BANK NONINTEREST INCOME AND RISK: AN EMPIRICAL ANALYSIS OF COMMERCIAL BANK IN MALAYSIA

CHAN DE LONG

MASTER OF SCIENCE (BANKING)

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CHAN DE LONG

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ABSTRACT

The purpose of this study is to investigate the impact of noninterest income on Malaysian commercial banks risk for over the period 2005 to 2014. Previous studies document that noninterest income activities may influence bank risk as the earnings volatility increases when banks expand into noninterest income generating activities due to higher level of competition. Employing a sample of 27 commercial banks in Malaysia, the finding of this study suggests that banks' risk will increase when net noninterest income increase. This study also includes bank size and return on equity (ROE) as control variables to see their impact on bank risk. The results indicate that larger banks tend to have lower risk, while banks with higher ROE will also have lower risk.

ABSTRAK

Tujuan kajian ini adalah untuk mengkaji kesan pendapatan bukan faedah ke atas risiko bank perdagangan Malaysia bagi tempoh 2005 hingga 2014. Kajian terdahulu mendokumenkan bahawa aktiviti pendapatan bukan faedah boleh mempengaruhi risiko bank kerana kemeruapan pendapatan akan meningkat apabila bank-bank mengembangkan aktiviti penjanaan pendapatan kepada bukan faedah disebabkan oleh tahap persaingan yang lebih tinggi. Menggunakan sampel 27 bank perdagangan di Malaysia, dapatan kajian ini menunjukkan bahawa risiko bank akan meningkat jika pendapatan bukan faedah meningkat. Kajian ini juga memasukkan saiz bank dan pulangan ke atas ekuiti (ROE) sebagai pembolehubah kawalan untuk melihat kesannya terhadap risiko bank. Keputusan menunjukkan bahawa bank-bank besar lebih cenderung mempunyai risiko yang lebih rendah, manakala bank-bank yang mempunyai ROE yang lebih tinggi juga akan mempunyai risiko yang lebih rendah.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

In the aftermath of the financial deregulation and liberalization, banks have been diversifying into new and innovative products and services other than traditional lending activities in order to stay competitive in the banking industry. Commercial banks have explored into new markets and are widening their range of products to gain market share.

Generally, the main business of a commercial bank is traditional intermediation activities which is deposit-taking and making loans. However, banking business nowadays begins to focus on other type of income, which non-interest income. In the United States and Europe, an increase in the noninterest income activities has caused the net interest margin of banks has been gradually declining (Allen & Santomero, 2001). This is due to one strategy to increase banks profit margin is to diversify away from traditional interest income generating activities toward noninterest income generating activities.

Noninterest income generating activities are a combination of heterogeneous components that generate noninterest income. Noninterest income consists of three components:

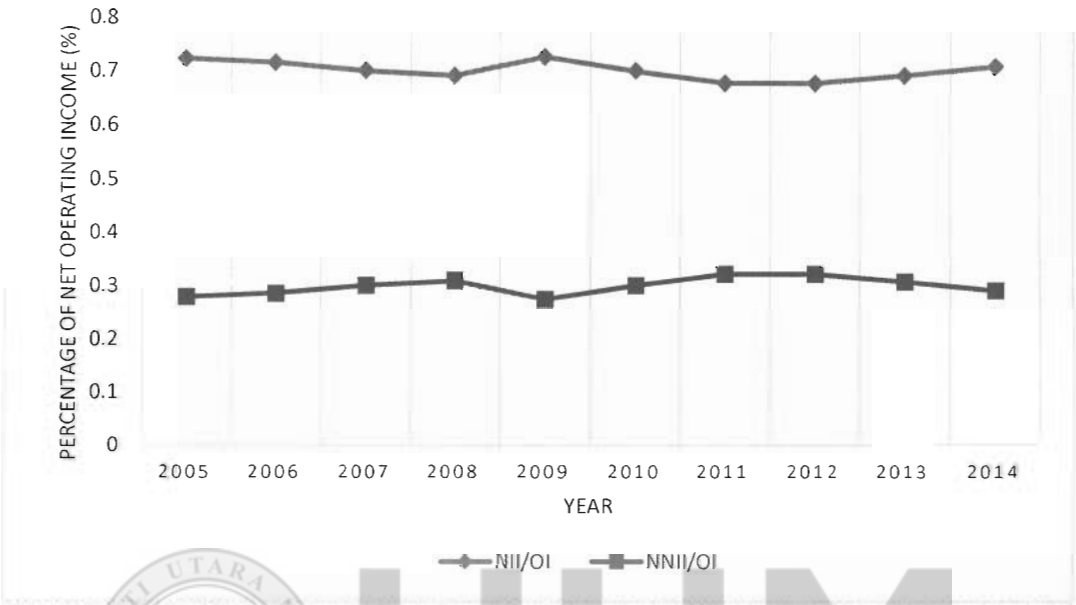
1) Fee and commission income comprises service charges and fees, underwriting fees, securitization, checking, brokerage income, letter of credit, cash management and others;

2) Trading income comprises the securities held for trading, held to maturity and available for sale and others; and

3) Other operating income comprises gain on foreign exchange, rental revenue, and others.

In the 1980s, European banks noninterest income has grown from 26% in 1989 to 41% in 1998 (ECB, 2000). In the United States commercial banks' noninterest income to total operating income had increased from 19% to 43% in 2001 (Stiroh, 2004). Similarly, in Malaysia total net noninterest income has grown since the mid-1990s. A total net noninterest income represented 23% to Malaysian commercial banks' operating income in 1998. This has increased to 32% to net operating income in 2012 (BNM, 2013). Although the total net noninterest income had increased over the year, but banks' total net interest income still contributes over 70 percent to bank net operating income in Malaysia. Figure 1 display trends of net interest income and net noninterest income to net operating income in Malaysia commercial banks from 2005 to 2014.

Figure 1:
Total Net Interest Income and Total Net Noninterest Income to Operating Income in Malaysian Commercial Banks.



Note: NII/OI: Net interest income to net operating income; NNII/OI: Net noninterest income to net operating income.

Sources: Bank Negara Malaysia's annual report from 2005 to 2014.

The trends show that, total net interest income has been reducing from 72.21% in 2005 to 70.92% in 2014. As for total net noninterest income, it rose from 27.80% in 2005 to 30.90% in 2008. However, it has a little fluctuation in 2009 where it declined to 27.41 percent due to the global financial crisis. Noninterest income especially in trading revenue shows that banks has loss on the trading investment (Hsu & Liao, 2010). After 2009, it has constantly increased to 29.07 percent in 2014.

Noninterest income might increase bank risk as the earning volatility is high. As suggested by DeYoung and Roland (2001), revenue from noninterest activities are likely to be not stable especially in fee-based activities because the information costs are low and the higher competition cause the customers always change from one bank to another. However, interest income is less volatile from period to period because borrowers and lenders will incur high switching[1] cost when they walk out from a lending relationship. Second, bank has to absorb the increase of fixed costs like additional human capital and technology need when expanding into noninterest income activities. The additional fixed costs increase banks' operating leverage[2]. The greater the operating leverage, the greater the bank risk.

However, noninterest income can also reduce bank risk in the following ways. First, noninterest income provides a more diversified income portfolio for a bank. This diversification could reduce bank risk because noninterest income will be less likely affect by the economic variables such as gross domestic product and interest rates (Feldman & Schmidt, 1999). Second, Froot and Stein, (1998) and Froot et al., (1993) document that diversification is a hedge against insolvency risk because bank not only depend on a single revenue stream but also in noninterest income.

[1] Switching cost includes all the expenses like redemption fees, legal costs, valuation fees, products fees, broker's fees and administration fee that are induced by the change of the lender.
[2] Operating leverage is a relationship between a bank fixed and variable costs. A bank with higher share of fixed costs and lower share of variable costs cause that a bank has to use more operating leverage.

1.1 Problem Statement

Focusing on noninterest income will increase the competitive edge of banks because banks can compete with broader range of market segment like market trading and investment banking. However, noninterest income activities may influence bank risk as the earnings volatility increases when they expand into noninterest income generating activities due to higher level of competition (Stiroh & Rumble, 2006; Mercieca et al., 2007). In this regard, Lepetit et.al. (2008a) and DeYoung and Roland (2001) question whether an increase in noninterest income activities may affect bank risk.

Existing literature focus on the developed countries like European and United States banks. The studies either focus on the effects of noninterest income on bank risk (Lepetit et al., 2008; Stiroh, 2004; Demsetz & Strahan, 1997), or on performance (DeYoung & P.Roland, 2001; Stiroh & Rumble, 2006). The studies by DeYoung and Roland (2001) and Stiroh (2004) document that bank will face higher risk when expanding into noninterest income, while Lee et al., (2014), Sanya and Wolfe (2011) and Esho et al., (2005) suggest noninterest income reduce bank risk.

However, there are limited studies examine the impact of noninterest income on bank risk in the context of emerging countries like Malaysia. Specifically, does the focus on noninterest income activities will influence bank risk in Malaysia?

1.2 Research Objective

The objective of conducting this study is to investigate the impact of noninterest income on bank risk in Malaysia.

1.3 Significance of the study

This study contributes to the existing literature in the following ways. Firstly, this is the first study that uses individual bank data from 2004 to 2005 for 27 Malaysian commercial banks to investigate the impact of noninterest income on bank risk. Secondly, most of the previous studies are focus on the relationship between noninterest income and performance but seldom focus on the relationship between noninterest income and bank risk. While the previous studies mainly work on developed countries like United States and European, present study examines the relationship between noninterest income and bank risk in an emerging country like Malaysia. Thirdly, the findings in this study show that the higher the reliance on noninterest income tend to increase the bank risk. The bank regulatory and shareholders should monitor bank do not over exposure to noninterest income to ensure bank earnings volatility is stable over the time.

1.4 Outline of the Research

The remaining structure of this study is as follows. Chapter 2 reviews existing literature. Chapter 3 details the data, sample and methodology. Chapter 4 reports the results of descriptive analysis, correlation matric, variation inflation factors and regression result. Chapter 5 concludes the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter discusses the existing literature to provide a better knowledge about the impact of noninterest income on bank risk.

2.1 Existing Literature

Previous studies on noninterest income focus on European and U.S banks. The studies either concentrate on the effects of non-interest activities on bank risk (Lepetit et al., 2008a; Stiroh, 2004; Demsetz & Strahan, 1997), or on performance (DeYoung & P.Roland, 2001; Stiroh & Rumble, 2006). Some of the studies highlight that the diversification of bank income structure with a combination of interest income and noninterest income activities allows for risk reduction and diversification of benefits. On the contrary, some findings find that income generate from noninterest activities tend to increase bank risk (Stiroh, 2004; Stiroh & Rumble, 2006).

Some of the empirical findings highlight the potential benefits to the bank that engage in a wider scope of activities. For instance, Lee et al. (2014) examine the potential of noninterest income influence on Asian banks risk and profitability over the period 1995 through 2009. They find that, noninterest income plays an important

role in reducing the bank risk and enhancing the bank profitability. Sanya and Wolfe (2011) conclude that, bank income diversification tend to decrease insolvency risk and increase profitability. Esho et al. (2005) investigate the cross-sectional relationship between Australian credit union's product mix, earnings, risk and pricing policy over the period 1993 through 2001. The finding suggests that, income diversification in Australian credit unions have reduced risk.

Similar to Esho et al. (2005), Gallo et al. (1996) suggest that, banks' mutual fund activities allow bank to enjoy diversification benefits which contribute to enhance the bank's profitability and reduce the risk over the period 1987 through 1994. Moreover, Kwast (1989) examines the potential gains from noninterest activity in bank securities held in the trading account over the period 1976 through 1985. The empirical results suggest that, there is slightly risk reduction from the trading activities. Besides, Brewer (1989) study the relationship between noninterest activity and bank holding company risk over the period 1978-1986, the study highlights there is a negative relationship between noninterest income and bank holding companies risk. There appears risk reduction via increasing noninterest income.

On the contrary, some findings suggest that there are no benefits from bank income diversification and diversification tend to increase bank risk. For instance, DeYoung and Roland (2001) indicate that earnings volatility increase with the portion of income generated by fee-based activities in U.S commercial banks. In addition, the study finds that the shifting from interest income into noninterest income come along with an increase in bank profitability and a deterioration in the risk-return trade off.

Another study by DeYoung and Rice (2004) obtain the same results, where noninterest income activities tend to increase bank risk.

Stiroh (2004) finds that U.S banks move toward in noninterest income activities over the period 1984 through 2001 are more dependent on noninterest income is correlated with higher risk. Stiroh and Rumble (2006), in their study of U.S financial holding companies (FHCs) from 1997 to 2002 discover the similar results where increase in noninterest income activities improve risk-adjusted performance.

Chiorazzo et al. (2008) investigate the link between profitability and noninterest revenue on Italian banks over the period 1993-2003. The result concludes that the relationship between risk-adjusted returns and income diversification is positive. This indicates that a rises in noninterest income will higher the bank risk.

Li and Zhang (2013) analyze the relationship between bank risk and noninterest income growth in the China commercial banks over the period 1986 to 2008. The study indicates that the China commercial banks has enjoyed diversification benefit in return with an increase in noninterest income activities but more dependence on noninterest income activities might increase the risk.

Williams and Prather (2010) explore the effect of bank risk on bank income portfolio between interest income and fee-based income for the Australia banks over the period 1987-2004. The results show that, expanding into fee-based income increase bank risk. Goddard et al. (2008) examine the impact of revenue diversification on bank

returns and risks over the period 1993 to 2004. The finding suggest that an increase share of noninterest income will increase the volatility of returns.

Pennathur et al. (2012) document that private sector banks involve in fee-based activities tend to increase risk as measure by the earning volatility. Kohler (2014) study how German banks' noninterest income affects bank risk over 2002-2012 and the findings conclude that an increase in bank risk is commonly associated with noninterest income activities such as fees and commission income. However, trading revenue come from noninterest activities has limited impact on bank risk.

Apart from this, there are some studies investigate the impact of bank revenue diversification based on bank characteristics such as size. Demsetz and Strahan (1997) investigate the effect of noninterest income on size and risk at U.S Bank Holding Companies (BHCs) for the period 1980 – 1993. The study suggests that large BHCs does not reflect the reductions in risk. The risk reduction at the large BHCs is offset by the greater loan portfolios especially in commercial loan and lower capital ratio. Mercieca et al. (2007) obtain the same result where there are no diversification benefits for the small European banks during 1997-2003. The study document that the reliance on noninterest income has negatively affected the financial stability of European banks.

Lepetit et al. (2008a) investigate how bank income structure diversification influence European banks risk from 1996 to 2002. The results show that the bank face higher risk and risk of insolvency when the rising in noninterest income activities especially in fees activities. In additional, Lepetit et al. (2008b) examine how European

bank income diversification has affected bank interest margin and loan pricing. The study documents that bank with higher level of commission and fee-based activities tend to increase bank risk. The findings are consistent with increase the previous studies by DeYoung and Roland (2001).

Overall, existing literatures on United States and European banks suggest that bank noninterest income tend to increase bank risk. Previous literatures mostly focus on the developed countries like U.S, European and Australia. Given the relatively limited evidence in the emerging county like Malaysia, this study can fill up the gap in the literature.

2.2 Summary

This chapter has discussed how bank income diversification influence on bank risk. The discussions highlight bank expansion into noninterest income such as fee and trading revenue tend to either increase or reduce on bank risk.

CHAPTER THREE

DATA AND METHODOLOGY

3.0 Introduction

This chapter discusses data and methodology used for this study. It contains five part. Part one explains the data collection method. Part two describes the sample of the study. Part three discusses the variables used in the study. Part five provides the methodology used in this study. Part six describes hypothesis of the study and last part provides a summary of the chapter.

3.1 Data Collection Method

This study utilizes unbalanced panel data for all of the Malaysian commercial banks. The data consists of 27 commercial banks operating in Malaysia where 8 are domestic banks while 19 are foreign banks (locally incorporated). The data used for this study are collected from the annual consolidated income statements and balance sheets of the bank for the period 2005 to 2014.

3.2 Sample

The sample consists of 27 commercial banks in Malaysia where 8 are domestic banks and 19 are foreign banks (locally incorporated) over the period 2005 to 2014. Appendix A on page 36 provides the list of commercial banks in Malaysia employed in this study.

3.3 Definition of variables

3.3.1 Dependent variable

Following Lepetit, et al. (2008a) and Goddard, et al. (2008), this study employs the standard deviation of return on assets (SDROA) as dependent variable. SDROA is used to test the level of bank risk, which is earnings volatility. It should also reflect the banks' earnings risk, not only the credit risk but also other types of bank risks.

3.3.2 Independent variables

An approach to measure the degree of diversification of bank income activities in Lepetit, et al. (2008) is to include the share of net interest income produced by traditional activities and the share of noninterest income generated by non-traditional activities.

First, net noninterest income to net operating income (NNIINOI) is included to capture the bank risk (DeYoung and Roland, 2001; Goddard, et al., 2008). Net

noninterest income is calculated by the difference between noninterest income and noninterest expenses; Net operating income is calculated by the total of net interest income and net noninterest income. A positive coefficient with the SDROA is expected because many noninterest based activities are likely to have less loyal customers due to the competitive rivalry is high and the information costs are low.

Next, noninterest income is split into two parts which are fee and commission income and trading revenue. Stiroh (2004) and Lepetit, et al. (2008a) suggest that this allow for more accurate insights to investigate the impact of bank noninterest income on bank risk. Hence, this study employs net fee and commission income to net operating income (NFCNOI) to capture the bank risk (Lepetit, et al., 2008). NFCNOI is calculated by the differences between fee and commission income and fee and commission expenses divided by net operating income. A negative coefficient with SDROA is expected because fee and commission income are less sensitive to economic downturn and the movements in interest. Therefore, increasing the share of fee and commission income in the bank noninterest income reduce bank risk.

Following Kwast (1989) and Kohler (2014), the net trading income to net operating income (NTINOI) is used to see its impact on bank risk. NTINOI is calculated by the differences between trading income and trading expenses divided by net operating income. A negative coefficient with SDROA is expected because in the finance theory, diversified in bank income structure should reduce bank risk and make net operating income to be more stable.

In addition, bank size is used as a control variable. Lepetit, et al. (2008a) and Kohler (2014) define bank size as the natural logarithm of total assets (LnTA). A negative coefficient with SDROA is expected because larger banks with higher share of net interest margin are found to reduce bank risk (Kohler, 2014).

Finally, following Lepetit, et al. (2008a), return on equity is used as another control variable to see its impact on bank risk. Return on equity is measured by net income divided by the total equity (ROE). A negative coefficient with SDROA is expected. Bank risk will reduce when the bank's provision on impaired losses is reduced resulting in increasing on bank earnings. A summarize of the variables used in this study will show on the table 1.

Table 1

Summary of the variables

Variable	Definition	Expected sign
SDROA	The standard deviation of return on assets.	N/A
NNIINOI	Net noninterest income divided by net operating income. Net noninterest is the differences between noninterest income and noninterest expenses. Net operating income calculated by the total of net interest income and net noninterest income.	+
NFCNOI	Net fee and commission income divided by net operating income. Net fee and commission income is the differences between fee and commission income and fee and commission expenses.	-
NTINOI	Net trading revenue scaled by net operating income. Net trading revenue is the differences between trading revenue and trading expenses.	-
LnTA	The natural logarithm of total assets	-
ROE	Net income divided by the total equity	-

3.4 Model

The model used in this study is modified from DeYoung and Roland (2001), Stiroh (2004), Esho, et al. (2005) and Lepetit, et al. (2008a). The model specification is as follow:

$$SDROA_{it} = \alpha + \beta_1 NNIINOI_{it} + \beta_2 NFCNOI_{it} + \beta_3 NTINOI_{it} + \beta_4 LnTA_{it} + \beta_5 ROE_{it} + \varepsilon_{it} \quad (1)$$

where $SDROA_{it}$ is the standard deviation on return on assets of bank $_i$ at year $_t$; $NNIINOI_{it}$ is the net noninterest income to net operating income of bank $_i$ at year $_t$; $NFCNOI_{it}$ is net fee and commission income to net operating income of bank $_i$ at year $_t$; $NTINOI_{it}$ is net trading income to net operating income of bank $_i$ at year $_t$; $LnTA_{it}$ is the natural logarithm of total assets of bank $_i$ at year $_t$; ROE_{it} is the return on equity of bank $_i$ at year $_t$ and ε_{it} is the error term.

Equation (1) above is estimated using an ordinary least squares regression analysis (OLS) to investigate the impact of bank income diversification on bank risk. OLS regression is an approach that is often used by the researchers and simple for econometrics. It also has several technical methods to remove errors (Udry, 1995).

3.5 Hypothesis

DeYoung and Roland (2001) and Lepetit, et al. (2008a) suggest that an increase in the noninterest income activities will increase bank risk. Therefore, hypothesis one is built as follows:

H1: Noninterest income has a positive relationship with bank risk.

3.6 Summary

This chapter has discussed the data set, sample selection, model and hypotheses of this study. The data has retrieved from the annual reports of each bank. The sample consists of 27 commercial banks in Malaysia. An ordinary least squares (OLS) is employed to test the hypotheses. The next chapter discuss the results and findings of the analysis.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter discusses the empirical results and the findings in this study. Section 4.1 reports descriptive analysis; Section 4.2 reports the correlation analysis; Section 4.3 notes the variance inflation factors; Section 4.4 discusses the results for OLS analysis; and Section 4.5 summarizes the chapter.

4.1 Descriptive Analysis

Table 2 presents the Malaysian commercial bank summary statistics for bank risk and the bank net noninterest income, and the controls variables.

Table 2

Descriptive statistics of variables used in this study

Variable	Observations	Mean	Std. Dev.	Min	Max
SDROA	188	0.0022	0.0025	1.00E-05	0.0127
NNIINOI	215	0.3553	0.1485	0.0420	0.9359
NFCNOI	215	0.1422	0.0648	0.0002	0.4601
NTINOI	215	0.1146	0.1807	-0.6876	1.5102
LnTA	215	7.3735	0.7156	5.5010	8.6557
ROE	215	0.1187	0.0735	-0.0415	0.3831

Variables definitions: NNIINOI: Net noninterest income to net operating income; NFCNOI: Net fee and commission income to net operating income; NTINOI: Net trading income to net operating income; LnTA: The natural logarithm of total assets; and ROE: Return on equity.

Based on the results, the mean of the risk measure standard deviation of return on assets (SDROA) is 0.22% implies a low bank risk, but it is slightly higher than the mean SDROA of 0.17% reported by Esho, et al. (2005) in their Australian credit union sample.

The mean of net noninterest income to operating income for the sample over 2005-2014 is 35.53%. A large portion of the revenue, on average are coming from the noninterest based activities. The revenue generated from fee and commission income is 14.22% of total operating income while trading income is 11.46% of total operating income. This suggests that the Malaysian commercial banks have actively diversified the revenue stream over the years. The results show the mean on return on equity (ROE) is 11.87% and the natural logarithm of total assets is 7.37.

4.2 Correlation Analysis

Table 3 presents the correlation matrix among the variables included in this study.

Table 3

Correlation Matrix

VARIABLE	NNIINOI	NFCNOI	NTINOI	LnTA	ROE
NNIINOI	1.0000				
NFCNOI	0.0226	1.0000			
NTINOI	0.4450	-0.3564	1.0000		
LOGTA	-0.1275	0.3242	-0.2027	1.0000	
ROE	-0.1493	0.2193	-0.1096	0.5986	1.0000

Variables definitions: NNIINOI: Net noninterest income to net operating income; NFCNOI: Net fee and commission income to net operating income; NTINOI: Net trading income to net operating income; LnTA: The natural logarithm of total assets; and ROE: Return on equity.

The correlation matrix in table 3 indicates that there is no multicollinearity problem in the analysis which the coefficient is higher than 80%. The result shows that the highest correlation is around 59% between LnTA and ROE.

4.3 Variance Inflation Factors (VIF)

Variance Inflation Factors are used to test multicollinearity. Table 4 presents the VIF statistics.

Table 4

Variance Inflation Factors

Variable	VIF	1/VIF
LnTA	1.62	0.618196
ROE	1.61	0.622435
NTINOI	1.40	0.713877
NNIINOI	1.31	0.765734
NFCNOI	1.24	0.80654
Mean VIF	1.43	

Variables definitions: LnTA: The natural logarithm of total assets; ROE: Return on equity; NTINOI: Net trading income to net operating income; NNIINOI: Net noninterest income to net operating income; and NFCNOI: Net fee and commission income to net operating income.

Table 4 shows that, all the independent variables used in this study obtain a VIF score lower than 5-10. Montgomery, et al. (2007) suggest that the regression coefficients are poorly estimated when the VIF score is more than 5-10. The mean of VIF is 1.43 indicating that collinearity does not show a problem.

4.4 Ordinary Least Squares Regression Analysis

Table 5 reports the results of OLS regression analysis on the impacts of the bank noninterest income and bank risk.

Table 5

Ordinary Least Squares Regression Analysis

	Dependent variable:	
	SDROA	
Independent variables:		
Constant		0.0075
(t-statistics)		(3.45)
NNIINOI		0.0038***
(t-statistics)		(2.83)
NFCNOI		-0.0006
(t-statistics)		(-0.19)
NTINOI		-0.0027**
(t-statistics)		(-2.35)
LnTA		-0.0007**
(t-statistics)		(-2.27)
ROE		-0.0082***
(t-statistics)		(-2.68)
Number of observation	=	188
F (5,182)	=	9.19
Prob > F	=	0
R-squared	=	0.2015
Adj R-squared	=	0.1796
Root MSE	=	0.00229

*Variables definitions: NNIINOI: Net noninterest income to net operating income; NFCNOI: Net fee and commission income to net operating income; NTINOI: Net trading income to net operating income; LnTA: The natural logarithm of total assets; and ROE: Return on equity. ***, ** and * represent significance level at 1%, 5% and 10% respectively.*

Based on table 5, the results indicate that NNIINOI positively and significantly influence the SDROA. This suggests that banks face higher risk when net noninterest income is on the rise where an increase in NNIINOI causes the SDROA to increase by 0.38%. The finding is similar to the studies by Stiroh (2004), DeYoung, et al. (2001), Lepetit, et al. (2008a) and Goddard, et al. (2008) where the higher noninterest income

comes with the higher bank risk. They conclude that the higher reliance on bank noninterest income is associated with higher in bank default risk because noninterest based activities are likely to have less loyal customers because of the competitive rivalry is high and the information costs are low.

The results in table 4.4 shows that NFCNOI is insignificant to the SDROA, meaning that there is lack of evidence to prove that NFCNOI is influence to bank risk in the sample studied. Next, the variable for NTINOI is significantly and negatively influence the SDROA. This implies that, the higher the trading income, the lower the bank risk would be where an increase in NTINOI causes the SDROA to reduce by 0.27%. The finding is similar to the studies by Kohler (2014) and Pennathur, et al. (2012).

LnTA used as a control variable, the results show LnTA is negatively and significantly to the SDROA. This implies that the larger the bank, the lower risk the bank risk where an increase in LnTA causes the SDROA reduce by 0.07%. The result is similar to the studies by Kohler (2014) and Lepetit, et al. (2008a) where they conclude that the larger the bank size with the higher net interest margin are found to be more stable.

Finally, ROE used as another control variable. The findings show that ROE is negative and significant to the SDROA. This suggests that bank with higher earnings will have lower risk where an increase in ROE causes the SDROA reduce by 0.82%. The result is similar to the studies by Lepetit, et al. (2008a) suggest that bank risk will

reduce when the bank's provision on impaired losses is reduced resulting in increasing on the return on equity.

4.5 Summary

This chapter has reported the results and the findings of the study. Section 4.1 discusses the descriptive analysis of all variables. The mean of the SDROA is 0.22% implies a default probability is very low, but it is slightly higher than the mean SDROA of 0.17% reported by Esho, et al. (2005) in their Australian credit union sample. Section 4.2 discusses the correlation matrix. The results do not show multicollinearity problem. The result shows that the highest correlation is around 59% between LnTA and ROE. Section 4.3 discusses VIF, the mean of VIF is 1.43 indicating that collinearity does not show a problem which below 5-10.

Finally, section 4.4 discusses the findings of this study. The results show that NNIINOI has a positive relationship with SDROA. The variables of NTINOI, LnTA and ROE has a negative relationship with bank risk. However, there is lack of evidence to prove that NFCNOI is influence to bank risk in the sample studied. Table 6 presents the results of hypothesis set for the study.

Table 6

Summary of hypothesis testing

	Objective	Hypothesis	Findings
1.	To investigate the impact of noninterest income on bank risk.	Noninterest income has a positive relationship with bank risk.	Supported

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.0 Introduction

This chapter includes of four sections. Section 5.1 presents the summary and the major findings of the study. Section 5.2 discusses the policy implication. Section 5.3 identifies limitation of the study and Section 5.4 concludes with recommendations for the future research.

5.1 Summary

This study examines the impact of income diversification in Malaysian commercial banks. Data was collected from 8 domestic and 19 foreign (incorporate locally) Malaysian commercial banks from 2005 to 2014. The main focus was to examine whether noninterest income activities of commercial banks affect bank risk. In general, the study finds that the greater reliance on noninterest income causes the greater bank risk in Malaysian commercial banks. The result is consistent with the studies by Stiroh (2004), DeYoung, et al. (2001), Lepetit, et al. (2008) and Goddard, et al. (2008) which they conclude that noninterest based activities are likely to have less loyal customers due to the competitive rivalry is high and the information costs are low. In contrast, the findings show that there is lack of evidence to prove that fee and commission income is influence to bank risk in the sample studied.

In addition, the findings suggest that, an increase in the trading revenue is associated with a lower bank risk. The findings are similar to the studies by Kohler (2014) and Pennathur, et al. (2012) where they conclude that diversified in bank income structure should reduce bank risk and make net operating income to be more stable. The findings also find that the larger the bank size had a lower bank risk due to the larger banks with higher share of net interest margin are found to reduce bank risk (Kohler, 2014).

Finally, the findings find that the higher on bank earnings of a commercial bank will have lower risk. The result is similar to the studies by Lepetit, et al. (2008) suggest that bank risk will reduce when the bank's provision on impaired losses is reduced resulting in increasing on bank earnings.

5.2 Contribution of the study

This study contributes to the bank regulators and investors in following ways. Firstly, the findings may assist banks regulators to set up policy in enhancing the disclosure and transparency of the components of bank noninterest income. This is because the subprime crisis that happened in 2008 was associated with securitization activities where fee and commission based income play a critical role. The enhanced disclosure and transparency of the bank revenue particularly in the aspect of noninterest income may reduce bank risk in Malaysia.

The findings also have implication for the investors. As the result shows that an additional risk is associated with noninterest income, the investors may require higher expected return to offset the risk in their portfolio.

5.3 Limitations of the study

First, the limitation is on the data collection phase. Sources of data has collected from each bank's annual report from the period 2005 to 2014, it is difficult to obtain a full data from every banks especially foreign banks, therefore the study used unbalanced panel data to run the analysis. A more comprehensive analysis can be conducted and better results can be obtained with a full data.

Secondly, the limitation is time constrain. This study was conducted in a semester period, approximately 5 months only, therefore the researcher do not have enough time to conduct this study. As a result, the scope of research only focus in Malaysia.

5.4 Recommendations for future research

There are two recommendations for future research. Firstly, the future research is recommended to use a larger sample to study how noninterest income influences bank risk. It would increase the number of observations that can deliver a more comprehensive and accurate results.

Secondly, there is another method can be use in future research. Sanya, et al. (2011) suggest that System Generalized Method of Moments estimators (System-GMM) can be used to investigate the impact of bank income diversification on bank risk. System-GMM can address econometric problems to solve endogeneity problem in estimation of panel models.

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