The Effects of Liquidity Risk and Interest-Rate Risk on Profitability and Firm Value among Banks in ASEAN-5 Countries

Olalere Oluwaseyi Ebenezer[1,*], Md. Aminul Islam[1], Wan Sallha Yusoff[1] and Shafiqur Rahman[2]

[1]*School of Business Innovation and Technopreneurship, Universiti Malaysia Perlis, Jalan Kangar-Alor Setar, Taman Pengkalan Jaya, 01000, Kangar, Perlis, Malaysia*

[2]*Central Queensland University, Australia*

Abstract: This study explores the issues relating to liquidity risk and interest-rate risk, recognizing that existing studies are mostly vague in emerging and developing markets. Panel data estimation technique is employed in the study based on data extracted from 63 commercial banks in *ASEAN-5* countries over the period 2009 to 2017 making up to 567 observations. The empirical results reveal that loan to deposit ratio have a positive significant effect on firm value while liquid asset ratio, interest rate risk (net interest margin and asset interest yield) have a negative significant effect on firm value for *ASEAN*. The loan to deposit ratio have a positive significant impact on return on asset, interest rate risk and banks size have a significant negative effect on return on asset for *ASEAN* banks while *GDP* and inflation have a positive significant effect on return on asset. Also, the liquidity risk have a negative significant effect on return on equity while the interest rate risk have a positive significant effect, bank size have a significant negative effect on return on equity while inflation rate have a positive significant impact on return on equity. Hence, this empirical study provides implications that emphasizes on the need for banks to adhere to prudential and regulatory guidelines and ensure corporate management with respect to liquidity exposure that is capable of critically affecting banks profitability and firm value. The dynamics of interest rate volatility in banks operating environment necessitates that financial institutions use sound risk management practices in order to obtain higher valuations, achieve better financial performance and experience diminished costs of financial distress that's useful for policy implementations in *ASEAN* economies and suggest that further study can explore the interaction between abnormal loan growth and non-performing loans with a robust econometrics model.

Keywords: Liquidity risk, interest-rate risk, profitability, firm value, *ASEAN*.

1. BACKGROUND

The risk and return trade-off is a well acknowledged nexus – suggesting that higher risk comes with higher returns. The ultimate test for effective management of inherent risk in banks is profitability and firm value maximization. The performance of financial institutions are greatly influenced by factors such as management policy and their exposures to risks burdens on the financial market they served. The failure of banks in the recent financial crisis almost a decade ago have negative impact on the real economy. Therefore, financial instability demands attention and the severe consequences on the economy has been empirically established (Agnello & Sousa, 2012). The numerous bank failures makes it imperative to protect depositors as financial institutions operates in an environment characterized by market imperfections (Dewatripont & Tirole, 1994). Meanwhile, economic theories show that different risks are intrinsically related to each other and are inseparable (Jarrow & Turnbull, 2000). For instance, the unexpected changes in the market value of firm's assets – generates market risk, affecting the probability of default and thus, generating credit risk. Conversely, if the probability of default unexpectedly changes - generating liquidity risk – this affects the market value of firm – generating market risk.

Contingency conditions dictates the unexpected liquidity needs of banks and the sudden inability to raise liquid funds is as a result of maturity mismatched in the timing of cash inflows and outflows. The off-balance sheet activities conducted through lending and funding business also give rise to liquidity risk as they do not only emerge from balance sheet business of banks. Globally, banks during and after the financial crisis of 2007-2008 experienced tremendous liquidity problem and several major drawbacks were reported in the period of bubble formation i.e. the pre-crisis (2004-2006), such as the assets and liabilities mismatch, derivative markets trading, the inability of banks to renew short-term obligation and the collapse of Bear Sterns, partially due to excessive leverage, severely caused liquidity problems for many financial institutions. Inappropriate management incentives, systemic risk neglection and unregulated financial innovations have led to a world crisis that has not finished yet. The study of Ali (2013) contends that the occurrence of financial crisis globally and afterwards in

*Address correspondence to this author at the School of Business Innovation and Technopreneurship, Universiti Malaysia Perlis, Jalan Kangar-Alor Setar, Taman Pengkalan Jaya, 01000, Kangar, Perlis, Malaysia; E-mail: oluwaseyi218@gmail.com

Asia reinforced that a contagion liquidity problem in one financial institution can affect other financial institutions around the world causing a detrimental systematic consequence.

Market risk on the other hand often arises as a result of the movements in markets variables such as interest rate, foreign exchange rate, equity and commodity risk leading to risk of losses in liquid portfolio. Market risk play a prominent role as it influences allocation of credits and mobilization of deposits. The level of interest rate intrinsically determines consumption level which consequentially affects economic growth due to the level of investment in a country. On one hand, interest rate is perceived by banks as either the price of deposits and cost of borrowing on the other hand. Among several competing demands, the major functions perform by banks involves rationalizing limited available financial resources (credit). The Basel Committee on Banking Supervision (2001) explicates that shareholders, managements and supervisors alike are usually concern about the economic value of banks that's sensitivity to fluctuation in interest rates. This is because market risk variation are a major threat to banks financial stability. Specifically, interest rate risk played an integral role in the historical banking crisis that occurred in the US during the 1990s labelled "Savings and Loan Crisis" with estimated total cost of $160billion during the crisis (Entrop, Memmel, Wilkens & Zeisler, 2008). Hence, a sound management of market risk practice is essential.

The existing literature offers little consensus regarding the effects of liquidity risk and interest-rate risk on profitability and firm value. The study is motivated on the grounds that interest rate risk is associated with the credit facilities which accounts for a lion share of bank's profitability. The empirical findings will help banks in emerging and developing economies to identify the effect of liquidity risk and interest rate risk and gear up bank management to monitor and control the risk in a timely and comprehensive manner. The significance of this study fills the gap in literature as prior studies have only focus on short-term performance measurement and cross-country studies focusing on long-term performance is only a subject of few studies. The remaining sections of this paper is organised as follows: section two focuses on literature review, section three discusses the methodology, section four presents the findings and the conclusion ends this research.

2. REVIEW OF RELATED LITERATURE

2.1. Liquidity Risk and Firm Performance

The classic functions of banks are based on liquidity because they offer an efficient institutional mechanism through which financial resources are mobilized and channel from less essential uses to more productive investments resulting in a significant contribution to the efficiency of the entire financial system (Wilner, 2000). Empirical literatures grounded on the nexus between liquidity risk, profitability and firm value is ambiguous especially in a comparative study context in emerging and developing economies. Numerous studies such as (Bourke, 1989; Kosmidou *et al.* 2005; Olagunju *et al.* 2012) explicated that liquidity risk positively affects the performance of banks. However, this notion was not supported by other studies who contend that a negative relationship exist between liquidity risk and bank performance under the misallocation of resources, indicating that banks monetary commitments have implications for liquidity (Molyneux and Thornton, 1992; Goddard *et al.* 2004). Hence, funds diversification ensure that bank avoid the vulnerability related to the concentration of funding and encourages investments for profit maximization.

Bank inability to meet all short term obligations defines what liquidity risk entails. Therefore, the performance of banks have significant influence on economic development, industrial expansion, growth of firm and corporate investment that demands a comprehensive insight into the banks in *ASEAN-5* countries. The *ASEAN* banks play an important role to support and foster the financial integration in this region, such as in mobilizing, allocating, and investing the savings of the society. The strong growth of *ASEAN* financial institutions are driven by the development of business fundamental and the increasing competitiveness of financial institutions in this region. Therefore, the *ASEAN* banking contributes a large part to the regional integration as it increases the corporation among *ASEAN* countries especially in the financial perspective. The recent banking integration and the history of banking reform provides a distinctive feature to the *ASEAN* banking market which allows this study to explores critical issues relating to liquidity and interest rate volatility of *ASEAN* banking institutions.

The study by Ly (2015) explored the nexus between liquidity risk and the performance of European banks. The study composed of sample from a panel of EU27

observed during 2001-2011. The empirical findings of this research asserts a negative relationship between liquidity risk and bank performance. The study by Cucinelli (2013) was investigated in European context which focus on liquidity risk and probability of default nexus. Based on OLS regression, the study employed a sample of 575 listed and non-listed banks and the findings suggest that no significant relationship exist between liquidity and probability of default in the long term. In addition, the study by Marozva (2015) analysed the association between liquidity risk and performance of bank while focusing on South African banks over the period 1998-2014. The bank performance is proxy by the net interest margin and findings revealed a significant negative relationship between liquidity risk and performance using the Autoregressive Distributed Lag (ARDL)-bound approach.

Furthermore, the study of Lartey Antwi and Boadi (2013) focus on seven listed banks during the period 2005 – 2010 and thus, analysed the nexus between liquidity and profitability in Ghana. The study found that there is a weak positive effect of liquidity on bank profitability. Investigating the main factors that affect the performance of banks in the G7 and the Switzerland, Mamatzakis and Bermpei (2014) use a sample of 97 banks and the panel data analysis results indicates that liquidity negatively influences performance. On the other hand, the study revealed that bank stability proxy by Z-score have a positive effect. A study of Iranian commercial banks over the period 2003 – 2010 by Tabari, Ahmadi and Emami (2013) explored the influence of liquidity risk on bank performance. The major findings suggest that credit risk and liquidity risk exerts a negative influence on the performance of Iranian commercial banks. Equally, the association between liquidity risk and Islamic banks performance of Malaysian banks was studies by Ariffin (2012) for the period 2006 to 2008. The findings of the study revealed an inverse relationship with ROA and ROE. Other studies such as (Bourke, 1989; Molyneux & Thornton, 1992; Kosmidou, Tanna & Pasiouras, 2005; Olagunju, David & Samuel, 2012; Ferrouhi, 2014) also investigates the effect of liquidity and Bank performance and found both positive and negative significant effect.

2.2. Interest Rate Risk and Firm Performance

The volatility of risk in the market affect the return of banks and the exposure of banks to market risk is determined by the volatility of underlying risk factors as the bank's portfolio is sensitive to the movements in this risk factors (Hendricks & Hirtle, 1997; Zahangir & Masukujj, 2011). According to Santomero (1997), market risk cannot be diversified away completely, but by its nature it can be hedged and thus, interest rates and the relative value of currencies are the two market risks that are of concern to the banking sector. The banks performance is solely affected as a result of its banking operations. Therefore, the majority of banks explicitly measure and manage the firm's vulnerability to interest rate variation as well as tracking their interest rate risk closely. Thus, market risk stands out despite the exposure of banks to wide array of financial risks, even so, it's the trigger for other form of financial risks which may affect banks financial performance.

Furthermore, the bank's interest income derive from assets and interest expenses on liabilities are major factors determined by the rate of interest. In fact, interest rates on assets and liabilities can be adjusted at different times, which expose banks to interest rate risk, or the contractual maturities of institutions assets and liabilities may differ across time, or inconsistency in the assets and liabilities dues to movements of interest rate benchmark, thus affecting the net interest income of banks (Aruwa & Musa, 2014). The economic structure of most banks in emerging and developing economies shifted to a new paradigm after the global financial crisis, attributable to repeated mismatch of assets and liabilities, making it very implausible for banks to hedge interest rate risk. The existing empirical studies offers little consensus regarding the effects of changes in interest rates on profitability and firm value. Banking institutions are exposed to re-pricing and yield curve risk if their interest rates are not fully flexible since banks sometimes borrow short-term and lend long-term. Consequently, the negative association between short-term interest rates and bank profitability has mostly been offered by the literature (Lloyd and Shick, 1977; Flannery, 1981; Flannery & James, 1984; Den Haan *et al.*, 2007; Kasman *et al.*, 2011).

Conversely, risk techniques are generally used by banks to protect their balance sheet against changes in interest rate. Hence, interest rate derivatives are used by banks to possibly hedge their exposure to interest rate risk exposure (Flannery, 1981; Gorton and Rosen, 1995; Purnanandam, 2007). The study by Memmel and Raupach (2010) explored the exposure of banks to interest rate risk in addition to their earnings from term transformation using a data set of German banks. Empirical findings from the study revealed that for the sample period 2005 to 2009, the systematic factor for

the exposure to interest rate risk rises and falls in synchronization with the shape of term structure. Similarly, the study of Patnaik and Shah (2004) assessed the influence of interest rate risk in the context of Indian banks. The empirical study found evidence of substantial exposure to interest rates and postulates that some banks seems to have a rather different exposure to interest rate risk because they might hold similar portfolios of government securities. Hence, the empirical results shows a striking feature as heterogeneity is seen across banks.

The evaluation of how an increase in interest rates affects the profitability of banks was investigated by (Peng, Lai, Leung & Shu, 2003). The study disintegrated the changes in Hong Kong dollar interest rates into movements in the US interest rate and the spread over the US rate. The empirical analysis was carried out on data for the period 1992 to 2002 and indicated that the in response to increase in the risk premium, there is a decline in net interest margin because the sensitivity of deposit rate to changes in the risk premium is more than that of the lending rate. Similarly, the findings of the study explicates that the domestic interest rate changes together with the US interest rate had little impact on the margin in the period under study. In a risk-performance framework, the Albanian banking system was appraised by (Kalluci, 2011). The quarterly time series data of risk index was used over the period 2001 to 2009, the high values of index was exhibited over the period under review, the banking system been well-capitalized and the high return on assets largely supported, in addition to by low return on assets (ROA) volatility. The study further reveal that in 2008, the increase in the cost of borrowed funds result in the fall in net interest margin and financing of earning assets through payment of liabilities.

Nofiyanti (2014) study on the effect of market risk on banking financial performance of listed banks in Indonesia, using a linear regression with a sample of 12 banks from 2010-2014; ROA was used as performance metrics and Interest margin as a proxy for market risk. The study found that market risk has a positive and significant influence on the financial performance of banks. Moreover, banks may change the size and composition of non-interest income/expense in response to movements in interest rates. On the other hand, prior empirical studies such as (Demirguc & Huizinga, 1999; Yousfi, 2012; Nofiyanti, 2014) found a positive relationship with interest rates and profits, particularly in emerging and developing market economies while studies such as (Ebrahim *et al.*, 2013; Aruwa & Musa, 2014) found a negative significant relationship between interest rate risk and profitability. However, the study of Albertazzi and Gambacorta (2009) concluded that short-term interest rates have no significant impact on income margins for a group of OECD countries. Therefore, the variety of studies conducted have given rise to wide gaps in extant studies as a result of limited researches on risk components (liquidity risk and interest-rate risk) on the long-term performance of banks. Previous studies conducted in are quite contradictory as a result of different outcome signalling inconsistency in relation to short-term performance measurement. Thus, the main objective of this study is to explore liquidity risk and interest-rate risk and its implication on profitability and firm value of banks.

2.3. Hypotheses Development

H1: Liquidity Risk significantly influences the profitability and value of firm

The first hypotheses in this study explicates how liquidity risk affects the profitability and firm value of commercial banks in emerging and developing economies. The study by Athanasoglou *et al.* (2006) posits that liquidity risk is a vital internal bank profitability determinant due to its ability to become a source of bank failures; and it occurs because of probable incapability of a bank to fund rises on the assets' side of the balance sheet or in accommodating reductions in liabilities. Banks profitability is often threatened when the liquidity needed to fund illiquid asset position cannot be obtained. Meanwhile, some studies found a positive significant influence of liquidity risk on financial performance of banks (Naceur & Kandil, 2008; Distinguin *et al.* 2012). And some found a negative impact of liquidity risk on bank performance (Marozva, 2015; Athanasoglou *et al.*, 2006; Arif & Anees, 2012). Hence, this study postulate a significant relationship between liquidity risk, profitability and firm value

H2: Interest rate significantly affects profitability and firm value

The study by Aruwa and Musa (2014) posits that a change in interest rate could lead to a mismatch between interest paid on deposits and interest received on loans. Investors are likely to experience losses due to factors that affect the overall performance of the financial markets caused due to interest rate risk. More broadly, the net interest margin of the banking sector

could be exposed to interest rate changes for a period if a large number of banks, presumably responding to the same or similar market signals, choose to take on similar exposures. Increase in interest rate does not discourage bank customers from borrowing, thereby increasing borrower's interest payments on loans. Therefore, some previous studies found that interest rate risk have a negative impact on financial performance of banks (Aruwa & Musa, 2014; Nofiyanti, 2014; Yousfi, 2012). Hence, the study postulate significant nexus between interest rate risk, profitability and firm value of banks.

3. METHODOLOGY

3.1. Data Sources and Definition of Variables

This study analyses panel data on 63 commercial banks in *ASEAN-5* countries, a study of emerging, developing and developed economies for the period 2009 – 2017. The chosen period is justify on the grounds that the aftermath of recent financial crisis is characterize by immerse financial market development and financial growth in the *ASEAN-5* countries. The panel comprises of ten Malaysian banks, three Singaporean banks, twenty-five Indonesian banks, fourteen Philippines banks and eleven banks from Thailand. Southeast Asia has the world's fastest growing economy since the Asian financial crisis in 1997-1998 in which *ASEAN* has been strengthening its financial institutions to protect itself from similar future threats and in doing so, it has built a strong foundation for growth. The dataset on the bank-specific risks variables and determinants includes loan and advance to deposit ratio, liquid asset to gross loan ratio, net interest margin, changes in interest rates, bank size are extracted from the financial statement of individual banks and Thomson Reuters. The macro-economic variables such as *GDP* growth rate and inflation are extracted from the World Bank Development Indicator. The macroeconomic variables were included in the model as prior studies affirms its direct or indirect non-linear relationships with the bank-specific variables. Tinoco-Zermeno *et al.* (2014) posits that the potentials of banks to generate higher profit and improve firm value is often affected by the dynamics of inflation rates

3.1.1. Firm Performance Variable

This study employ the enterprise value which is generally used in identifying undervalued firms and is a robust market value proxy (Lifland 2011), because it captures the actual and overall market value of firm as a whole business and it's an economic measure useful

for the valuation of firm (Bhullar & Bhatnagar 2013). Enterprise value put into consideration debt obligations, non-controlling minority interest and excess cash in valuing a firm. Thus, this study used a unique ratio of enterprise value-to-operating performance (EV/EBITDA) as a measure of firm value as justified in the study by (Bhullar & Bhatnagar 2013). Therefore, the enterprise value divided by Earnings before interest, taxes, depreciation and amortization (EV/EBITDA) represents the proxy for firm value. Enterprise value is measured as equity value + total debt– cash & cash equivalents + preferred stock + minority interest (Bhullar & Bhatnagar 2013; Boţoc, 2015).

According to previous studies that have used return on assets, ROA is measured as the net income for the year divided by total assets. It is typically the average value over the year (Yousfi, 2012). That is, the profit after tax divided by total assets. Prior studies that have use ROA as profitability variable includes (Alper & Anbar, 2011; Tafri *et al.*, 2009; Aruwa & Musa, 2014; Kolapo *et al.*, 2012). On the other hand, the return on equity (ROE) is measured by net income over total equity of banks. The return on equity assess the financial return of a shareholder's investment and indicates how well a firm uses shareholders fund to generate profit (Tafri *et al.*, 2011; Yousfi, 2012; Alper & Anbar, 2011; Saeed, 2013).

3.1.2. Risk Components Variables

The proxy for liquidity risk used in this study is the ratio of bank's total loan and advances to total deposits and liquid asset to total asset ratio which is also the proxy that is used by other studies (Spathis *et al.*, 2002; Al-Tamimi *et al.*, 2015; Said & Tumin, 2011; Aruwa & Musa, 2014; Marozva, 2015; Saeed, 2013). Thus, the bank liquidity risk decreases as the proportion of the liquid asset's increase (Said & Tumin, 2011; Tafri *et al.*, 2009). Hence, the expected relationship with financial performance is negative.

The proxy for interest rate risk used in this study is the net interest margin and the asset interest yield. The NIM is the net interest income divided average interest earning assets. Hence, the net interest margin measures the difference between the interest income generated by banks and the amount of interest paid out to their lenders, relative to the amount of interest earning assets (Dumicic & Ridzak, 2013; Khrawish, 2011; Ongore & Kusa, 2013; Hamadi & Awdeh, 2012; Tarus *et al.*, 2012; Kalluci, 2010). While the asset

interest yield is proxy by interest income to total asset ratio. This study expect a positive relationship between interest rate risk, profitability and firm value.

3.1.3. Control Variables

Usually, bank size is often measured by using natural log total assets and is used as a control variable in this study (Tafri *et al.,* 2009; Akhtar *et al.*, 2010; Athanasoglou, Brissimis, & Delis, 2008; Tafri *et al.*, 2011; How *et al.*, 2005). In most cases, bank size is generally used to capture potential economies or diseconomies of scale. In relation to financial performance, usually it is anticipated that the relationship between banks size and profitability is positive (Smirlock, 1985).

Favourable economic growth in any country spurs households' income and other businesses and the direction of economic progress is as a result of growth in GDP. The effect of economic environment on banks financial performance is usually controlled by employing the growth as the macroeconomic variable as used by (Tafri *et al.*, 2011; Dumicic & Ridzak, 2013; Sinha & Sharma, 2016). This is usually measured by the GDP growth, and it is expected to have a positive relationship with bank profitability and firm value

Furthermore, the inflation (consumer price index) is used in this study as a control variable. The study by Ćurak *et al.* (2013) explicates that low level of inflation rate and a stable price suggest a positive economic growth and possibly raises the profitability and firm value of banks. The expectation of this study is a negative nexus with bank profitability and firm value.

The method and estimation employed in this study is the panel data analysis and it's a special techniques which accounts for the time-series and cross-sectional dimension of the dataset. By implication, it gives more informative data with less variability but less collinearity among the variables and substantially reduce the problems that arise from omitted variables. Hence, panel data models are mostly estimated using either fixed effects or random effects models.

$$FV_{it} = \beta_0 + \beta_1 LD_{it} + \beta_2 LATA_{it} + \beta_3 NIM_{it} + \beta_4 AIY_{it} \\ + \beta_5 SIZE_{it} + \beta_6 GDP_{it} + \beta_7 INFL_{it} + \varepsilon_{i,t} \tag{1}$$

$$ROA_{it} = \beta_0 + \beta_1 LD_{it} + \beta_2 LATA_{it} + \beta_3 NIM_{it} + \beta_4 AIY_{it} \\ + \beta_5 SIZE_{it} + \beta_6 GDP_{it} + \beta_7 INFL_{it} + \varepsilon_{i,t} \tag{2}$$

$$ROE_{it} = \beta_0 + \beta_1 LD_{it} + \beta_2 LATA_{it} + \beta_3 NIM_{it} + \beta_4 AIY_{it} \\ + \beta_5 SIZE_{it} + \beta_6 GDP_{it} + \beta_7 INFL_{it} + \varepsilon_{i,t} \tag{3}$$

Where *FV* represents *firm value*, *ROA* represents *return on asset*, *ROE* represents return on equity, while the liquidity risk contains the *loan to deposit ratio and liquid asset to total asset* of bank, while interest-rate risk contains net interest margin and asset interest yield ratio, *i* at time *t*. Control-variables includes *bank size*, *GDP* growth and *inflation*.

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics

The Table **1** below summarize the descriptive statistics of the variables categorized into Asean-5 banks and the Nigerian commercial banks.

This table summarizes the mean and standard deviation of the dependent and independent variables used in the study for the Asean banks stood at 0.1020 (10%). The return on assets of Asean banks has a mean of 2% while the return on equity of Asean banks has a mean of 13% respectively. The loan to deposit ratio averagely stood at 95% for Asean banks, this implies that the loan expansion of Asean banks is more rapid and expansionary. However, the average liquid to total asset ratio for Asean banks stood at 9%. In addition, the average net interest margin of Asean banks stood at 18%, this implies most Asean banks averagely realizes high interest from lending activities. The average asset interest yield of Asean commercial banks is 7% while the average size of Asean banks is approximately $21 million respectively. The average GDP growth rate is 5% for Asean economies during the period of study. Finally, the average inflation rate is 3% in the Asean economy for the period of study.

4.2. Panel Unit Roots Test

In a sense, time series data are often assume to be non-stationary and the presence of non-stationary variables might result in spurious regression results. Therefore, the study conducted a panel unit roots test to check the stationary and/or the presence of unit root in the time series data in order to avoid spurious results. As shown in Table **2** below, the study use the ADF-Fisher with AIC criterion which assumes individual unit roots process and uses chi square test statistics. Therefore, the results indicated that majority of the variables are stationary and significant at 1st difference with intercept only.

4.3. Panel Data Analysis

This study employed the panel data analysis in its estimation which indicates a special techniques which

Table 1:   Summary of Descriptive Statistics

Variables	ASEAN BANKS		
	No.	Mean	SD
FV	567	.10204	.15336
ROA	567	.02068	.01615
ROE	567	.12628	.06887
LD	567	.95235	.27111
LATA	567	.09121	.07291
NIM	567	.17554	.09269
AIY	567	.06659	.04192
SIZE	567	.21524	.02882
GDP	567	.04945	.02165
INFL	567	.03237	.01992

NOTE: FV = Firm value. LD = Loan to deposit ratio. LATA = Liquid asset to total asset ratio. NIM = Net Interest Margin. AIY = Asset Interest Yield. SIZE = size of banks. GDP = growth of GDP. INFL = inflation.

Table 2:   ADF Unit Root Test based on AIC Selection Criteria

Var.	With Intercept only			With Intercept and Trend only		
	Level	1st Diff	I(d)	Level	1st Diff	I(d)
FV	255.337***		I(0)	211.887***		I(0)
ROA	166.426***		I(0)	189.576***		I(0)
ROE	142.805	336.505***	I(0)	220.552***		I(0)
LD	245.521***		I(0)	214.827***		I(0)
LATA	210.885***		I(0)	193.080***		I(0)
NIM	202.177***		I(0)	178.503***		I(0)
AIY	284.948***		I(0)	203.632***		I(0)
SIZE	260.149***		I(0)	131.191	189.695***	I(0)
GDP	487.143***		I(0)	392.357***		I(0)
INFL	189.628***		I(0)	382.692***		I(0)

Notes: t-stat = t-statistics. I(d) = integrated by the order of *d*. FV = Firm value. LD = Loan to deposit ratio. LATA = Liquid asset to total asset ratio. NIM = Net Interest Margin. AIY = Asset Interest Yield. SIZE = size of banks. GDP = growth of GDP. INFL = inflation.
The null hypotheses shows that the data are non-stationary, or contains a unit root.
***, **, * indicate significant at 1%, 5% and 10% level respectively.

accounts for the time-series and cross-sectional dimension of the dataset. Additionally, diagnostic test was also conducted before proceeding to testing panel regression models. The variance inflation factor results indicates the absence of multicollinearity in the models since the coefficient of VIF is less than 10 and the mean is less than 5 (Hair *et al*., 2006) and any autocorrelation and heteroskedasticity problem were treated accordingly.

The results shown in Table **3** below indicates that all the models are significant, implying that the choice of

fixed effect for all the models in this study is justifiable. The model 1 has a heteroskedasticity problem which was treated using the option *"robust"* while the model 2 and 3 both has an autocorrelation and heteroskedasticity problem and was treated using the Driscoll-Kraay standard error.

4.3.1. Empirical Result with Firm Value as the Dependent Variable

Table **3** explicates the coefficients estimates of the analysis for the Asean banks with firm value as the dependent variable.

Table 3: Hausman Model Specification Test

	Model 1	Model 2	Model 3
Firm Value (FV)			
Chi2 =	15.64	16.68	71.51
Prob>chi2 =	0.0286	0.0196	0.0000
Justification	**FEM**	**FEM**	**FEM**

Note: *signification at 1%, **, sig at 5%.
REM – Random effect model, FEM – Fixed effect model.

Table 4: Result with Firm Value as Dependent Variable

Variables	ASEAN BANKs Model 1	
	Coef.	*t-stats*
LD	.0477	2.62***
LATA	-.5580	-2.49**
NIM	-.0496	-4.54***
AIY	-1.2720	-3.43***
SIZE	-.5431	-1.48
GDP	.2802	1.56
INFL	-.3778	-1.15
_cons	-.7389	-1.29
R-sqd	0.1769	
Prob>F	0.0000	
Obs.	567	
Hausman	FEM	

Note: *** indicates significant at 1%, ** indicates significant at 5%, * indicates significant at 10%.

The empirical model 1 indicates that the liquidity risk variable (loan to deposit ratio) has a positive significant effect on the firm value at 1% significance level for the Asean banks. This implies that a 1% improvement in liquidity risk (loan to deposit ratio), the firm value will increase by approximately 5%, *ceteris paribus*. This suggest that an increase in loan to deposit ratio exposed banks to liquidity risk since they grant more credit as compare to receiving deposit. This often leads to an insufficient liquidity especially in a massive and unexpected withdrawal of depositors. Banks appear to be unable to respond integrally or partially to requests of withdrawal. This is consistent with the study by Du, Wu and Liang (2016) who found a significant positive relationship. On the contrary, the liquid asset to total asset has a negative significant effect on firm value at 5% significance level for the Asean commercial banks. This indicates that a decrease in liquid asset ratio by 1%, the firm value will improve approximately by 55%, *ceteris paribus*. The results suggests that banks hold liquid assets as an obligation to the requirements imposed by the authorities and holding money for these purposes may lead to low bank profitability as low returns are expected. This sometimes implies that current assets value is not enough to fulfil current obligations, from this point of view liquidity is the protection of the banks. When a bank has inadequate liquidity, it cannot obtain sufficient funds, either by increasing liabilities or by converting assets promptly, at a reasonable cost, thereby affecting profitability.

Conversely, the interest rate risk (net interest margin) has a negative significant effect on the value of firm at 1% significance level for the all the banks. This implies that a decrease in net interest margin by 1% will increase the firm value by approximately 5%, *ceteris paribus*. The implication is that increase in the cost of borrowed funds and earning assets financed by paying liabilities will negatively affects the firm value of banks. The imbalance in terms of size or maturity dates between assets and liabilities sensitive to interest rates leads to potential losses for the bank when interest rate increases or declines which influences the firm value of banks. Also, the asset interest yield has a negative significant impact on firm value at 1% significance level. This suggests that a reduction in the asset interest yield by 1% will improve the value of firm by 127%, *ceteris paribus*. This result implies that the banks income and the economic value of its assets and liabilities are exposed to interest rate risk as a result of the differences between the timing of interest rate changes, timing of cash flows and unexpected fluctuations of interest rate changes. Further results revealed that the bank size, *GDP* and the rate of inflation has no significant relationship with the value of firm for the Asean banks.

4.3.2. Empirical Result with ROA as the Dependent Variable

Table **4** explicates the coefficients estimates of the analysis for the aggregate data of all banks and the disaggregate data for the Asean banks with return on asset as the dependent variable.

The empirical model 2 indicates that the loan to deposit ratio has a positive and significant effect on return on asset for the Asean banks. This implies that a 1% improvement in loan to deposit ratio will increase the return on assets of Asean commercial banks by 0.5%, *ceteris paribus*. The result implies that significant improvement in liquidity management and excessive lending activities will increase the return on asset. The results is consistent with the study by Filip (2016) who

Table 5: Result with Return on Asset as Dependent Variable

Variables	ASEAN BANKs Model 2	
	Coef.	*t-stats*
LD	.0051	3.26***
LATA	-.0047	-0.93
NIM	.0067	5.90***
AIY	.2325	7.66***
SIZE	-.2417	-1.93*
GDP	.0163	1.98*
INFL	.0154	1.98*
_cons	.0644	2.08*
R-sqd	0.5460	
Prob>F	0.0000	
Obs.	567	
Hausman	FEM	

Note: *** indicates significant at 1%, ** indicates significant at 5%, * indicates significant at 10%.

found a positive relationship but contrary to the study by Saeed (2013), Yousfi (2014), Bekele (2015), Petria, Capraru and Ihnatov (2015) who found a negative relationship and Ariffin and Tafri (2014), Al-Tamimi, Miniaoui and Elkelish (2015), Haque and Wani (2015) who found no significant relationship. The liquid asset ratio is found to be negative and insignificant for the Asean commercial banks. However, the net interest margin has a positive and significant effect on the return on assets at 1% significance level for the Asean banks. This suggests that a 1% improvement in net interest margin will increase the return on assets by 0.6%, *ceteris paribus*. The plausible reason is that a rise in the interest rate often leads to higher interest payments for the variable rate loan which could possibly leads to increase in *NIM* and then increase the return on assets of banks. The result is contrary to the findings by (Aruwa & Musa, 2014; Ngalawa *et al.,* 2013) who found a negative significant relationship.

The asset interest yield of Asean banks has a positive significant influence on the return on asset at 1% significance level. This suggests that a 1% improvement in asset interest yield will increase in return on asset by approximately 23%, *ceteris paribus*. Furthermore, the bank size has a negative significant relationship with return on asset, suggesting that a decrease in bank size by 1%, the return on asset will improve by 24%, *ceteris paribus*. The result suggests that larger size of banks is associated with less

profitability for Asean commercial banks. This findings is in line with (Kosmidou, Tanna & Pasiouras, 2008) and contrary to the findings of (Goddard, Molyneux & Wilson, 2004; Tingbani, 2015; Kommunuri, Narayan, Wheaton, & Jandug, 2015). The GDP growth rate and inflation rate has a positive significant effect on return on asset of Asean commercial banks. This implies that a 1% improvement in *GDP* growth and inflation rate, the return on asset will increase by approximately 2% and 2% respectively, *ceteris paribus*.

4.3.3. Empirical Result with ROE as the Dependent Variable

Table **5** reports the coefficients estimates of the analysis for the Asean banks with return on equity as the dependent variable.

Table 6: Result with Return on Equity as Dependent Variable

	ASEAN BANKs Model 3	
	Coef.	*t-stats*
LD	-.0103	-3.63***
LATA	-.0084	-3.18***
NIM	.0767	10.54***
AIY	.0628	6.90***
SIZE	-2.7494	-5.68***
GDP	.0538	0.82
INFL	.0073	5.24***
_cons	1.0550	8.72***
R-sqd	0.5839	
Prob>F	0.0000	
Obs.	567	
Hausman	FEM	

Note: *** indicates significant at 1%, ** indicates significant at 5%, * indicates significant at 10%.

The empirical model 3 indicates that the loan to deposit ratio has a negative and significant effect on the return on equity of banks for the Asean banks. This implies that a decrease in loan to deposit ratio by 1% will improve the return on equity of Asean commercial banks by 1%, *ceteris paribus*. The result implies that significant improvement in liquidity management and steady decline in excessive lending activities will increase the return on equity. The results is consistent with the study by Saeed (2013), Yousfi (2014), Bekele (2015), Petria, Capraru and Ihnatov (2015) who found a negative relationship but contrary to the study by Filip (2016) who found a positive relationship. The liquid

asset ratio is found to have a negative and significant impact on return on equity for the Asean commercial banks, implying that a decrease in liquid asset ratio by 1% will improve the return on equity by 0.8%, *ceteris paribus*. However, the net interest margin has a positive and significant effect on the return on equity at 1% significance level for the Asean banks. This suggests that a 1% improvement in net interest margin will increase the return on equity by 7%, *ceteris paribus*. The probable reason is that an increase in interest rate might leads to higher interest payments for the variable rate loan which could possibly leads to increase in *NIM* and then increase the return on equity of banks. This result is consistent with the findings by Yousfi (2014) and contrary to the studies by (Aruwa & Musa, 2014; Ngalawa *et al.*, 2013) who found a negative significant relationship.

The asset interest yield of Asean banks has a positive significant influence on the return on equity at 1% significance level. This suggests that a 1% improvement in asset interest yield will increase in return on equity by approximately 6%, *ceteris paribus*. This suggest that a steady increase in the asset interest yield of Asean banks will possibly increase the return on equity. Furthermore, the bank size has a negative significant relationship with return on equity, suggesting that a decrease in bank size by 1%, the return on equity will improve by 274%, *ceteris paribus*. This empirical result suggests that larger size of banks is associated with less profitability for Asean commercial banks. This findings is in line with (Kosmidou, Tanna & Pasiouras, 2008) and contrary to the findings of (Goddard, Molyneux & Wilson, 2004; Tingbani, 2015; Kommunuri, Narayan, Wheaton, & Jandug, 2015). The *GDP* growth rate has a positive but insignificant effect on return on equity. However, the inflation rate has a positive significant effect on return on equity of Asean commercial banks at 1% significant level. This implies that a 1% improvement in inflation rate, the return on equity will increase by approximately 0.7%, *ceteris paribus*. This implies that a favourable economic environment for financial institutions will increase their profitability simultaneously.

4.4. Implications

The empirical findings of this study emphasizes on the need for banks to adhere to prudential and regulatory guidelines and ensure corporate management with respect to liquidity exposure that is capable of critically affecting banks profitability and firm value. It is imperative for the bank's management to be aware of its liquidity position in different buckets. This will help them in enhancing their investment portfolio and providing a competitive edge in the market. It is the utmost priority of bank's management to pay the required attention to the liquidity problems. These problems should be promptly addressed, and immediate remedial measures should be taken to avoid the consequences of illiquidity. Furthermore, the dynamics of interest rate volatility in banks operating environment necessitates that financial institutions use sound risk management practices in order to obtain higher valuations, achieve better financial performance and experience diminished costs of financial distress. The knowledge of the underlying factors explaining bank's interest rate exposure is particularly important for different economic agents. Good examples are bank managers, who want to adequately manage their interest rate risk; investors, concerned about the pricing of bank equities for hedging and asset allocation purposes; and bank regulators, primarily interested about the assessment of systemic interest rate risk and the stability and soundness of the banking system. Hence, this paper provides a new compilation and synthesis of recent theoretical and empirical research that addresses many of the limitations of prior research.

5. CONCLUSION

The rapid expansion in business opportunities, extensive competition among banks and technological advancement all creates a platform for widespread loan supply to borrowers and extensive and excessive lending activities. This research study examines the implication of liquidity risk and interest rate risk on profitability and firm value in the emerging, developing and advance banking sector. The method used in the study is a panel data estimation with time-series of 9-years covering 2009 to 2017 and cross-sections of 63 commercial banks from Malaysia, Singapore, Indonesia, Philippines, and Thailand. And to the best of the researcher's knowledge, this study is the first to assess the impact of liquidity risk and interest-rate risk, profitability and firm value as a comparative study on Asean economies commercial banks. The findings of this empirical study are valuable for managers, investors, analysts and scholars.

This research raises important issues on the role of liquidity risk and interest rate volatility and how it can possibly influence the profitability and firm value in the banking sector under the influence of other important macroeconomic indicators such as *GDP* growth and

the rate of inflation. Therefore, the empirical results for the Asean banks shows that loan to deposit ratio have a positive significant relationship with firm value while liquid asset ratio, net interest margin, asset interest yield all have a negative significant relationship with the firm value. The bank size, *GDP* and inflation is found to have no significant relationship with firm value for the Asean banks. This study also examined the influence of liquidity risk and interest-rate risk on bank profitability and the empirical result for the Asean banks explicates that loan to deposit ratio have a positive significant relationship with return on asset while the liquid asset ratio in the model have an insignificant effect on return on asset. The interest rate risk variables (net interest margin and asset interest yield) both have a positive significant effect on return on asset. However, the size of banks have a negative significant relationship with return on asset while the *GDP* and inflation have a positive significant relationship with *ROA*.

Furthermore, the empirical findings of this study for the Asean economies banks revealed that liquidity risk (loan to deposit ratio and liquid asset ratio) both have a negative significant effect on return on equity while interest rate risk (net interest margin and asset interest yield) both significantly impact on *ROE* positively. The bank size have a negative significant influence on ROE and inflation have a positive significant effect on return on equity. However, the *GDP* growth is found to be positive but insignificant for the Asean banks. The empirical findings of this study emphasizes on the need for banks to adhere to prudential and regulatory guidelines and ensure corporate management with respect to liquidity exposure that is capable of critically affecting banks profitability and firm value. Furthermore, the dynamics of interest rate volatility in banks operating environment necessitates that financial institutions use sound risk management practices in order to obtain higher valuations, achieve better financial performance and experience diminished costs of financial distress. Hence, this paper provides a new compilation and synthesis of recent theoretical and empirical research that addresses many of the limitations of prior research. Recommendation for future studies suggest that further research can explore the interactions between interest-rate risk and lending growth on profitability and the value of firm. Moreover, future study can also explore this dynamic relationship in the context of conventional and Islamic banks as a comparative study in order to give it wider research coverage.

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