RISKS AND VULNERABILITIES OF SHADOW BANKS: THE CASE IN MALAYSIA

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the research project.

(4) The word count of this research report is 16,890.

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Lastly, we thank our family members and friends who have supported us in every aspect during the progress of this research.

DEDICATION

We would like to dedicate this research project to our supervisor, Dr Eng Yoke Kee, for her helpful advice and guidance that helped us to complete this project.

Furthermore, as a token of appreciation for the support from our family members and friends, we would like to dedicate this project to them as well.

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LIST OF ABBREVIATIONS

ABS	Asset-Backed Security
BGLM	Breusch-Pagan Lagrange Multiplier
BNM	Bank Negara Malaysia
BSN	Bank Simpanan Nasional
CI	Collateral Intermediation
CNLRM	Classical Normal Linear Regression Model
DE	Debt-to-Equity ratio
DSD	Deposits of securitized debt
ECB	European Central Bank
ECM	Error Components Model
ESOP	Employee Stock Ownership Plan
FC	Financial Crisis
FEM	Fixed Effect Model
FICO	Fair Isaac Corporation
FSB	Financial Stability Board
HH	Household Debt
HL	Ratio of Housing Loan to Total Loan
IMF	International Monetary Fund
LSDV	Least Square Dummy Variable
MBSB	Malaysia Building Society Berhad
NBFI	Non-Banking Financial Institutions
NPL	Non-Performing Loan
ODFI	Other Development Financial Institutions
OFI	Other Financial Institutions
OLS	Ordinary Least Square

POLS	Pooled Ordinary Least Square
RCE	RCE Capital Berhad
REM	Random Effect Model
SH	Number of shares held by the management
SME	Small and medium-sized enterprises
SPV	Special Purpose Vehicle
VAR	Value at Risk

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PREFACE

The 2008 U.S financial crisis is the largest recession that the western world faced since the Great Depression in 1930s. Millions of citizens lost their job, while the greedy bankers retreat from it safe and sound and attribute the causes to the unavoidable “Financial Storm”. The staggering banks were given “bailout” by the government with the tax money from citizens.

However, there is no smoke without fire. The financial crisis does come without symptom. The 2008 Financial Crisis was generally believed to be caused by housing bubble and unregulated shadow banks activities. The excessive securitization on mortgage loan makes the shadow bank itself ultimately susceptible and vulnerable to the financial shock. It validates with the saying, “The greatest risk is the risk of ignorance”. The shadow banks are continuing to grow rapidly in recent year, and it is becoming difficult to be controlled.

By the time we finish our work, it was already close to the end of 2017. Would the financial crisis come again after 10 years? How would it happen? The question left us very much curiosity to look into the risk and vulnerability of shadow banks in Malaysia.

ABSTRACT

This research paper is targeted to examine the risk and vulnerability of shadow banking sector in Malaysia. Due to the tremendous growth of shadow banking sector in our country since the global financial crisis, we have factored in a total of 7 independent variables in our model to figure out the impact of these variables on the non-performing loan of shadow banking firms in Malaysia. Our sample datasets are secondary data which was collected from the annual report of the respective 11 shadow banks as well as Financial Stability Board in Malaysia and International Monetary Fund from the time period from 2005 to 2015. Also, we have adopted Fixed Effect Models (FEM) in our research to run the hypothesis testing. The empirical result of our full model found that the deposits of securitized debts, debt-to-equity ratio, household debt and financial crisis are negatively related with non-performing loan while collateral intermediation, housing loan to total loan ratio are positively related to non-performing loan. However, there is one exceptional case in our model where shareholding owned by management is actually having a non-linear relationship with the non-performing loan. Future researchers are encouraged to enlarge the research area and include other important determinant variables in examining the effect of these variables on the risk and vulnerability of shadow banking firms in Malaysia.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

Shadow banking system denotes to the financial intermediaries whose members are not subject to regulatory while easing the creation of credit across the global financial system. Due to shadow banking has greater flexibility as they less impacted by regulatory body of financial institutions, the failure of a number of such institutions during the crisis caused in substantial risks that were transmitted more widely through the financial system (Elliott, Kroeber & Qiao, 2015).

After the global financial crisis in 2008, superior attention has been concentrated on the role and scope of shadow banking system in transmitting risks to the financial system. In Malaysia, shadow bank is used more familiar with to cover all financial intermediaries-like activity performed by bank. For example, the activities of shadow bank that are not subject to regulation include hedge funds, unlisted derivatives and other unlisted instruments (Financial Stability and Payment System Report, 2011).

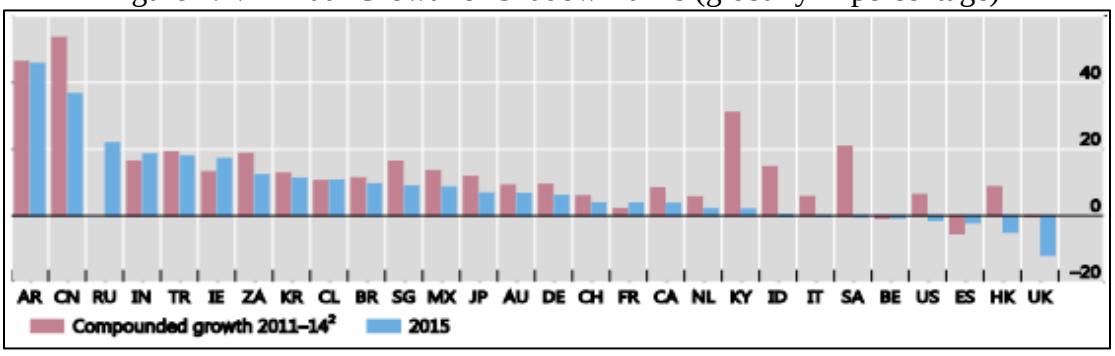
Shadow banks are not required to hold reserve requirement and it does not backed by central bank act as lender of last resort and they do not have safety net (Elliott et al., 2015). As shadow banks do not take deposits, they are financed by uninsured, unsecured and secured short term financial instruments. The fundamental idea behind the functioning of shadow banking system is financed by short-term funds in the money markets and use those funds to buy assets with longer term maturities, but then without the regulatory enable shadow banks access to emergency liquidity support. Shadow bank may expose to high degree of risk if it have along with the misappropriation and default caused by wrong incentives from the significant players (Luttrell, Rosenblum & Thies, 2012).

This study highlights on the factors that might give impact to NPLs. In this chapter, it will make known the variables that probably affect shadow banks' NPLs in Malaysia. On top of that, other sections such as problem statement, objectives, research questions, significance of study and chapter layout is covered in this chapter too.

1.1 Research Background

Shadow banking, commonly prescribed as credit intermediation outside the conventional banking system, is defined by Financial Stability Board (FSB) as "credit intermediation involving entities and activities outside the regular banking system" (Financial Stability Board, 2013). However, this definition contains two limitations in which (1) it includes entities such as leasing and finance firms, hedge funds that are not commonly referred as shadow banks, and (2) shadow banking activities are assumed to operate outside traditional banks, in fact, shadow banking activities like securitization and collateralization are operated within traditional banks as well.

Figure 1.1: Annual Growth of Shadow Banks (globally in percentage)

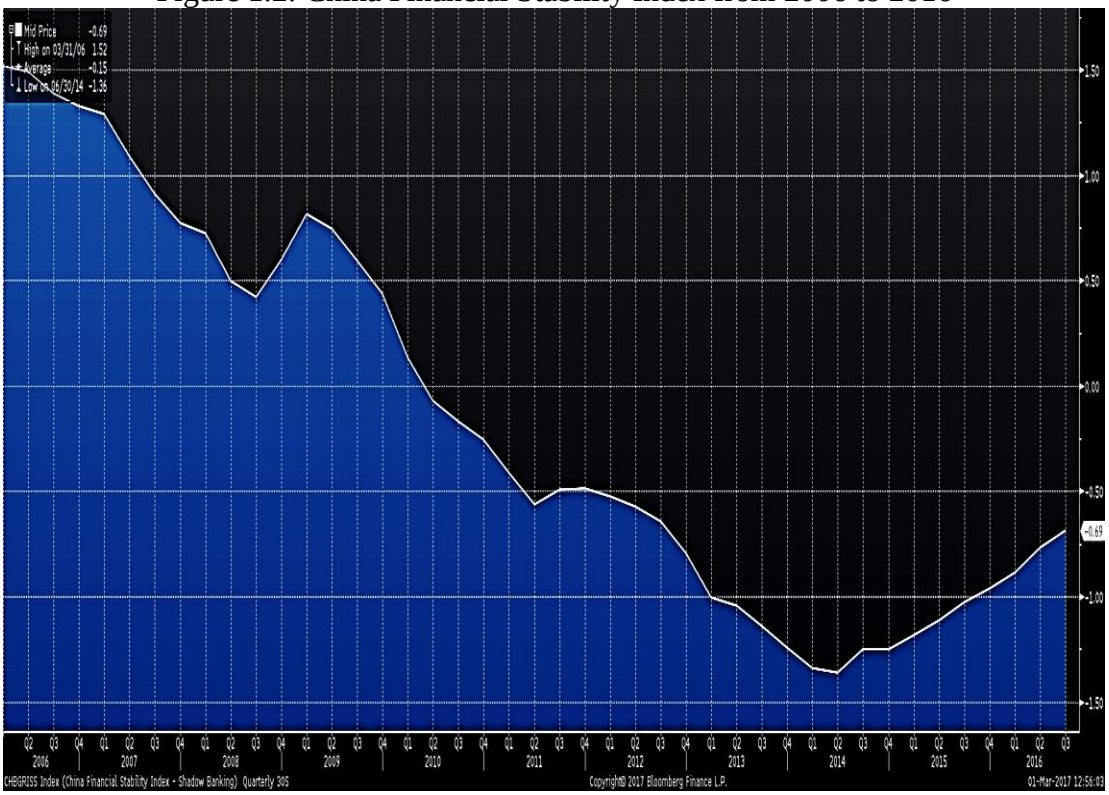


Notes:
AR = Argentina; AU = Australia; BE = Belgium; BR = Brazil; CA = Canada; CL = Chile; CN = China; DE = Germany; EA = Euro areas; ES = Spain; FR = France; HK = Hong Kong; ID = Indonesia; IE = Ireland; IN = India; IT = Italy; JP = Japan; KR = Korea; KY = Cayman Island; MX = Mexico; NL = Netherlands; RU = Russia; SA = Saudi Arabia; SG = Singapore; TR = Turkey; UK = United Kingdom; US = United States; ZA = South Africa.

Source from: Global Shadow Banking Monitoring Report 2016

In the recent years, the growth of shadow banks was extensive in most regions. The main reasons may be due to "regulatory arbitrage" and cost efficiency factor. It is undeniable that the costs for traditional banks will be higher than shadow banks as they are subject to regulatory constraints on the on-balance sheet activities. In order to minimize the costs, they tend to shift most activities off their balance sheets. Figure 1.1, shows that in 2015, only United Kingdom, Hong Kong, Spain, United States, Belgium, Saudi Arabia and Italy had a negative growth after the exchange rate effect was adjusted. In contrast, countries in the emerging market economies like Argentina and China reported a tremendous growth in shadow banking activities.

Figure 1.2: China Financial Stability Index from 2006 to 2016

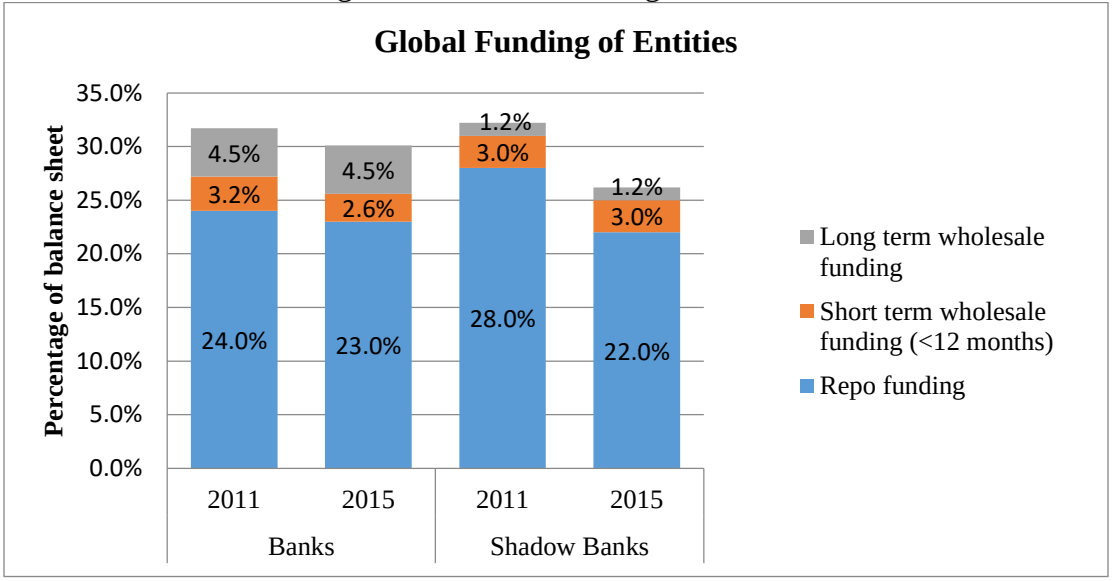


Source from: Bloomberg

We can further justify the growth of shadow banking industry in China from Figure 1.2 using the financial stability index. As we can see, before 2010, the financial stability index remained positive and in 2010, the index stated to drop below 0 point

and continued to drop drastically to almost -1.50 points in 2014. Even though there is an upward trend from 2014 till today, the index still did not manage to reach above 0 point.

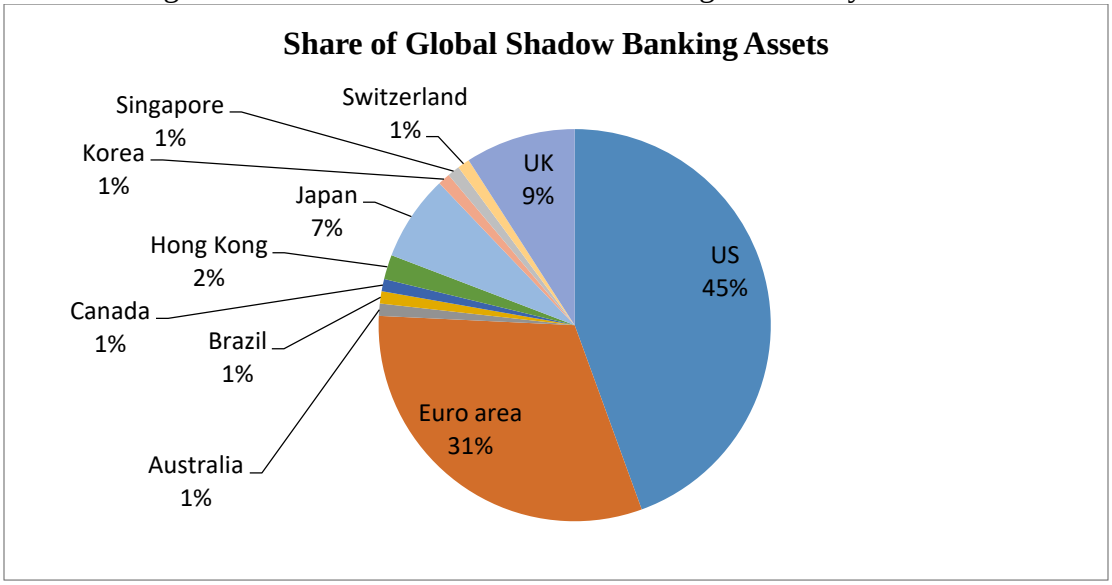
Figure 1.3: Global Funding of Entitles



Source from: Global Shadow Banking Monitoring Report 2016

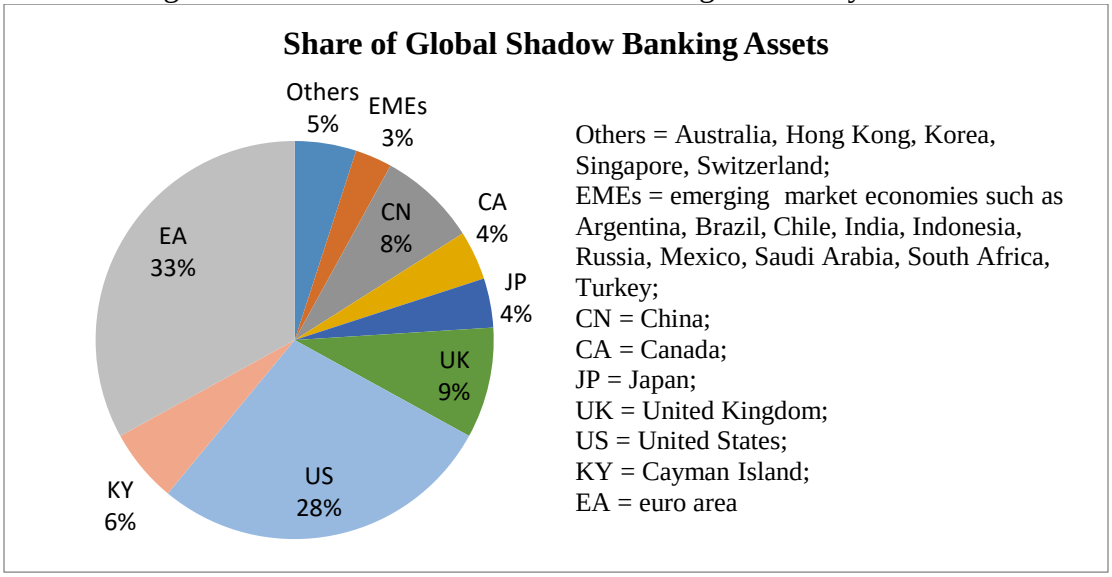
About one-fourth of the total financial intermediation worldwide is comprised of shadow banks (Valckx et al., 2014). It is believed that the financial sector was enhanced by the existence of shadow banks as there is a better risk sharing and liquidity and maturity transformation (Claessens, Pozsar, Ratnovski & Singh, 2012). To illustrate, non-liquid assets can be mobilized through securitization, the risk and return distribution can also be customized to feed investors' needs by means of structured finance techniques such as using repurchase agreements (repos) and other wholesale funding by shadow banks. From Figure 1.3, despite the decrease in funding from 2011 to 2015, the percentage of funding by shadow banks globally are almost similar to that of traditional banks and this may increase exposure to financial stability risks due to high leverage taken by shadow banks.

Figure 1.4: Share of Global Shadow Banking Assets in year 2005



Source from: Global Shadow Banking Monitoring Report 2012

Figure 1.5: Share of Global Shadow Banking Assets in year 2015



Source from: Global Shadow Banking Monitoring Report 2016

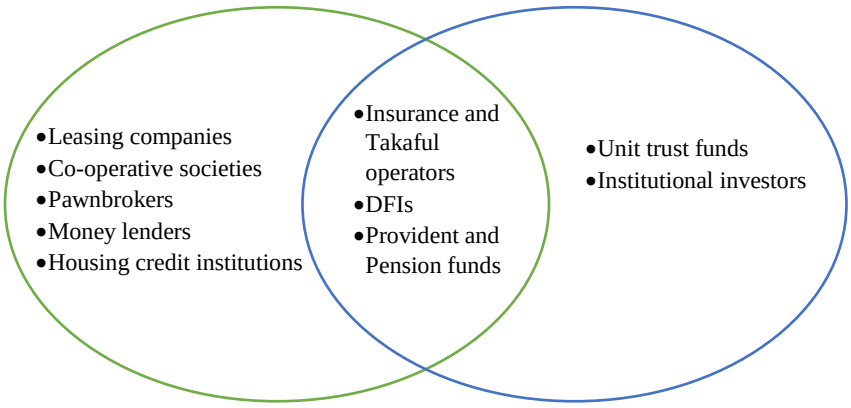
The figures above are used to illustrate the size of shadow banking system globally. From 2005 to 2015, we can see that the United States being the largest share of global shadow banking assets in 2005 has dropped almost half of its share in 2015. Another country to take note is China, from Figure 1.4, we noticed that China had zero share

in terms of shadow banking assets but in 2015, China's share is 8%. Same goes to Cayman Island, a key hedge fund centre which had 6% share in 2015 but none in 2005. From here, we can conclude that the growth of shadow banking activities differ across countries.

1.1.1 Malaysia Shadow Banking Industry

According to Bank Negara Malaysia, the term "Non-Bank Financial Institution" refers to shadow banks in Malaysia. During the pioneering stage in 1950s, there were a limited number of NBFIs in Malaysia. The number increases throughout the rapid expansion of economic activities. As a result, the NBFIs establish a position in the financial system and expand in relation to Malaysia's economy.

Figure 1.6: Non-Bank Entities in Malaysia

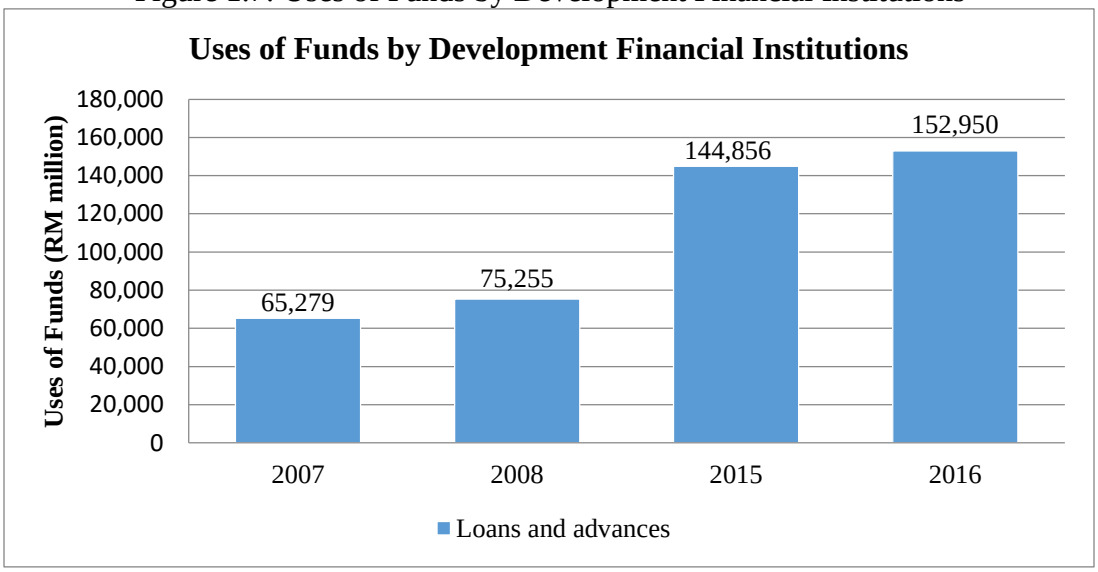


Source from: Malaysia Financial Stability and Payment System Report 2011

NBFIs in Malaysia include several entities (Figure 1.6) but in this paper, we categorized the NBFIs under three main branches, which are: (1) development financial institutions; (2) other development institutions; and (3) non-bank financial providers. According to Bank Negara Malaysia, there are slight differences between

Malaysia's NBFIs and shadow banks in other countries. In Malaysia, NBFIs have compatible role to traditional banks as they provide financial services to certain market segments. Besides, several authorities are responsible to oversee the NBFIs' activities in Malaysia and hence, their activities are less complex and in a smaller scale compared to those countries with heavy reliance on shadow banks like China.

Figure 1.7: Uses of Funds by Development Financial Institutions



Source from: Financial Stability and Systems Report 2016

The continue development of shadow banking sector threatened the traditional banking system as it may generate risks that weaken the stability of the traditional system.

1.1.2 Issues in Malaysia Shadow Banking Industry

According to Bank Negara's Financial Stability and Systems Report 2016, the lending standards may be eased by NBFIs, causing the outstanding personal financing grew at 4.8% in 2016, as compared to 3.4% in 2015. The household debt-to-GDP ratio is predicted to be about 88% in 2016, which is on an increasing trend since 2012 (around 80%). NBFIs are expanding in terms of the assets owned that consist of

almost 40% of the total financial system assets. From Figure 1.7, development financial institution as one of the categories under NBFIs, we notice that the number of funds used for loans and advances have almost doubled from 2007 to 2016. This signals a growing trend of shadow banking in Malaysia.

On November 2016, the Security Commission Malaysia (SC) has granted license to 6 P2P platforms, which are B2B FinPAL, Peoplender, Ethis Kapital, ManagePay Services, Modalku Ventures and FundedByMe Malaysia. These operators are taking initiatives to drive the growth of Fintech in Malaysia. As the Fintech falls under the category of shadow banking industry (Buchak, Piskorski & Seru, 2017), we believe that with the regulatory change in Malaysia financial industry, the size of shadow bank in Malaysia would start growing rapidly, causing our financial system more vulnerable to any shock and default risk.

In order to measure the efficiently of shadow banks operation in Malaysia, we look into the non-performing loans (NPL) of individual banks. According to Karim, Chan and Hassan (2010), the growth and innovation in Malaysia is restricted by the limited capital in banks due to the growing amount of NPL. When banks accumulated high amount of NPL, they need to exert extra managerial effort and spend additional expenses such as cost of monitoring borrowers, analysing lending arrangements and maintaining the loan in order to address the problem. Although the NPL in Malaysia has fallen in general, it is mainly due to the transfer of NPL from banks to asset management companies, in other words, shadow banks.

1.2 Problem Statement

Shadow banking sector in Malaysia has captured much attention since the event of Sub-Prime Crisis in 2008 as the operation of conventional banking sector is limited by more stringent government regulation such as increased minimum capital requirements (Lysandrou & Nesvetailova, 2013). There are only two studies on Malaysia Shadow Banking industry available in current literature. Isa and Rashid (2014) have studied the impact of securitization and collateralization to Malaysia shadow banks, while Farid (2010) discussed on the challenges of monitoring Malaysia shadow banking.

Financial crises are mostly inevitable as people tend to make bad investment decision all the time. Therefore, we are keen in figuring out the performance of shadow banking sector when financial crisis sweep across the developing countries especially in Malaysia. In fact, according to Gorton and Metrik (2012), shadow banks was the main cause for the recent financial crisis as the shadow banking system and traditional banking system is highly interrelated in 21st century. Lysandrou and Nesvetailova (2013) also argue that Non-Banking Financial Institutions (NBFIs) has introduced complexities into the financial system, such as the production of collateralized debt obligations which is believed to be the main cause of financial crisis. Research done by Bernanke (2011) suggests that much work need to be done in order to better understand the source of systemic risk and improve the monitoring tools. Our concern is that will shadow banks in Malaysia be affected by the financial crisis as some of them are governed by the Development Financial Institutions Act 2002.

Besides, Malaysia, being a developing country, has fewer expertise, skills and technology as compared to developed countries, and on top of that, Malaysia highly depends on banks and non-bank financial institutions as source of funding (Rahman

& Reja, 2015). According to Thillainathan (1999), the financial distress that happened in 1998 was mainly caused by the high concentration of ownership structure in Malaysian banks. It is believed that when management own huge stake of ownership, moral hazard problem arises as they tend to maximise their own profit by involving in activities that place the banks in a risky position. Due to this, our study is to investigate how the ownership structure of shadow banks influences their performance which is measured in terms of non-performing loans.

Last but not least, shadow banking activities is now growing again after the financial crisis and shadow banking sector grew significantly as they step in to fill the gaps left by traditional banking sector. However, Farid (2010) argued that shadow banking could be a huge problem for the financial system in Malaysia as they are mostly the first one to lose their liquidity (risk of bank run) when the bad time comes. We aim to shed some light towards better understanding of the potential risk of the shadow banking system as we are fully aware of their high leveraging activities and lower minimum capital requirements. Acharya et al. (2011) and Plantin (2012) argue that many shadow banking activities prior to the recent financial crisis aim at bypassing bank capital requirements, thereby realizing a higher leverage than that allowed by banking regulations.

In simpler words, shadow banking could be a great threat for our financial systems if there is absence of reformation for the policy issues regarding to the shadow banking system. Therefore, our study also focuses on the debt-to-equity ratios in each shadow banks and from there, we look into the effects of the ratio on the non-performing loans in order to restraint some practices in shadow banks that may possibly lead to leverage problem.

1.3 Research Objectives

1.3.1 General Objectives

The increasing public awareness on the existence and growth of shadow banking in Malaysia since the recent financial crisis has inspired us to investigate on the risk and vulnerability of shadow banking in Malaysia. Therefore, the general objective of this research is to investigate the factors that spur the default risk in shadow banks of Malaysia

1.3.2 Specific Objectives

1. To identify the impact of financial crisis to the shadow banking industry in Malaysia as a whole.
2. To examine how ownership structure influence the risks of shadow banks.
3. To identify the relationship between shadow banks' default risks and its leverage.

1.4 Research Questions

Corresponding to our executed general and specific research objectives above, we target to response to five addressed research questions. Our analysis, discussions and arguments in the following chapters will mostly depend on answering the below listed research questions:

1. Is financial crisis the main driving force that lead to increment of default risk in shadow banking industry?
2. Does the change in shareholding by management affect shadow banks' efficiency in managing their risks?
3. How debt-to-equity (leverage) levels influence the risks of default among shadow banking institutions?

1.5 Hypotheses of the Study

After the literature review is completed, the hypotheses that have been developed are stated below:

1.5.1 Financial Crisis

H_0: There is no significant relationship with financial crisis and non-performing loan.
H_1: There is a significant relationship with financial crisis and non-performing loan.

1.5.2 Number of shares held by management

H_0: There is no significant relationship with number of share held by management and non-performing loan.
H_1: There is a significant relationship with number of share held by management and non-performing loan.

1.5.3 Debt to Equity Ratio

H_0: There is no significant relationship with debt to equity ratio and non-performing loan.

H_1: There is a significant relationship with debt to equity ratio and non-performing loan.

1.5.4 Deposits of Securitized Debts

H_0: There is no significant relationship with deposits of securitized debts and non-performing loan.

H_1: There is a significant relationship with deposits of securitized debts and non-performing loan.

1.5.5 Collateral Intermediation

H_0: There is no significant relationship with collateral intermediation and non-performing loan.

H_1: There is a significant relationship with collateral intermediation and non-performing loan.

1.5.6 Household Debt

H_0: There is no significant relationship with household debt and non-performing loan.

H_1: There is a significant relationship with household debt and non-performing loan.

1.5.7 Real Estate to Total Loan Ratio

H_0: There is no significant relationship with real estate to total loan ratio and non-performing loan.

H_1: There is a significant relationship with real estate to total loan ratio and non-performing loan.

1.6 Significance of Study

Shadow banking system still consider as fresh issue in the Malaysia's research field, The growth of shadow banking system gradually attract more attention around the world with regards certain issue like shadow bank default risk. In spite of the threat of shadow bank to our economy, the literature on Malaysia's shadow banks is still limited. The greatest risk is the risk of ignorance. Neglecting it would cost us tremendously in the future. Thus, it is crucial to identify the variables that lead to the risk in order to provide awareness for a field which has long been ignored. We believe more studies have to be done in order to generate insight on the shadow banking industry in Malaysia. Our study focuses on analysing the relationship between possible variable and non-performing loan of shadow bank in Malaysia We intend to create an absolute research on the determinant of default risk of shadow bank and given a better understanding about the shadow banking system

Furthermore, our study contributes to the field in a few ways. We took a different perspective to study the risk, namely from the aspect of leverage, ownership and financial crisis. We adopted some important variables which used in study of traditional banks in the past, but has little been applied to the field of shadow banks. These new elements are reshaping our thoughts about them. In another words, if these variables which has substantial influence on traditional banking system also play a role in affecting the default risk of shadow banks, then we should be concerned how destructive it can be to our financial system.

Moreover, after we study on the determinant of shadow bank default risk, it may helpful in development or establishment of legal framework. Through our research, legislative authorities may have a different perspective to the vulnerabilities in shadow banking system. Thereby, legislative authorities able to formulate the act or regulation in line with reality in order to promote a soundness and effectiveness financial system and prevent occurrence of financial banking crisis. Our study also investigates the threshold level for numbers of shares held by management. It may assist the directors' to identify equilibrium for the purpose of reducing agency problem.

1.7 Chapter Layout

The remaining chapters of the study are structured as follow. Chapter 2 will present a comprehensive review on past researchers end result. Chapter 3 exhibits the models, econometric methodologies and techniques to explore into the stated research topics. Chapter 4 discuss the outcomes and findings of the using model and techniques in the previous chapter. To sum up, Chapter 5 will conclude the discussion of findings, recommendation and conclusion.

1.8 Conclusion

The paper is to examine the determinants that will affect shadow banks' non-performing loan. The determining factors have been focused in this research. Result of this research may attain different from past researches since this research uses different determinants and other relevant factors may also affect the empirical result.

CHAPTER 2 LITERATURE REVIEW

2.0 Introduction

For this chapter, we are going to demonstrate a historical insight from different past researchers on different concerns of shadow bank and highlight the overview of determinants of shadow bank non- performing loan.

2.1 Review of the Literature

2.1.1 Shadow Bank Overview

Shadow bank is a credit intermediation. The low interest rate environment and superior banking sector regulation in the aftershock of the financial crisis have certainly contributed to the growth of the shadow bank internationally and it has drawn the focus of economic researcher to investigate it. Throughout past research from different researchers, there are different types of methodologies, both quantitative and qualitative methods have been implemented in discussing the determinants of shadow bank. In their research, they have pointed out that these measures of the shadow banking system are imperfect for several reasons.

Eichner, Kohn and Palumbo (2010) studied about data restrictions of the flow of funds in foreseeing the risks prior to the financial crisis. In 1996, Bernstein established a model which presented that the total of non-performing loans is a substantial influential factor of the expenses that shadow banks incur as well as the estimates of scale economies for lending institutions. On the other hand, Isa and Rashid (2014) adopted Ordinary Least Squares (OLS) model regression model and

least square dummy variable (LSDV) estimation model to identify the determining factor of default risks of shadow banks restricting to focus on their two main activities which are securitization and collateralization. Securitization and collateral intermediation (CI) are two main intermediation functions in the shadow banking. There is a need to examine the determinants of default risks in securitization and collateralization activities of the shadow banks in order to prevent the household balance sheets from becoming a source of systemic risks. Furthermore, MoAshcraft and Schuermann (2008) label asymmetric information that existed in the securitization of subprime mortgage credit although these frictions can be generalized to all securitization transactions. Besides that, Meeks, Nelson and Alessandri (2013) have established and tested a dynamic model which simulates the interaction between shadow banking and banking system through the securitized assets channel.

In 2011, Nkusu investigate the macroeconomic factors causing non-performing loan through panel vector autoregressive models and panel regressions. Throughout the research, Guy and Lowe (2011) developed a forecasting model to track the systemic and individual banks' non-performing loan, in order to identify possible risks to the banking sector. According to Mehmood, Youas and Ahmed (2013), the macroeconomic effect on loan default could be survived with proper terms of lending in terms of maturity, capital requirement as well as interest rate. Next, Deutsche Bundesbank (2014) using wavelet analysis to model the statistical relationship between the money holdings of the non-bank financial intermediaries and some macroeconomic variables, namely the gross domestic product, the index of consumer prices and a share price index.

Alternatively, empirical analysis is widely used in shadow banking topic as well. A comprehensive empirical study was presented by IMF (2014) on the shadow banking in progressive countries intended to find main drivers of its growth patterns. Moreover, Hattori et al. (2010) and Bank of Japan (1991a) applied empirical study to examine the 1980s bubble in Japan and highpoints the transformation of some large non-financial firms from net debtors to net creditors to banks, incorporated

themselves into financial system. In addition, Tang and Wang (2016) apply empirical study to examine the relation between shadow banking and return of commercial bank.

2.1.2 Non-Performing Loan

To begin with, the main customers of shadow banks in Malaysia are mainly from middle-income groups and they are usually the one who are at higher risks of defaulting on their loans. In this regard, it is essential to examine and supervise the non-performing loans in shadow banking sector to prevent those household debts becoming a source of systematic risks. Therefore, we can say that shadow banking sector is not immune to the increasing non-performing loans in Malaysia. Our financial system could be adversely affected by a mountain of shadow banking non-performing assets if the circumstances are beyond the control of Bank Negara Malaysia.

Over the decades, non-performing loans have attracted interests among researchers. One of them is the study of the banking crisis which is resulted from the increasing non-performing loans which turned into banking failures (Barr and Siems, 1994). Furthermore, the research done by Adebola, Yusoff and Dahalan (2011) also considered that non-performing loans are one of the main causes of the global financial crisis. Most importantly, the issue of non-performing loans has a significant effect on developing countries where SMEs constitute a major part of their economy (Rasool et al., 2013).

2.1.3 Deposits of Securitized Debts

Securitization is when the shadow banks originate, re-pack, and re-sell pools of credit; and subsequently, in the process they transfer credit, maturity, and liquidity risks. Research done in the earlier stage indicates that securitization can help to reduce risks faced by banks (Pavel & Philis, 1987; Greenbaum & Thakor, 1987; Hess & Smith, 1988). Later works studied how securitization affect bank risks and focuses are given from various perspectives. Research done by Cantor and Rouyer (2000) suggest that when the risk of a security sold to investors is higher than the issuer risk before securitization, the issuer's credit risk is said to be improved. This is supported by Ambrose, et. al. (2004) who proved that lenders usually offer safer loans to the secondary market while keep riskier loans in their portfolio. On the contrary, some researchers found evidence showing that the loan kept in the banks have a lower default rate than those being offered to the market (Carey, 1998; Mian & Sufi, 2009; Dell'Aricca, et.al., 2009; Keys, et. al., 2010). Based on the analysis on the securitization effect on the overall bank risks, there are different points of views among the researchers. Positive relationship was found between securitization and bank risks where the growth of securitized debt increases the systematic risk of banks (Dionne & Harchaoui, 2003; Franke & Krahnen, 2005; Haensel & Krahnen, 2007). Contradictory view was provided by Jiangli and Pritsker (2008) where increased securitization helps in lowering the banks insolvency risk. Based on their studies, securitization benefits the banks and has a positive role regarding the turmoil in credit. Cebenoyan and Strahan (2004) reassure this relationship but further state that the banks take on new risks using the reduced risks from securitization.

2.1.4 Collateral Intermediation

Collateral intermediation happens when the banks keep up large volume of transactions by heavily rely on reusing limited collateral. The stock of collateral and

its velocity are important elements under shadow banking system. Since the financial crisis in 2008, the usage of collateral dropped significantly due to counterparty risks as banks would rather keep collateral for safety purposes rather than lend out. The amount of collateral and the frequency of intermediation (velocity) between the scarce collateral available can result in the bank risks as it amplifies the pro-cyclicality problem (Ghosh et al., 2012). This is because in security financing, banks use assets instead of deposits collected as collateral to raise funds, then they use the funds to purchase more assets and later use the assets as collateral to raise additional funds. This whole cycle results in the pro-cyclicality of financial system, which in turn increases banks risks. Studies done by Singh (2011) support this view by saying that a reduction in the re-use of collateral has a positive role on financial stability. A different view was given by Adrian and Shin (2010) who claimed that when collateral use drops, it slows down financial intermediation, in other words, it dries up the interbank markets.

2.1.5 Debt-to-Equity Ratio (Leverage Ratio)

To be able to understand, according to Investopedia, debt-to-equity ratio is actually one of the leverage ratio that compares a company's total liabilities to its total shareholder's equity. This ratio provides a clear view on a company's leverage position. For instance, a higher percentage of debt-to-equity ratio indicates that the company is highly leveraged and has a weaker equity position. It could also be said that leverage ratio is suitable to be used as both macro- or micro-prudential policy tool and also a signalling tool for detecting a potential crisis. Subsequently, a leverage ratio can act as an indicator to detect the case of leverage building up for individual financial institutions (Fostel and Geanakoplos, 2013).

Usually, shadow banks are more likely to fail than traditional commercial banks as these institutions are not restricted by any type of solvency or prudential regulation like what is imposed on commercial banks (Crockett and Cohen, 2001). This is further justified by the research done by Archaya (2010) and Pantin (2012), where both of them argue that many shadow-banking arrangements aim to bypass minimum bank capital requirements in order to achieve a higher leverage position which are allowed prior to the recent financial crisis. Therefore, they have greater flexibility to utilize their leveraging position in order to increase their short-term profit. For instance, shadow banks and related intermediaries prefer to become more indebted to increase their leverage and as their balance sheets expand, they have more credit supply to existing or new borrowers. In this way, we can say that the greater the leverage, the greater the size of investment and hence there is higher possibility for shadow banks to experience difficulties when things are beyond their control, thereby resulting in more externalities on other parts of the financial system.

2.1.6 Household Debt

According to Hunt (2015), household debt is defined as the indebtedness for several aspects, such as purchasing real estate, financing investment and other consumption. The researcher believe that, the high level and increasing growth of household would rise the sensitivity of household to shock or any crisis and this lead to default risk. Moreover, previous studies show that high level of household debt may have great impact on macroeconomic in two situation which are: (1) economic downturn as high leverage may lead to financial crisis and, (2) households are exposed to volatility and increase the vulnerability to financial shocks that involve income, interest and asset price risk (Finocchiaro, Nilson, Nyberg & Soultanaeva, 2011).

From Gliack and Lansing (2010), the researcher suggests the understanding on the impact of the indebtedness of household in development of crisis in three common forms. First, before year 2007, most of the nation, their indebtedness of household rise intensely and faster than disposable income. Second, there is a positive relationship between sharp rise in household debt and housing price. Lastly, the nation which was experiencing the great increase in debt will most likely involve in economic recession.

However, there are some controversial arguments about the high level of household debt that results in a lower non-performing loan ratio, hence, no financial shock. According to (ECB, 2005), the ratio of the non-performing loans declined from year 1998 although the debt ratio increased. The reason that may explain this condition is the better use of advance technique in risk management by bank or the bigger bank may gain better opportunities to diversify their risk by using financial derivative product or securitization.

For instance, United Kingdom and United State, both of these country's non-performing loan ratio was decreasing drastically since 1990 under the acceleration of household debt ratio. Furthermore, from the Financial Stability Report 2016 in Malaysia, the banks have been raising progressively on the level and the standard of loan provision and reserve for collective impairment in order to enhance buffer against the potential risk on loss (The Financial Stability and Payment System Report, 2016).

2.1.7 Ratio of Housing Loan to Total Loan

According to The Financial Stability and Payment System Report (2016), real estate financing still consider as high demand and it contribute major portion to the growth in household debt which is more than 50% in Malaysia. In addition, real estate loan plays an important role in household debt sector for two major reasons: (1) housing purchase is an asset on the base of investment and (2) the property may use as collateral. These two factors would have a significant influence on the movement of housing price. Following the "capital gain channel", higher housing price requires a greater amount of loan and it pushes citizens to invest in housing and therefore, it boosts up the housing price (Finocchiaro, Nilson, Nyberg & Soultanaeva, 2011). Himmelberg, Mayer and Sinai (2005) showed that the intense growth in housing price is caused by basic factor of supply and demand and the researcher stated that the housing bubble was led by several reasons which affect the willingness of people to invest in housing sector. Thus, a previous research believe that financial crisis caused by the asset bubble burst will lead to more serious non-performing loan which may result in default risk (Wan, 2015). Lastly, we may state that the relation between real estate loan to total loan ratio and non-performing loan is almost similar as household debt since real estate loan was part from the household indebtedness section.

2.1.8 Financial Crisis

Many people argue that shadow banks have played a significant role in the run-up to the financial crisis. An important fact that we have to know before we further discuss on this topic is that shadow banking sector has grown substantially in the last 3 decades without the supervision of regulators. This is further justified by (Gorton & Metrick, 2012), where their rough calculation has shown that the assets of shadow banking system were at least on the same level as the assets of commercial banks just before the financial crisis in 2007-08. Therefore, shadow banking system is highly

vulnerable to an investor's run which indicates the panic withdrawal of resources and asset price imbalance where assets is devalued against the liabilities when things go south (McCulley, 2007).

The reason being for this is that these non-banking financial institutions were operating with a very high leverage and they were also loosely regulated and supervised by central bank. As a result, it leads to the beginning of financial crisis as the declining housing prices in the US has heavily impacted shadow banking system because most of their illiquid assets are funded by short-term liabilities and hence it resulted in a more severe problem to the global financial system (Schleifer, 2010). Moreover, the downfall of shadow banking system has significantly reduced the ability of commercial banks to originate and renew loans as well as developing continuing problems for households and firms that rely on bank's credit facility. Other than that, according to Acharya (2013), commercial banks cannot easily fill up the role that shadow banks had played in providing credit to the economy.

Hence, this issue is definitely contributing to the delay in restoring the flow of credit to a volume consistent with that of a recovery from a typical recession. Lastly, the research done by Caprio and Klingebiel (1996) as well as Kaminsky and Reinhart (1999) show that there is positive effect of NPL on the probability of crisis and NPL played a key role in predicting banking crisis.

2.1.9 Numbers of Shares held by Management

The efficiency and effectiveness in bad debts management is largely attributed to behaviour of management, say, the risk appetite of management. A number of literatures showed that the ownership structure plays an important role in determining

the NPL of traditional financial institution, yet limited research considered the influence of ownership structure in shadow banks industry. It is normally believed that increase in management's shareholding incentives them to perform better and reduce moral hazard problem.

The efficiency of state-owned banks is generally deemed to be lower. Novaes and Werlang (1995) claimed that the market outperform the state-owned banks in general, as government tends to focus their portfolios of NPL caused by the state itself. Bank with higher ownership by government is found to be related to sluggish development and lower growth (Porta, Silanes & Shleifer, 2002; Lata, 2015). We should take note that a numbers of shadow banks in Malaysia are owned by the state or nation government. Besides, research also showed that insider ownership has a significant negative relationship with credit risk of the firm (Akwaa-Sekyi & Moreno, 2016; Mensah, Amidu & Abor, 2015). On the other hand, a research targeting in Taiwan's banks showed that increase in private shareholding also induces more NPL (Hu, Li & Chiu, 2004).

2.2 Review of Relevant Theoretical Models

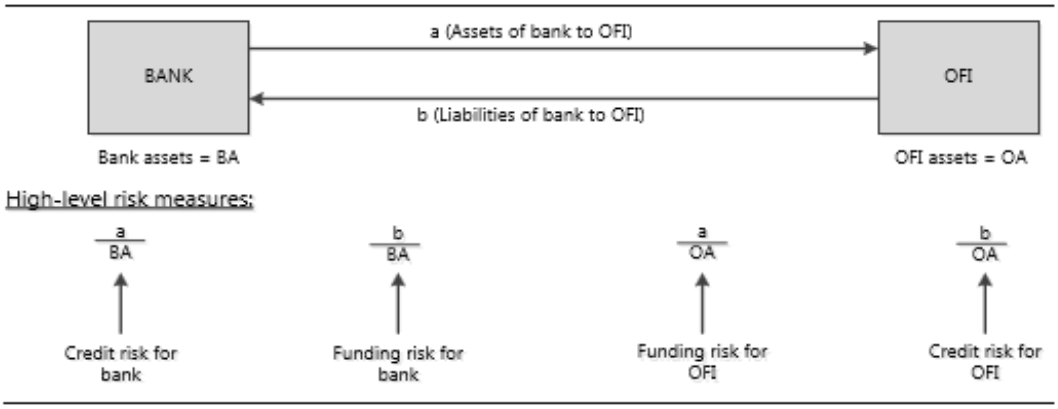
In spite of the enormous threat caused by the shadow banks, neither the methodologies to measure systematic risk of shadow banking activities nor theory that explain shadow banks have been established. Due to incompleteness of data, it added up the challenges for researchers to investigate the issues, so as the difficulty to address the interconnectedness of shadow banks. Isa and Rashid (2014) designed a model to measure the default risk of shadow bank, which proposed by Global Shadow Banking Monitoring Report during 2013. The model is expressed as:

$$logNPL_{it} = \beta_0 + log\beta_1 DSD_{it} + log\beta_2 CI_{it} + \varepsilon_{it}.$$

This model measured the risk which may arise from 2 main activities of shadow banks: liquidity transformation and credit intermediation.

Financial Stability Board further identified the 4 aspects of risk in shadow banks: maturity transformation, liquidity transformation, imperfect credit risk transfer and leverage. However, we can't find any study that study default risk of shadow banks based on this updated framework.

Figure 2.1: Risk Analysis Framework of Inter-connectedness between Banks and Other Financial Intermediaries (OFIs)



Source: FSB (2015, p27)

2.3 Proposed Theoretical/ Conceptual Framework

Several theories have been proclaimed to explain non-performing loan as a measure of the risks in the financial system. However, there is inadequate theory on the risks in shadow banks. This study will discuss two theories that connect both concepts.

2.3.1 Agency Theory

According to Pandey (2010) and Eisenhardt (1989), this theory illustrates the relationship where the principal (shareholders) authorizes work to the agents (managers), who perform on behalf of the principal. Due to the differences in earning distribution, there could be a possible mismatch of interest between shareholders, managers and debt holders, which results in taking excessive risk or abandoning profitable projects (Mayers & Smith, 1987). During period of crisis, agency problem may cause unrestrained lending by the managers, increasing the possibility of non-performing loan (Jimenez and Saurina, 2006). This positive relationship is supported by studies done by Khemraj and Pasha (2006) and Dash and Kabra (2010).

According to another explanation, when the debt-to-equity ratios of banks are high, they may not have enough resources in the financial outcome and the management may not behave carefully. This in turn increases the variation of the interest between borrowers and lenders (Holmstrom & Tirole, 1997).

Another way to look into agency theory is through securitization and collateral intermediation. In order to protect the interest of bondholders, banks typically inclined towards debt securitization. Creditors (bondholders) are given the rights to retain some of the assets of the borrowers (firms) until the loans are repaid. Here, the higher the collateral, the more possibility for banks to overcome agency problem (Jerzemowska, 2006). According to Maggio and Tahbaz-Salehi (2015), the shortage of collateral often leads to an upper limit on the size of capital that can be intermediated efficiently in the market. In other words, when the loans exceeded the limit, high chances are they will become non-performing ones.

On the other hand, agency cost can be reduced by limiting the managers' freedom of action. According to Jensen (1986), dividend payouts, share repurchases and

acquiring additional debt tend to lower the amount of money controlled by managers, which in turn reduce their probability of undertaking risky decision. Compensation in the form of shares can limit the agency problem. When managers are given options and voting rights that arise from share ownership, they will be more prudent and opt for less risky investments as now they have the same interest as shareholders (Shapiro, 1999). An increase in equity participation increases the effectiveness.

2.3.2 Financial Acceleration Theory

Financial acceleration is used to explain the effect of economic shocks on economic activity due to financial market imperfections. This theory are discussed in Bernanke and Gertler (1989), Bernanke and Gilchrist (1999), and Kiyotaki and Moore (1997). It depends on the interactions between economic agents' net worth and the external finance premium where economic agents' net worth is defined as: the sum of liquid assets plus collateral value of illiquid assets less outstanding obligations; and the external finance premium is defined as: the difference between the cost of funds raised externally and opportunity costs internal to the firm. The relationship between both elements is commonly recognized as the basis of the financial accelerator.

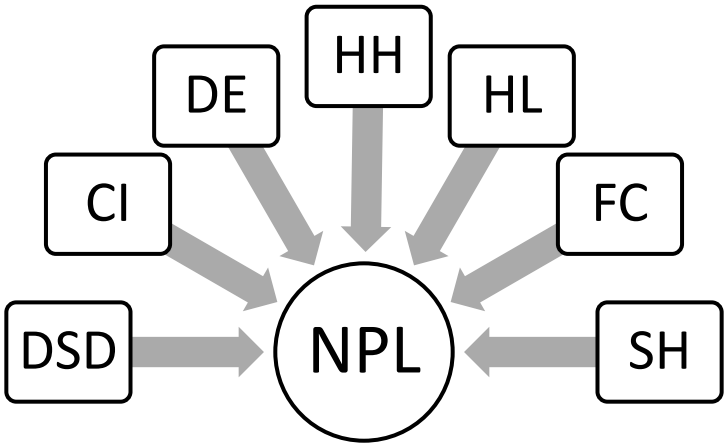
The financial accelerator effect can be illustrated as a change in aggregate economic activity that causes a change in economic agents' net worth. Due to imperfect information, the terms under which economic agents are able to raise external finance, hence also the external finance premium, are inversely related to their net worth. This inverse relation between output changes and the external finance premium makes borrowing more difficult and/or expensive during financial crisis (recession) than during the expansionary phase. This in turn amplifies the fluctuations in investment, spending and production over business cycles. As a result, the happening of financial

crisis reduces the loan provided in the market, hence, lower possibility of non-performing loan.

2.4 Hypotheses Development

We construct a model based on FSB's works as our base model, together with some theories to assist developing our theoretical framework. It can be depicted as follows:

Figure 2.2: Theoretical Model



Note:
DSD = Deposits of securitized debt; CI = Collateral Intermediation; DE= Debt-to-equity ratio; HH = Household debt; HL = Ratio of housing loan to total loan; FC = Financial crisis; SH = Number of shares held by management.

DSD, CI and DE are adopted as the core determinants to capture the key risks in shadow banks which arose from liquidity or maturity transformation, credit intermediation and leverage. HH, HL, FC and SH were also included to examine the effects of external and operational factors to the default risks of shadow banks.

2.5 Conclusion

In this chapter, numbers of literatures widely discuss about how the researcher define shadow banks as well as what factors driving non-performing loans to increase. Some studies included several variables however some explicitly focus on a particular variable to predict whether the variable is significant on affecting non-performing loans of shadow banks. On the other hand, this research is aiming to find out which variable(s) are the sensitive one(s) in a broad point of view. Alternatively, several findings have concluded that non-performing loans are significant in causing global financial crisis nevertheless financial crisis is insignificant in causing the non-performing loans to increase. In addition, there are several different outcomes and sayings regarding to consequence and effect between the non-performing loan and household debt. To put it briefly, we have adopted agency theory to explain the relationship between non-performing loan and shareholding by management as well as securitization and collateral intermediation variables. Financial acceleration theory is used in explaining the effect of instability of economy on economic activity.

CHAPTER 3 METHODOLOGY

3.0 Introduction

In this chapter we introduce an overview of the methodology in this research. There are three major parts that will be explained in this chapter, which are theoretical model, empirical model and data collection and its sources. Due to the limited cross-sectional units and time-series data, we are unable to perform cross-sectional or time-series analysis. Therefore, we applied panel method for the research. The sample size included a total number of 11 companies from year 2005 to 2015. The data used are sourced from Bank Negara Malaysia, International Monetary Fund (IMF) and company's annual report.

The theoretical model and expected outcome will be presented in Section 3.1. Next, we will further discuss the empirical model and panel data technique will be shown in Section 3.2, which includes Pooled OLS model, Fixed Effects Model (FEM), Random Effect Model (REM), Poolability Hypothesis Test, Lagrange Multiplier Test and Hausmen test. Lastly, we will introduce the data collection method and source of data in Section 3.3.

3.1 Theoretical Model

"Risks and Vulnerabilities of Shadow Banks: The Case in Malaysia" is a quantitative research with the attempts to study the factors that may lead to the defaults in Malaysia shadow banking industry. This study is an associational type of research by relating variables in order to examine whether relationship exist.

Based on the previous theory and model, we may deduce a function for the study of default risk of shadow banking system in Malaysia, presented as:

$$NPL = f(DSD, CI, DE, HH, HL, FC, SH)$$

The default risk of shadow banks is deemed to be a function of bank's risk appetite, lending activities, ownership structure and external events. Based on efforts by past researchers, we our expectation on the impact of each variable on NPL on below.

Table 3.1: Expected Relationship with Default Risk

Variables	Expected Sign
DSD	Positive
CI	Positive
DE	Negative
HH	Positive
HL	Positive
FC	Positive
SH	Non-Linear

Source from: Developed for the research

3.1.1 Non-Performing Loans

In this study, Non-Performing Loan (NPL) Ratio was adopted as a proxy of default risk. NPL is refers to ratio of bad debts to the total lending loan. In broad senses, the non-performing loan is a good reflection of credit risk. Meanwhile, credit risk is the uncertainty arises from the relationship with borrower, as they are unable to make required payment. Due to the reason that the nature of business of a bank is money lending, NPL is usually used by researcher to represent probability of default in banking sectors. Unbearably high NPL can cause a bank to default.

The similar approach has been adapted by other researchers. Kucukkocaoglu and Altintas (2016) used NPL as default rates for macroeconomic credit stress testing and to estimate credit losses. Jovic (2017) measured the credit risk level in Serbian banking sectors by using NPL as a proxy for credit risk. Rashid, Azid and Malik (2014) pointed out that credit risk is one of the biggest factors that affect the sustainability of the banking sector. Heffernan (2005) mentioned that high NPL ratio in banking sector is an early warning signal indicating distress.

According to Khemraj and Pasha (2009), non-performing loans are threatening the financial vulnerability in the particular country or region. They also found a significant relationship between non-performing loans and banking crises. Besides, Sorge (2004) also argued that it is viable to use non-performing loans as one of the variables to determine the vulnerability of financial system. Hence, we can say that the non-performing loans act as an important indicator in predicting the happening of financial crisis; it can be presented by the following equations:

$$\text{NPL} = \frac{\text{Impaired Financing}}{\text{Total Loan}} \qquad (1)$$

3.1.2 Deposits of Securitized Debt

Deposit of securitized debts is one of indicators to measure the growth in securitization. It is measured by the amount of deposits placed in other institutions and the amount due for guarantees. Securitization is a process of transforming asset with a payment stream into a marketable security. The most common form of securitization is Asset-Backed Security (ABS). It was deemed to be one of the key factors that trigger financial crisis (FCIC Report, 2011).

The relationship between deposits of securitized debt and the risks of shadow banks (that are measured in terms of the non-performing loans) depends on the quality of the assets (Canton & Rouyer, 2000). When a low quality asset is used for securitization purpose, there is high chance that it will result in non-performing loan. This is supported by Gorton and Souleles (2005), who show that the market price of the asset-backed securities indicate the bank's ability to provide recourse. A poor performing securitization portfolio is believed to generate higher risks for shadow banks (Vermilyea, Web & Kish, 2008).

Bertay, Gong and Wagner (2017) explained the downside risk of securitization as it tends to reduce the efficiency of financial intermediation. As securitization is commonly used as a method to monitor borrowers' risk, given the assumption that borrowers will remain high credit worthy. Securitization thereby becomes a disincentive as bank with greater securitization ignores the importance of screening and monitoring, causing lower quality lending (Bertay et al., 2017).

Deposits of securitized debt (2)

= Deposits and placements at other financial institutions + Amount due for guarantees

3.1.3 Collateral Intermediation

Shadow banks re-use the scarce collateral for intermediation purpose to reduce counterparty risks for the safety of the lenders (investors). According to Duffie (2010), collateral intermediation exposes the banks to liquidity problem as when customers withdraw their collaterals, banks need to find a new source to replace. With the limited amount of collateral, finding a replacement could be a difficult task. Hedge funds, being the prime brokerage clients of shadow banks place the shadow banks

into an instable position when they want their collateral back, this happened during the financial crisis in 2008. Having said that, there is a positive relationship between collateral intermediation and the non-performing loans of shadow banks as the pro-cyclicality problem was amplified (Ghosh, et. al., 2012). It is measured by the summation of investment securities and derivative financial instruments of individual shadow bank.

Collateral Intermediation

= Investment Securities + Derivative Financial Instruments (3)

3.1.4 Debt to Equity

To begin with, the debt to equity ratio is used to measure a company's financial leverage. According to Ghosh (2005), banking sector is exposed to the threat of a high level of non-performing loans and therefore they tend to tighten their lending activities especially when the bank is highly leveraged. To summarize, there is negative relationship between the debt-to-equity ratio and non-performing loans. This is further justified by the research done by Archaya (2010) and Pantin (2012), where both of them claimed that operation of shadow banks tend to bypass minimum bank capital requirements in order to achieve a higher leverage position.

Even though it is counterintuitive to observe increase in bank's default risk while leverage decrease, we should not forget that banks accept deposit from the public as a debt. Therefore, it is justifiable to say a low leverage banks contain higher risk.

$$\text{Debt to Equity} = \frac{\text{Total Liabilities}}{\text{Total Equity}} \quad (4)$$

3.1.5 Household Debt

Household debt is the total aggregate amount of loan to the household entity borrowed by financial institutions. The data for household debt in this research are collected from Bank Negara Malaysia. The lending practices among shadow banks are the key focus by central bank of Malaysia. According to BNM (2016), the household debt takes a large portion of percentage out of the total financing by Non-bank Financial Institution.

Based on the 2008 U.S financial crisis, Cynamon and Fazzari (2008) claimed that the unprecedented high household debt is one of the causes to the deep recession. Rinaldi and Arellano (2006) conclude that increase in the total debt taken by household will likely to increase the possibility of default loan. The higher debt ratio would most likely amplify the impact of interest rate shocks, future income or the possibility of unemployment on household debt servicing. Besides, the high household debt increases the vulnerability of shadow banks toward the shock of vast unemployment (Hunt, 2015).

3.1.6 Ratio of Housing Loan to Total Loan

Housing loan ratio is used to measure the amount of the housing loan in terms of total loan credit by the shadow bank. Morgan and Zhang (2015) held housing loan ratio as a measure of financial inclusion as well as financial development. Cucinelli (2015) bank lending behavior will most likely affect non- performing loan. Homebuyers and lender bought into increasing house values and borrowers defaults when price drop (Adelino, Schoar & Severino, 2016). Hence, we may hypothesize that high percentage of housing loan in banks'

Morgan and Zhang (2015) have found that an increased share of mortgage lending have positive relationship with financial stability, especially by lowering the probability of default by financial institutions and reducing the non-performing loan ratio, till 30% - 40% of the total loan.

$$\text{Ratio of Housing Loan to Total Loan} = \frac{\text{Total Loan to Housing Sector}}{\text{Total Loan}} \quad (5)$$

3.1.7 Financial Crisis

The credit quality of loan portfolios across most countries has deteriorated quickly since the US Subprime Mortgage Crisis. In fact, before the financial crises are sweeping through the world in 2008, the credit quality of loan portfolios are remained quite stable and safe. Here, we can conclude that loan performance is closely associated with the economy cycle. This is further justified by the research done by Caprio and Klingebiel (1996) as well as Kaminsky and Reinhart (1999) as their studies show that there is positive effect of non-performing loans on the probability of crisis and hence non-performing loans are useful in predicting banking crises. Furthermore, the financial accelerator effect proposed that there is lower chances of non-performing loan during the event of financial crisis as credit supply is usually slower and lesser especially when the economy cycle is at recession phase. Therefore, we can say that the loan performance is tightly linked to the happening of financial crisis.

FC = 1 if the observations belong to 2008;
= 0 if otherwise (5)

3.1.8 Number of Shares held by Management

Research done by Jensen and Meckling (1976) tell us that when management ownership increases, they are less likely to misuse corporate's wealth. Further studies were done to investigate the relationship between management shareholding and firm performance and we found that there is a non-linear relationship exists among them. According to Demsetz (1983), a small stake ownership by management will constrain them towards value maximization due to the market for corporate control. However, when a manager owns substantial amount of shares, he may influence the firm to ensure that he secured his employment. In this case, the higher the stake ownership by management, the higher the probability for the management to perform activity that did not maximize firm's benefit. We measure management's shareholdings by dividing the number of shares owned by directors to the total number of shares in each individual bank.

$$\text{Number of shares held by management} = \frac{\text{Number of shares held by directors}}{\text{Total number of shares}} \quad (7)$$

3.2 Empirical Model

In this section, a brief explanation of each panel data analysis model will be introduced. The purpose of data analysis is to process the data into useful insight and knowledge and to support decision-making. We regresses Non-Performing Loan (NPL) to a series of independent variables to test their significance of influence.

The regression model is expressed as follows:

$$NPL_{it} = \beta_0 + \beta_1 Log(DSD)_{it} + \beta_2 Log(CI)_{it} + \beta_3 Log(DE)_{it} + \beta_4 Log(HH)_{it} + \beta_5 HL_{it} + \beta_6 FC_{it} + \beta_7 SH_{it} + \varepsilon_{it}$$

We should note that DSD, CI, DE, HH are in log form to respond to the skewness of large value and to show percentage change. Such model is known as lin-log model. Unlike linear model, the slope coefficient ($\beta_1, \beta_2, \beta_3, \beta_4$) show the absolute change in NPL to a percentage change in regressors (DSD, CI, DE, HH).

3.2.1 Panel Data Technique

As we mentioned earlier, the data being used in this research is panel data. Simply saying, it is a set of data which involves both space and time dimensions. It depicts the change of each individual over time. According to Gujarati (2004), there are few advantages of panel data:

I. The panel data technique takes individual-specific variables into account and thereby involves more heterogeneity.
II. It is more informative, variable, efficient and less collinearity problems.
III. It is better for researchers to study the dynamics of changes.
IV. The panel data technique is capable to uncover effects that can hardly be detected by time-series or cross-sectional technique.
V. Complicated behavioural changes can be better understood through panel data technique.
VI. Bias can be reduced rather than using aggregate data.

As our research not only studies the macro-factors that lead to the risk of default in shadow banks, but also involve the behavioural aspects which is unique to each of them, we therefore adopted the technique for our research.

3.2.2 Pooled OLS Model

The pooled OLS method is the simplest approach out of the 3 model discussed by ignoring the space and time dimensions of pooled data. Model is measured by using the OLS regression. The pooled OLS method is established based on 3 assumptions:

- Intercepts are constant across individuals.
- Slopes are constant across individuals
- No time effect (Time Invariant)

The model can be written as:

$$Y_{it} = \beta_1 + \beta_2 X_{itk} + \varepsilon_{it}$$

Where i = Bank Rakyat, BSN, …, RCE banks
t = 2005-20015
k = Log (DSD), Log (CI), Log (DE), Log (HH), HL, FC, SH.

As the model essentially originated from OLS model, thus it is restricted to the assumptions of classical normal linear regression model (CNLRM). The prerequisites and highly restricted assumptions make POLS unpractical to economic study despite its simplicity. It has two main issues in term of applications:

- The model ignores the different characteristic across periods.
- The estimators will lose its consistency, efficiency and become biased, when heterogeneity appears.

Due to these restrictions, the relationship between variables may thus be mispresented (Gujarati, 2004). Poolability hypothesis testing is necessary before POLS is used.

3.2.3 Fixed Effects Model

The Fixed Effects Model (FEM), which also known as Least-Square Dummy Variable (LSDV), distinguishes from POLS by taking the individual character of each cross-sectional unit into account. FEM can be further subcategorized into 3 scenarios to fulfil different assumptions, in order to consider the slope coefficient and time effects. The 3 scenarios are (it should be noted that the following scenarios assume a different intercept across individuals):

a) Slopes are constant and no time effects

"Fixed Effects" refers to the unique traits that make each individual distinctive which is a result of different background, risk appetite, principle and etc. In the basic form of LSDV, such "Fixed Effects" is assumed to be constant across time, that is, time invariant. The regression for POLS can be written as:

$$Y_{it} = \alpha_1 + \alpha_2 D_{2i} + \alpha_3 D_{3i} + \cdots + \alpha_{11} D_{11i} + \beta_2 X_{itk} + \varepsilon_{it} \qquad (8)$$

Where D_{2i} = 1 if the observations belongs to BSN bank
= 0 if otherwise
D_{3i} = 1 if the observations belongs to Bank Pembangunan
= 0 if otherwise
...

D_{11i} = 1 if the observation belongs to RCE bank
= 0 if otherwise
t = 2001-2003
k = Log (DSD), Log (CI), Log (DE), Log (HH), HL, FC, SH

b) Slopes are constant but time varies

The same method can be applied to address the time effect. In the real world, it isn't realistic to exclude the time effects that often take places due to unexpected

events. We can introduce the time effects by modelling the time dummy. We can formulate the time effect as:

$$Y_{it} = \delta_0 + \delta_1 Dum_{06} + \cdots + \delta_{10} Dum_{15} + \beta_2 X_{itk} + \mu_{it} \qquad (9)$$

Where Dum_{06} = 1 if the observations belongs to year 2006
= 0 if otherwise
Dum_{10} = 1 if the observations belongs to year 2015
= 0 if otherwise
i = Bank Rakyat, BSN, …, RCE banks
k = Log (DSD), Log (CI), Log (DE), Log (HH), HL, FC, SH

We may thus integrate equation (9) into (8), and the model can be expressed as:

$$Y_{it} = \alpha_1 + \alpha_2 D_{2i} + \alpha_3 D_{3i} + \cdots + \alpha_{11} D_{11i} + \delta_0 + \delta_1 Dum_{06} + \cdots + \delta_{10} Dum_{15} + \beta_2 X_{itk} + \mu_{it}$$

As such, we can see how the model improves in order to adapt the real world better.

c) Slope coefficient varies but time invariant

In this scenario, the slope coefficient and intercept are assumed to be all different. This is to say that the effect of independent variables is different in each individual. The model for this assumption can be modified from (8), which we will get:

$$Y_{it} = \alpha_1 + \alpha_2 D_{2i} + \alpha_3 D_{3i} + \cdots + \alpha_{11} D_{11i} + \beta_2 X_{itk} + \gamma_1 (D_{2i} X_{itk}) + \gamma_2 (D_{3i} X_{itk}) + \cdots + \gamma_{10} (D_{11i} X_{itk}) + \mu_{it}$$

We can conclude that the at least one slope coefficient is different from the base group if one or more γ coefficient are statistically significant.

Even though FEM is often good to apply in research, there are few limitations that shouldn't be ignored. A caution should be take note to not including too many dummy variable as it reduce degree of freedom. Next, multicollinearity may thereby exist. Besides, the FEM model is also incapable to catch up the effects of some time-invariant variables. Lastly, the model assumes that normality of errors term ($\mu_{it} \sim N(0, \sigma^2)$. Since the error term is a composition of cross-sectional and time-series data, researchers modified it in few ways (Gujarati, 2004):

I. Error variance is assumed to be heteroscedastic or homoscedastic for cross-section units
II. The cross-section units are assumed to be autocorrelated (AR1) or nonautocorrelated.
III. The error term of one individual is likely correlated with another, or we may assume it is not correlated.

3.2.4 Random Effect Model

Due to the limitation of FEM, the model lose its degree of freedom with the increasing number of variables, also, the model is unable to include relevant independent variables that is time-invariant. Random Effect Model (REM) or Error Components Model (ECM) was applied to address the 2 limitations in FEM through the use of error term. Random effect model (REM) use when there are some omitted variables vary among cases but do not change over time or some omitted variables maybe constant among cases but vary over time (Brooks, 2008).

Given the following model:

$$Y_{it} = \beta_{1i} + \beta_2 X_{itk} + \varepsilon_{it} \qquad (10)$$

REM assume the intercept is a composition of a random variables that is individual-specific (ε_i) and a mean value of β_1. Since there are a certain omitted determinants that we have limited knowledge to conjecture, the β_{1i} can be further express as:

$$\beta_{1i} = \beta_1 + \mu_i \quad (11)$$

Where i = Bank Rakyat, BSN, …, RCE banks
t = 2005-20015
k = Log (DSD), Log (CI), Log (DE), Log (HH), HL, FC, SH
$\varepsilon_i \sim N(0, \sigma^2)$

Substituting (11) into (10), we may get:

$$Y_{it} = \beta_1 + \beta_2 X_{itk} + \mu_i + \varepsilon_{it} \quad (12)$$
$$= \beta_1 + \beta_2 X_{itk} + w_{it}$$

w_{it} is the composition of two error term. Notice that in REM, all the cross-sectional units share a common intercept β_1, however their characteristic will be caught by the μ_i that is unobservable. In the REM model, the numbers of regressors apparently lesser comparing to FEM, thereby it reduce the likelihood of multicollinearity problem.

3.2.5 Poolability Hypothesis Test

The poolability test (or Likelihood Ratio Test) was conducted to select most appropriate model between POLS and FEM model for the analysis. As we mentioned in the earlier part of this chapter, POLS assumed a common intercept within the

cross-sectional unit. Simply saying, the cross-sectional unit is assumed to be characteristically indifferent in POLS mode. Contrary, FEM unleashed this assumption in order to better reflecting the distinctive properties of each cross-sectional unit. Hence, the poolability test is a quantitative technique to examine whether it is reasonable to pool the individual together.

The null hypothesis of poolability assumes no common intercept. F-test can be applied for the poolability test across cross sections in panel data models. Test statistic formula for Poolability hypothesis test:

$$F = \frac{(R^2_{FEM} - R^2_{POLS}) \Big/ (K_{FEM} - K_{POLS})}{(1 - R^2_{FEM}) \Big/ (n - K_{FEM} - 1)}$$

R^2 = coefficient of determination

K = number of regressors

n = sample size

Zellner (1962) also discover a method to test for the poolability by using likelihood ratio (LR) test. Under the null hypothesis, LR follows the chi-square distribution with q degrees of freedom. The LR test is the method used by EVIEWS 9 software, therefore poolability test result for our study is based on the LR test, which expressed as:

$$LR = -2\log\left(\left(1 + {qF}/{df_u}\right)^{-\frac{NT}{2}}\right)$$

If the p-value is lower than significant level (0.1/0.05/0.01), the null hypothesis need to be rejected, FEM is deemed to preferable to POLS. Otherwise, if the test statistic

remains insignificant, no panel models need to be specified, as all individual are sufficiently homogeneous.

3.2.6 Breusch-Pagan Lagrange Multiplier Test

In the situation where selecting a better model between POLS and REM, Breusch-Pagan Lagrange Multiplier (BGLM) test is a common way for the econometrician.

Recall the Random Effect Model in (12), where

$$Y_{it} = \beta_1 + \beta_2 X_{itk} + \mu_i + \varepsilon_{it}$$

The null hypothesis of BGLM test is that the variance of random effects equal to zero: Var $[\mu_i] = 0$, then every cross-sectional unit would have the common intercept, meaning that there is no random effects in the models and POLS model can be applied. In order to test the hypothesis, we can regress the ε_i on the independent variables as the following auxiliary regression:

$$\widehat{\mu_i}^2 = \delta_0 + \delta_1 X_{itk}$$

Breusch and Pagan (1979) proposed that if the $R^2$of the auxiliary model is high, then the $\widehat{\mu_i}^2$ is said to be well explained by the independent variables. As a result, the test statistic: NR^2 will be higher than the critical value on chi-square distribution. Therefore, we can know that Var $[\mu_i] \neq 0$, we can hence reject the null hypothesis and conclude that REM is preferable.

Decision rule for LM test is that if the p-value of test-statistic is lower than significant level (0.1/0.05/0.01), we can reject null hypothesis. Otherwise, do not reject null

hypothesis. If the null hypothesis is rejected means that the REM is the more appropriate model compared to the POLS.

3.2.7 Hausman Test

According to Hill, Griffiths and Lim (2008), the function of Hausman test is examine whether FEM or REM is the more suitable model to test the equation. Based on the REM model, the intercept is a composition of a random variable (μ_i). Therefore, the null hypothesis is that there is no relationship between independent variables and random variable (μ_i), which REM is preferable.

Test statistic formula for Hausman specification test:

$$H = \frac{\beta_{FE} - \beta_{REM}}{[Var(\beta_{FE}) - Var(\beta_{REM})]^{-1}(\beta_{FE} - \beta_{REM})}$$

Decision rule for this test is that if the probability value of H-statistic is lower than significant level (0.1/0.05/0.01), reject null hypothesis. Otherwise, do not reject null hypothesis. If the null hypothesis is rejected means that the FEM is the most appropriate model to estimate the equation and for REM is not suit for the equation and it imply that REM has correlation with at least one of the independent variable.

3.3 Data Collection Method and Source of Data

This study is conducted to examine the determinants that will affect non-performing loan of shadow bank in Malaysia in financial sector. There are 7 independent variables have been chosen to use, which are collateral intermediation (CI), deposit

securitization debt (DSD), shareholding by company directors, household debt, debt to equity, housing loan ratio and financial crisis.

Lavrakas (2008) defined the target population as those entities for which the findings of the research are meant to generalize. The target population is the unregulated institutional credit intermediary in Malaysia. Based on the previous works by Isa and Rashid (2014), there are total numbers of 15 financial institutions falls in the category of shadow banks. They can be classified as Development Financial Institution (DFIs) which were bound by Development Financial Institutions Act 2002, Other Development Financial Institutions (ODFIs) which is not regulated by the act, and, some other non-bank financial service providers.

The DFIs and ODFIs can be regarded as specialised financial institutions which set up by government with aims to develop and promote key economic sectors, such as exports and imports.

Table 3.2: Shadow Banks in Malaysia

DFIs	ODFIs	Non-bank financial provider
Bank Pembangunan Malaysia	MIDF	MBSB
SME Bank	Credit Guarantee Corporation	RCE Capital Group
EXIM Bank	Lembaga Tabung Haji	AEON Credit Berhad
Bank Rakyat Malaysia	Sabah Development Bank	Court Mammoth Berhad
Bank Simpanan Nasional (BSN)	Sabah Credit Corporation	
Agrobank		

Source from: Isa and Rashid (2014)

However, in our opinion, the size of shadow banks is beyond that. In recent years, the emerging of Fintech companies and Peer-To-Peer Financing (P2P), can also be seen

as a part of shadow banks. Although the sizes of Fintech companies are still relatively small, their existence should not be ignored.

Sampling size is the number of observations selected from the population for the purpose of data analysis. As shadow banks are not subjected to disclosure of information, the data regarding to the shadow banks in Malaysia are very limited. It increases the difficulty of our researchers. As a result, only 11 shadow banks are left for the study after filtering banks with incomplete or unavailable data. The times periods is from 2005 to 2015. As some of the data categories are unobservable, unbalanced panel data set was applied for the analysis.

In short, 96 total panel observations are included in this analysis. The detailed of the number of observations are summarized as table below:

Table 3.3: Panel Observation

Bank Name	Period
Bank Rakyat	2007-2015
BSN	2005-2015
Bank Pembangunan	2009-2015
EXIM Bank	2008-2015
SME bank	2009-2015
CGC	2005-2015
Lembaga Tabung Haji	2010-2015
Sabah Development	2010-2015
Sabah Credit	2005-2015
MBSB	2005-2015
RCE	2005-2015

Source from: Developed for the research

Table 3.4: Variables with Definition, Measurement Unit and Sources

Variable	Definition	Unit of measurement	Sources
Non-performing loan	A non-performing loan (NPL) is the amount of borrowed money upon which the borrower has not made his scheduled payments for at least 90 days. A non-performing loan is either in default or close to being in default.	Percentage	Annual report
Deposit securitization debt	Deposit for the process of transforming asset with a payment stream into a marketable security	RM	Annual report
Collateral intermediation	Scarce collateral used for intermediation purpose to reduce counterparty risks for the safety of the lenders (investors)	RM	Annual report
Debt to Equity	The debt to equity ratio used to measure a company's financial leverage, calculated by how much debt a company financed by dividing a company's total liabilities by total equity.	Ratio	Annual report
Household debt	Household debt is the total aggregate amount of money that the household require payments of interest or principal to financial institutions.	RM in million	Financial stability report
Housing loan	Amount of real estate loan to total loan.	Ratio	Financial stability report
Financial crisis	A financial crisis is a situation in which the values of financial institutions or assets suddenly lose a large part of their nominal value.		
Number of shares held by management	Number of share hold by company directors.	Percentage	Annual report

Source from: Developed for the research

3.4 Conclusion

In conclusion, due to the limited cross-sectional units and time-series data, we are unable to perform cross-sectional or time-series analysis. Therefore, we applied panel method for the research. The research data is source from the company annual report, International Monetary Fund (IMF) and Bank Negara Malaysia (BNM). Total observation we applied in research is 97, which retrieve from 11 Malaysia's shadow bank and the period started from 2005 to 2015.

Methodology and assumptions for Pooled OLS, Fixed effect model and Random Poolability hypothesis test, Breusch-Pagan Langrange Multiplier test and Hausman hypothesis testing are also presented in this chapter.

CHAPTER 4 EMPIRICAL RESULTS

4.0 Data analysis

In chapter 4, we present the explanation on the result of this study and introduce the analysis of data for 11 shadow bank from 2005 to 2015 in Malaysia which total 97 observation. First part of this chapter is descriptive analysis on non-performing loan and the independent variables. Second part of this chapter will determine and choose the best method between Pooled OLS, FEM or REM through Poolability Hypothesis Test, Lagrange Multiplier Test and Hausman test. Then, the last part for this chapter is the empirical result and we will figure out the relationship between the non-performing loan and independent variables (deposit of securitize debt, collateral intermediation, shareholding by management, financial crisis, debt to equity ratio, household debt and housing loan to total loan ratio).

4.1 Descriptive Analysis

This descriptive statistical analysis was presented at this part in order to show the characteristic of the data. Furthermore, the objective of this section is to understand the distribution and characteristic of the data. Table 4.1 present the data of mean, median, maximum, minimum, standard deviation, skewness and kurtosis of the regression model.

Table 4.1: Descriptive Analysis for All Variables

Variables	*NPL*	*DSD*	*CI*	*DE*	*HH*	*HL*
Mean	0.1029	1296497906	5102928687	5.6374	694822	0.2655
Median	0.0622	889666000	387665000	5.0975	667800	0.0001
Mode	0.1205	-	80000000	7.2495	580600	-
Standard Deviation	0.1220	1360503293	10314932093	9.2601	215641	0.3549
Kurtosis	9.5568	3.1856	7.3497	33.0101	-1.2951	-0.2677
Skewness	2.8532	1.6571	2.7559	-3.8898	0.1359	1.0758
Range	0.6929	7110851500	47722117129	94.7212	670907	1.0000
Minimum	0.0050	1178500	652871	-63.6423	359693	0.0000
Maximum	0.6979	7112030000	47722770000	31.0788	1030600	1.0000

Note:
1) No. shadow bank = 11, year = 2005-2015, total observation = 97;
2) NPL= Non-performing loan, DSD = Deposit of securitization debt, CI = Collateral intermediation, DE = Debt to equity ratio, HH = Household debt, HL = Housing loan to total loan ratio.

Source from: Developed for the research

4.1.1 Non-Performing Loan

Based on 11 non-bank financial institutions in Malaysia for a period of 2005 till 2015, the mean value for non-performing loan ratio, which is the main determinant in gauging the risk of shadow banking sector, is approximately at 0.1029. The maximum value of non-performing loan ratio is recorded by MBSB in the year 2005 which is around 0.6979. In contrast, the minimum value is around 0.0050 which is almost fourteen times lower than the maximum value. The minimum amount is contributed by Sabah Credit in year 2015. By looking at the maximum and minimum value, we can see that there are huge differences in between the highest and lowest value of non-performing loans among the 11 banks in our research. The positive skewness indicates that the distribution is skewed to the right. The tails of distribution is considered heavy as it has a kurtosis value of more than 2. A kurtosis value of 2.853154062 indicates that its tails are thinner and shorter, and often the central peak of the distribution is lower and broader.

4.1.2 Deposits of Securitized Debt

Based on 11 non-bank financial institutions in Malaysia for a period of 2005 till 2015, the mean value for deposits of securitized debt, which consists of deposits and placements at other financial institutions and the amount due for guarantees, is approximately RM1,296,497,906. The maximum value of around RM7 billion is contributed by MBSB in year 2015, the company is showing a drastic increase in terms of securitized loans as it undertakes programs to strengthen its liquidity (MBSB Annual Report, 2014). In contrast, the minimum value is around RM1 million, almost 7,000 times lower than the maximum value. The amount is taken from Sabah Credit in year 2006. Here, we understand that shadow banking activities are not developed and utilized fully in the previous years. Due to huge differences among the values in these non-bank financial institutions as compared to the mean, the standard deviation

is tremendously high. The positive skewness indicates that the distribution is skewed to the right. The tails of distribution is considered heavy as it has a kurtosis value of more than 3.

4.1.3 Collateral Intermediation

The mean value for collateral intermediation which is formed by investment securities and derivatives financial instruments is RM5,102,928,687. There is a huge different between the maximum value of around RM47 billion from Lembaga Tabung Haji in 2015 and the minimum value of approximately RM652 thousand from Sabah Credit in 2006. This results in a high standard deviation, which indicates large data dispersions of the pane data series from the mean. The positive skewness indicates that the distribution is skewed to the right. The tails of distribution is extremely heavy as its kurtosis value is far more than 2.

4.1.4 Debt to Equity

The mean value of debt-to-equity ratio for the 11 non-banking financial institutions is 5.637426753. From the table above, we can understand that there is a big gap in between the maximum and minimum value of debt-to-equity ratio. The maximum value of the debt-to-equity ratio is 31.0788, recorded by MBSB in year 2010 whereas the minimum value is around -63.6423, and calculated by our team based on the figures in BSN's annual report in 2005. The big gap in between the maximum and minimum value of debt-to-equity ratio resulted in a high standard deviation, which shows that there is large data dispersions of the pane data series from the mean. The positive skewness indicates that the distribution is skewed to the right. The tails of distribution is extremely light as its kurtosis value is lesser than - 3.

4.1.5 Household Debt

According to the data get from financial stability report of 11 non-bank financial institutions in Malaysia for a period 2005 till 2015, the mean value for household debt is about RM694,821,732,000. The highest level of household debt has loan out by the non-financial institutions is RM670,907,000,000. On the other hand, the lowest household debt is RM359,693,000,000. The standard deviation for this variable is RM215,640,862,400 and the skewness for this group of data is 46500981528 means that the data are fairly symmetrical. The kurtosis of this dataset is 0.1359, it is considered to be a "light-tailed dataset.

4.1.6 Ratio of Housing Loan to Total Loan

The mean value for housing loan is 0.2654%. This is based on the average value of 11 non-bank financial institutions' amount of real estate against the total loan. For the maximum and minimum value of this variables is 100% and 0 %.Thus, the range of this variables is the highest as 100%. This group of data results in a standard deviation of 0.3549, which indicate not much dispersions from the mean value. The positive skewness indicates that the size of the right-handed tail is slightly larger than the left-handed tail. The tails of distribution is consider heavy as its kurtosis value is 1.0757 which higher than.

4.2 Model Selection

After performing the 3 tests, we can conclude that FEM is the best model out of the three. We summarized the 3 models as follows:

Table 4.2: Results of Panel Data Estimates

Dependent Variable: NPL				
Variable	*POLS*	*FEM*	*REM*	*FEM (White Cross Section)*
C	1.7675**	2.539***	2.4425***	2.5386***
	(0.5461)	(0.5029)	(0.4095)	(0.4534)
LOG(DSD)	-0.0050	-0.0224**	-0.0111	-0.0224**
	(0.0096)	(0.0086)	(0.0079)	(0.0099)
LOG(CI)	-0.0226***	0.0100	-0.0048	0.0100
	(0.0058)	(0.0139)	(0.0078)	(0.0123)
LDE	0.0284**	-0.0507**	-0.0224	-0.0507**
	(0.0129)	(0.0216)	(0.0156)	(0.0215)
LHH	-0.0807**	0.1878***	-0.1472***	-0.1878***
	(0.0403)	(0.0382)	(0.0322)	(0.0336)
HL	-0.2045***	0.3122***	-0.0050	0.3122***
	(0.0592)	(0.0976)	(0.0631)	(0.0845)
FC	-0.0221	-0.0448	-0.0286	-0.0448***
	(0.0446)	(0.0329)	(0.0323)	(0.0146)
SH	-1.4258*	12.9545	-0.8274	12.9545**
	(0.8088)	(14.0094)	(0.6545)	(6.4474)
(SH)^2	2.4217	-13.2427	1.4907	-13.2427*
	(1.7976)	(14.7262)	(1.3417)	(6.7118)
R-squared	0.2885	0.6754	0.2391	0.6754
Adjusted R-squared	0.2230	0.5995	0.1691	0.5995
F-statistic	4.4085	8.9009	3.4173	8.9009
Specification Test				
Poolability Hypothesis test		9.1791***		
Breush-Pagan Larange Multiplier test	11.2629***			
Hausman test			35.4581***	

Notes: 1) ***, ** and * referring to the rejection of null hypothesis at significance level 1%, 5% and 10% respectively;
2) Figures in parenthesis represent the standard error.

It is noteworthy to mention that White Cross-Sectional coefficient covariance was applied to the FEM model after the selection. As we mentioned earlier, the model assumes that normality of errors term ($\mu_{it} \sim N(0, \sigma^2)$) and the error term is a composition of cross-sectional and time-series data, therefore heteroscedasticity is worrisome here. The heteroscedasticity may affect the distribution of coefficients increasing the variances of the distributions and therefore making the estimators of OLS method inefficient. As a result, we may obtain higher t-statistic and F-statistic, making us tends to reject the null hypothesis.

The application of White Cross-Sectional coefficient covariance can solve the problem as it is robust to cross-section heteroscedasticity and correlation among cross section [$\text{Var}(\varepsilon_{it}) = \sigma_i^2$; $\text{Cov}(\varepsilon_{it}, \varepsilon_{jt}) = \sigma_{ij}$].

All the specification test rejected the null hypothesis testing at 1 % significance level. Therefore, the POLS and REM model are rejected for this study, suggesting FEM model is the best for the analysis.

4.3 Empirical Result

In this section, we will examine the effects of each explanatory variable to the default risk of shadow banks in Malaysia. All the analysis is performed by using E-view 9. The final model adopted is Fixed Effects Model (FEM). Besides, the model also examine whether there is a non-linear relationship between shareholding and NPL. White Cross-Sectional coefficient covariance was used to rectify the heteroscedasticity. Furthermore, the coefficient of the determinant (R^2) explain an estimation of the strength of the relation between the model and the explanatory variables as well as the F-test typically use to examine the relationship between regression model and independent variables is significant statistically or not.

According to table 4.2, the results show that R^2 is 0.6754 which means that 67.54% of total variation in non-performing loan is explained by variation of independent variables. Meanwhile, the probability value of F-test is found to be less than 0.01. In conclusion, there is enough evidence that the model is significant at 1% significance level.

4.3.1 Deposits of Securitized Debt

Based on the result from table 4.2, we found that there is a negative relationship between deposits of securitized debt and non-performing loan. Besides, the probability value of 0.0262 signals that deposits of securitized debt is significant at 5% significant level. Therefore, we reject the null hypothesis and state that there is a negative and significant relationship between the two variables. The coefficient of -0.02236 tells us that when the deposits of securitized debt increase 1%, on average, the non-performing loan will decrease by 0.02236, ceteris paribus.

According to our result, the deposit of securitized debt is the variables that had significant relationship with non-performing loan and it is negatively related. The result showing an increase in deposits of securitized debt reduces the non-performing loan is in line with the study done by Casu et. al. (2010) which showed that the increase in securitization will result in greater credit risk exposure which causes the banks to become risk averse and leads them to shift their portfolio to lower risk. A negative relationship between the variables is also shown in studies done by Jiangli and Pritsker (2008) and Cebenoyan and Strahan (2004). However, it depends on the quality of the assets, securitizing an asset of lower quality can increase the possibility of non-performing loan (Carey, 1998).

4.3.2 Collateral Intermediation

Based on the result from table 4.2, the probability value of 0.4173 indicated that collateral intermediation is not significant at 1% significant level. Hence, we do not reject the null hypothesis and state that there is no enough evidence to conclude the influence of collateral intermediation on NPL.

For collateral intermediation, it is the only variables that show an insignificant result in our research. However, the empirical result shows a positive relationship with the non-performing loan which is similar as our expectation. Based upon the study of Ghosh et al (2012) which suggests that collateral intermediation increases the procyclicality problem in the financial system. Therefore, when intermediation increases, non-performing loan will most probably increase. Moreover, the expansion of credit intermediation has led to rapid growth in balance sheet, a noticeable increase in leverage and causes difficulties in valuing financial products (Luttrell, Rosenblum & Thies, 2012).

4.3.3 Debt to Equity

Based on the result from table 4.2, we find that there is a negative relationship between debt-to-equity and non-performing loan. Besides, the probability value of 0.0209 indicated that debt-to-equity is significant at 5% significant level. Hence, we reject the null hypothesis and state that there is a negative and significant relationship between the two variables. The coefficient of -0.0507 implies that when the debt-to-equity ratio increases 1%, on average, the non-performing loan will decrease by 0.0507, ceteris paribus.

In addition, debt to equity ratio shows a negative relationship with non-performing loan, which is inconsistent with our expectation sign. But, the negative result can be justified by the research done by Ghosh (2005) as he proposed that leverage ratio is negatively associated to non-performing loan especially when the bank is highly leveraged because it influences the banks to decrease their credit supply. This is mainly due to a higher leverage increases the vulnerability of banks towards default risk as it adds more weaknesses and uncertainties to the operation of the banks, thereby banks choose to decrease credit supply and lower risk of default.

4.3.4 Household Debt

Based on the table 4.2, the empirical result shows that the relationship between household debt and non-performing loan is negatively related. Moreover, the probability value of the test statistic for household debt is 0 which lower than the significant level at 1%. Thereby, the null hypothesis is rejected and it indicate there is a strongly negative relationship between household debt and non-performing loan. In addition, the coefficient of household debt is -0.1878 which imply that when household debt increased 1 percent, the non-performing loan will declined by 0.1878, holding others variable constant.

Our finding is consistent with the research done by past researchers. Finocchiaro, Nilson, Nyberg and Soultanaeva (2011) suggest the negative sign of the household debt variables was due to the bank improvement on the implementing the advance technology in risk management and it lead to the larger bank may gain advantage on diversification by using derivative product or securitization. Also, we believe increasing in household debt implied a good economic outlook, therefore the NPL level of financial institution were managed to lower down.

In spite of the negative result we achieved, we should note that it does not indicate the increase of household debt is a cause of low NPL. Hunt (2015) warns that the growth of household indebtedness would rise up the sensitivity of household to financial shock as well as result in default.

4.3.5 Ratio of Housing Loan to Total Loan

According to table 4.2, the result from FEM present that there is a positive relationship between housing loan to total loan ratio and non-performing loan. Besides, the result shown that the probability value of test statistic for housing loan to total loan ratio to total loan ratio is 0.0004 which lower than the significant level at 0.01. Therefore, the null hypothesis had been rejected as well as the result present a significant relationship between housing loan to total loan ratio and non-performing loan. Furthermore, the coefficient of the housing loan to total loan ratio to total loan ratio is 0.3122 which indicates that when housing loan to total loan ratio to total loan ratio rise by 1 percentage point, the non-performing loan would increase by 0.3122, holding others variable constant.

Based on the Financial Stability and Payment System Report (2016), housing loan to total loan ratio consider as the major part of the household debt. From previous study (Wan, 2015), the researcher suggested that an asset bubble which causing by housing price increase sharply would result in default and eventually cause financial shock. In addition, housing loan to total loan ratio act as an important component which lead to housing bubble (Finocchiaro, Nilson, Nyberg & Soultanaeva, 2011). Furthermore, the study found that the nation which experiencing in rising in household debt and housing price enormously would have high probability involve in economic downturn (Glianck & Lansing, 2010).Thus, we can concluded the positive relationship between

the housing loan to total loan ratio to total loan ratio is consistent with these previous research.

4.3.6 Financial Crisis

Based on the result from table 4.2, we find that there is a negative relationship between financial crisis and non-performing loan. Moreover, the probability value of 0.0030 indicated that financial crisis is significant at 1% significant level. Hence, we reject the null hypothesis and state that there is a negative and significant relationship between the two variables. The coefficient of -0.0448 implies that, on average, the non-performing loan is lower during financial crisis by 0.0448 than other time, ceteris paribus. This can be explained by financial accelerator effect where it states that a change in aggregate economic activity causes changes in investment, spending and production over business cycle and then it reduce credit supply in the market and hence a lower non-performing loan is expected to be happened.

4.3.7 Shareholding by Management

Based on the result from table 4.2, we have enough evidence to prove that there is a non-linear relationship between shareholding by management and non-performing loan. The threshold level can be found by using the following method:

$$B_{sh}+B_{sh^2}(SH) = 0$$

For B_{sh}, it equals to 12.9544, and the value of $B_{B_{sh^2}}$ is -13.2427. Thus, the threshold level is can be computed by doing some simple algebra:

$$SH = \frac{B_{sh}}{B_{sh^2}}, \quad SH = \frac{12.9544}{13.2427}$$

$$= 0.9782$$

Eventually, we get result of threshold level which is at 0.9782 equivalents to 97.82%. Threshold level refers to an optimal point of the optimal when the shareholding by management increases. For instance, if the percentage of shares held by management is less than 97.82%, it signals a positive relationship between two variables. In contrary, if management held the company's share is more than 97.82%, it will become negatively related between two variables.

For shareholding by management, the result shows a significant non-linear relationship with non-performing loan. The positive or negative sign of the relationship in between shareholding and non-performing loan shows that an increase or decrease in management shareholding could reflect in a higher or lower non-performing loan in different level of shareholding by management. Based on the result, if the of level of shareholding by management lower than 97.82 %, increase in shareholding will result in higher NPL. Sullivan and Spong (2007) have concluded that the stock ownership of mangers for the banks is positively related with the bank risk, where they argue that bank managers could operate the banks for their own benefit under certain circumstances. Hu et al. (2004) also found an increasing of the shareholding will lead to the greater non-performing loan in private firm. As a result, the management become more aggressive operating strategy and leaded to a higher non-performing loan in the banks. However, when the percentage of stock held by management is greater than the threshold level (97.82%), it will become a negative relationship between two variables. Zakaria (2015) found that a higher concentration of ownership will bring more intervention from the owner or the management side. Therefore, the management could thus become more conservative when the shareholding by management is overwhelmed.

4.4 Conclusion

In this chapter , FEM had been chosen as the best model through three specification test (Poolability Hypothesis test, Breush-Pagan Lagrange Multiplier test and Hausman test). Due to our concern about the problem of heteroscedasticity, White Cross-Sectional coefficient covariance was applied to the FEM model for better analysis.

Based on the empirical result, we found that the relationship of all the independent variables is significant with the NPL ratio except for collateral intermediation. Apart from this, the result present that housing loan to total loan ratio to total loan ratio are positively related with non-performing loan. In contrast, deposit of securitization debt, financial crisis, debt to equity ratio and household debt are negatively related with non-performing loan.

CHAPTER 5 : DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

In chapter 5, it will present the overall picture of our research. This chapter will show the discussion of major finding from empirical result and the summarization of our study. Besides, there is policy implication and limitation based upon our research would include in this chapter as well. Apart from this, at the end of the chapter, there is certain recommendation for future study and conclusion are made based on the research.

5.1 Summary

The main objectives of our research are focusing on the factor that stimulates the default risk of 11 shadow bank in Malaysia from 2005 to 2015. In our research , there are numerous of data are produced and applied from 11 Malaysia's shadow bank and over the ten year period from 2005 to 2015 in order to determine the important variables that will affect the non-performing loan of shadow bank in Malaysia. Thereby, we can conclude that our research objective had attained since several essential element were proved as significance in affect the non-performing of Malaysia's Shadow bank. In this research, we concentrate on the non-performing loan of the shadow bank in Malaysia influenced by several variables which involves deposit of securitization debt, collateral intermediation, debt to equity ratio, financial crisis, housing loan to total loan ratio, household debt and the amount of shareholding by management.

5.2 Discussion of Major Findings

Based on our study, we found a negative relationship between financial crisis and shadow banking's non-performing loan. Henceforth, the answer for the research question is out of our expectation. Although it is common perception for people to believe that the happening of financial crisis always coupled with a rising amount of non-performing loans, but the result we obtained from our study was opposite with the usual norm. This can be explained by financial accelerator effect where it states that a lower non-performing loan is expected to take place when there is a drastic fall in economic activities such as investment, production and spending which turned out to be a lesser credit supply in the market. Therefore, it is interesting for us to see such result as it provides us another side of point of view in explaining the relationship between financial crisis and shadow bank's non-performing loan.

Next, we identified the existence of non-linear relationship between shareholding owned by management and shadow bank's non-performing loan. According to our result, the non-performing loan tends to increase in the same direction with shareholding owned by management until it meets certain threshold level at 97.82% and then the non-performing loan starts to fall down when the shareholding owned by management exceeded the threshold. The explanation for the first stage of the association between the shareholding owned by management and non-performing loan before the ownership concentration meets a certain threshold could refer to the research done by Zakaria (2015) where it states that a higher concentrated ownership tends to result in more intervention from the owner or management side.

Therefore, we can say that a higher shareholding from the management side could lead to the situation where the decision of the owner or the management is prioritized before the other shareholders. In a nutshell, higher shareholding in a particular

shadow bank could affect management action and then lead to a poorer risk management efficiency. Contrary, the negative relationship at the second stage when the ownership concentration exceeded the specified threshold level can be justified by the research done by Berle and Means (1993) where they opined that a higher concentration in ownership structure will result in enhanced banking performing by reducing bank riskiness as the management has more incentives to control and maintain the non-performing loan at a lower level. Besides, Aghion and Tirole (1997) has proposed that firm performance can be improved when there is a concentrated ownership in the firm due to the increase in supervision of daily operation and prevention of managerial takeovers.

We are also keen in determining the relationship between shadow bank's default risks and its leverage. Based on our empirical results, we found that there is a negative relationship between these two variables. Hence, we can say that lower non-performing loans are expected to occur when the debt-to-equity ratio of a firm is relatively high. The negative result is align with the research done by Ghosh (2005), he figured that a higher leverage increases the vulnerability of banks towards default risk as it adds more weaknesses and uncertainties to the operation of the banks. The negative relationship between them can be explained as the highly leveraged position of the bank influences the bank to decrease their credit supply. Therefore, the negative relationship in this case is consistent with our expectation sign where we estimated a negative relationship between them before we carried out our empirical test.

5.3. Policy Implication

Throughout our studies, it is believed that policy makers and practitioners will gain a different view on the factors which may affect the risk and vulnerability of shadow

banking sector in Malaysia. Therefore, the finding in our research might be applicable for policy makers and regulators, such as the Bank Negara Malaysia, Financial Stability Board and Shadow Bank regulatory board, in governing and supervising the lending activities in shadow banking sector.

Based on empirical results, that shareholding by management has significant positive impact on NPLs until management's shareholding reached 97.82%. Henceforth, we can say that the higher owner concentration could result in a higher non-performing loan. It implied that manager may perform some activities which are not align with the bank's benefit when he or she owns substantial amount of shares due to their influential power in corporate decision making (Demsetz, 1983). Due to the nature of Malaysia's shadow banks industry, where majority of DFI and ODFIs are establish with a specific mission to develop key economic sectors, most shadow banks are actually owned by the government, hence the shareholding by company directors are commonly low. In short, the agency problem would not be a main concern for Malaysia's shadow banking industry as increase in shareholding does not increase risk management efficiency. On the other hand, it is more advisable to incentives the managers based on other approach, instead of Employee Stock Ownership Plan (ESOP).

Apart from this, the debt-to-equity ratio is negatively related with non-performing loan based on our research. This can be explained by the study done by Ghosh (2005), where he believed that banking sector tends to decrease their lending activities especially when the bank is at the state where they are high leveraged. Therefore, non-performing loan decreases when the credit supply given out by bank is slowing down. Considered banks as a deposit collector, higher deposit from the public increase it debt-to-equity ratio, implied its high credibility and stability. However, we also concern about the rising interconnectedness between shadow bank and traditional bank when the leverage ratio of shadow banks is increasing staggeringly. An

overwhelmed leverage ratio in shadow bank could indicate a possibility of regulatory arbitrage, where traditional bank borrow its capital to shadow bank in order to gain higher profit. We encourage BNM to pay attention to OFIs with leverage ratio outside of the safety range. In depth, we advise them to pay specific attention to the source of debts of shadow bank.

Thirdly, housing loan to total loan ratio is positively significant with non-performing loan. According to our analysis, for every 1 percentage point increase in ratio of housing loan to total loan, on average, the NPL would increase by 0.3122, holding other variables constant. In a nutshell, it is obvious that growth in housing loan is the main threat for shadow banking system as the higher the housing loan to total loan ratio, the higher the non-performing loan. Therefore, policy makers are encouraged to take initiatives in deriving a more appropriate approach to impose stringent rules in order to control the approval of new housing loan, such as FICO credit scores to evaluate borrowers' creditability. The supervisory board should also not take their eyes away from the housing/ real estate market, as the surge in housing price may increase the speculative activities and causing threats to financial stability.

Lastly, the BNM and security commission is recommended to require more shadow banks to disclose its data, in order to better investigate and understand the issues.

5.4 Limitations of the Study

According to Kucukkcocaoglu and Altintas (2014), there are many problems in using non-performing loan ratios to measure the risk of shadow banking sector as it underestimated portfolio losses and ignored the issue of transferring non-performing

loans from bank's balance sheet to asset management companies. Therefore, using NPL as a proxy of default risk has its flaws.

Next, as shadow banks are commonly non-listed company, they are not subject to disclosure of data. Even though shadow banks has existed for a long period of time, their danger and importance is only be realized after 2008 financial crisis. Therefore, due to the scarcity of shadow banks' data, we are unable to study wider range of variables and its effects in longer period of time.

We should also note that our study has limitation to include all the shadow banks in Malaysia in our study. The development financial institution only represents a part of shadow bank. We are restricted from capturing special purpose vehicle (SPV) and off balance sheet vehicles hatched by shadow banks into our study. Not to mention that we are not able to include fintech firms in our sample datasets. The fintech firm is an emerging fraction of shadow bank industry in recent year, but its impact is yet to be fully understood.

Lastly, since we are using Fixed Effects Model (FEM), we are unable to capture time-invariant variables like regulations in our study. Time-invariant variables are variables that do not change over time, e.g. regulation and etc. This limits us from investigate further about other time-invariant variables that may affect the risk and vulnerability of shadow banking industry in Malaysia.

5.5 Recommendations for Future Research

Firstly, future study is recommended to conduct more in-depth analysis with an inclusion of moral hazards problem. The moral hazard problem is arisen due to the asymmetric information, where one party is trying to gain at the expenses of another party by hiding part of the truth. Throughout this research we can only find that number of share hold by Board of Director is significant in affecting the non-performing loan. Therefore, we will recommend future researchers to figure a better way for the measurement of moral hazard problems, especially between lenders and borrowers, to obtain a more precise result.

In addition, the growth of financial technology is adding to the growth of shadow banking sector. For example, one of the main fintech activities which is Peer to peer are getting more common nowadays as it is convenient enough to allow customer to obtain loan through an online platform. Hence, our opinion is that our sample data is not enough to reflect the shadow banking risk in Malaysia. We hope that future researcher will put more focus on this matter as fintech firms are emerging in the recent years and this is one of the areas they should look into.

Lastly, we also recommend the future researcher to tackle the NPLs problem. As NPLs has its flaws in representing default risk, we look forward to seeing different approach to better investigate the default risk of shadow banks. Meanwhile, we also hope that future researchers will consider a different methodology in order to estimate the influences of time-invariant variables that cannot be captured by FEM models.

5.6 Conclusion

The main objective of our research is to examine the variables that will affect the risk and vulnerability of shadow banking system in Malaysia among the eleven shadow banks in Malaysia from 2005 to 2015. Also, we have adopted Fixed Effect Models (FEM) in our research to run the hypothesis testing.

As a conclusion, our results shows that the deposits of securitized debts, debt-to-equity ratio, household debt and financial crisis are negatively related with non-performing loan whereas collateral intermediation, housing loan to total loan ratio are positively related to non-performing loan. Nevertheless, there is one exceptional case in our model where shareholding owned by management is actually having a non-linear relationship with the non-performing loan. Based on our empirical results, we can see that housing loan to total loan ratio and shareholding by management is considered as more influential variables among the others. In this case, the relationship between financial crisis and non-performing loan is supported by financial acceleration theory.

Looking back to our research objective, now we can conclude that we have successfully figured out that financial crisis and debt-to-equity are negatively associated to the non-performing loan whereas shareholding owned by management is non-linear to the non-performing loan. The non-performing loan will only decrease when the shareholding owned by management exceeded the specified threshold at the level of 97.82%.

The policy implication based on this research can be summarized into 4, which are incentives the managers based on other risk-adjusted indicators, pay specific attention

to the source of debts of shadow bank, impose stringent rules in credit approval and implement requirement for disclosure of shadow bank data.

Nevertheless, there are still some weaknesses in our research as the result could be affect by some limitation such as unavailability of complete data, exclusion of time-invariant variables and imperfect reflection of default risks.

Lastly, we have also suggested some recommendations for future studies like inclusion of moral hazard problem and time-invariant variables as well as consideration of fintech firms in shadow banking sector in further studies about this topic.

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APPENDICES

Appendix I : List of 11 Non-Bank Financial Intermediaries in Malaysia

1. Bank Kerjasama Rakyat Malaysia Berhad (Bank Rakyat)
2. Bank Simpanan National (BSN)
3. Bank Pembangunan Malaysia Berhad (Bank Pembangunan)
4. Export-Import Bank of Malaysia Berhad (EXIM Bank)
5. Small Medium Enterprise Development Bank Malaysia Berhad (SME Bank)
6. lumbago Tabung Haji (LTH)
7. Credit Guarantee Corporation Malaysia Berhad (CGC)
8. Sabah Development Bank Berhad (SDB)
9. Sabah Credit Corporation (SCC)
10. RCE Capital Group
11. Malaysia Building Society Berhad (MBSB)

Appendix II : E-views Outputs

Pool OLS model estimated output

Dependent Variable: NPL
Method: Panel Least Squares
Date: 07/19/17 Time: 14:17
Sample: 2005 2015
Periods included: 11
Cross-sections included: 11
Total panel (unbalanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.767504	0.546173	3.236161	0.0017
LOG(DSD)	-0.005002	0.009606	-0.520749	0.6039
LOG(CI)	-0.022567	0.005837	-3.866330	0.0002
LDEBT_EQUITY	0.028443	0.012929	2.199879	0.0305
LHH	-0.080735	0.040310	-2.002831	0.0483
HL	-0.204512	0.059191	-3.455100	0.0009
FC1	-0.022094	0.044616	-0.495199	0.6217
SHAREHOLDING	-1.425780	0.808843	-1.762739	0.0815
(SHAREHOLDING)^2	2.421704	1.797615	1.347176	0.1814

R-squared	0.288450	Mean dependent var	0.103175
Adjusted R-squared	0.223020	S.D. dependent var	0.122604
S.E. of regression	0.108071	Akaike info criterion	-1.523003
Sum squared resid	1.016096	Schwarz criterion	-1.282595
Log likelihood	82.10415	Hannan-Quinn criter.	-1.425826
F-statistic	4.408539	Durbin-Watson stat	0.290255
Prob(F-statistic)	0.000166		

Fixed Effect Model estimated output

Dependent Variable: NPL
Method: Panel Least Squares
Date: 07/19/17 Time: 14:19
Sample: 2005 2015
Periods included: 11
Cross-sections included: 11
Total panel (unbalanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.538581	0.502885	5.048037	0.0000
LOG(DSD)	-0.022363	0.008624	-2.593039	0.0114
LOG(CI)	0.009994	0.013930	0.717454	0.4753
LDEBT_EQUITY	-0.050698	0.021568	-2.350566	0.0213
LHH	-0.187780	0.038157	-4.921199	0.0000
HL	0.312243	0.097558	3.200592	0.0020
FC1	-0.044811	0.032971	-1.359112	0.1781
SHAREHOLDING	12.95446	14.00941	0.924697	0.3580
(SHAREHOLDING)^2	-13.24271	14.72624	-0.899260	0.3713

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.675401	Mean dependent var	0.103175
Adjusted R-squared	0.599521	S.D. dependent var	0.122604
S.E. of regression	0.077588	Akaike info criterion	-2.099526
Sum squared resid	0.463528	Schwarz criterion	-1.591998
Log likelihood	119.7772	Hannan-Quinn criter.	-1.894375
F-statistic	8.900888	Durbin-Watson stat	0.711883
Prob(F-statistic)	0.000000		

Random Effect Model estimated output

Dependent Variable: NPL
Method: Panel EGLS (Cross-section random effects)
Date: 07/19/17 Time: 14:20
Sample: 2005 2015
Periods included: 11
Cross-sections included: 11
Total panel (unbalanced) observations: 96
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.442544	0.409519	5.964429	0.0000
LOG(DSD)	-0.011129	0.007893	-1.409911	0.1621
LOG(CI)	-0.004834	0.007827	-0.617657	0.5384
LDEBT_EQUITY	-0.022444	0.015555	-1.442931	0.1526
LHH	-0.147241	0.032279	-4.561471	0.0000
HL	-0.004977	0.063142	-0.078824	0.9374
FC1	-0.028645	0.032258	-0.888017	0.3770
SHAREHOLDING	-0.827432	0.654501	-1.264218	0.2095
(SHAREHOLDING)^2	1.490739	1.341710	1.111074	0.2696

Effects Specification	S.D.	Rho
Cross-section random	0.054099	0.3271
Idiosyncratic random	0.077588	0.6729

Weighted Statistics			
R-squared	0.239099	Mean dependent var	0.044976
Adjusted R-squared	0.169131	S.D. dependent var	0.098217
S.E. of regression	0.089336	Sum squared resid	0.694344
F-statistic	3.417262	Durbin-Watson stat	0.359780
Prob(F-statistic)	0.001840		

Unweighted Statistics			
R-squared	0.065351	Mean dependent var	0.103175
Sum squared resid	1.334683	Durbin-Watson stat	0.187169

Fixed Effect Model (White Cross-Section) estimated output

Dependent Variable: NPL
Method: Panel Least Squares
Date: 07/19/17 Time: 14:22
Sample: 2005 2015
Periods included: 11
Cross-sections included: 11
Total panel (unbalanced) observations: 96
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.538581	0.453445	5.598437	0.0000
LOG(DSD)	-0.022363	0.009866	-2.266679	0.0262
LOG(CI)	0.009994	0.012256	0.815418	0.4173
LDEBT_EQUITY	-0.050698	0.021493	-2.358744	0.0209
LHH	-0.187780	0.033597	-5.589187	0.0000
HL	0.312243	0.084466	3.696660	0.0004
FC1	-0.044811	0.014606	-3.068036	0.0030
SHAREHOLDING	12.95446	6.447398	2.009254	0.0480
(SHAREHOLDING)^2	-13.24271	6.711834	-1.973039	0.0521

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.675401	Mean dependent var	0.103175
Adjusted R-squared	0.599521	S.D. dependent var	0.122604
S.E. of regression	0.077588	Akaike info criterion	-2.099526
Sum squared resid	0.463528	Schwarz criterion	-1.591998
Log likelihood	119.7772	Hannan-Quinn criter.	-1.894375
F-statistic	8.900888	Durbin-Watson stat	0.711883
Prob(F-statistic)	0.000000		

Poolability Hypothesis Test estimated output

Redundant Fixed Effects Tests
Equation: FINAL1
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	9.179100	(10,77)	0.0000
Cross-section Chi-square	75.346160	10	0.0000

Cross-section fixed effects test equation:
Dependent Variable: NPL
Method: Panel Least Squares
Date: 07/19/17 Time: 14:23
Sample: 2005 2015
Periods included: 11
Cross-sections included: 11
Total panel (unbalanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.767504	0.546173	3.236161	0.0017
LOG(DSD)	-0.005002	0.009606	-0.520749	0.6039
LOG(CI)	-0.022567	0.005837	-3.866330	0.0002
LDEBT_EQUITY	0.028443	0.012929	2.199879	0.0305
LHH	-0.080735	0.040310	-2.002831	0.0483
HL	-0.204512	0.059191	-3.455100	0.0009
FC1	-0.022094	0.044616	-0.495199	0.6217
SHAREHOLDING	-1.425780	0.808843	-1.762739	0.0815
(SHAREHOLDING)^2	2.421704	1.797615	1.347176	0.1814

R-squared	0.288450	Mean dependent var	0.103175
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S.E. of regression	0.108071	Akaike info criterion	-1.523003
Sum squared resid	1.016096	Schwarz criterion	-1.282595
Log likelihood	82.10415	Hannan-Quinn criter.	-1.425826
F-statistic	4.408539	Durbin-Watson stat	0.290255
Prob(F-statistic)	0.000166		

Breush-Pagan Larange Multiplier Test estimated output

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided
(all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	11.26292	3.909211	15.17213
	(0.0008)	(0.0480)	(0.0001)
Honda	3.356027	-1.977172	0.974998
	(0.0004)	--	(0.1648)
King-Wu	3.356027	-1.977172	0.918737
	(0.0004)	--	(0.1791)
Standardized Honda	6.099734	-1.609459	-1.644551
	(0.0000)	--	--
Standardized King-Wu	6.099734	-1.609459	-1.714315
	(0.0000)	--	--
Gourierioux, et al.*	--	--	11.26292
			(< 0.01)

*Mixed chi-square asymptotic critical values:

1%	7.289
5%	4.321
10%	2.952

Hausman Test estimated output

Correlated Random Effects - Hausman Test
Equation: FINAL1
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	35.458094	8	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
LOG(DSD)	-0.022363	-0.011129	0.000012	0.0012
LOG(CI)	0.009994	-0.004834	0.000133	0.1982
LDEBT_EQUITY	-0.050698	-0.022444	0.000223	0.0586
LHH	-0.187780	-0.147241	0.000414	0.0463
HL	0.312243	-0.004977	0.005531	0.0000
FC1	-0.044811	-0.028645	0.000047	0.0178
SHAREHOLDING	12.954462	-0.827432	195.835242	0.3247
(SHAREHOLDING)^2	-13.242710	1.490739	215.061855	0.3151

Cross-section random effects test equation:
Dependent Variable: NPL
Method: Panel Least Squares
Date: 07/19/17 Time: 14:35
Sample: 2005 2015
Periods included: 11
Cross-sections included: 11
Total panel (unbalanced) observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.538581	0.502885	5.048037	0.0000
LOG(DSD)	-0.022363	0.008624	-2.593039	0.0114
LOG(CI)	0.009994	0.013930	0.717454	0.4753
LDEBT_EQUITY	-0.050698	0.021568	-2.350566	0.0213
LHH	-0.187780	0.038157	-4.921199	0.0000
HL	0.312243	0.097558	3.200592	0.0020
FC1	-0.044811	0.032971	-1.359112	0.1781
SHAREHOLDING	12.95446	14.00941	0.924697	0.3580
(SHAREHOLDING)^2	-13.24271	14.72624	-0.899260	0.3713

Effects Specification

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S.E. of regression	0.077588	Akaike info criterion	-2.099526
Sum squared resid	0.463528	Schwarz criterion	-1.591998
Log likelihood	119.7772	Hannan-Quinn criter.	-1.894375

F-statistic	8.900888	Durbin-Watson stat	0.711883
Prob(F-statistic)	0.000000		