermediation in Singapore

The wide discrepancy between clear definitions of shadow banks across countries, including the scope of activities in Asia., leads to difficulties in estimating the size of the shadow banking industry on a consistent and comparable basis. In Asia, the proportion of shadow banks amounted to less than 15% of the assets of the total financial system in 2015. In terms of financial assets, Japan and China had the most developed shadow banking activities, whereas the two financial hubs of Hongkong and Singapore had the largest OFI sectors in relation to the size of their economies.

The profile of shadow banking in Asian countries neither abide by a single definition nor does domestic regulations follow global best practices. Nonetheless, regulations at the national level are applied with an eye for the consideration of potential risks and the applicability of the FSB's recommendations (Shadow Banking Report, 2014). However, different FSB members may employ different criteria to classify what entities are registered as NBFIs, OFIs or certain shadow banks on account of economic conditions, legal arrangements and infrastructural arguments. A broad definition of shadow banking can be found in the IMF (2014), with a classification based on three categories: entity-based, activity-based and a mixture of the two. In addition, the World Bank (2016) categorised non-bank financial institutions (NBFIs) as those that conduct financial services in terms of

collective or individual investments, risk pooling, financial consulting, money transmission and cheques to cash. These NBFIs services are provided by insurance companies, venture capitalists, currency exchanges, pawnshops and some microfinance organisations that accommodate specialised groups or the unbanked to obtain credit access.

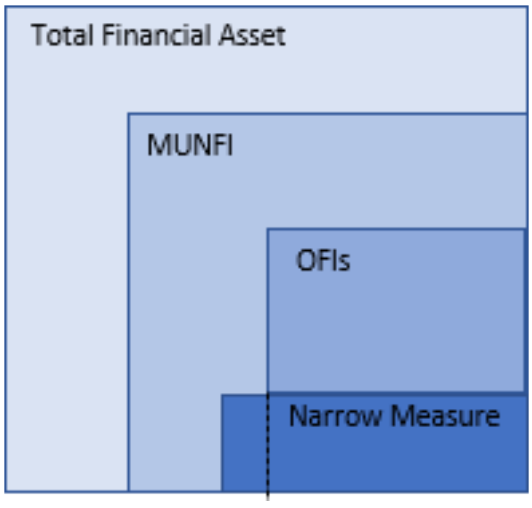
The Monetary Authority of Singapore (MAS) defines shadow banks as institutions for which risks may trigger systemic economic consequences which cannot be addressed by regulation (Hofmann, 2017). A large number of banks and NBFIs are currently operating in Singapore, as illustrated in Table 6.2. The MAS (2017) includes institutions such as merchant banks, finance companies, insurance companies/brokers, finance holding companies, money brokers, Singapore Government Securities (SGS) market dealers and the Central Provident Fund (CPF). Singapore also considers that short-term repurchase agreements (repos) fall under this definition. For example, repo chain transactions can enhance the interconnectivity and exposure of multiple financial intermediaries to the risk of price drops. In this case, repos become low-risk products for lenders-buyers that affect financial transactions that have been collateralised. The process begins from securitization lending to cover borrowers in return for collateral in the form of repo and reverse repo transactions (Hofmann, 2018). OFIs in Singapore hardly engage in repo transactions and collateral swaps. Such findings indicate that in the current situation, broker-dealer activities entail low systemic risk. Nonetheless, they could be a candidate for shadow banking if broker-dealer activities on the non-bank side generate high-volume transactions and leverage (Hofmann, 2018).

Table 6.2
Number of NBFIs in Singapore

Type of Institution	*2015*	*2016*	*2017*	*2018*
Non-Bank Financial Institutions				
Finance Companies	3	3	3	3
Merchant Banks	38	34	32	30
Insurance Companies	181	186	186	184
Insurance Brokers	74	75	77	80
Licensed Financial Advisors	60	62	61	64
Capital Markets Service Licences	493	533	584	669
Dealing in Securities	123	137	151	166
Trading in Future Contracts	60	68	71	76
Advising on Corporate Finance	42	40	46	45
Fund Management	335	367	404	471
Leveraged Foreign Exchange Trading	24	27	29	34
Securities Financing	17	17	18	18
Providing Custodial Services for Securities	37	37	42	44
Real Estate Investment Trust Management	34	36	38	40
Providing Credit Rating Service	4	4	4	4
Licensed Trust Companies	54	53	58	58

Sources: Annual Report of 2017/2018, Monetary Authority of Singapore

Figure 6.5
Shadow Banks Positions in Narrow Measure



This section explores the shadow bank entities in Singapore that are included in the narrow measure or pose bank-like financial stability risks (Figure 6.5) if they perform one of the FSB's five economic functions that can potentially lead to systemic risks (Global Monitoring Report, 2019). In their 2014 *Financial Stability Review*, the MAS looks at the growth in shadow banks in view of the monetary authority's implementation of tight lending regulations on the banks and subsequent attempts to provide lucrative ways for

investors to place their money in Singapore's financial sector. However, risks arising from shadow banking activities need to be closely monitored. These actions need to be done to prevent banks from lending to non-banking financial intermediaries (NBFIs), including hedge funds, insurance companies and pension funds (Nandini and Umesh, 2017).

Focusing on Singapore's shadow banks, we find broad correlation between the definitions and scope of FSB regulations that most entities were performing either Economic Function 1 and/or Economic Function 5. The MAS also defines shadow bank activities as those that can potentially lead to economic turmoil from their systemic risks, which cover maturity transformation, liquidity transformation, leverage and credit risk. MAS points out that maturity transformation uses short-term liabilities to finance the purchase of long-term assets. Liquidity transformation is defined as the issuance of liabilities that are easily repaid to finance unliquidated assets. Finally, credit risk can arise from uncertainty about the obligors' ability to fulfil their contractual obligations and commenced by credit originators or intermediaries (FSR, 2013). Further understanding of the narrow measure of shadow banks and other bank-like entities in Singapore are summarized in Table 6.3.

Table 6.3
Singapore's Shadow Bank Classification by Economic Function

EF	Definition	Typical entity types	Singapore entity Types
EF1	Management of collective investment vehicles with features that make them susceptible to runs	MMFs, fixed income funds, mixed funds, credit hedge funds, real estate funds	Collective investment scheme[1], MMFs[1], hedge funds[1], Central Provident Fund[2]
EF2	Loan provision that is dependent on short-term funding	Finance companies, leasing/factoring companies, consumer credit companies	Finance companies[2], online platform[1]
EF3	Intermediation of market activities that is dependent on short-term funding or on secured funding of client assets	Broker-dealers, securities finance companies	Money broker[2], SGS market dealers[2]
EF4	Facilitation of credit creation	Credit insurance companies, financial guarantors, monolines	Insurance companies[2], Financial Holding Company[2]
EF5	Securitisation-based credit intermediation and funding of financial entities	Securitisation vehicles, structured finance vehicles, asset-backed securities	Structured finance vehicles[1]

Note:
1. FSB (2019).
2. MAS Annual Report.

Source: Author's modification.

Table 6.4
Singapore Shadow Bank Classification by Systemic Risk

Systemic Risk	Definition	Entities
SR 1	Maturity Transformation	MMFs, Structured Finance Vehicles (SFVs)
SR 2	Liquidity Transformation	Hedge Funds, MMFs, SFVs
SR 3	Credit Risk Transfer	
SR 4	Leverage	Hedge Funds, MMFs

Source: Author's modification.

This study will first explore the developments of shadow banking according to the MAS and then focus on the FSB's explanation, which provides more uniformity in comparing and contrasting across other countries:

6.2.2 Finance Companies

According to Lee and Jao (1982), these companies conduct their activities by accepting fixed and savings deposits, but not demand deposits. At first glance, they appear to have a similar business model as commercial banks that offer savings, loans and credit facilities to their customers, but cannot provide deposit accounts which are repayable on demand by cheque. Some activities offered by finance companies are deposit-taking and lending to individuals as well as enterprises such as SMEs. The other difference between a finance company and a commercial bank is that they are unable to deal with commodities, foreign currency and share acquisitions. Considering Singapore's liberal banking regime, the MAS categorised finance companies as shadow banks because they can generate systemic risks as a result of the tight competition among institutions with their deposits and lending services as well as the provision of loans that are dependent on short-term funding (Economic Function 2).

The MAS also categorises special financial intermediation that involves a bank-like model, and such activities can lead to a recession, as occurred in 1975-1977. Lending rates are consequently higher than those of banks with four main lines of business that include (a) housing loans, (b) hire purchase of motor vehicles, television sets, air-conditioners and other durable consumer goods, (c) lease finance and (d) investment in real estate, property, stocks and shares. Therefore, finance companies engage in maturity transformation and credit risk may arise as they possess a license to follow a bank-like model (SR 1 and SR 3). Figure 6.6 reports the total assets as well as the total number of finance companies in Singapore and other selected Asian countries.

Figure 6.6
Total Assets and the Total Number of Finance Companies in Selected Asian Countries in 2012

Number of institutions and total assets (USD m)

	AU	HK	ID	IN	JP	KR	MY	PH	SG^^	TH
Number	101	62	200	415***	2,259	65	3,445#	579	3	29
Total Assets	106,327	248,035**	36,322		580,394	154,054	21,498	16,862^	12,247	
Average Assets	1,053	4,001	182		257	2,370	6	29	4,082	

Figure 6.7
Finance Company Loans

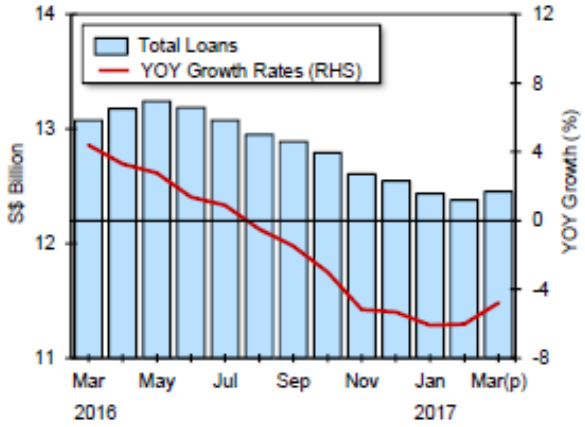
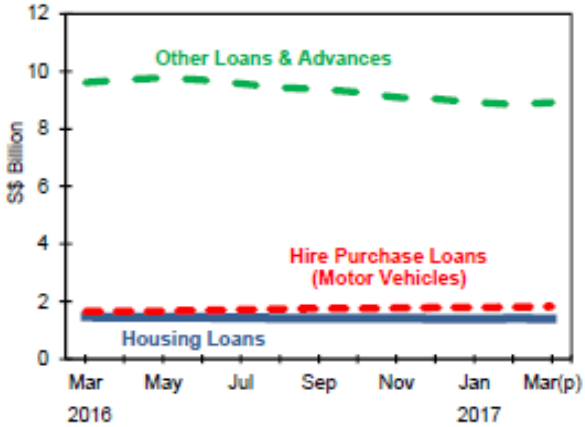


Figure 6.8
Finance Company Loans by Sector



Source: MAS Highlight of Monetary and Financial Developments, 2017.

6.2.3 Merchant Banks

The next type of entity that may fall into the NBFI category in Singapore are merchant banks. These institutions are obligated to arrange finance, rather than finance the project directly. Some sources of funds can come from banks and other financial institutions, but only if the fixed deposits fulfil the following two criteria: one, the amount must be more than USD250,000 per deposit and the minimum maturity is one month. In some specific conditions of the funding, the investor base is limited, and the entities have to borrow the funds either from the interbank market or from their headquarters. MAS aims to place merchant banks under its Banking Act regulation with the intent to simplify and consolidate regulation in one place in terms of administration and reference for this entity. Several typical activities falling under merchant banking are lending, asset management, corporate finance, underwriting of share and bond issues, mergers and acquisitions, portfolio investment management, management consultancy and other fee-based activities.

6.2.4 Insurance and Reinsurance Companies

The liberalisation in the insurance sector to serve domestic business needs has led to the emergence of an offshore insurance business and other reinsurance activities (MAS, 2011). Given the rapid development of these entities, Singaporean insurance plays an important role in pooling the risks for the public and has established this sector as a regional insurance hub in Asia. Aside from its potential market size, the insurance sectors offers various diversified products; including general insurance; life insurance; captive insurance; reinsurance and insurance intermediaries that are managed by licensed insurers; authorized reinsurers; approved marine, aviation and transit (MAT) insurers; and foreign insurers. For instance, direct insurance and reinsurance are classified as shadow banking because they facilitate credit creation, which is Economic Function 4. In other cases, insurance companies participate in the credit creation process due to their provisions of insurance services, derivative contracts and subscriptions of CDOs for cash investments in capital markets (Lemma, 2016). Many of these services contribute to overall economic growth and impact other financial markets by intermediating regional insurance business,

redistributing risks and providing risk advisory services. Not surprisingly, insurance has another link with financial markets as they hold a lot of assets in corporate debt, government securities and equities. Some Singaporean insurance firms established listed SGS products with a significant market share. In 2010 Q3, insurers accounted for about 10% of the SGS and local corporate debt market, but an insignificant share of the SGX-equity market (MAS, 2011). Credit enhancements such as financial guarantees, CDS and mortgage guarantees directly link insurers to financial markets and other financial intermediaries. On the other hand, some researchers such as Zafeiris (2018) do not categorise insurance business activities as shadow banking. While those activities do involve maturity and liquidity transformation, it is liability-driven, and insurance firms are able to match liabilities to long-term funding. This argument is borne out by work done by the MAS. Based on their preliminary study in investigating significant players, they conclude that insurance firms in Singapore only pose limited systemic risk (MAS, 2011).

In general, reinsurance serves as a financial intermediary between savers and investors by receiving premiums and paying insurance benefits. Furthermore, the industry covers a special purpose reinsurance vehicle by conducting insurance securitisation with the aim of fulfilling reinsurance contract obligations. These institutions help finance economic development by accepting insurance premiums and allocating the funds to investments in real estate, shares, debentures, Singapore government securities and, to a small extent, to advance loans to customers. Figure 6.9 illustrates the development of the Singaporean insurance industry and shows that it remains well-capitalised in terms of capital-adequacy ratios (CARs). Both direct life and direct general insurance industry show CAR levels of 236% and 334% respectively.

Figure 6.9
CARs of Direct Life and Direct General Insurers

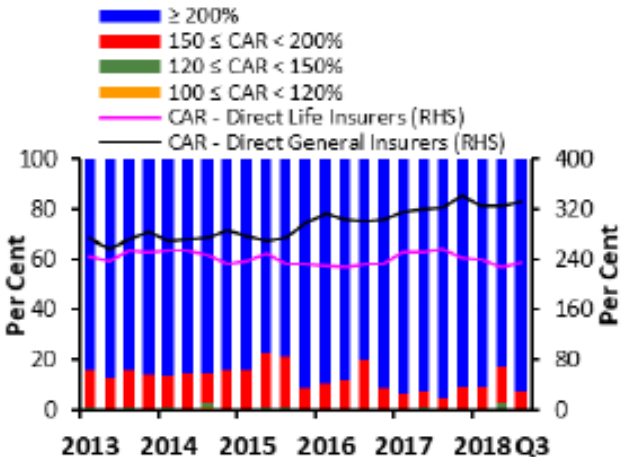
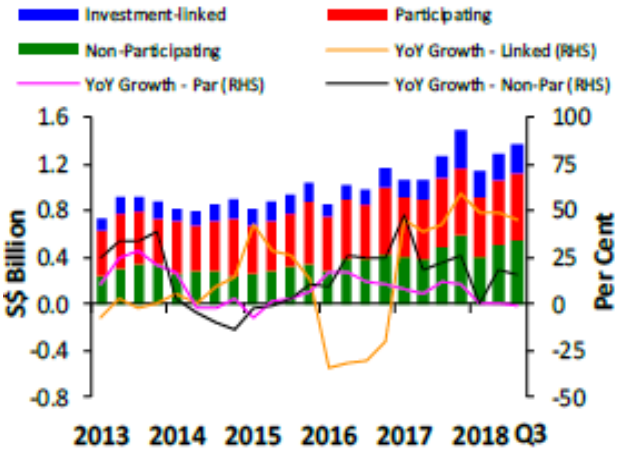


Figure 6.10
Direct Life Insurers: New Business Premiums



Source: MAS (2018).

Figure 6.11
Asset Composition
of Singaporean Insurance Funds

Figure 6.12
Liabilities Composition
of Singaporean Insurance Funds

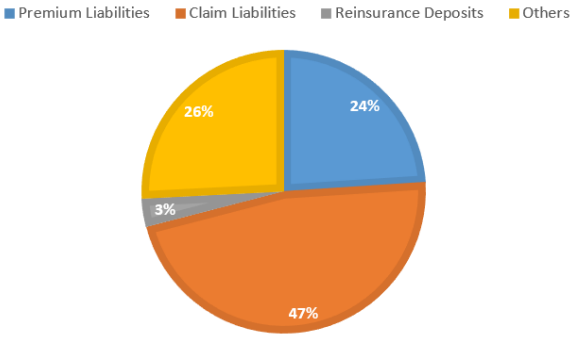


Figure 6.13
Asset Composition
of Singaporean Reinsurance Funds

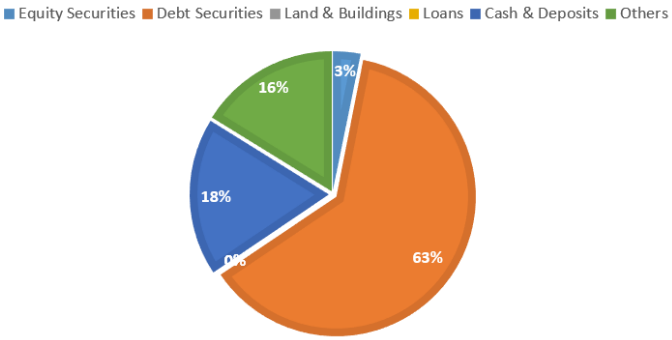


Figure 6.14
Liabilities Composition
of Singaporean Reinsurance Funds

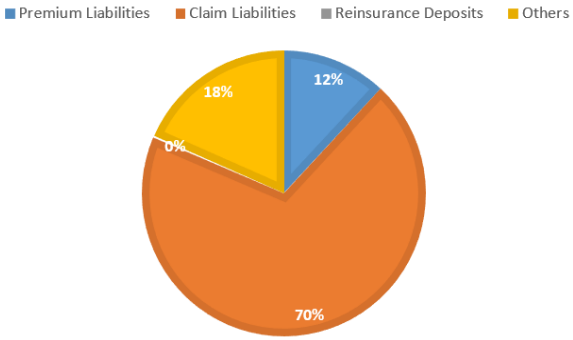
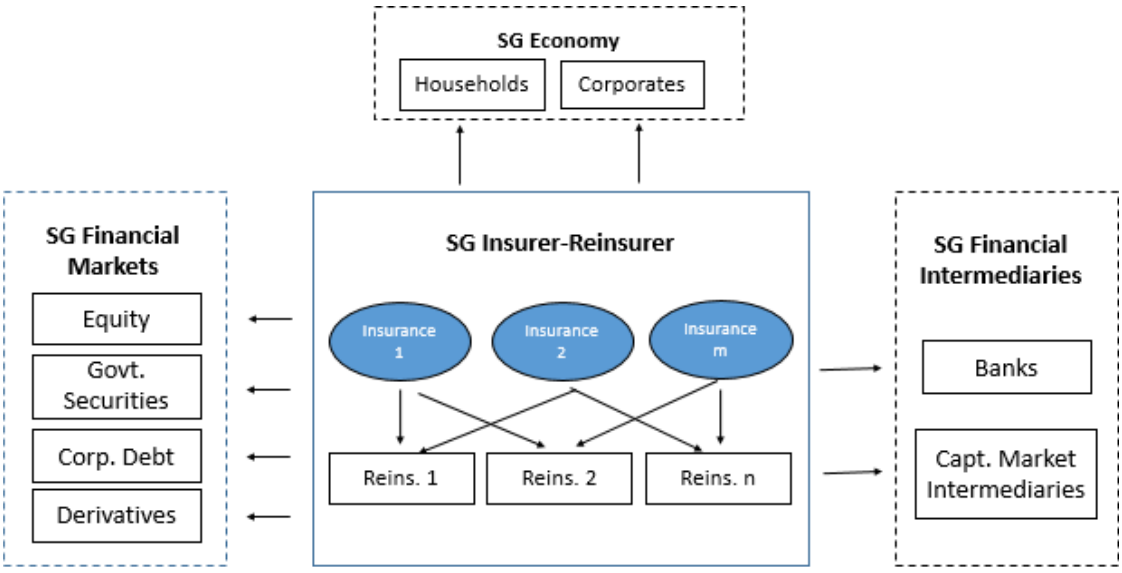


Figure 6.15 allows us to examine in greater detail their linkages of a group of significant direct insurers and reinsurers (based on market share) with the domestic economy, financial market and other financial intermediaries.

Figure 6.15
Systemic Importance of Singapore's Insurance Sector



Source: MAS (2011).

While we find evidence for connectivity between insurers and financial markets, it may not provide much of an impact, as the insurance sector holds a lot of assets in the form of corporate debt, government securities, equities, cash and deposits. Moreover, linkages to other financial intermediaries occur via credit enhancements of issuing credit guarantees, CDS, mortgage guarantees and other financial products provided by insurers. Therefore, the preliminary analysis suggests that the Singaporean insurance and reinsurance sectors would pose limited systemic risk.

A more specific explanation of Singapore's shadow banks in the next sections is based on the FSB's definition.

6.2.5 Hedge Funds

A hedge fund is typically categorised as a Collective Investment Scheme (CIS) under the Securities and Future Act (SFA) regulation. The MAS (2001) ascertains that there is no precise definition of a hedge fund. A commonly used description for a hedge fund is, however, a pooled fund managed by professionals who act more aggressively than traditional sellers in speculative activity through leveraged investments strategies (Chew, 1999). The use of advanced investment strategies, such as high leverage, potentially generate large short-term fund flows and generate exposure to financial markets and economies (EF 1). Singapore also identifies CIS as shadow banking due to its potential impact on liquidity transformation risks and maturity in the implementation of credit instruments (SR 2). On the other hand, hedge funds should be classified as shadow banking, but only to the extent that they intermediate credit (i.e., placing assets backed by liabilities or pooled equity into credit instruments).

Since the 1980's, Singapore has become a leading regional and global asset management centre. A significant proportion of funds, equal to 78% of Singapore's AUMs that are managed by fund managers, are sourced from outside the country, with 67% of all AUMs invested in the Asia-Pacific area. Figure 6.16 shows that in 2018, assets under management (AUM) in Singapore amounted to SGD3.4 trillion, a 5% increase from the year before (MAS, 2018). These assets were managed by 628 registered and licensed funds managers, some of whom operated within the 270 fund management companies registered in the MAS's financial directory. Furthermore, Figure 6.17 shows that the biggest asset allocation in 2018 was private equity with an amount of SGD213 billion. This was followed by hedge funds, REITs, real estate and venture capital. The diversification sectors, consistent with the criteria of being low risk, such as equity, bonds, private equity, venture capital and real estate, were included in the alternatives. The CIS and cash/money markets categories are illustrated in Figure 6.17. Almost 50% of the allocation was distributed to equity.

Figure 6. 16
Assets Under Management

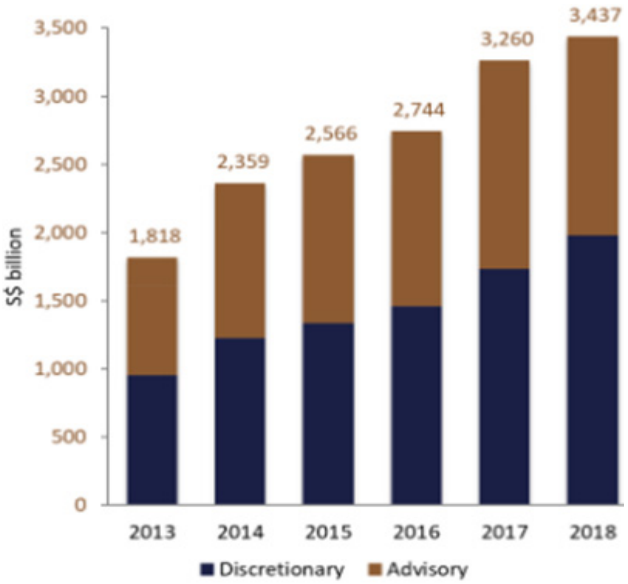
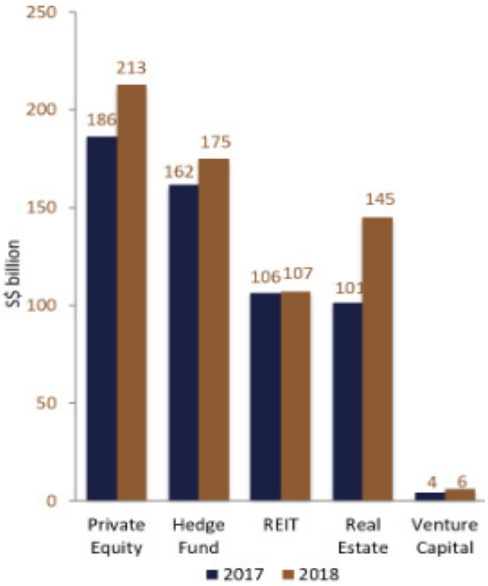
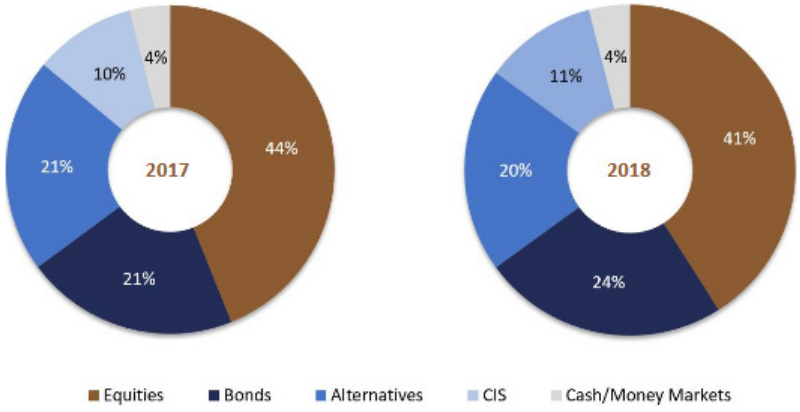


Figure 6.17
Alternative Sectors



Source: Monetary Authority of Singapore (2018).

Figure 6.18
Hedge Fund Investments by Asset Class



Source: Monetary Authority of Singapore (2018).

6.2.6 Money Market Funds (MMFs)

Considering the above requirements, the Singaporean authorities consider money market fund investments to be shadow banking, as they believe that the risks are insufficiently addressed by the regulatory or supervisory framework. Singapore points out that MMFs should be identified as shadow banking only to the extent as they intermediate credit (i.e., placing assets backed by liabilities or pooled equity into credit instruments) and where there are little or no prudential regulatory standards and supervisory oversight. Looking at the features of their asset composition, which are fixed income and mixed-income funds for which AUMs are invested mostly in equity, MMFs are categorised as EF 1. MMFs also contribute to vulnerabilities through maturity transformation (SR 1)., liquidity transformation (SR 2) and leverage (SR 4). This is because they invest in short-term debt instruments, but shares are quickly redeemed on demand (FSB, 2017).

Given the latter condition, the MAS eliminates MMFs as shadow banking they are still under government supervision (Hofmann, 2018). In general, MMFs in Singapore invest in short-term, high-quality fixed income instruments with a maturity between three to six months and not exceeding twelve months. Several investment types are included, such as corporate and government bonds, commercial bills and deposit financial institutions to attract investors wanting a better return. There are four instruments that are used in money market operation, such as (1) direct borrowing or lending, (2) foreign exchange swaps, (3) repurchase agreements (or repos) and (4) MAS bills.

As MMF investments account for only a small portion of the total for the fund management industry in Asia, including Singapore, there is only a very small possibility of MMFs generating systemic risks as they are not permitted to offer constant-net-asset-value (CNAV) MMFs (which are susceptible to runs) to the public. Money markets operate by pricing over-collateralised debt to mimimise the cost of lending. Debt that is over collateralised, short debt maturities, reference pricing, coarse ratings, opacity and symmetric ignorance contribute to the liquidity of money market, but everything that is added to the liquidity will push risk. If the principal collateral is disabled and common trust is impaired, there can be severe consequences, including the complete loss of liquidity of money market instruments (Holmstrom, 2015).

6.2.7 Structured Finance Vehicles (SFVs)

Singapore considers SFVs to be shadow banking only to the extent that they intermediate credit (i.e., placing assets backed by liabilities or pooled equity into credit instruments) with no or only a few prudential regulatory standards or supervisory oversight. SFVs in most jurisdictions involve securitisation that are classified under Economic Function 5. Financial institutions usually use SFVs to transform maturity and liquidity of financial products which may in turn lead to the creation of systemic risks.

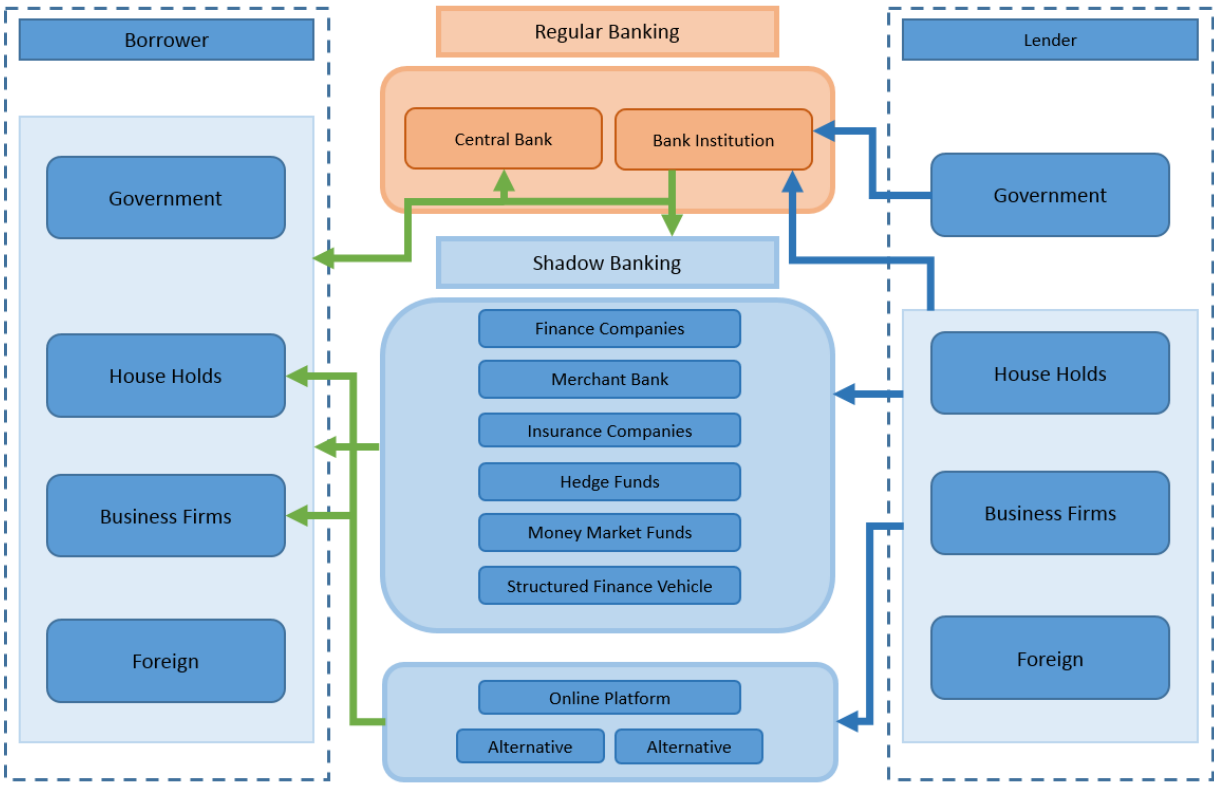
Figure 6.19
Total Asset of SFVs in Singapore in 2012

Incidence of entities and their total assets (USD m)

	AU	ID	IN	JP	KR	MY	SG	TH
Total Assets	130,029	205	33*	278,046	123,825	4,534	4,546	29

* Data in respect of SPVs set up by 14 Asset Reconstruction companies registered with Reserve Bank of India

Figure 6.20
Singapore's Shadow Banking Map



Source: Documented by author.

Figure 6.20 depicts the shadow banking map for Singapore. It presents Singapore's financial system and captures the flow of funds from the ultimate lender on the right-hand side of the figure to the borrower on the left-hand side. Several types of credit intermediaries are examined to highlight the linkages between institutions in Singapore's financial markets. All types of lenders, such as households, business firms and foreign investors, can save their surplus funds in traditional bank institutions and allocate their money as investments in shadow banking entities (asset managers) or online platforms. This kind of operation also finds support from the MAS, whose survey of asset managers showed that 78% of assets under management were sourced from outside Singapore.

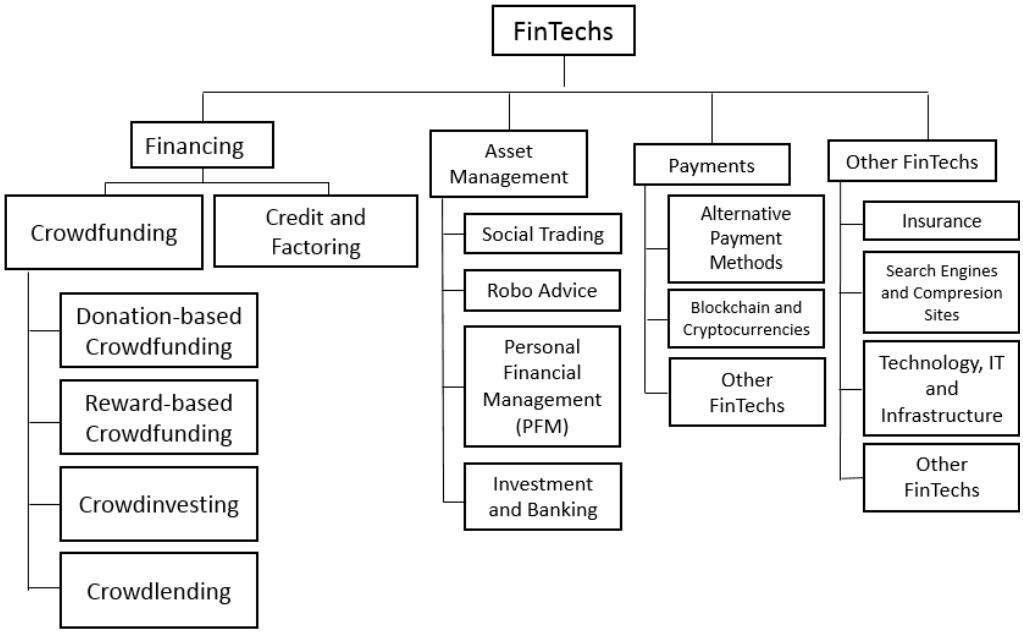
In many instances, the ultimate borrowers are mainly business firms that will benefit from the presence of shadow banking as they can borrow funds to finance their business operation or expansion. Regarding online platforms, business customers, such as SMEs, obtain financing from crowdlending operations as well as personal loans from private customers or households to finance various spending needs in short-term liquidity. The primary function of the financial system is to connect borrowers and lenders and creating a well-functioning economic system. The existence of the financial system allows funds to be directed and allocated to productive activities which can promote the efficient disbursement of capital in the overall economy.

6.3 Prospects for New Forms of Financial Intermediation

In parallel with the rapid growth in the digitisation of the economy in the 2000's, shadow banking activities have been hastened by the emergence of financial technology (FinTech). Thompson (2017) states that online services are much more likely to be offered by non-bank intermediaries than traditional banks, even though the burgeoning shift in consumers' preference ought to encourage traditional financial institutions to copy non-bank intermediaries and provide their own competitive services involving FinTech. For instance, as reported by Thomson Reuters (2017), traditional fund managers keen to maintain their high performance in relation to their competitors may want to increase leverage in their operations. Tools for doing so include employing artificial intelligence, data analytics and robo-advisers to identify investment opportunities and other approaches to automate their operations, processes and digital distribution. Allied Market Research projects P2P lending to grow at a compound annual growth rate of 51.5% by 2022. This innovation has been highlighted by MAS - that unambiguous regulation can bring about implications and alter the business model of fund managers in the future.

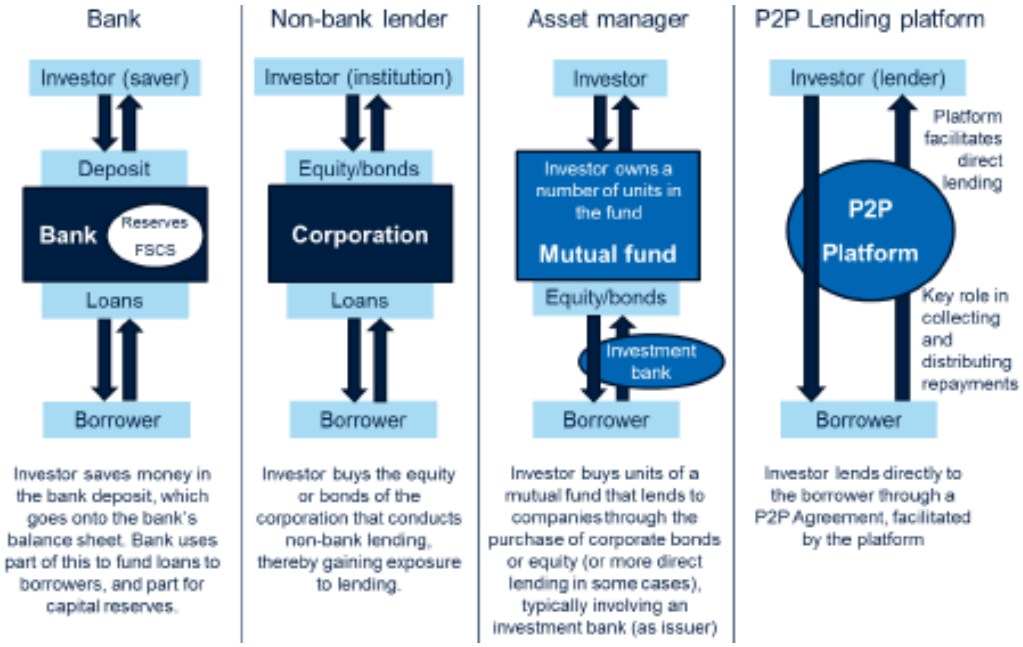
The issue of new forms of financial intermediation is closely related to the government of Singapore's goal to establish a "smart financial centre" with the application of digital and advanced ICT to the finance sector. According to the consultancy firm EY, Singapore was ranked fourth among the world's top FinTech hubs. To bolster that claim, Singapore accounts for 39% of all FinTech firms at the ASEAN level. A survey on the growth of the FinTech market size from EY in 2016 reported a size of GBP0.6 billion (SGD1.06 billion), with investment of GBP44.0 million (SGD77.8 million) and provision of around 7,000 jobs. Singapore's FinTech Association has grown into one of the largest FinTech associations in the world, consisting of over 300 corporate members and broad partnerships with 30 countries. According to Dorfleitner (2017), financing, asset management, payments and other FinTech are classified as four segments of that industry. This statement is also supported by a report by EOB (2017), that such complex services are provided by organisations focusing particularly on activities beyond deposit and saving money, such as loans, investments, financial advisory and asset management services. A general scope for the classification of FinTech is provided in Figure 6.21.

Figure 6.21
Broader FinTech Classification



Source: Dorfleitner (2017).

Figure 6.22
Main Form Investor Exposure to Lending Value Chain



Source: Oxera Economic Council (2016).

Figure 6.22 depicts four main forms of the credit value chain, which reflect the responsibility of direct lending (P2P) in servicing loans from the investor to the individual rather than through financial securities or asset managers. P2P lending provides direct lending from lenders (investors) to borrowers (individuals or SMEs). In other words, this platform provides loans and sets up direct contracts between the investor and borrower

without financial intermediation companies or asset managers. Compared to asset managers who essentially focus on corporate bonds in large companies and have big amounts of managed funds, P2P lending has focused on small loans to individuals or SMEs.

The collective arrangement of FinTech and the increasing role of online platforms or financial technology-related non-bank entities in extending credit or facilitating credit creation (FinTech credit) continue to be a common theme across jurisdictions. It is manifested by the existence of digital infrastructures, such as crowdfunding platforms and peer-to-peer (P2P) lending, which tend to be used by the unbanked portion of society. These innovations create new types of agreements and procedures in the classic areas of banking, such as lending, investment strategies and payments. As stated by Navaretti et al. (2017), the actual and potential areas of expansion of FinTech cover three fields: transaction execution (payments, clearing and settlement), fund management (deposit lending, capital raising and investment management) and the insurance industry. Users can obtain various advantages from the digitisation process in financial services, such as facilitating and simplifying simple access transactions *via* the internet or mobile apps, cost reductions, higher speed of automated processes, higher transparency and convenience (Nino et al., 2017). P2P lending provides a new and effective form of financial intermediation which benefits SMEs, consumers and property loan activities (Oxera Economic Council, 2016).

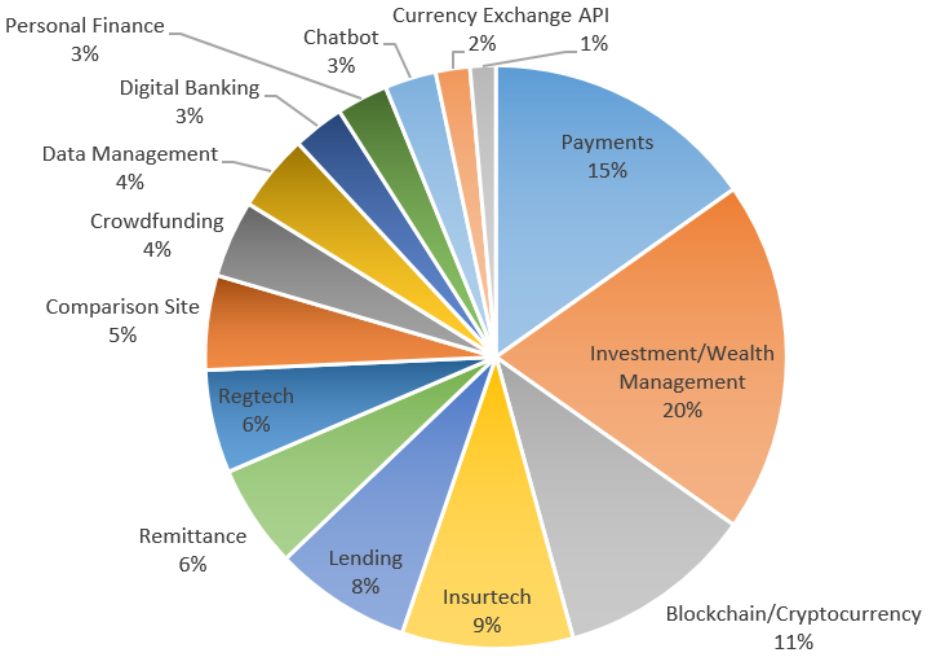
The FinTech regulatory landscape in Singapore is under the oversight of the MAS' FinTech and Innovation Group. The FinTech industry follows Know Your Customer (KYC) procedures to identify business clients' identities, which then permit the Finance Ministry and GovTech to assess the potential risks to business relationships arising from illegal or fraudulent transactions. Table 6.5 provides further explanations about the financial landscape in Singapore.

Table 6.5
The Financial Landscape in Singapore

Dedicated FinTech teams	FinTech industry enablers/utilities	FinTech regulation/ standards	FinTech regulatory sandbox
FinTech and Innovation Group of the MAS	• National Know Your Customer (KYC) utility is a collaboration between the Ministry of Finance and GovTech • Successfully completed its blockchain inter-bank payments proof-of-concept project • The Application Programming Interface (API) playbook recommends guidelines for developing financial services APIs • Industry-wide projects such as decentralized recordkeeping in trade finance supported by the Financial Sector Technology and Innovation scheme • Reducing financial requirements for crowdfunding platforms	• Consultation Paper on digital advice issued by MAS • Regulation on P2P lending and equity crowdfunding • Consultation Paper on payment roadmap issued by MAS	FinTech regulatory sandbox by MAS

In a report by Fintech Singapore at the end of 2017, the type of FinTech entities in Singapore reflected diverse trends and comprised 210 FinTech companies with high-growth potential in the future. A breakdown of these companies is provided in Figure 6.23. In particular, 32 are active in payments, 41 in investment/wealth management, 23 in blockchain/cryptocurrency-related activities, 20 in Insurtech, 16 in lending, 12 in remittances, 12 in Regtech, 11 in internet comparison sites, 9 in crowdfunding, 9 in data management, 6 in digital banking, 6 in personal finance, 6 are involved the provision of chatbots, 4 in currency exchange and the remaining 3 provide application programming interfaces (APIs).

Figure 6.23
Breakdown of 210 Singaporean FinTech Companies with High-Growth Potential

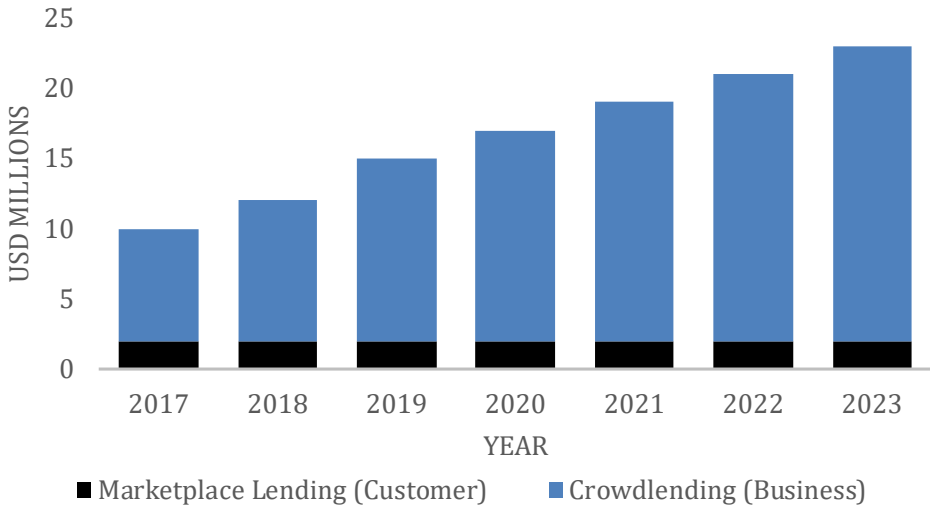


Source: FinTech Singapore (2017).

P2P lending offers an investment opportunity to the investor in the form of delivering funding loans and receiving the cash-flow of the lending business. The risks inherent in P2P lending are typically similar to other investments, such as portfolio corporate bonds. It also involves the buying and selling of mortgages. The direct lending approach is used to limit the liquidity of P2P lending investment. Although the platforms accommodate liquidity investments in regular times by the secondary market, the underlying risks remain higher (Oxera Economic Council, 2016). On the other hand, sophisticated businesses are hampered by a lack of cash flow or working capital that affects their business growth. As usual, the bank's funds for lending mainly come from three sources: deposits, equity and debt. Nowadays, though, traditional incumbents are more selective and less generous in providing credit to finance. Peer-to-peer lending then appears to solve this capital business stagnancy by offering a direct approach to lending and borrowing facilities for customers. In Singapore's cash-intensive economy, this is a boon to the development of alternative credit systems, particularly online lending platforms.

Singapore's digital financial services have the goal of financing small- and medium-sized enterprises (SMEs) based on credit scoring from applications to their platform providers. This digital lending consists of **alternative lending** and **alternative financing**. In case of the former, alternative lending targets business customers as well as private borrowers. As reflected in Figure 6.24, total transaction values in the alternative lending segment reached USD247.3 million in 2019 and is expected to gradually grow until 2023. This market is divided into two loan categories. The first is crowdlending, which arranges a bank-independent loan for SMEs, while the second is marketplace or P2P lending, which provides personal loans through private or institutional investors. Detailed descriptions about crowdlending and marketplace or P2P lending are as follows below:

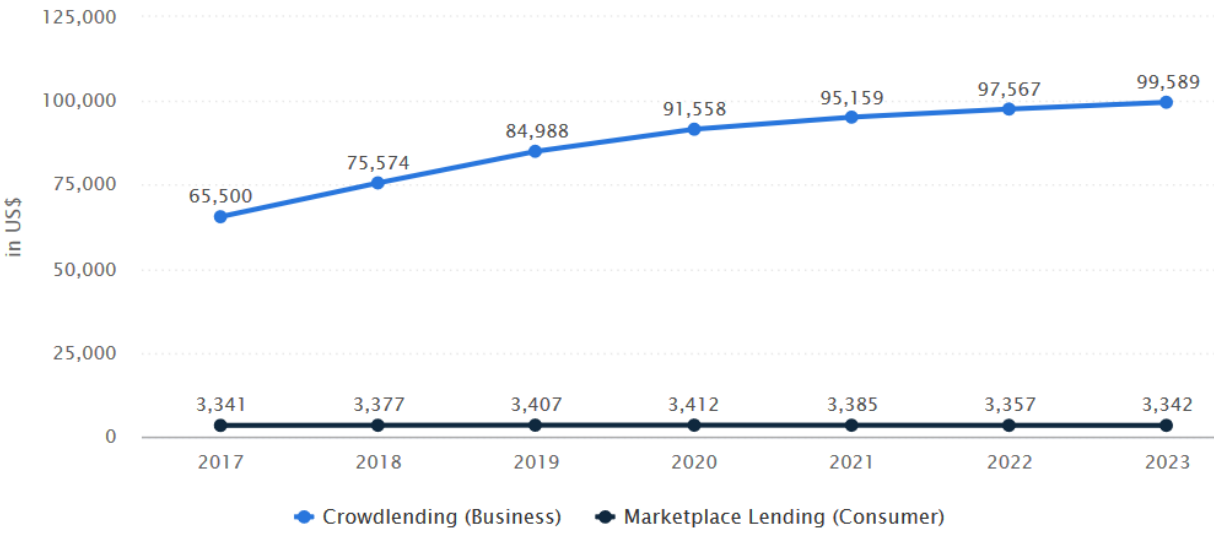
Figure 6.24
Transaction Values in Alternative Lending Segments



Note: The figure shows the forecasted value of transactions in the selected market (market segment, region) for each year. The figures do not refer to the actual revenue that is generated by the processing companies.
Source: Statista (2019)

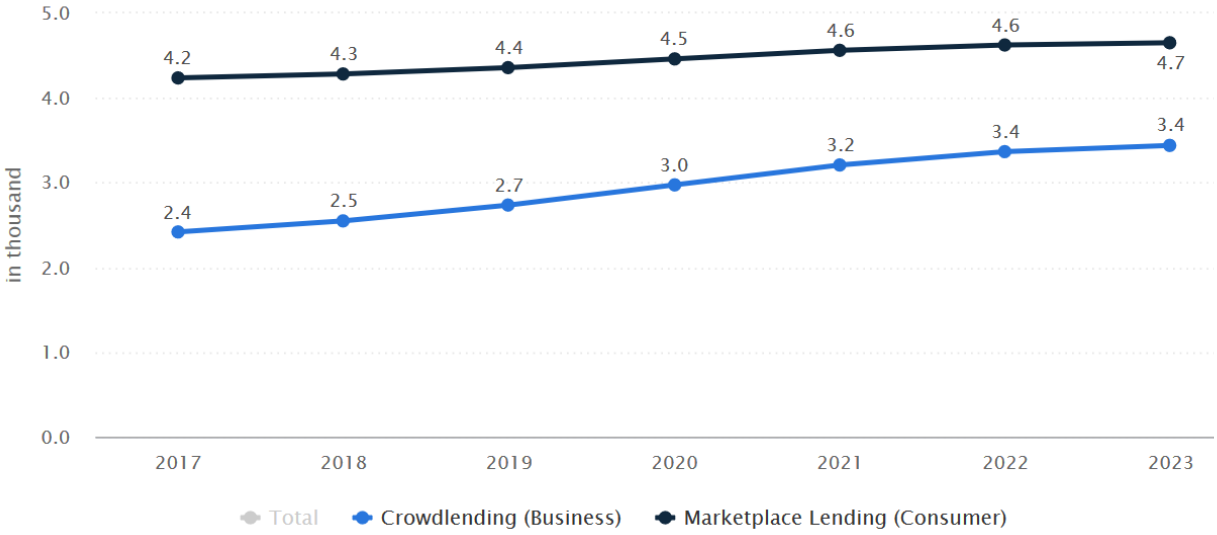
SMEs can obtain loans on crowdlending platforms, which come from single or multiple types of financing provided by private or institutional investors via the online brokering platform. The mechanism of credit application begins when the applicants register on the platform and fills out a financing request. Subsequently, the applications are scrutinised by the platform's credit analyst based on an internal credit scoring system to assess whether they meet the financing requirements. Basically, the criteria of online platforms tend to be easier than those for traditional banking systems, since no collateral is required. However, other requirements may need to be considered, such as investment turnover. These financing requests can be invested in private or institutional investors with an appropriate interest rate as recommended by the credit rating company. The growth of business financing in crowdlending mechanisms is reflected in the transaction value of USD232.5 million in 2019, with an average funding per campaign of USD84,988, and the number of transactions is expected to reach some 3,400 over the next four years as illustrated in Figures 6.25 and 6.26 respectively.

Figure 6.25
Total Average Funding Per Loan in Crowdlending Segment



Note: The figure shows total average funding per successfully funded loan in the selected market. The value is expected to show an annual growth rate for 2020-2023.
Source: Statista (2019)

Figure 6.26
Number of Loans in Crowdlending Segment



Note: The figure shows the number of successfully funded alternative loans (within the last 12 months) in the selected market and region. The value is expected to show an annual growth rate for 2020-2023.
Source: Statista (2019)

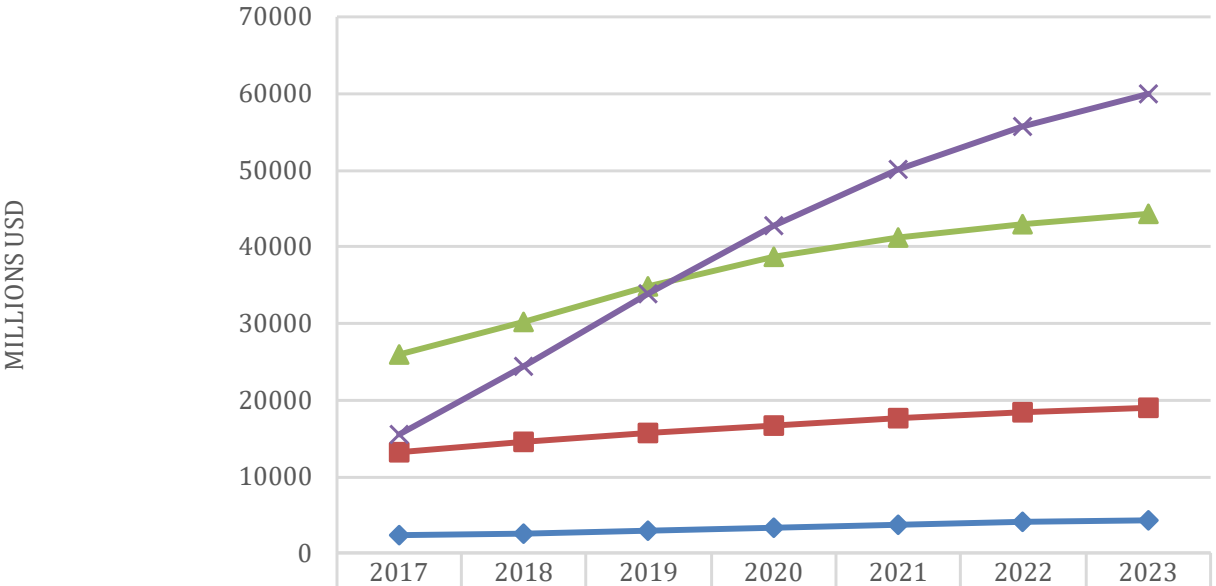
In contrast to the previous platform, marketplace lending encourages private users to place loan requests on an online platform to collaborate with private investors at a suitable interest rate. Online portals such as Lending Club, Zopa, auxmoney and Prosper employ credit score systems and a list of financial request applications before assigning a fixed lending rate.

More than one investor can participate in the credit request. The other uniqueness of online platforms that can be an attractive benefit for many users is the assessment process, which is more flexible than traditional bank loans even though banks collaborate with the platform providers. This flexibility is reflected in prerequisite characteristics, risk audit and less exposure to users which are normally associated with credit lending. Tools that are being used as a benchmark are the outstanding amount and short-term instalments or consumer loans which are agreed upon during the period.

Several activities in online marketplace lending for consumer cover personal loan applications and private investors and P2P loans, which charge an interest rate based on a borrower's credit score by the platform providers. As a result of these activities, the total transaction value in the marketplace lending segment reached USD14.8 million in 2019 and the number of transactions is predicted to reach 4,700 in 2023. In the ongoing development of FinTech activities, there is no evidence that these sectors present a compelling financial stability risk in their current form.

The other type of digital financing in Singapore that falls under alternative financing targets the market for business customers that is not considered by the banks. This alternative financing mechanism is commonly known as crowdfunding, which is a process of sourcing money from individuals or groups of investors for funding projects, start-ups or social campaigns. There are three general methods of crowdfunding, comprising equity-crowdfunding, reward-crowdfunding and donation-crowdfunding (Nino et al., 2017). Focusing on the Singaporean FinTech system, crowd investing and crowdfunding models have a different focus in financing businesses, particularly for start-ups exchanging investment for company shares (equity-based) and entertainment firms (reward-based). The equity-based model requires a capital service license to operate in Singapore. This is because of the liability process faced by investors in case they lose their investment if a company does not perform well. A problem appears when a crowd of people invest in unlisted company shares at an early-stage and allow the investor to compete by creating incentives (Nino et al., 2017). The other crowdfunding model is reward based. Here, an investor gains rewards based on the proportionate amount of money they invested with entrepreneurs if they meet project goals. The total transaction value in the alternative financing segment reached USD7.5 million in 2019, with more than 50% of this amount dominated by crowd investing. The average funding per campaign in the crowd investing sector amounted to USD148,979 in 2019. Figure 6.27 shows that the average transaction value per user in the digital payments segment in 2019 was USD3,016.

Figure 6.27
Transaction Value per User



	2017	2018	2019	2020	2021	2022	2023
Digital Payments	2404.1	2675.8	3015.7	3405.4	3784.7	4088.3	4314
Personal Finance	13181.2	14608	15766.1	16770.7	17642.8	18393	19039.9
Alternative Lending	25925.1	30307.8	34865.1	38666.2	41276.7	43039.1	44255
Alternative Financing	15483.6	24420.7	33978.7	42781	50087.1	55754.9	60051.2

Note: The figure shows the average annual transaction value per user (or potential user) of the selected market (market segment, region) for each year. The value is expected to show an annual growth rate for 2020-2023.
Source: Statista (2019)

The substantive volume of traditional insurance in Singapore has been categorised as shadow banking by the MAS. In order to foster innovation in the insurance sector, the Singaporean government, through the MAS and insurance providers, issued InsureTech technological innovations, whereby two parties agree using automated insurance contracts using blockchain technology (Nino et al., 2017).

Other significant future planning in Singapore occurs in wealth management. The Boston Consulting Group (BCG) projected Asian wealth to grow at 14% per annum between 2017 and 2022, compared to 11% in the rest of the world, with countries such as China and India spearheading that growth. In order to play a role in that development, Singapore started automatic sharing of information with 64 countries that serve to indicate the greater degree of transparency and changing attitudes of wealth management clients. Therefore, the continued expectation of growth rests on wealth management advisors that help shape and change future generation regarding planning and investing (Ng Yao Loong, 2018).

MAS (2018), along with their partners, developed the Financial Services Industry Transformation Map (ITM), in which the wealth management sector plays a major role. Some priorities, such as the transformation of wealth management, are pushed forward by developing strong pools of expertise, broadening product and service offerings and promoting technological innovations. Singapore also offers attractive platforms to facilitate

investment by creating a vibrant private equity and venture capital (PE/VC) eco-system. The average AUM grew by 16.9% per annum over two years, led by PE/VC.

Despite the potential advantages of FinTech mentioned above, there are also many concerns for both investors and borrowers about the future platform lending marketplace. Investors are concerned that minimal regulation and loan performance uncertainty could hamper FinTech revenue growth and lead to reputational risk. For borrowers, cybersecurity and credit risk could be two important issues, since conducting investment transactions on an online platform opens them up to both of these possibilities (Nino et al., 2017). On the macro level, more advanced FinTech can have several effects on financial services, such as fractional-reserve banking systems accompanied by maturity transformation leading to bank runs. FinTech also raises a new issue regarding trust, the future of money and the future role of central banks. In the case of non-bank P2P lending, it potentially poses asymmetric information problems as financial authorities demand to obtain the necessary information about their intermediation activities from the company's balance sheets (Nakaso, 2016). With respect to the mandate of the central bank to maintain the future stability of the currency, they may need to adopt an optimum framework of a "decentralized system" as part of the adoption of distributed ledger technology (DLT) and the blockchain. The sluggishness of the central bank in accepting technological developments and only providing banknotes as payment instruments could keep economic development constrained (Nakaso, 2016).

6.4 Regulation

Before delving deeper into regulation, this study will discuss improvements to risk-return diversification for investors and their resulting economic impact. According to Adrian (2015), shadow banks can be a source of systemic risk as the lack of regulation means a loss of control to prevent the build-up of leverage and interconnections between banks and other financial intermediaries to shadow banks. The direct links between shadow banks and systemic risk is attributed to several causes, including the collateral chain, the high level of leverage, loan guarantees, and agency problems related to securitisation and regulatory arbitrage. All these factors lead to interconnectedness that has implications for the distribution of funding and credit risk (Jokivuolle, 2018; Upper, 2018). To this must be added the indirect exposure through similar asset holdings that makes asset prices prone to valuation effects (Upper, 2018).

The existing regulatory framework already contains the main elements of a FinTech-related economic perspective, but it needs to be developed further to adjust to business models, real practices and market growth (Oxera Economic Council, 2016). Policymakers and FinTech providers need to frame future developments in regulations with several main areas in mind, such as ensuring effective communication with investors involving clear standardisation information across the platforms, utilising appropriate credit-risk management, implementing additional codes of conduct standardisation and equal treatment for any type of investor and regulatory prohibition of maturity transformation.

As mentioned before, the harmful regulatory arbitrage can be classified into three categories. First, the shadow bank entity operates the channelling process to a regular bank off-balance sheet. Second, a traditional institution seeks the cheapest option in jurisdiction to disclose their exposure. Finally, incentives used by a bank to minimise

risk indicators, reduce capital and liquidity requirements (Nouy, 2017). Hence, the policymakers' challenge in the continuous development of this sector is to maximise the benefits of shadow banking while minimising systemic risks. The MAS currently monitors shadow banking activity by using a range of data sources, including regulatory returns and proposed complementary regulation of shadow bank interactions with conventional banks, MMFs, securitisation processes, securities lending and repo activity and the shadow bank entities themselves (MAS, 2011). Such steps to limit regulatory arbitrage of shadow banks has similarities with regulations for finance companies and banks. Another example reflects the same risk of capital market intermediaries and insurance companies.

Online platforms have several design features to prevent and, if needed, manage the possibilities of loan default risk, liquidity risk and platform risk, all of which can be experienced by an investor not only in normal market conditions but also potentially during severe market dislocations (Oxera Economic Council, 2016). To begin with, credit risk assessment and interest rate management by means of credit-score models ensure that returns are appropriate given risk levels. In other words, rates offered are priced to at least cover expected losses. Second, the key benefit from P2P lending arises from the diversification of risk management that spreads the total invested amount into several kinds of loans. In P2P lending, economic agents are able to choose the deals that they want to invest in and the interest rate they want to earn. Another function that is designed to better manage risk for investors in P2P platforms is through the provision of liquidity in secondary markets. Many P2P platforms facilitate long-duration loans which enable investors to sell their portfolios to other investors. This mechanism creates possibilities for investors to sell their remaining loans to other investors to enable them to access their funds before the loans are repaid. The implementation of P2P platform incentives to manage risk, due to both a direct impact on revenue and reputational effects, may affect their viability in the longer term. Based on the earlier discussion, the possibility of P2P lending contains contagion risk, where a relatively small shock on one platform may cascade to many more P2P platforms — this possibility may not be as worrying in the context of Singapore, considering the small share of online shadow bank to Singapore's other presence in global finance.

Singapore imposes stringent regulations on the financial sector, the main provisions for which are stated in the Securities and Futures Act (SFA) Section 82(1). The latter sets up the businesses permissible based on the key regulated activities. SFA also manages the activities that include investment funds, especially for holders of capital markets service licenses and representatives, collective investment schemes and business trusts by issuing guidelines and codes of conduct of business. Many countries around the world, including Singapore in 2014, have adapted the regulatory sandbox as part of introducing and managing financial innovations. In general, the regulations are adapted to fit local needs and provide new products for financial markets at lower cost and quicker access in a controlled environment. They also protect customers from entering risky transactions too eagerly and without due care and encourage innovators to raise funds. The testing ground of the regulatory toolbox uses real customers and is protected by additional – complementary – safeguards that are used for assessments. This assessment help to identify how the products fit in with the existing regulations, which ensures customers are protected. Furthermore, all the entities in Singapore that are engaged in moneylending activities are subject to authorisation from the Register of Moneylenders following the Moneylenders Act 2010 (Singapore Statue Online, 2019).

As technology companies in Singapore enter the sandbox, two basic criteria are evaluated. First, the suggested financial service should include new technology or improve the use of existing technology in an innovative way. Second, it should overcome existing problems or bring advantages to customers or industries. A collaborative approach rather than competition is taken across the ecosystem.

Based on the advantages of a developed finance ecosystem and technological advances, MAS' Managing Director Ravi Menon revealed that Singapore's monetary authority instigated a broader strategy to become a "Smart Nation". Towards that aim, the MAS strives to improve digital government services through better utilisation of data and other new technologies. Even though Singapore's monetary authority is pleased with the existence of FinTech players, MAS forbids shadow banking activities using electronic funds to grant loans from the payment system start-ups (Menon, 2018). The monetary authority intends to scale up FinTech operations based on risk perspectives and unified regulations at the banks' level.

Singapore's government has offered additional high-level support by introducing a FinTech patent scheme known as the FinTech Fast Track Initiative to boost the creation of vigorous ecosystems for innovation through research and development. Another implementation following the Payment Service Bill that became law was the operation of aggregate mobile wallets in which more than SGD5 million must be fully secured. FinTech cannot lend that amount to somebody else unless it obtains a banking license to take in deposit and provide loans to agents in the economy. This principle of ringfencing or the process whereby a portion of a company's assets or profits is separated without the intention of it being used, is similar to the current practice with other entities, such as security dealers. It also reflects procedures such as selling shares by customers and insurers who must segregate between their own and shareholders' funds.

6.5 The Impact of Monetary Policy on Shadow Banks through the Asset Price Channel in Singapore

This chapter aims to achieve three main purposes. The first objective is to uncover a coherent view of shadow banking activities in Singapore. In order to accomplish this goal, we investigate and then present a map of shadow banking activities in Singapore. In so doing, this study uses the activity-based definition of shadow banks. Moving on, the second objective is to explore the prospects for new financial intermediaries through the existence of financial technology. The first two objectives are investigated in a qualitative approach that is based on related preliminary research to build the shadow banking map in Singapore.

6.5.1 Data Description

The high supply and demand of shadow banking products create new forms of financing, making the price involved very sensitive for households, SMEs or large companies. The determination of the appropriate interest rates in the transmission mechanism of shadow banking is crucial. Although insurance funds are the largest NBFIs in Singapore, they are not categorised as narrow shadow banking (OFI) according to the FSB. This is because the activities they are engaged in are not considered to create systemic risk. Thus, the market behaviour of a shadow banking entity can be assessed

through the asset management industry, which accounts for the second largest share of NBFI assets in Singapore. The growth of the asset management industry in Singapore proceeded quickly and haphazardly, leading to a lack of market transparency and needed regulation. Therefore, returns from net asset value (NAV) are argueably more accurate and useful to capture shadow banking developments in the respective country.

Temasek Holdings is a global investment company headquartered in Singapore that we choose to represent non-bank financial intermediaries for this study. Based on data from Bloomberg, Temasek Holding PTE Ltd is the biggest asset management company in Singapore, with current total equity assets under management of USD107.1 billion invested in 404 securities. By industry sector, the largest exposures are financials (37.4%) and communications (30.5%). Considering its limited data, aggregate size, popularity and close relationship to the credit markets, seven of Temasek Holdings' funds returns which are registered in Securities Companies, serve as the best proxy for Singapore's shadow banking asset price. We also deem them to be an appropriate indicator of the market-based interest rate that is determined by market supply-demand forces. The model is then adapted along two different lines. The first model will be used to compute the impact of monetary policy on shadow banking returns, while the second model investigates the monetary impact on asset growth of shadow banks by category, i.e., equity, fixed income and money market funds (MMF). By doing so, we hope to find more robust results that could hence become a useful resource for financial regulators.

Moving on to the third goal, we employ the following model approach to assess the impact of monetary policy on shadow banking returns through the asset price channel. The dependent variable is either the net asset value (NAV) of Temasek Holdings (Model 1) or total asset growth of each type of retail fund product (Model 2). More specifically, we try to estimate the impact on three types of asset classes, which are equity (e.g., stock), fixed income asset (e.g., bonds) and cash equivalent assets like MMFs. We analyse three types of funds of Temasek Holdings' asset, namely Fullerton China focusing on shared fund to capture equity funds, Fullerton-Asian High Yield Class D-USD Fund to capture fixed-income funds and Fullerton SGD Cash Fund to represent money market funds.

We select data on the daily returns on Temasek Holding's NAV from 1 January 2016 to 30 April 2019, for a total of 868 daily yields. Bloomberg provides data on just seven funds under management of Temasek Holding Asset Management, which is why we use the total assets of these seven funds to generate a standardised weighted NAV. The weighted average provides us with the daily yield from which we can calculate an effective annual return. In addition, the exogenous control variables include the Singapore Interbank Offered Rate (SIBOR) interbank money market rate as well as the policy rate to measure the price-based monetary policy tool. The benchmark interest rate to represent the administrative monetary policy tool are the lending and deposit rates which use the MAS' standing facility. The facility's lending rate is 0.5% above the reference rate, while the deposit rate is 0.5% below the reference rate, subject to a floor of zero. We also include an exogenous control variable, which is the nominal effective exchange rate (NEER). The latter is included to measure the extent to which the exchange rate determines the returns on shadow banking. To avoid the consequences arising from the high correlation coefficient between the interest rates, we include them one at a time into the model to see which one has the most significant effect on our dependent variable. We use the natural logarithm of the NEER data.

We investigate the autocorrelation and partial autocorrelation functions of Temasek Holding's returns and the exogenous control variables at levels: the autocorrelation and partial autocorrelation functions of Temasek Holding's returns and assets have a decaying pattern, which shows that returns are non-stationary in levels and contain a unit root. We also check the autocorrelation and partial autocorrelation function at first differences and the results show that all variables are stationary in first differences and do not contain a unit root.

Table 6.6
Data Description

Variable Name	Description		Proxy Indicator	Source
Dependent Variable				
Return	Asset Price (Model 1)	Weighted Daily Net Asset Value	$(NAV_t - NAV_{t-1})/NAV_{t-1}$	Bloomberg
- **Equity** - **Fixed** - **MMF**	Volume of total assets of each product (Model 2)	Total asset growth for each asset type	$(X_t - X_{t-1})/X_{t-1}$	Bloomberg
Exogenous Variable				
- **Lending** - **Deposit**	Administrative monetary policy tool: benchmark interest rate	- Lending rate - Deposit rate	Daily MAS standing facility deposit rate and borrowing rate	https://mas.gov.sg
- **MMF** - **Policy**	Price-based monetary policy tool	- Singapore Interbank Money Market Rate - Policy rate	- SIBOR - Daily policy rate	
Control Variable				
NEER	Exchange rate	Nominal Effective Exchange Rate (NEER)	Local currency	IMF's International Financial Statistics (IFS) dataset

6.5.2 Empirical Model

Following Zhang and Wan (2017), this study uses the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model. The reason for using the EGARCH model instead of other empirical models is twofold. First, these models are better suited for high-frequency data that are affected by heteroskedasticity than the simple GARCH model. Two, the empirical results suggest that the EGARCH model fits the sample data better than a GARCH model in capturing the volatility of shadow banking asset price returns.

Before doing the EGARCH regressions, we conduct tests for the order of the appropriate ARIMA (p,d,q) model as the first step of EGARCH estimation. Then we continue with the robustness tests, such as the serial autocorrelation LM test, to ensure that the data are free from autocorrelation, and a heteroskedasticity test to ensure that the residual errors are normally distributed. The autocorrelation and partial autocorrelation functions of Temasek Holding's returns have a random pattern, which indicates that returns are stationary at levels and do not contain a root unit. The model specification is as follows:

$$r_t = \sum_{i=1}^{s} \phi_i r_{i-1} + Z'_m X_t^m + u_t. \quad u_t \sim N(0, \sigma_t^2) \qquad \text{..... (11)}$$

$$ln(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j ln(\sigma_{t-j}^2) + \sum_{i=1}^{p} \alpha_i \left|\frac{u_{t-i}}{\sigma_{t-i}}\right| + \sum_{k=1}^{r} \gamma_k \frac{u_{t-k}}{\sigma_{t-k}} + Z'_v X_t^v \qquad \text{..... (12)}$$

where the endogenous variable, r_t, is Temasek Holding's interest return, equation (11) is the mean equation of the shadow banking interest rate series, equation (12) is the variance equation, the term $\sum_{i=1}^{s} \phi_i r_{i-1} + Z'_m X_t^m$ represents the time-varying mean and σ_t^2 is the time-varying variance. The mean is assumed to show persistence in the shadow banking interest rate as well as in exogenous factor that should affect shadow banking. The exogenous control variable, X_t^m, include the interbank money market rate and the policy rate as price-based monetary policy, the policy rate and the benchmark interest rate, while the administrative monetary policy tools are the lending and deposit rate. X_t^v is the exogenous variable for the variance equation and γ_k is the asymmetric impact of positive or negative innovations on the standardised residuals.

6.5.3 Empirical Results

6.5.3.1 Temasek Holdings' Return

In this section we present our empirical results by first determining the lag structure of the underlying models and subsequently the best-fitting model. The best model is chosen by considering the significance of various estimated models from the statistical probability of a sequence of F-tests, the significance of the AR or MA coefficients used, the maximised value of the log-likelihood function and the minimised value of the AIC and SIC criteria. We choose the best model coming from either the GARCH or Exponential-GARCH (EGARCH) specification under the assumptions that the errors follow a normal (Gaussian) distribution. Before evaluating the best model, we must ensure that all significant AR and MA coefficients are included. The best ARIMA representation for Temasek Holding's returns is the ARIMA(2,1,2) model. Finally, we ensure that there is no serial correlation in the model, and that there is heteroskedasticity in the ARCH effect test, so that the ARCH-GARCH method can be used.

Table 6.7
Empirical Result of Model 1 for Singapore

Variable	Policy Rate	Deposit Rate	Lending Rate	Interbank Rate
	ARIMA(2,1,2)	ARIMA(2,1,2)	ARIMA(2,1,2)	ARIMA(2,1,2)
Mean Equation Results				
Constant	7.66E-05	7.14E-05	7.47E-05	7.16E-05
Exogenous	–0.259**	–0.004	–0.171	–0.030
NEER	1.305*	1.303*	1.300*	1.303*
AR(1)	0.251*	0.250*	0.250*	0.250*
AR(2)	–0.895*	–0.900*	–0.897*	–0.900*
MA(1)	–0.265*	–0.265*	–0.265*	–0.265*
MA(2)	0.887*	0.892*	0.891*	0.892*
Diagnostic tests				
***R*-squared**	0.021	0.021	0.022	0.021
Adjusted *R*-squared	0.015	0.014	0.015	0.014
Log-likelihood	2424.527	2424.424	2424.619	2424.424
***F*-statistic**	3.137	3.103	3.168	3.102
Akaike info criterion	–5.590	–5.589	–5.590	–5.590
Schwarz criterion	–5.551	–5.551	–5.551	–5.551

Table 6.7 shows the estimated models for each exogenous variable (policy rate, deposit rate, lending rate and interbank rate). Based on the estimation results, all the exogenous variables have a negative relationship, with only the policy rate having a significant effect on Temasek Holdings' returns. The small contribution of the monetary policy tools may be due to other factors. The negative association between Temasek Holdings' returns and the price-based monetary policy tools means that any increase in the policy rate will drive Temasek Holdings' returns down. The latter result is in accordance with the theory of the transmission mechanism through the asset price channel, where monetary policy influences changes in asset prices. For the administrative monetary policy tools, results suggest that the elasticity of the policy rate gets reflected in effective changes in monetary policy to retail-market rates. This argument might possibly explain the insignificant result for interbank interest rates and monetary policy tools that are not effective in driving the shadow banking market, because there is a lack of connection between them. For administrative monetary policy tools, we find that the elasticity of the policy rate implies effective transmission of monetary policy to retail-market rates.

In addition, to ensure that our model is robust, we conduct a diagnostic test of heteroscedasticity, namely the ARCH-LM test, to ensure that the classical assumptions about the residuals hold in the estimation of the model. Any increase in the nominal effective exchange rate (NEER) signifies a depreciation of the Singapore dollar that will affect Temasek Holdings' returns. This result is in line with Zhang and Wan (2017), who

found that lending rates as administrative monetary policy tools affected retail interest rates in China, based on Yu'E Bao interest rates. On the other hand, the results differ from He and Wang (2012) and Porter and Xu (2013), who argued for using the seven-day repo rate as the market-determined interbank interest rate rather than the SHIBOR.

6.5.3.2 Temasek Holdings' Assets

In order to analyse the impact of monetary policy on Temasek Holdings' assets under management, we follow the same steps as above. Table 6.8 separates the estimation results into different types of assets, which are equity, fixed income and total assets. The main exogenous variable for all asset types turn out to be insignificant except for the interbank money market rate (MMR) through SIBOR. Interestingly, changes in interbank rates have a positive relationship and significantly impact equity asset volumes with a magnitude of 0.048%. The explanation for this result is related to the prior argument that Singapore's interbank rate is well-established and effective in influencing inflows into Temasek Holdings' equity fund.

The interbank rate is also used as the rate of interest which is charged on short-term loans between Singaporean banks and underlies liquidity operations that are conducted by commercial banks. This market is an essential channel for liquidity and transparent trading, ensuring a stable pricing mechanism. The sensitivity of equity fund assets to equity prices motivates the monetary authority to formulate liquidity provisions in controlling the continuity of financial markets. Hence, a short-term monetary policy level that can transmit the benchmark monetary policy signal is required to reduce market volatility.

The absence of any effects coming from the lending rate, deposit rate or policy rate might be due to an imperfect transmission among monetary policy rate tools, specifically on the fixed income asset class. Table 6.8 illustrates that none of the benchmark interest rates or price-based monetary policy tools affect the growth of fixed-income asset holdings.

Table 6.8
Empirical Results of Model 2 for Singapore

Dependent Variable	Equity				Fixed-Income				Total Assets			
	Lending Rate	Deposit Rate	Policy Rate	MMR	Lending Rate	Deposit Rate	Policy Rate	MMR	Lending Rate	Deposit Rate	Policy Rate	MMR
	ARIMA(2,1,2)	ARIMA(2,1,2)	ARIMA(2,1,2)	ARIMA(2,1,2)	ARIMA(3,1,3)	ARIMA(3,1,3)	ARIMA(3,1,3)	ARIMA(3,1,3)	ARIMA(2,1,1)	ARIMA(2,1,1)	ARIMA(2,1,1)	ARIMA(2,1,1)
Mean Equation Results												
Constant	-0.001	-0.001	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000	-0.005	-0.005	-0.003	-0.005
NEER	0.365	0.366	0.443	0.444	0.111	0.109	0.108	0.109	0.091	0.097	0.627	0.056
Exogenous	-0.129	-0.132	0.000	0.048*	0.054	0.047	-0.000	0.006	0.716	0.802	-0.006	-0.009
AR(1)	1.191	1.191	1.198	1.197	0.496	0.496	0.500	0.500	0.994	0.994	1.012	0.993
AR(2)	-0.956	-0.956	-0.966	-0.965	0.480	0.481	0.485	0.483	-0.027	-0.027	-0.021	-0.027
AR(3)					-0.887	-0.886	-0.885	-0.886				
MA(1)	-1.198	-1.197	-1.208	-1.208	-0.543	-0.543	-0.546	-0.546	-0.996	-0.996	-1.029	-0.995
MA(2)	0.984	0.983	0.998	0.998	-0.441	-0.442	-0.445	-0.443				
MA(3)					0.919	0.919	0.918	0.919				
Diagnostic Tests												
R-squared	0.021	0.021	0.023	0.026	0.019	0.019	0.019	0.019	0.022	0.023	0.051	0.021
Adjusted *R*-squared	0.013	0.013	0.014	0.018	0.007	0.007	0.007	0.007	0.007	0.008	0.036	0.006
Log-likelihood	1897.422	1897.410	1898.074	1899.270	2334.758	2334.740	2334.714	2334.785	620.990	621.052	625.861	620.660
Akaike info criterion	-5.417	-5.417	-5.419	-5.422	-6.615	-6.674	-6.674	-6.615	-3.705	-3.705	-3.734	-3.703
Schwarz criterion	-5.371	-5.371	-5.373	-5.376	-6.651	-6.615	-6.618	-6.651	-3.636	-3.636	-3.665	-3.634

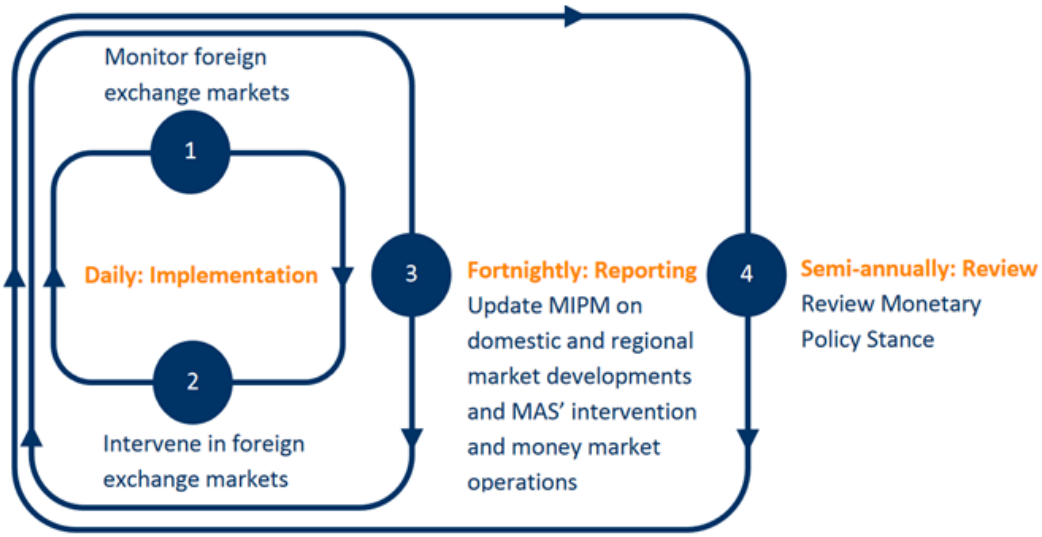
6.5.4 The Monetary Policy Framework in Singapore

The MAS as the monetary authority of Singapore has a mandate to maintain price stability and support the sustained growth of the economy through its monetary policy. Amongst monetary policy frameworks, Singapore is quite unique in its use of the exchange rate, more specifically known by Singapore dollar nominal effective exchange rate (SGDNEER), rather than an interest rate as the effective tool for maintaining price stability. The main reason for this is the fact that imported goods dominate domestic expenditure and the exchange rate, therefore, has a stronger influence on inflation. As stated by McCandless and Weber (1995), the growth of money is highly correlated with inflation, which have an impact on Singapore's M3 measure of the money supply.

Figure 6.28 illustrates monetary policy implementation in Singapore. The MAS monitors the daily movement in the NEER to ensure currency fluctuations fall within the foreign exchange crawling policy band.

The main objective of Singapore's monetary policy is price stability to support sustainable economic growth. The MAS intervenes in the foreign exchange market to maintain the Singapore dollar exchange rate, in the form of the nominal effective exchange rate (NEER), within the policy band. The implementation of the exchange rate-based monetary policy proceeds as follows. The MAS monitors the daily movements in the NEER to ensure currency movements fall within the crawling policy band. Foreign exchange interventions, both in the spot and forward markets, are implemented during undesirable foreign exchange market conditions, especially when the NEER fluctuates widely and is in danger of breaching its foreign exchange crawling policy band.

Figure 6.28
Implementation Cycle of Monetary Policy



Source: MAS (2013)

Second, the MAS' Market Management Department (MDD) will report its intervention and money market operations at the fortnightly Money and Investment Meeting (MIPM), which is equivalent to the Monetary Policy Commitee of other central banks. In addition to reporting its operations, MDD also supplies updates on domestic

and regional market volatility. Finally, MAS provides monetary policy formulation as a separate function to prevent monetary policy decisions from interfering with short-term implementation considerations. The Economic Policy Group continually evaluates the exchange rate to avoid misalignment in the Singapore dollar currency value. After each review, a Monetary Policy Statement (MPS) is released with information on the newest movements of the exchange rate and to provide updates on exchange rate policy management.

6.6 Conclusion

Looking at the growth of the Singaporean economy and the use of M3 as the broad money aggregate, the structure of Singapore's shadow banking system is quite different from that of the US and Europe, which are both relatively complex, both in terms of activities and entities. In this regard, Singapore is more similar to Hong Kong, which has the largest share of OFIs in the financial sector. The entities categorised as shadow banks, according to the FSB definition, are collective investment schemes, hedge funds, money market funds and structured finance vehicles. The main reason behind the emergence of these types of shadow banks over others is mainly due to the stringent lending regulations in the banking sector. The latter creates obstacles for corporates and private customers in obtaining funds for their operational business and daily needs. The other reason is that these institutions can be a lucrative way for investors to place their money in Singapore's financial sector. This study also includes some analysis as to what extent online platforms, such as P2P lending, are involved in shadow banking activities.

The MAS defines shadow banking as any activity that creates risks that can trigger systemic economic crises and cannot be addressed by regulations. Related to this issue, Financial Technology (or FinTech) is growing rapidly. Firms in this area have the potential to operate as shadow banks or non-bank financial intermediaries (NBFI) in conducting credit intermediation. The relatively simpler credit requirement and assessment process by FinTech online platforms make these firms an attractive and cost-efficient option. Singapore is attempting to make the FinTech revolution part of its Smart Financial Centre objective rather than a source of technology disruption by collaborating and synergising with all stakeholders. Peer-to-peer lending is projected by Allied Market Research to grow at a compound annual growth rate of 51.5% by 2022. These innovations have been met with clear regulations by the MAS which can have other implications and alter the business model of fund managers in the future.

To assess the effect of changes in monetary policy on shadow banking in Singapore, we use the effective annual returns of one of the largest asset management firms in Singapore, namely Temasek Holdings, as a proxy for the shadow banking interest rate in Singapore. We included exogenous control variables that involve interest rates: the interbank rates to measure the price-based monetary policy tool, the policy rate, the lending rate and the deposit rate to capture administrative monetary policy tools as well as the nominal effective exchange rate (NEER). The results suggest that only the policy rate has a significant negative effect on Temasek Holdings' returns, equal to 2%. The small contribution of monetary policy tools may come from other factors. The negative association between Temasek Holdings' returns and price-based monetary policy tools means that any increase in the policy rate will lower Temasek Holdings' returns. This argument might be able to explain the insignificant result of interbank interest rates and

monetary policy tools which are not effective in influencing the shadow banking market since there is a lack of connection between them. For administrative monetary policy tools, results suggest that the elasticity of the policy rate transmits effective changes in monetary policy to retail-market rates.

Alterations in the interbank interest rate have significant positive effects of 2.6% on Temasek Holdings' equity assets under management. This result means that a 1% increase in SIBOR increases equity assets by 1%, which is in line with the argument that Singapore's interbank rate is well-established and effective in influencing inflows into Temasek Holdings' equity assets. On the other hand, this finding cannot be generalised due to data limitations. As a consequence, we are only able to use one asset manager in our sample, even though it is the largest asset management company in Singapore.

6.7 Policy Recommendations

The rapid growth and development of the Singaporean economy has been accompanied by the rapid development of financial technology and activities. The stringent lending regulations in the banking sector have encouraged economic agents to increasingly look to NBFIs because of their accessibility and straightforward credit terms. Therefore, the rapid growth of financial technology would result in more NBFIs and credit intermediation activities. Instead of regarding NBFIs and financial technology as problems in the economy, it is preferable if the monetary authority could build a synergistic relationship between financial insitutitons/intermediaries and shadow banks. Moreover, the authority needs to implement regulations and specific controls for the intermediary activities in shadow banks to avoid systemic economic crises as shadow banking activities in Singapore are quite extensive.

REFERENCES

Abubakar, L., Sukmadilaga, C., and Handayani, T., (2016), "Impact of Shadow Banking Activities as Non-Bank Intermediation toward Regulatory Developments in Function Control of Financial Services Sector in Indonesia," *Diponegoro Law Review*, 1(1), pp. 47-60.

Accenture, (2017), "Global FinTech Investment Growth Continues in 2016," Available at: https://www.accenture.com/id-en/company-news-release-global-FinTech-investment-growth-continues

Adrian, T. and Ashcraft, A. B., (2016), "Shadow Banking: A Review of the Literature," in Jones, G. (Ed.), Banking Crises, Springer, pp. 282-315.

Adrian, T., Covitz, D., and Liang, N., (2015), "Financial Stability Monitoring," *Annual Review of Financial Economics*, 7(1), pp. 282-315.

Adrian, T., and Shin, H. S., (2008), "Financial Intermediaries, Financial Stability and Monetary Policy," *Staff Reports*, 346, New York, NY: Federal Reserve Bank of New York.

Adrian, T., and Shin, H. S., (2010), "Financial Intermediaries and Monetary Economies," in Friedman B. and Woodford. M., (Eds.), Handbook of Monetary Economics, 3, pp. 601-650.

Alimirruchi, W., and Kiswara, E., (2017), "Analyzing Operational and Financial Performance on Financial Technology (Fintech) Firm," Case Study on Samsung Pay, Semarang, Indonesia: Diponegoro University.

Allen, F., Goldstein, I. and Jagtiani, J., (2018), "The Interplay among Financial Regulations, Resilience and Growth," *Journal of Financial Services Research*, 53(2-3), pp. 141-162.

Angeloni, I., Faia, E. and Lo Duca, M., (2015), "Monetary Policy and Risk-Taking," *Journal Economic Dynamics and Control*, 52, pp.285-307.

Ansari, S. S. and Krop, P., (2012), "Incumbent Performance in the Face of Radical Innovation: Towards a Framework for Incumbent Challenger Dynamics," *Research Policy*, 41(8), pp. 1357-1374.

Arner, Buckley and Barberis, (2016), "The Evolution of FinTech: A New Post-Crisis Paradigm?" *University of Hong Kong Faculty of Law Research Paper,* No. 2015/047.

Athey, S., Parashkevov, I., Sarukkai, V., and Xia, J., (2016), "Bitcoin Pricing, Adoption, and Usage: Theory and Evidence," *Institute for Economic Policy Research Working Paper,* No.17-033.

Azarenkova, G., Shkodina, I., Samorodov, B., Babenko, M., and Onishchenko, I., (2018), "The Influence of Financial Technologies on the Global Financial System Stability," *Investment Management and Financial Innovations*, 15(4), pp. 229-238.

Bakk-Simon, K., Borgioli, S., Giron, C., Hampell, H., Maddaloni, A., Recine, F., and Rosati, S., (2012), "Shadow Banking in the Euro Area: An Overview," *European Central Bank Occasional Paper Series*, No 133.

Balyuk, T., (2016), "Financial Innovation and Borrowers: Evidence from Peer-to-Peer Lending," *Rotman School of Management Working Paper*, No. 2802220.

Bank of England, (2017), Market-Based Finance: A Macroprudential View, Speech, Available at: http://www.bankofengland.co.uk/speeches

Bank for International Settlements, (2018), "Innovative Technology in Financial Supervision (Suptech) – The Experience of Early Users," *Financial Stability Institute Insights on Policy Implementation,* No. 9.

Bank Indonesia, DKMP, (2018), "Kajian Stabilitas Sistem Keuangan: Penguatan SSK dalam Upaya Menjaga Momentum Pertumbuhan," Maret 2018, Jakarta, Bank Indonesia.

Bank Negara Malaysia, (2004), "BNM Introduces New Interest Rate Framework," Press Release 14/14/34, 23 April 2004, Available at: https://www.bnm.gov.my/index.php?ch=en_press&pg=en_press&ac=1017&lang=en

Bank Negara Malaysia, (2013), Financial Service Act 2013.

Bank of Thailand, (2019), Financial Stability Report 2016.

Bank of Thailand, (2019), Financial Stability Report 2018.

Barberis, J., (2014), "The Rise of FinTech: Getting Hong Kong to Lead the Digital Financial Transition in APAC," *FinTech HK*, pp. 13.

Barth, J. et al., (2015), "China's Shadow Banking Sector: Beneficial or Harmful to Economic Growth?" *Journal of Financial Economic Policy*, 7(4), pp. 421-445.

Beck, T., Demirguc-Kunt, A., and Levine, R., (2007), "Finance, Inequality and the Poor," *Journal of Economic Growth*, 12, pp. 27-49.

Bettinger, A., (1972), "Fintech: A Series of 40 Time Shared Models Used at Manufacturers Hanover Trust Company," *Interfaces,* 2(4), pp. 62-64.

Boer, M., and Vazquez, J., (2017), "Cyber Security & Financial Stability: How Cyberattacks could Materially Impact the Global Financial System," *Institute of International Finance*, pp. 1-9.

Boivin, J., Kiley, M., and Mishkin, F., (2011), "How Has the Monetary Transmission Mechanism Evolved Over Time?" *Handbook of Monetary Economics*, 3, pp. 369-422.

Bouveret, A., (2018), "Cyber Risk for the Financial Sector: A Framework for Quantitative Assessment," *IMF Working Paper,* WP/18/143, Strategy, Policy & Review Department.

Braggion, F., Manconi, A., and Zhu, H., (2018), "Can Technology Undermine Macroprudential Regulation? Evidence from Peer-to-Peer Credit in China," *CEPR Discussion Papers*, 12668.

Buchak et al., (2018), "FinTech, Regulatory Arbitrage and the Rise of Shadow Banks," *Journal of Financial Economics*," 130, pp. 453-483.

Calice, P., and Zhou, N., (2018), "Benchmarking Cost of Financial Intermediation Around the World," *Policy Research Working Paper*, 8478.

Calomiris, C., Himmelberg, C. P., and Wachtel, P., (1995), "Commercial Paper, Corporate Finance, and the Business Cycle: A Microeconomic Perspective," *Carnegie-Rochester Conference Series on Public Policy*, 42(1), pp. 203-250.

Carmichael, J., and Pomerleano, M., (2002), "The Development and Regulation of Non-bank Financial Institutions, Washington D. C., World Bank.

Carmichael, J., and Pomerleano, M., (2010), "The Development and Regulation of Non-bank Financial Institutions," The International Bank for Reconstruction and Development/World Bank, Washington D. C.

Cebula, J. J., and Young, L.R., (2010,) "A Taxonomy of Operational Cyber Security Risks," *Technical Note CMU/SEI-2010-TN-028,* Software Engineering Institute, Carnegie Mellon University.

Cetorelli, N., Mandel, B. H., and Mollineaux, L., (2012), "The Evolution of Banks and Financial Intermediation: Framing the Analysis," *FBNY Economic Policy Review*.

Chartered Financial Analyst, (2014), The Investment Industruments: A Top-Down View.

Chen, Q., (2014), Shadow Banking, Electronic Industry Publishing House, Beijing, China.

Chew, M., (1999), "The Spectre of Hedge Funds: Regulatory Responses to Speculative Activity in Singapore and Hongkong," *Singapore Journal of International and Comparative Law,* 3, pp. 82-107.

Christensen, C., (2013), "The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail," Harvard Business Review Press, Boston: MA.

Civilize, B., Watewai, T., Panyanukul, S., Ruengsrichaiya, K., (2019), "Mapping Thailand's Financial Landscape: A Perspective through Balance Sheet Linkages and Contagion," *Puey Ungphakorn Institute for Economic Research*, No.114.

Cizinska, R., Krabec, T., and Venegas, P., (2016), "FieldsRank: The Network Value of the Firm," *International Advances in Economic Research*, 22(4), pp. 461-463.

Claessens, S. and Ratnovski, L., (2014), "What Is Shadow Banking?" *IMF Working Paper*, No.14/25.

Davis, K., Maddock, R., and Foo, M., (2017), "Catching up with Indonesia's Fintech Industry," *Law and Financial Markets Review.*

Demirgüç-Kunt, A., and Levine, R., (2009), "Finance and Inequality," *World Bank Policy Research Working Paper,* No. 4967.

Diallo, B., and Al-Mansour, A., (2017), "Shadow Banking, Insurance and Financial Sector Stability," *Research International Business and Finance.*

Dorfleitner, G., Hornuf, L., Schmitt, M., and Weber, M., (2017), "Fintech in Germany, Regensburg," Springer.

Economist Intelligence Unit, (2015), "Strategic Partnership for the Digital Age," Telstra Report, Available at: http://connectingcompanies.economiest.com/whitepaper/about-the-report/

Ehlers, T., Kong, S., and Zhu, F., (2018), "Mapping Shadow Banking in China: Structure and Dynamics," *BIS Working Paper,* No. 701.

Elliott, D., Meisenzahl, R. R., Peydro, J., and Turner, B. C., (2019), "Nonbanks, Banks, and Monetary Policy: U.S. Loan-Level Evidence since the 1990s," Proceedings of Paris December 2019 Finance Meeting EUROFIDAI-ESSEC.

Ernst and Young, (2017), "FinTech Adoption Index: The Rapid Emergence of FinTech," *EY FinTech Adoption Index Bulletin Research*, Available at: https://www.ey.com/Publication/vwLUAssets/ey-fintech-adoption-index-2017/$FILE/ey-fintech-adoption-index-2017.pdf

Errico, L., Harutyunyan, A., Loukoianova, E., Walton, R., Korniyenko, Y., Amidzic, G., AbuShanab, H., and Shin, H. S., (2014), "Mapping the Shadow Banking System Through a Global Flow of Fund Analysis," *IMF Working Paper*, No. 14/10.

European Central Bank, (2012), "Shadow Banking in the Euro Area: An Overview," *Occasional Paper Series,* No. 133, April.

Ewijk, S. V., (2018), "Looking Ahead: Forthcoming Financial Innovations and Institutions-Opportunities and Risks from a Financial Stability Perspective," in Jokivuolle, E., (Ed.), Shadow Banking: Financial Intermediation Beyond Banks, pp. 73-76.

Fabio, B., Manconi, A., and Zhu, H., (2018), "Can Technology Undermine Macro-prudential Regulation? Evidence from Peer-to-peer Credit in China," *Working Paper*.

Falk, M., (2016), "The Role of Shadow Banking in the Monetary Transmission Mechanism and the Business Cycle," Annual Conference 2016, Augsburg, Demographic Change 145763.

Farid, M. A. M., (2013), "Monitoring Shadow Banking and its Challenges: the Malaysian Experience," Proceedings of Sixth IFC Conference on Statistical Issues and Activities in a Changing Environment, 36, pp. 99-122.

Financial Stability Board (FSB), (2011), "Shadow Banking: Strengthening Oversight and Regulation," October 2011.

FSB, (2012), Progress Report to the G20 on Strengthening the Oversight and Regulation of Shadow Banking.

FSB, (2012), Strengthening Oversight and Regulation of Shadow Banking. Consultative Document.

FSB, (2014), Global Shadow Banking Monitoring Report 2014.

FSB, (2017), Fintech Credit: Market Structure, Business Model and Financial Stability Implication.

FSB, (2018), Global Shadow Banking Monitoring Report 2017.

FSB, (2019), Global Monitoring Report on Non-Bank Financial Intermediation 2018.

FinTech Report, (2017), FinTech Report – December 2017, Available at: https://www.statista.com/

FinTech Singapore, (2017), Singapore Fintech Map 2017, Available at: https://fintechnews.sg/14455/fintech/singapore-fintech-map-2017/

FitchRatings, (2019), Fintech Thailand, Available at: https://www.fitchratings.com/site/thailand

Fletcher School, The, (2017), Digital Planet 2017: How Competitiveness and Trust in Digital Economies Vary Across the World.

Fuster, A., Plosser, M., Schnabl, P., and Vickery, J., (2018), "The Role of Technology in Mortgage Lending," *Staff Reports*, 836, New York, NY: Federal Reserve Bank of New York.

Gabrieli, T., Pilbeam, K. and Shi, B., (2017), "The Impact of Shadow Banking on the Implementation of Chinese Monetary Policy," *International Economics Policy.*

Ghosh, S., Mazo, I., and Robe, O., (2012), "Chasing the Shadows: How Significant Is Shadow Banking in Emerging Markets?" *World Bank Working Paper,* No. 88.

Global Findex, (2018), The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution, Washington DC, World Bank Group.

Group of Thirty, (2016), Shadow Banking and Capital Markets Risk and Opportunities, November, Washington D. C.

Gomber, P., Kauffman, R. J., Parker, C., and Weber, B. W., (2017), On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption and Transformation in Financial Services.

Haisen, H., and Yazdifar, H., (2015), "Impact of the Shadow Banking System on Monetary Policy in China," *Journal of Management Studies*, 1(1), pp. 1-52.

Hamza, H., and Saadaoui, Z., (2018), "Monetary Transmission through the Debt Financing Channel of Islamic Banks: Does PSIA Play a Role?" *Research in International Business and Finance*, 45, pp. 557-570.

Han, X., Hus, X, and Li, J., (2019), "The Impact of Enterprises' Shadow Banking Activities on Business Performance: A Test Based on Mediator Effect of Investment Scale and Investment Efficiency," *Emerging Market Finance and Trade*, 55(14), pp. 1-17.

Han, X., Tian, G., and Li, J., (2017), "Non-financial Enterprises' Shadow Banking Activities and Financial Structure: Empirical Evidence of Chinese Listed Companies," *Studies of International Finance*, 10, pp. 44-51.

He, D., and H. Wang, (2012), "Dual-track Interest Rates and the Conduct of Monetary Policy in China," *China Economic Review,* 23(4), pp. 928-947.

Hofmann, C., (2017), "Shadow Banking in Singapore," *Singapore Journal of Legal Studies*, pp.18-52.

Hofmann, C., (2018), "Shadow Banking in Singapore," in Research Handbook on Shadow Banking: Legal and Regulatory Aspects, pp. 423-452.

Holmstrom, B., (2015), "Understanding the Role of Debt in the Financial System," *BIS Working Paper,* No. 479.

Hsu, S., Li, J., and Xue, Y., (2014), "Shadow Banking and Systemic Risk in China," *Political Economy Research Institute Working Paper,* No. 349.

Hussain, A., Bao, J., and Fanli., (2019), "The Impact of the Shadow Banking System on the Economy: An Empirical Analysis," *Journal of Applied Finance & Banking*, 9(3), pp. 1-11.

Ilesanmi, K. D., and Tewari, D. D., (2019), "Management of Shadow Banks for Economic and Financial Stability in South Africa," *Cogent Economic & Finance*, 0(0), pp. 1-29.

Iman, N., (2018), "Assessing the Dynamics of Fintech in Indonesia," *Investment Management and Financial Innovations,* 15(4), pp. 296-303.

Indonesian Ministry of Finance, (2012), "Kajian Ekonomi Keuangan," 12(3), pp. 27-54.

International Monetary Fund (IMF), (2014), Global Financial Stability Report: Risk Taking, Liquidity, and Shadow Banking Curbing Excess while Promoting Growth.

IMF, (2019), Global Financial Stability Report: Lower for Longer.

Jagtiani, J., and Lemieux, C., (2017), "Fintech Lending: Financial Inclusion, Risk Pricing, and Alternative Information," *Federal Reserve Bank of Philadelphia Working Paper,* No.17-17.

Jagtiani, J., and John, K., (2018), "FinTech: The Impact on Consumers and Regulatory Responses," *Journal of Economics and Business*, 100, pp. 1-6.

Jagtiani, J., and Lemiux, C., (2016), "Small Business Lending after the Financial Crisis: A New Competition for Community Banks," *Federal Reserve Bank of Chicago Economic Perspectives,* 2(2016), pp. 1-30, 3.

Jokivoulle, E., (2018), "Shadow Banking: Financial Intermediation Beyond Banks," Vienna, SUERF Conference Proceedings.

Jun, J., and Yeo, E., (2016), "Entry of Fintech Firms and Competition in the Retail Payments Market," *Asia-Pacific Journal of Financial Studies,* 45(2), pp. 159-184.

Kashyap, A. K., Stein, J. C., and Wilcox, D. W., (1992), "Monetary Policy and Credit Condition: Evidence from the Composition of External Finance," *National Bureau of Economic Research Working Paper,* No. 4015.

Kearney, A.T., (2017), "Glass Half Full: Investors are Bullish about Economic Growth and FDI Prospects, but are Monitoring Political Risks for Abrupt Changes to the Business Environment," The 2017 A.T. Kearney Foreign Direct Investment Confidence Index.

Kim, Y., Park, Y. J., and Choi, J., (2016), "The Adoption of Mobile Payment Services for 'Fintech'," *International Journal of Applied Engineering Research*, 11(2), pp. 1058-1061.

Knaack, P., and Gruin, J., (2017), "From Shadow Banking to Digital Financial Inclusion: Regulatory Framework Contestation between China and the FSB," *Global Economic Governance Working Paper,* 134.

Koutroumpis, P., and Lafond, F., (2018), "Disruptive Technologies and Regional Innovation Policy," Background Paper for an OECD/EC Workshop on 22 November 2018, Paris.

Landau, J., (2019), "Shadow Banking and Financial Stability," *SEACEN Financial Stability Journal*, 1, pp. 1-13.

Langley, S., (2014), Landscaping UK Fintech, London, EY.

Lee, S. Y., and Jao, Y. C., (1982), "Financial Structure and Monetary Policy in Thailand," in Lee, S. Y., and Jao, Y.C., (Eds.), Financial Structures and Monetary Policies in Southeast Asia, London, Palgrave, pp. 148-171.

Lemma, V., (2016), "Shadow Banking Entities," in 'The Shadow Banking System', Palgrave Macmillan Studies in Banking and Financial Institutions, London, Palgrave Macmillan.

Levine, R., (2005), "Finance and Growth: Theory and Evidence," in Aghion, P., and Durlauf, S. (Eds.), Handbook of Economic Growth, 1(A), pp. 865-934.

Li, B. and Wu, G., (2011), "The Credit Creation Functions of the Shadow Banking System and the Challenge on the Monetary Policy," *Journal of Financial Research*, 12, pp. 77-84.

Li, J., Hsu, S., and Qin, Y., (2014), "Shadow Banking in China: Institutional Risks," *China Economic Review*, 31, pp. 119-129.

Liu, J., Sheng, H., and Ma, Y., (2014), "The Business Mechanism and Social Welfare Loss Model Analysis of Enterprises Engaging in the Shadow Banking Business," *Journal of Financial Research*, 5, pp. 96-109.

Liang, H., and Reichert, A. K., (2012), "The Impact of Banks and Non-bank Financial Institutions on Economic Growth," *The Service Industries Journal*, 32(5), pp. 699-717.

Lee, I., and Shin, Y. J., (2018), "Fintech: Ecosystem, Business Models, Investment Decisions, and Challenges," *Business Horizons*, 61(1), pp. 35-46.

Loncarski, I., (2016), "Risk Management," *Risk Management,* 18, pp. 1-3.

Maier, E., (2016), "Supply and Demand on Crowdlending Platforms: Connecting Small and Medium-sized Enterprise Borrowers and Consumer Investors," *Journal of Retailing and Consumer Services*, 33, pp. 143-153.

Malatesta, F., Masciantonio, S., and Zaghini, A., (2016), "The Shadow Banking System in the Euro Area: Definitions, Key Features and the Funding of Firms," *Italian Economic Journal*, 2(2), pp. 217-237.

McCandless, G. T., and Weber, W. E., (1995), "Some Monetary Facts," *Federal Reserve Bank of Minneapolis Quarterly Review,* 19(3), pp. 2-11.

Menon, R., (2018), "Singapore FinTech – Innovation, Inclusion, Inspiration," Singapore FinTech Festivas 2018, Singapore. 12 November.

Micu, I., and Micu, A., (2016), "Financial Technology (Fintech) and its Implementation on the Romanian Non-banking Capital Market," *SEA Practical Application of Science*, IV 2(11), pp. 379-384.

Mugobo, V., and Mutize, M., (2015), "The Effects of Shadow Banking on the Traditional Banking System in Zimbabwe," *Journal of Governance and Regulation*, 4(4), pp. 605-611.

Monetary Authority of Singapore (MAS), (2011), "Financial Stability Review," Macroeconomic Surveillance Department.

MAS, (2013), Monetary Policy Operations in Singapore.

MAS, (2016), Fintech Regulatory Sandbox Guidelines.

MAS, (2018), Asset Management Survey: The Gateway to Asset Management Opportunities in Asia.

MAS, (2018), Financial Stability Review, Macroprudential Surveillance Department.

Nandini, V., and Umesh, D., (2017), "The Singapore Blue Chips: The Rewards and Risk of Investing in Singapore's Largest Corporates," *World Scientific Books*, No. 9960, World Scientific Publishing.

Nakaso, H., (2016), "FinTech – Its Impacts on Finance, Economies and Central Banking," Remarks at the University of Tokyo-Bank of Japan Joint Conference in Tokyo on 'FinTech and the Future of Money.'

Nash, R. M., and Beardsley, E., (2015), The Future of Finance: The Rise of The New Shadow Bank, Goldman Sach Global Investment Research.

Navaretti, G. B., Calzolari, G., Mansilla-Fernandez., and Pozzolo, A. F., (2017), "FinTech and Banking. Friends or Foes?" *European Economy: Banks, Regulation, and The Real Sector*, 2017(2), pp. 3-30.

Nelson, B., Pinter. G., and Theodoridis. K., (2017), "Do Contractionary Monetary Policy Shocks Expand Shadow Banking?" *Journal of Applied Econometrics*, 33(2), pp. 198-211.

Nemet, G. F., (2009), "Demand-Pull, Technology-Push, and Government-led Incentives for Non-Incremental Technical Change," *Research Policy*, 38(5), pp. 700–709.

Ng, A., and Kwok, B. K. B., (2017), "Emergence of Fintech and Cybersecurity in a Global Financial Centre: Strategic Approach by a Regulator," *Journal of Financial Regulation and Compliance,* 25(4), pp. 422-434.

Nikkei Asian Review, (2017), "Wu Xiaoling Sees Shadow Banking as China's Biggest Financial Risk," Available at: https://asia.nikkei.com/Economy/Wu-Xiaoling-sees-shadow-banking-as-China-s-biggest-financial-risk.

Nino, J. L., Langthaler, J., Fabian, M., and Mayorga, J., (2017), "An Overview of FinTech: Their Benefits and Risks Association of Supervisors of Bank of the Americas," Association of Supervisors of Bank of the Americas.

Nouy, D., (2017), "Safer than Ever Before? An Assessment of the Impact of Regulation on Banks' Resilience Eight Years on," *Financial Stability Review*, 21, pp. 23-32.

Oxera Economic Council, (2016), "The Economics of Peer-to-Peer Lending," UK, Oxera Consulting LLP.

Pejkovska, M., (2018), "Potential Negative Effects of Fintech on the Financial Services Sector: Examples from the European Union, India and the United States of America, Helsinki," Helsinki Metropolia University of Applied Sciences.

Perignon, C., Thesmar, D., and Vuillemey, G., "Wholesale Funding Dry-Ups," *HEC Paris Research Paper.*

Pluksna, L., (2013), "Role of Shadow Banking," Tilburg Law School International Business Law.

Porter, N., and Xu, T., (2013), "Money Market Rates and Retail Interest Regulation in China: The Disconnect between Interbank and Retail Credit Conditions," *Bank of Canada Working Paper*, pp. 2013-20.

Pozsar, Z., Adrian, T., Ashcraft, A., and Boesky, H., (2010), "Shadow Banking," *Staff Reports,* 458, New York, NY: Federal Reserve Bank of New York.

Pozsar, Z., Adrian, T., Ashcraft, A., and Boesky, H., (2013), "Shadow Banking," *FRBNY Economic Policy Review*, 19(2), pp 1-16.

PriceWaterhouseCoopers, (2016), "Blurred Lines: How FinTech is Shaping Financial Services," Global FinTech Report.

Puschmann, T., (2017), "Fintech," *Business & Information Systems Engineering: The International Journal of Wirtschaftsinformatik*, 59(1), pp. 69-76.

Putri, W. H., Nurwiyanta, N., and Sungkono, S., (2019), "The Emerging Fintech and Financial Slack on Corporate Financial Performance," *Investment Management and Financial Innovations,* 16(2), pp. 348-354.

Qin, D., Xu, Z., and Zhang, X., (2014), "How Much has Informal Credit Lending Responded to Monetary Policy in China? The Case of Wenzhou," *Journal of Asian Economics*, 31-32, pp. 22-31.

Schueffel, P., (2016), "Taming the Beast: A Scientific Definition of FinTech," *Journal of Innovation Management*, 4(4), pp. 32-54.

Securities Commission Malaysia, (2011), Capital Market Masterplan 2, Kuala Lumpur, Malaysia.

Securities Commission Malaysia, (2017), The Reporter, 7(4), pp. 14.

Serletis, A. and Xu, L., (2019), "The Demand for Banking and Shadow Banking Services," *North American Journal of Economics and Finance*, 47, pp. 132-146.

Shen, Y., and Huang, Y., (2016), "Introduction to the Special Issue: Internet Finance in China," *China Economic Journal*, 9(3), pp. 221-224.

Sheng, A., and Soon, N. C., (2016), "Shadow Banking in China: An Opportunity for Financial Reform," U. K.: John Wiley & Sons Ltd.

Shim, Y., and Shin, D., (2016), "Fintech Industry from The Perspective of Actor-Network Theory," *Telecomunication Policy*, 40(2-3), pp. 168-181.

Shrestha, M., (2017), Role of Non-Bank Financial Intermediation: Challenges for Central Banks in the SEACEN Countries, SEACEN Research and Training Centre.

Singapore Statute Online, (2019), Moneylenders Act, Available at: https://sso.agc.gov.sg/Act/MA2008.

Singh, M., (2014), "The Economics of Shadow Banking," Conference Volume 2013, Reserve Bank of Australia.

Solarz, M., (2013), "The Importance of Shadow Banking Sector Entities for Population Affected by Credit Exclusion," *Copernican Journal of Finance & Accounting*, 2(2), pp. 189-201.

Statista.com., (2017), FinTech Report – December 2017.

Statista.com., (2019), Alternative Lending Singapore, Available at: https://www.statista.com/outlook/399/124/alternative-lending/singapore

Stein, J. C., (2010), "Securitization, Shadow Banking & Financial Fragility," *Deadalus*, 139(4), pp. 41-51.

Stern, C., Makinen, M., and Qian, Z., (2017), "FinTech in China – with a Special Focus on Peer to Peer Lending," *Journal of Chinese Economic and Foreign Trade Studies*, 10(3), pp. 215-228.

Stiglitz, J. E., and Weiss, A., (1981), "Credit Rationing in Markets with Imperfect Information," *The American Economic Review*, 71(3), pp. 393-410.

Tan, Y., (2017), "The Impact of Competition and Shadow Banking on Profitability: Evidence from the Chinese Banking Industry," *North American Journal of Economics and Finance*, 42, pp. 89-106.

Tian, G., Li, J., Xue, Y., and Hsu, S., (2015), "Systemic Risk in the Chinese Shadow Banking System: A Sector-level Perspective," *Journal Emerging Markets Finance and Trade,* 52(2), pp. 475-486.

Thomson Reuters, (2017), Thomson Reuters Annual Report 2016.

Thompson, K., (2018), "Wealth Management Advice in the Digital Age," *Journal of Securities Operations & Custody*, 10(1), pp. 6-11.

Tsai, C., and Peng, K., (2017), "The FinTech Revolution and Financial Regulation: The Case of Online Supply Chain Financing," *Asian Journal of Law and Society*, 4(1), pp. 109-132.

Ulrich, A., and Bholat, D., (2016), "Peer-to-Peer Lending and Financial Innovation in the United Kingdom," *Working Paper,* No. 598, Bank of England, UK.

Upper, C., (2018), "Four Questions on Shadow Banking," in Jokivuolle, E. (Ed.), Shadow Banking: Financial Intermediation beyond Banks, pp. 38-39.

Vives, X., (2017), "The Impact of Fintech on Banking," *European Economy: Banks, Regulation, and The Real Sector*, 2017(2), pp. 97-106.

Wang, B. and J. Li., (2013), "The Size of Chinese Shadow Bank, Risk Assessment and Supervision Countermeasures," *Journal of Central University of Finance & Economics,* 1, pp. 20–25.

Wang, Y., Lie, Z., Li, C., and Du, J., (2015), "Identifying the Shadow Banking Activities of Enterprises' Shadow Banking Activities in China: Evidence from a Consolidated Balance Sheet," *Management World*, 12, pp. 24-4.

Wharton Fintech, (2014), What is FinTech? Available at: https://www.whartonfintech.org/blog/what-is-fintech/

Wong, CY., and Eng Y. K., (2017), "Whither Monetary Policy when Decentralized Finace Prevails?", Malaysia, Universiti Tunku Abdul Rahman.

World Bank, (2018), Global Financial Development Report 2017/2018t: Bankers without Borders, Washington, D. C.

World Bank, (2019), Data Catalog World Bank Open Data, Available at: https://datacatalog.worldbank.org/

World Economic Forum, (2015), The Future of Financial Services: How Disruptive Innovations are Reshaping the Way Financial Services are Structured, Provisioned and Consumed.

World Economic Forum, (2016), The Global Information Technology Report 2016: Innovating in the Digital Economy.

Wu, M., and Shen, C. H., (2018), "The Effect of Shadow Banking on Bank Risk from the View of Capital Adequacy," *International Review of Economics and Finance*, 63(C), pp. 176-197.

Xiao, K., (2017), Government Intervention in Financial Market, Vancouver, University British Columbia.

Xiao, K., (2018), Monetary Transmission in Shadow Banks, New York, Columbia Business School.

Xie, P., and Zou, C., (2013), "The Theory of Internet Finance," *China Economist,* 8(2), pp. 1-15.

Xie, P., Zou, C., and Liu, H., (2016), "The Fundamentals of Internet Finance and its Policy Implications in China," *China Economic Journal*, 9(3), pp. 240-252.

Zafeiris, D., (2018), "The Role of Regulation and Supervision in Shadow Banking: An Insurance Sector Perspective," in Jokivuolle, E., (Ed.), Shadow Banking: Financial Intermediation beyond Banks, pp. 60-65.

Zavolokina, L., Dolata, M., and Schwabe, G., (2016), "The Fintech Phenomenon: Antecedents of Financial Innovation Perceived by The Popular Press," *Financial Innovation,* 2(16).

Zhang, S., and Wan, J., (2017), "Do China's Shadow Banking Interest Rates Capture its Monetary Policy Stance?" *Emerging Market and Trade*, 53(12), pp. 2686-2695.