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Liquidity Risk Management and Financial Performance of Conventional Commercial Banks in Malaysia

[1]Vikneswaran S/O Manual, [2]Chin Hui Shi, [3]Siti Zaleha Abdul Rashid, [4]Siti Zaleha Abdul Rashid

Abstract*--This study determines the relationship between liquidity risk indicators and financial performance of Malaysian conventional commercial banks with the eventual objective to advice policies to improve the management of liquidity risk in Malaysia banks. Malaysia banking sector definitely will gain valuable benefit from this study because liquidity risk management and bank performance are the significant determinant of the development, survival, sustainability, growth and performance of Malaysian banking system. The liquidity risk indicators used in this study include the cash reserves, customer deposit, liquidity gap, liquidity ratio and nonperforming loan; while the financial performance is determined by return on assets and return on equity as the dependent variables. The secondary data was retrieved from the published annual reports of eight (8) locally-owned conventional bank in Malaysia for the 10-year period from 2008 to 2017. Balanced panel fixed-effect regression models are applied to assess the influence of these five (5) liquidity risk indicators on financial performance of all local conventional banks in Malaysia. Estimates are performed using the Estimated Generalised Least Squares (EGLS) weight of cross-sectional seemingly unrelated regression (SUR). The results reveals that cash reserves, customer deposit, liquidity gap, and liquidity ratio have a significant negative impact on financial performance; and nonperforming loan has a significant and positive effect on Malaysian bank profitability. However, the study found that the correlation between customer deposit and return on asset are insignificant. Furthermore, it also found that the cash reserve does not have any significant impact on the return on equity. The study discovered that the least influential factor is cash reserves, indicating that cash reserve had the least impact on banks' earnings for Malaysian conventional banks. Conversely, liquidity ratio and liquidity gap are the most influential liquidity risk factors towards return on asset and return on equity, respectively.*

Keywords*--Liquidity Risks, Financial Performance, Malaysia, Cash Reserves, Customer Deposits, Liquidity Gap, Liquidity Ratio, Nonperforming Loans, Return on Assets, and Return on Equity.*

I. INTRODUCTION

Banking is an important system ensuring the financial stability and economic development. Their main role is financial intermediation and creating liquidity for the economy. According to Macey (2011), bank primarily engaged in maturity transformation where they are actually financing its long-term assets (loan) with short-term liabilities (deposits). However, this role can expose them to liquidity risk, where bank unable to meet

[1]*University Technology Malaysia, Kuala Lumpur, Azman Hashim International Business School, Asia Pacific University vikneswaran. manual@apu.edu.my*
[2]*School of Accounting, Finance and Quantitative Studies, Asia Pacific University,Malaysia,Huishi0210@hotmail.com*
[3]*University Technology Malaysia, Kuala Lumpur, International Business School*
[4]*University Technology Malaysia, Kuala Lumpur, International Business School*
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its obligation and cause banks to prompt sale of assets which influencing on their financial performance. According to Bank for International Settlements (2008), liquidity is the bank's capability to finance its increment in assets and meet commitments as they come due, without incurring unacceptable losses. Maaka (2013) also expressed that the incapability of banks to raise liquidity is caused by the maturity mismatch between inflows and outflows as well as the unpredicted liquidity needs emerging from contingency conditions. Bank generally granting long term loan that will be sold quickly and receiving short term deposits that allow depositor to withdraw any time. Such a liquidity mismatch, in which their liabilities are more liquid than its assets, can cause subsequent trouble when the depositors attempt to withdraw fund all at once. Jenkinson (2008) stated that liquidity risk not only influences the bank performance but also its standing, because bank may lose the confidence in depositors if funds are not provide to them on time. Additionally, poor liquidity position may cause penalties from the regulators. Subsequent studies (Khan and Syed, 2013; Plochan, 2007; Muranaga and Ohsawa, 2002) also discussed that bank may face serious consequences if this risk is not appropriately managed. Therefore, it is crucial to study the liquidity risk determinant and its impact on bank performance.

1.1 Background of The Study

In Malaysia context, banking system is the principal part as it accounted for nearly 70 percent of the total assets of the financial system. Malaysia banking sector is regulated and supervised by the central bank, Bank Negara Malaysia (BNM). As of May 2019, Malaysian banking system comprised of total 26 commercial conventional banks, 16 commercial Islamic banks, two international Islamic banks, 11 investment banks, and two other financial institutions. They are licensed and regulated pursuant to the provisions of the Banking Act and the regulations and prudential guidelines issued by Bank Negara Malaysia. In the past research, Global Financial Crisis 2007 has raised the fundamental issue about liquidity risk management for banks. It was found that banks with poor liquidity management and high dependent on short-term financing will highly affect them to failure. Lehman Brothers and Northern Rock provide a notable example of commercial banks that collapsed due to liquidity risk. This crisis has caused Malaysia Financial system entered into Asian Financial Crisis, resulting major banks of Malaysia in illiquid position.

In 2015, Bank Negara Malaysia had established the Liquidity Coverage Ratio (LCR) Framework to replace the Liquidity Framework in 1998 (Bank Negara Malaysia, 2016). This framework provides the bank with much better means of assessing on their present and future liquidity position. According to data from Bank Negara Malaysia (2018), the LCR for all Malaysian banks including commercial bank, Islamic bank and investment bank has increased over the four years and was stood at high level and well above the minimum transitional requirement set by BNM (refers to Table 1). However, the rising LCR do not imply that Malaysia banks has good liquidity management because Lee, Lim, Tan, and Teoh (2013) stated that high liquidity level might constrain banks from high return investment activities and lending activities. This has brought up the need of the research to analyse the impact of liquidity management on the financial performance. Malaysia banking sector will gain valuable benefit from this study because liquidity risk management and bank performance are the significant determinant of the development and survival of Malaysian banking system.

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Table 1: Liquidity Coverage Ratio in Malaysia Banks

LCR Framework takes effect on	1 June 2015	1 Jan 2016	1 Jan 2017	1 Jan 2018	1 Jan 2019 & thereafter
Minimum LCR	60%	70%	80%	90%	100%
Commercial Banks	131%	125%	141%	136%	-
Islamic Banks	110%	125%	130%	155%	-
Investment Banks	114%	117%	136%	143%	-

Source: Bank Negara Malaysia – Monthly Highlights and Statistics 2018 (1.28a)

Note: LCR from 2015-2017 is ended at December, while LCR for 2018 is ended at March.

1.2 Research Objectives

The objective of this research is to identify the liquidity risk factors. Besides, it also aims to demonstrate the impact of liquidity risk on financial performance of eight (8) conventional commercial banks in Malaysia from 2008 to 2017. The specific objectives are as follow:

(i) To identify the influence of cash reserves on financial performance

(ii) To explore the influence of customer deposit on financial performance

(iii) To investigate the influence of liquidity gap on financial performance

(iv) To determine the influence of liquidity ratio on financial performance

(v) To examine the influence of nonperforming loan on financial performance

1.3 Research Framework

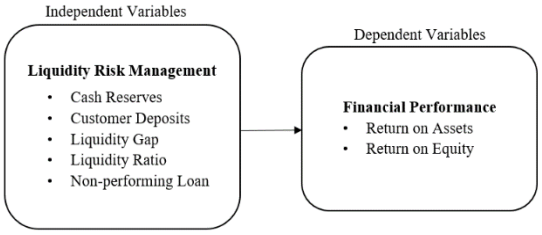

Figure 1: Conceptual Framework

II. LITERATURE REVIEW

Subsequent literature found that liquidity risk will cause serious consequence to banks following the crisis, especially on their financial performance. A study by Farooq, Maqbool, Humanyun, Nawaz, and Abbas (2015) investigated that liquidity risk management has positive impact on the performance of Pakistani banks. Besides, Edem (2017) found that liquidity risk management and financial performance in deposit money banks are positively related. Several recent studies such as Kibachia (2017), Musiega et al. (2017), Musembi et al. (2016), Salim and Bilal (2016), Osoro and Muturi (2015), Agbada and Osuji (2013); Khan and Syed (2013); Arif and NaumanAnees (2012), also revealed that there is direct correlation between liquidity risk management and financial performance in bank. However, another research done by Hakimi and Zaghdoudi (2017) revealed that Tunisian banks' financial performance and liquidity risk have negative associations. According to Adebayo, David and Samuel (2011), they concluded that bank are expected to maintain optimal liquidity level to meet

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financial obligations to depositors and maximise profit for shareholders. Therefore, bank should not compromise efficient liquidity management and thereby they concluded liquidity risk and profitability are negatively related. Another study undertaken by Shen et al. (2009) examined that liquidity risk is inversely related to bank performance in bank-based financial system because banking system are heavily relied on bank finance. However, liquidity risk is positively related to bank performance in market-based because it depends highly on stock market finance and securities markets. Hakim and Neamie (2001) determined the relationship between financial risk and bank performance of Egypt and Lebanon bank. The study found that liquidity risk is insignificant and has no impact in bank profitability. All of these previous investigations of influential liquidity management on financial performance in bank can be summarised in the following table. These recent findings show the influence of liquidity risk management on financial performance cannot be regarded as conclusive.

Table 2: Relationship between liquidity risk and bank performance.

Estimated Result	Research Study
Positive relationship	Edem (2017); Kibachia (2017); Musiega, Olweny, Mukanzi, and Mutua (2017), Musembi, Ali, and Kingi (2016); Salim and Bilal (2016); Farooq, Maqbool, Humanyun, Nawaz, and Abbas (2015); Osoro and Muturi (2015); Agbada and Osuji (2013); Khan and Syed (2013); Arif and NaumanAnees (2012)
Negative relationship	Hakimi and Zaghdoudi (2017), Shen, Chen, Kao, Yeh (2009)
Insignificant Relationship	Shen, Chen, Kao, Yeh (2009), Hakim and Neamie (2001)

Source: own construction

Jenkinson (2008) stated that liquidity risk not only affects the bank's performance but also its reputation. This is reflected by the fact that a bank may lose the confidence of its depositors if funds are not provided to them on time, resulted to the banks' reputation may become at stake in this situation. In addition to this, poor liquidity positions may cause penalties from the regulators. Subsequent studies also concluded that bank may face serious consequences if this risk is not properly managed. Khan and Syed (2013) also stated that liquidity risk can harm both bank's incomes and the assets. Therefore, it turns out to be the main focus of bank management and administration for ensuring there is adequate funds in banks to meet the upcoming demands of their customers. In response to this risk, banks maintain liquidity risk management to ensure they are enough funds to settle the financial obligation in time. Edem (2017) states liquidity planning is an important framework of bank risk management, it involves acquiring sufficient liquid assets in bank to meet the financial obligations to depositors and other stakeholders. To manage more effective and efficient liquidity risk management, it is important to identify the potential liquidity risk that arises in the bank.

2.1 Cash Reserves

Cash reserves is the minimum required fund that need to preserve in bank to meet the short-term obligations. In other words, it is the currency deposit that is not lending out to the bank customers. Various studies have been done to examine the relationship between cash reserves and bank performance.Edem (2017) examined the impact of liquidity management on the performance of deposit money banks in Nigeria for period 1986-2011. He used cash reserves as one of the liquidity measures to assess the liquidity risk. The results

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showed that cash reserves and performance of Nigerian deposit money banks are positively related. This finding also similar with empirical studies by Ogamda, Mogwambo, Otieno (20180, Khan and Syed (2013), Arif and Anees (2012), which these researchers found a positive correlation between cash reserve and financial performance of banks. The positive correlation is due to the fact that adequate cash reserves can help banks to mitigate liquidity risk by preventing them from fire sale risks and decrease the banks' reliance on the repo market that reduced the cost of overnight borrowing. However, they did not consider the opportunity cost of holding these reserves rather than investing the funds in earning investments. Ogamda, Mogwambo, Otieno (2018), Ndoka, Islami and Shima (2017), Abid and Lodhi (2015), Mwangi (2014), Rao and Somaiya (2006) found that bank profitability will decrease when there is an increase in bank reserves level. This negative correlation can be explained by the high cost for banks in preserving these cash reserves. Besides, banks may lose the market opportunities as the cash reserves decrease the liberation of cash assets. This clearly showed that maintaining more cash reserves may causes the net income of bank decrease as it increases bank expenditure and reduce the opportunity of bank generating income. Hence, this study expects that:

H_1A: Cash reserve has a negative significant relationship with bank profitability

2.2 Customer Deposits

Another liquidity risk determinants that influence bank performance is customer deposit. Deposit constitutes the cheapest source of funds available to commercial banks. There are few literature conducted on impact of customer deposit on financial performance of bank. Bologna (2011) examined the role of different banks' liquidity funding structures in explaining the banks' failures, which occurred in the United States during 2007 to 2009. He noted that deposits play an important role in bank funding as the commercial bank assets are mainly funded through customer deposits. Hence, to improve the profitability of commercial banks, they must be able to raise deposits at reasonable rate in order to provide loans to customers. This indicates that bank that can generate more deposits at a lower cost will be able to offer more loans competitively, thereby generating more profits. The positive correlation between cash reserves also supported by Arif and Anees (2012), Khan and Syed (2013), and Ndoka, Islami and Shima (2017). However, the positive relationship between customer deposit and bank profitability was contradicted by numbers of empirical studies by Nafula (2003), Gul, Irshad, and Zaman (2011), El-Ansary and Megahed (2016), and Kithinji (2019), who found an inverse correlation between customer deposit and bank performance supports the argument that deposits contain an opportunity costs that will cause a reduction in banks' earnings.On the basis of above literature discussion, the following hypothesis was established.

H_1B: Customer deposit has a positive significant relationship with bank profitability

2.3 Liquidity Gap

Liquidity gap is another liquidity measure selected for this study because most researchers concluded that it is the main cause of liquidity risk (Plochan, 2007; Goodhart, 2008; Goddard et al., 2009). It shows the maturity mismatch between assets and liabilities. With a substantial liquidity gap, banks have shortage of cash to meet their settlements. This in turn causes bank to borrow funds from the other banks at a higher costs, thereby increasing the cost of bank and cause a reduction in banks' earnings. Arif and Anees (2012) revealed that there is a negative association between liquidity gap and Pakistani bank's profitability. Another study done by Khan and Syed (2013) also determined that liquidity gap found in Pakistani banks has inverse effect on

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banks performance. The authors expressed that maturity gap between asset and liabilities is the major cause of liquidity risk. With a substantial liquidity gap, the banks may have to borrow from the repo market even at a higher rate, thus pushing up the cost of banks. This rise in the cost eventually affects the bank's profitability. Hence, increase in liquidity gap will generate liquidity risk and thereby reducing the banks' earnings. Ndoka, Islami and Shima (2017) have investigated the effect of liquidity risk on profitability of Albanian commercial banks using panel regression analysis. The analysis is based on an empirical study with secondary data collected from annual reports of 16 commercial banks that spans the period from 2005 to 2015. The study found that liquidity gap also negatively effect on the banks' profitability. The findings also supported by Plochan (2007) and Goodhart (2008) who found evidence of negative relationship between liquidity gap and financial performance in banks. All the past literatures found that increase in liquidity gap will reduce in bank earnings. Thus, H_1C: Liquidity gap has a negative significant relationship with bank profitability

2.4 Liquidity Ratio

Liquidity ratio (loan-to-deposit) is a common liquidity risk measurement used by many scholars in assessing the influence of liquidity risk on bank performance. In general, loans are the main income source for a bank, accordingly, bank's profitability is expected to increase as its portfolio of loans grows specially. In addition, Salim and Bilal (2016) stated that banks having high proportion of liquid assets are unlikely to gain higher profits, but are less exposed to liquidity risk. Farooq et al. (2015), Musembi, Ali and Kingi (2016), Abel and Roux (2016), Rahman, Hamid and Khan (2015), Tariq, Usman, Mir, Aman, and Ali (2014) also demonstrated that liquidity ratio had a positive influence on financial performance of banks. However, evidences from various studies also revealed a negative correlation between liquidity ratio and profits (Abobakr, 2018; Kingu, Macha and Gwahula, 2018; Edem, 2017; El-ansary and Megahed, 2016; Growe, DeBruine, Lee, and Maldonado, 2014; Menicucci and Paolucci, 2015; Sufian, 2009; Anbar and Alper, 2011).The explanation is that an increase in liquidity ratio will decrease the liquidity level of the bank and cause bank to expose liquidity risk and financial distress, thereby reducing the bank profitability (Kingu, Macha and Gwahula, 2018). A higher liquidity ratio indicates that banks have reached the limit of funding loans from their own deposits, and used more expensive approaches such as expensive deposits, debt and equity financing to finance their loan. This also reduce the profitability of the bank (Kingu, Macha and Gwahula, 2018). Besides, Menicucci and Paolucci (2015) also stated that a high liquidity ratio could imply that banks have grown rapidly on their loans portfolio, having to pay a higher cost for their funding requirements and this may lead to a negative effect on profitability. Hence, this study assumes that

H_1D: Liquidity ratio has a negative significant relationship with bank profitability

2.5 Nonperforming Loan

Nonperforming loan is loan when interest and principal payments are overdue for more than 90 days or at least 90 days of interest payments have been refinanced, capitalised or delayed by agreements (Ugoni, 2016; Joseph, Edson, Manuere, Clifford and Michael, 2012). Nonperforming loans are considered as a determinant of banks' profitability. There is growing body of empirical evidence suggests that high levels of nonperforming loans adversely affect bank earnings through provisioning of doubtful debts and bad debt write-offs, which often

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affects profitability and capital levels of banks (Ombaba, 2013; Kingu, Macha and Gwahula, 2018). Subsequently, in a relatively large number of banks, the moment when nonperforming loans exceeded bank capital can compound into a bank crisis and eventually turns into a financial crisis (Karim, Chan and Hassan, 2010; Biabani et al., 2012). Sangmi and Nazir (2010) said that the lower level of nonperforming loan, the better the bank performance. Empirical studies (Arif and Anees, 2012; Khan and Syed, 2013; Madishetti and Rwechungura, 2013; Ombaba, 2013; Ugoni, 2016; Kingu, Macha and Gwahula, 2018) found a negative relationship between nonperforming loans and bank profitability. Therefore, it is expected that:

H_1E: Nonperforming loan has a negative significant relationship with bank profitability

Table 3: Summary of past studies of liquidity risk variables impact on bank performance

Variables	**Found Sign**	**Research Study**
Cash Reserves	+	Edem (2017); Khan and Syed (2013); Arif and Anees (2012)
	-	Ogamda, Mogwambo, Otieno (2018); Ndoka, Islami and Shima (2017); Abid and Lodhi (2015); Mwangi (2014); Rahman (2013); Ahmad, Muhammad, Marson (2009);
	/	Udeh (2015)
Customer Deposit	+	Bologna (2011); Arif and Anees (2012); Khan and Syed (2013); Ndoka, Islami and Shima (2017).
	-	Nafula (2003); Gul, Irshad, and Zaman (2011); El-Ansary and Megahed (2016); Kithinji (2019)
Liquidity Gap	-	Arif and Anees (2012); Khan and Syed (2013); Ndoka, Islami and Shima (2017)
Liquidity Ratio	+	Farooq, Maqbool, Humanyun, Nawaz, and Abbas (2015); Musembi, Ali and Kingi (2016); Abel and Roux (2016); Rahman, Hamid and Khan (2015); Tariq, Usman, Mir,Aman, and Ali (2014).
	-	Abobakr (2018); Kingu, Macha and Gwahula (2018); Edem (2017); El-ansary and Megahed (2016); Growe, DeBruine, Lee, and Maldonado (2014); Menicucci and Paolucci (2015); Sufian (2009); Anbar and Alper (2011).
	/	Ongore and Kusa (2013); Salim and Bilal (2016); Rengasamy (2014)
Nonperforming loan	+	Maaka (2013); Yemngang (2015); Kithinji, Mwangi, Litondo and Ogutu (2017); Panta (2018); Araka, Mogwambo, and Otieno, (2018).
	-	Arif and Anees (2012); Khan and Syed (2013); Madishetti and Rwechungura (2013); Ombaba (2013), Ugoani (2016); Panta (2018); Kingu, Macha and Gwahula (2018).

Source: own construction

Note: (+) positive relationship, (-) negative relationship, (/) insignificant relationship

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2.6 Research Hypothesis

$H_{1\,A}$: There is negative relationship between cash reserves and financial performance

$H_{1\,B}$: There is positive relationship between customer deposit and financial performance

$H_{1\,C}$: There is negative relationship between liquidity gap and financial performance

$H_{1\,D}$: There is negative relationship between liquidity ratio and financial performance

$H_{1\,E}$: There is negative relationship between nonperforming loan and financial performance

III. RESEARCH METHODOLOGY

This study adopted positivist and used deductive research approach for hypothesis generating to test the theory. This study is a quantitative research type with a focus on explanatory research purpose aiming to examine the impact of liquidity risk on financial performance of Malaysian conventional banks. This research undertaken an archival research strategy to collect secondary data from published annual reports of conventional banks that is available on their official company website for a period of 10 years from 2008 to 2017. A sample of eight (8) local conventional banks are selected attributable to their accessibility and reliability annual reports that are subjected to audit and for compliance to regulations specified by Bank Negara Malaysia.

Table 4: Local conventional Banks in Malaysia

No.	Name	Notation
1	Affin Bank Berhad	AFFIN
2	Alliance Bank Malaysia Berhad	ALLIANCE
3	AmBank (M) Berhad	AMBANK
4	CIMB Bank Berhad	CIMB
5	Hong Leong Bank Berhad	HLB
6	Malayan Banking Berhad	MAYBANK
7	Public Bank Berhad	PUBLIC
8	RHB Bank Berhad	RHB

Table 5: Sources of Secondary Data

No	Variable	Proxy	Measurement	Source from Annual Report
1	Cash Reserves	CASH	"Cash and short-term funds" taken from the assets side	Statement of Financial Position
2	Customer Deposits	DEP	"Deposits from customers" taken from the liability side	Statement of Financial Position
3	Liquidity Gap	LGAP	"Maturity mismatch" from liquidity risk disclosure table	Notes to Financial Statement

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4	Liquidity Ratio	LTD	Total Loan / Total Deposit	Statement of Financial Position
5	Nonperforming Loan	NPL	"Net impaired loans" from the notes of Loans, Advances And Financing	Notes to Financial Statement
6	Return on Assets	ROA	Net Income / Total Assets	Profit and Loss Statement & Statement of Financial Position
7	Return on Equity	ROE	Net income / Total Shareholders' Equity	Profit and Loss Statement & Statement of Financial Position

Multiple regression analysis were applied in this study to analyse the influence of independent variables (Liquidity risk indicators) on dependent variables (Financial Performance), using the Ordinary Least Square (OLS) model. In this research, there are five (5) independent variables including cash reserves, customer deposit, liquidity gap, liquidity ratio, and nonperforming loan; and two (2) dependent variables including return on assets and return on equity.

The two multiple regression equations used for this research are stated as below:

$ROA_{it} = \beta_0 + \beta_1 CASH_{it} + \beta_2 DEP_{it} + \beta_3 LGAP_{it} + \beta_4 LTD_{it} + \beta_5 NPL_{it} + u_{it}$ ……. (1)

$ROE_{it} = \beta_0 + \beta_1 CASH_{it} + \beta_2 DEP_{it} + \beta_3 LGAP_{it} + \beta_4 LTD_{it} + \beta_5 NPL_{it} + u_{it}$ ……. (2)where,

ROA = Return on Asset

ROE = Return on Equity

CASH = Cash Reserves

DEP = Customer Deposits

LGAP = Liquidity Gap

LTD = Liquidity Ratio

NPL = Nonperforming Loan

β_0 = Constant coefficients specific to each bank

$\beta_1, \ldots \beta_5$ = Coefficients of independent variable

i =all the eight local conventional banks (i = 1:AFFIN, 2:ALLIANCE, 3:AMBANK, 4:CIMB, 5:HLB, 6:MAYBANK, 7:PUBLIC, 8:RHB)

t =Time in years from 2008 to 2017 ($t = 2008, 2009, 2010,$ 2011, 2012, 2013, 2014, 2015, 2016, 2017)

u_{it} = Error term normally distributed about the mean of zero

Based on this study, logarithm transformation has performed to improve the data normality. The data undergoes a log transformation including cash reserves (CASH), customer deposits (DEP), liquidity gap (LGAP) and nonperforming loans (NPL). Hence, the log-transformed panel regression is formed as below:

$ROA_{it} = \beta_0 + \beta_1 \log(CASH_{it}) + \beta_2 \log(DEP_{it}) + \beta_3 \log(LGAP_{it}) + \beta_4 LTD_{it} + \beta_5 \log(NPL_{it}) + u_{it}$ …… (3)

$ROE_{it} = \beta_0 + \beta_1 \log(CASH_{it}) + \beta_2 \log(DEP_{it}) + \beta_3 \log(LGAP_{it}) + \beta_4 LTD_{it} + \beta_5 \log(NPL_{it}) + u_{it}$ …… (4)

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IV. DATA ANALYSIS AND PRESENTATION

4.1 Descriptive Analysis

The table shows the summary statistics for the 560 (computed as 8 x 10 x 7) secondary data which consisting of eight (8) banks over the 10 years period (2008-2017) for each variables. The summary statistics provides information on the measures of the central tendency including mean, maximum, and minimum; the measures of dispersion including standard deviation; and the measure of normality including skewness and kurtosis.

Table 6: Descriptive Analysis

Variable	N	Mean	Maximum	Minimum	Standard Deviation	Skewness	Kurtosis
ROA (%)	80	0.011	0.015	0.002	0.002	-0.559	3.986
ROE (%)	80	0.128	0.256	0.029	0.038	0.697	4.786
CASH (RM'000)	80	17,876,614	58,140,545	914,038	13,700,508	1.256	4.052
DEP (RM'000)	80	150,000,000	502,000,000	21,351,760	118,000,000	1.215	3.984
LGAP (RM'000)	80	17,583,138	75,183,606	2,594,388	15,544,800	1.746	6.166
LTD	80	0.847	0.984	0.515	0.092	-1.307	5.744
NPL (RM'000)	80	2,241,117	7,429,372	222,876	1,778,244	1.046	3.361
Total	560						

The distribution is highly skewed if the skewness value is above +1 or below -1; while the distribution is moderately skewed if the skewness value is between -1 and -0.5 as well as lies between 0.5 and 1. The kurtosis for perfect normal distribution is 3, which also known as *Mesokurtic*. The distribution is *leptokurtic* if the kurtosis is more than 3, the distribution is *platykurtic* if the kurtosis is less than 3. Hence, normal distribution must have the skewness near to 0 and kurtosis near to 3. The analysis shows that ROA and LTD were positively skewed to right; while the other variables including ROE, CASH, DEP, LGAP and NPL were negatively skewed to left. Furthermore, all variables are leptokurtic as their kurtosis values are more than 3 indicates a relatively flat distribution. Some variable data are found to be highly skewed which violated the normality assumption. Hence, the logarithm transformation is used to reduce these skewed data and improve the data normality (Quinn and Keough, 2002; Little, 2013; Feng, et al., 2014). The data undergoes a log transformation including cash reserves (CASH), customer deposits (DEP), liquidity gap (LGAP) and nonperforming loans (NPL).

4.2Panel Data Specification Tests

Beforehand conducting the regressions analysis, there are a few tests required to determine the fitness and appropriateness of the panel data to be analysed. Firstly, ***unit root test*** is employed to test whether the panel data is stationery.Several panel unit root tests were employed including Levin, Lin & Chu (LLC), Im, Pesaran and Shin (IPS), Fisher-type Augmented Dickey-Fuller (ADF), and Fisher-type Phillips-Perron (PP). In this

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study, nonstationary data were caught and resolved immediately by using first differencing method. Based on table below, the result shows that all observed data has no unit root and was stationery at 5% significance level.

Table 7: Panel Data Unit Root Test

Variable	**Unit Root Test**	**Statistic**	**P-value**
Return on Asset (at Level)	LLC	-7.6951	0.0000*
	IPS	-3.2160	0.0007*
	ADF	38.9741	0.0011*
	PP	27.0864	0.0405*
Return on Equity (at 1st difference)	LLC	-10.7631	0.0000*
	IPS	-5.2634	0.0000*
	ADF	55.8742	0.0000*
	PP	51.1417	0.0000*
Cash Reserves (at 1st difference)	LLC	-9.5051	0.0000*
	IPS	-4.6290	0.0000*
	ADF	54.4873	0.0000*
	PP	71.1115	0.0000*
Deposit (at Level)	LLC	-7.5644	0.0000*
	IPS	-2.2326	0.0128*
	ADF	31.4991	0.0116*
	PP	60.9483	0.0000*
Liquidity Gap (at 1st difference)	LLC	-6.4795	0.0000*
	IPS	-6.4303	0.0000*
	ADF	64.1018	0.0000*
	PP	49.4888	0.0000*
Nonperforming loan (at Level)	LLC	-6.3206	0.0000*
	IPS	-3.1446	0.0008*
	ADF	38.2007	0.0014*
	PP	45.5871	0.0001*
Liquidity Ratio (at 1st difference)	LLC	-8.5220	0.0000*
	IPS	-3.9231	0.0000*
	ADF	47.9842	0.0000*
	PP	56.3318	0.0000*

Note: (*) means the p-value is less than significance level of 5%;

Source: Data extracted from EViews output

The diagnostic tests for these data include normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test; which are employed to ensure all panel data fulfilled the cardinal assumptions of CLRM. Furthermore, appropriate remedies were applied when violations of these assumptions were detected.

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Table 8: Summary of Diagnostic Tests

Assumptions	Multicollinearity Test	Normality Test	Heteroscedasticity Test	Autocorrelation Test
Model 1 (ROA)	No multicollinearity	Panel data is normally distributed	*Residuals are heteroscedastic	No autocorrelation
Model 2 (ROE)	No multicollinearity	Panel data is normally distributed	*Residuals are heteroscedastic	Inconclusive

Note: (√) means the assumption is fulfilled; while (*) means the violation is detected.

Table 8summarises the result of tests for linear regression model assumptions. It shows that both panel regression models have fulfilled the assumptions of no multicollinearity, no autocorrelation and normal distribution. However, both panel regression models did not meet the homoscedasticity assumption. Additionally, the autocorrelation test for the second panel regression model is inconclusive, therefore, we assume that there may be autocorrelation between the residuals. In short, the presence of heteroscedastic and auto-correlated residuals have been detected among the entire dataset. However, the problem of autocorrelation and heteroscedasticity were corrected by using the Panel Estimated Generalised Least Squares (EGLS) with cross-section SUR (Seemingly Unrelated Regression) specification, which have been used by other researchers such as Yaffee (2003), Yeo and Lee (2009), and Arowolo and Ekum (2016). In the words of Daskalakis and Psillaki (2008), this generalised method can correct both heteroscedasticity and autocorrelation problems that exist between the residuals for the given cross-section. Hausman test is applied and the result shows that appropriate model for estimating the panel equations is fixed effect model.

4.3Panel Regression Analysis and Test of Significance

Panel data fixed effect regression models are used to assess the impact of liquidity risk on financial performance of local conventional banks in Malaysia. Several tests are conducted to test the overall goodness of the fit model, the significance of the regression model, and the significance of the regression coefficients. Based on analysis of overall goodness of fit model, both model has the R-squared value of more than 90% which implies a good explanatory power and linearly fits data set. Furthermore, the adjusted R-square for both model is 97.8% and 95.2% respectively, showing that both model results are reliable in explaining the impact of liquidity risk on the financial performance. Based on the analysis of model significance, the f-statistic of both model has p-value of less than 0.05 which implies that the both model are significant in predicting the financial performance of the commercial banks in Malaysia.

Table 9: Summary of Regression Coefficient Analysis

	Model 1			**Model 2**		
Variables	DV: Return on Asset			DV: Return on Equity		
	Coefficient	P-value	Results	Coefficient	P-value	Results
Constant	0.013678	0.0011		0.130120	0.0010	

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Cash Reserves	-0.000331	0.0000	- Significant	0.000743	0.4071	+ Insignificant
Customer Deposits	-0.000412	0.0648	- Insignificant	-0.012233	0.0000	- Significant
Liquidity Gap	-0.004890	0.0000	- Significant	-0.095343	0.0000	- Significant
Liquidity Ratio	-0.011557	0.0000	- Significant	-0.086253	0.0000	- Significant
Nonperforming Loan	0.000373	0.0000	+ Significant	0.007284	0.0000	+ Significant

The estimated panel regression models can be written as:

$$ROA = 0.01368 - 0.000331CASH - 0.000412DEP - 0.004890LGAP - 0.01156LTD + 0.000373NPL + u \quad \ldots\ldots (5)$$

$$ROE = 0.013012 + 0.0007CASH - 0.012233DEP - 0.095343LGAP - 0.08625LTD + 0.007284NPL + u \quad \ldots\ldots (6)$$

Table 9 presents the summary of regression coefficients analysis. The results reveals that cash reserves, customer deposit, liquidity gap, and liquidity ratio have a significant negative impact on financial performance; and nonperforming loan has a significant and positive effect on Malaysian bank profitability. However, the study found that the correlation between customer deposit and return on asset are insignificant. Furthermore, it also found that the cash reserve does not have any significant impact on the return on equity. The study discovered that the least influential factor is cash reserves, indicating that cash reserve had the least impact on banks' earnings for Malaysian conventional banks. Conversely, liquidity ratio and liquidity gap are the most influential liquidity risk factors towards return on asset and return on equity, respectively.

4.4Hypothesis Testing

The study reveals that there are three (3) alternative hypothesis are accepted, indicating the liquidity risk indicators such as cash reserves, liquidity gap and liquidity ratio have significant and negative impact on financial performance of conventional banks in Malaysia. However, there are two (2) alternative hypothesis are rejected and the findings are contrast with the expectations and past findings. The study shows that customer deposit affects the bank profitability negatively and nonperforming loan affect the bank profitability positively. All findings in this study are supported by previous studies as shown in table below.

Table 10: Hypothesis Testing Results

Hypothesis	Expected Sign	Result Sign	Hypothesis Testing	Supported Literatures
H_1A Cash Reserves	-	-	Accept H_1A	Mwangi (2014); Abid and Lodhi (2015); Ndoka, Islami and Shima (2017); Ogamda, Mogwambo, Otieno (2018)

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H_1B Customer Deposits	+	-	Reject H_1B	Nafula (2003); Gul, Irshad, and Zaman (2011); El-Ansary and Megahed (2016); Kithinji (2019)
H_1C Liquidity Gap	-	-	Accept H_1C	Plochan (2007); Goodhart (2008); Arif and Anees (2012); Khan and Syed (2013); Ndoka, Islami and Shima (2017)
H_1D Liquidity Ratio	-	-	Accept H_1D	Abobakr (2018); Kingu, Macha and Gwahula (2018); Edem (2017); El-ansary and Megahed (2016); Growe, DeBruine, Lee, and Maldonado (2014); Menicucci and Paolucci (2015); Sufian (2009); Anbar and Alper (2011).
H_1E Nonperforming Loan	-	+	Reject H_1E	Maaka (2013); Yemngang (2015); Kithinji, Mwangi, Litondo and Ogutu (2017); Panta (2018); Araka, Mogwambo, and Otieno (2018).

V. DISCUSSION ON FINDINGS

Firstly, the study found that cash reserves have a significant and inverse impact on return on assets. This result is supported by empirical studies by Ndoka, Islami and Shima (2017), Abid and Lodhi (2015), Ogamda, Mogwambo, Otieno (2018), Mwangi (2014), and Rao and Somaiya (2006). The negative relationship means maintaining high levels of cash reserves as liquidity risk management practices would not generate any returns to Malaysian conventional banks. A possible explanation is that when bank increase their cash reserves, there will be extremely high costs of retaining these cash reserves. Besides, Malaysian banks may lose the market opportunities as the cash reserves decrease the liberation of cash assets. Hence, holding more cash reserves will result in a decrease in net income of Malaysian bank as it increases bank spending and reduces the bank revenue opportunities. However, cash reserves was found to have insignificant and direct impact on return on equity, which might due to the cash reserves held form a small proportion to the banks' total equity. Nonetheless, the positive correlation is similar with empirical studies by Ogamda, Mogwambo, Otieno (2018), Edem (2017), Khan and Syed (2013), Arif and Anees (2012). This relationship may be due to the fact that adequate cash reserves can help banks to mitigate liquidity risk by preventing them from fire sale risks and decrease the banks' reliance on the repo market that reduced the cost of overnight borrowing. However, they did not consider the opportunity cost of holding these reserves rather than investing the funds in earning investments. Therefore, the alternative hypothesis is accepted and the study concluded that an increase in cash reserves will lead to Malaysian conventional banks' profitability to decline.

H_1A: There is negative relationship between cash reserves and financial performance of conventional commercial banks in Malaysia. (Accepted)

Secondly, the empirical study found that there is an insignificant negative correlation between customer deposits and return on assets, but it has a significant negative relationship with return on equity. However, this study expects that customer deposit has a positive significant relationship with bank profitability. The findings contrast with numerous studies by Ndoka, Islami and Shima (2017), Khan and Syed (2013), Arif

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and Anees (2012), Bologna (2011), who found that there is a positive relationship between customer deposits and financial performance of banks as more deposits improve the lending capacity and thus result in higher profits. Therefore, the alternative hypothesis is rejected and the study concluded that an increase in the amount of deposits from customer will cause a reduction in banks' earnings of Malaysian conventional banks. This is in line with the study by Zolkifli, Hamid and Janor (2015), who expressed that high volatility of deposit increase the risk of bank liquidity, suggesting that higher deposit movements indicate that the deposit is within this instability and uncertainty associated with the ability of banks to provide production services to customers. The result also supported by empirical studies by Nafula (2003), Gul, Irshad, and Zaman (2011), El-Ansary and Megahed (2016), and Kithinji (2019), found the inverse correlation between customer deposit and bank performance because deposits include opportunity costs, such as funding cost, branching cost and other expenses, which will result in a reduction in bank revenue.

H_1B: There is positive relationship between customer deposits and financial performance of conventional commercial banks in Malaysia. (Rejected)

Thirdly, liquidity gap is found to have a significant negative correlation with the return on asset and return on equity. This discovery is supported by empirical studies by Plochan (2007), Goodhart (2008), Arif and Anees (2012), Khan and Syed (2013), Ndoka, Islami and Shima (2017), which found that an increase in liquidity gap would create liquidity risks, thereby reducing the banks' earnings. In the words of Plochan (2007) and Khan and Syed (2013), the major cause of liquidity risk is the maturity gap between asset and liabilities of the banks. Due to the large liquidity gap, banks may lack cash to meet their liabilities, and they may have to borrow funds from the repo market at a higher interest rate. This can lead to an increase in bank costs, which in turn reduces the bank revenue. Hence, the alternative hypothesis is accepted at over 95% confidence level and the study suggests that liquidity gap and bank profitability are inversely related for Malaysian conventional commercial banks.

H_1C: There is negative relationship between liquidity gap and financial performance of conventional commercial banks in Malaysia. (Accepted)

Fourthly, the study also revealed that liquidity ratio has a significant negative relationship with the return on asset and return on equity. The findings of this study is supported by empirical studies by Abobakr (2018), Kingu, Macha and Gwahula (2018), Edem (2017), El-ansary and Megahed (2016), Growe, DeBruine, Lee, and Maldonado (2014), Menicucci and Paolucci (2015), Sufian (2009), and Anbar and Alper (2011), which confirmed that liquidity ratio and bank profitability are negatively correlated. The possible explanation is that loans are one of the risky assets in commercial banks. Therefore, an increase in the liquidity ratio will reduce banks' liquidity level and expose banks more to liquidity risk and financial distress, thereby reducing the bank income. In addition, Kingu, Macha and Gwahula (2018) also stated that a higher liquidity ratio indicates that banks have reached the their own deposit financing limit and banks will use more expensive approaches such as expensive deposits, debt and equity financing to finance their loan and hence decrease in banks' earnings. Menicucci and Paolucci (2015) also expressed that a high liquidity ratio may mean that the banks' loan portfolio is growing rapidly and they have to pay higher costs for their funding capital requirements, which may lead to a negative impact on banks' earnings

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H_1D: There is negative relationship between liquidity ratio and financial performance of conventional commercial banks in Malaysia. (Accepted)

Lastly, it is found that there is a positive and significant relationship between nonperforming loan and financial performance of conventional banks in Malaysia. This finding is interesting as it contrasts with other studies by Arif and Anees (2012), Khan and Syed (2013), Madishetti and Rwechungura (2013), Ombaba (2013), Ugoani (2016), Panta (2018) and Kingu, Macha and Gwahula (2018), which confirmed that high level of nonperforming loan will reduce the banks' liquidity level and therefore affect the bank profitability negatively. The positive relation found in this study may be due to the fact that the worsening of debtors' creditworthiness increase the level of nonperforming loan, which causes banks to charge higher interest rate on loans for compensating the possible default loans. Hence, debtors are likely to borrow at higher lending rates which increases the interest income for banks, thereby increasing the net interest margin and banks' profitability. This result is strongly supported by empirical studies by Maaka (2013), Yemngang (2015), Kithinji, Mwangi, Litondo and Ogutu (2017), Panta (2018), and Araka, Mogwambo, and Otieno (2018).

H_1E: There is negative relationship between nonperforming loan and financial performance of conventional commercial banks in Malaysia. (Rejected)

In short, three (3) alternative hypotheses have been accepted while the other two (2) hypotheses have been rejected. All of these findings are supported by previous studies with relevant discussion. In short, the results reveals that cash reserves, customer deposit, liquidity gap, and liquidity ratio have a significant negative impact on financial performance; and nonperforming loan has a significant and positive effect on Malaysian bank profitability.

VI. CONCLUSION AND RECOMMENDATIONS

This study determines the relationship between liquidity risk indicators and the financial performance of Malaysian conventional commercial banks. In this study, the cash reserves, customer deposit, liquidity gap, liquidity ratio and nonperforming loan are used as the liquidity risk indicators; while the financial performance is determined by return on assets and return on equity as dependent variables. The study concluded that *cash reserve* affect the bank profitability negatively because these reserves are non-income generating assets. The study suggests that Malaysian banks could minimise their cash reserves by investing in a more profitable businesses and productive investments that can improve financial performance. For banks holding reserves in the form of cash, it is suggested that they should be held in the form of near-money assets that have a ready market but are stable in price, according to Ogamda, Mogwambo, Otieno (2018). They should also adopt an appropriate cash management model to minimise the possibility of insufficient cash reserves. This can be achieved by making appropriate forecasts of cash demand based on past patterns on minimum and maximum cash levels.

In addition, the study found that *customer deposits* and financial performance of banks are negatively correlated. In other words, an increase in deposits indicating the deposit is within this instability and uncertainty associated with the ability of banks to provide production services to customers, thereby reducing bank income. Based on this study, customer deposits of Malaysian conventional banks have increased by an average of 34% over the past 10 years, from RM86.9 billion in 2008 to RM220.5 billion in 2017. This shows that Malaysian

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banks' deposits are highly volatile, reducing the banks' liquidity level, thereby increasing liquidity risk and correspondingly affecting bank income. Beside, deposits include opportunity costs, such as funding cost, branching cost and other expenses, which will result in a reduction in bank revenue. Hence, the study suggests that increasing deposit levels as liquidity risk management might not necessary be increasing banks' earnings.

Additionally, the study concluded that an increase in *liquidity gap* would create liquidity risks, thereby reducing the banks' earnings. Due to the large liquidity gap, banks may lack cash to meet their liabilities, and they may have to borrow funds from the repo market at a higher interest rate. This can lead to an increase in bank costs, which in turn reduces the bank revenue. According to the Bank for International Settlements (2017), the repo market plays a significant role in facilitating the flow of cash and securities around the financial system. Majority of central bank will depend on this market to provide emergency assistance to the banking system. However, the study shows that Malaysian conventional banks are not relying on this market. They have maintained a positive liquidity gap in the past 10 years under review, indicating there is a positive maturity mismatch between assets and liabilities in conventional banks in Malaysia. Hence, it implies that Malaysian conventional banks have sufficient cash to settle their settlement in due, reducing their reliance on the repo market. It also assist them to prevent the inverse impact of the liquidity gap within an acceptable range set by central bank. The study recommends that banks can maintain sufficient cash reserves to avoid the harmful effects of liquidity.

Furthermore, it is found that an increase in the *liquidity ratio* will reduce banks' liquidity level and expose banks more to liquidity risk and financial distress, thereby reducing the bank income. Besides, a high liquidity ratio indicate that the banks' loan portfolio is growing rapidly and they have to pay higher costs for their funding capital requirements, which may lead to a negative impact on banks' earnings. In Malaysia, the trend in average of liquidity ratio has increased from 2010 to 2017, reaching the highest liquidity ratio of 0.91 in 2017 over the past 10 years. This high liquidity ratio indicates that the liquidity level of Malaysian conventional banks is not sufficient to cover unforeseen fund requirements as their loan balances are higher relative to deposits. Hence, the increase in loan-to-deposit ratio led to a significant decline in return on asset and return on equity. The study suggests that Malaysian banks should not offer more loans for the benefit of interest revenue. They should maintain a sufficient level of liquidity by reducing the loan balance because it incurred high cost for the funding requirement that will cause a negative impact on banks' earnings. In addition, they must be able to maintain a good loan-to-deposit ratio because the huge allocation of deposits being converted into loans will reduce the bank profitability due to increased liquidity risk exposure.

Lastly, the study concluded that *nonperforming loan* have a positive impact on bank profitability. However, I personally think that this finding seems illogical because the increase in nonperforming loans would erode the interest income as there will be large number of defaulters not repaying any agreed principal and interest payment on loans. Malaysia banks should pay attention to net interest margin because an increase in lending rates may increase the interest income for bank and thus increase in net interest margin and bank profits, even there is an increase in nonperforming loans that might also reduce bank profits. They should pay attention to the way they earn profit from interest on loans.

The management of nonperforming loans is important as the loan interest is considered as the largest income for banks, helps in increasing liquidity level of banks and improving the banks' financial performance.

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Hence, failure to manage nonperforming loans over a long term period will gradually affects profitability of commercial banks. This study reveals several recommendations for practitioners (banks managers) and regulators (central bank). For *practitioners*, the study recommended that banks should apply efficient and effective credit risk management to ensure that loans are matched with the debtors' ability to repay and minimise on their interest rate regulations and other incidental cost as a mean of reducing nonperforming loan. Besides, the study also suggested that banks should have a mechanism of identifying loan defaulters and take necessary action and charge borrowers the loan interest rates as per regulations of Bank Negara Malaysia (BNM), central bank of Malaysia. In addition, it is recommended that banks could hire qualified and experienced debt collectors and competent personnel that enhance regular credit risk monitoring of their loan portfolio to reduce loan default. For *regulators*, the study suggested that Bank Negara Malaysia (BNM), which is the regulatory authority of commercial banks in Malaysia should apply stringent regulations on interest rates charged by commercial banks. The study also recommended that regulators should devise regulations and monitoring tools that will trigger early warning signals of potential bank failures due to accumulation of NPL.

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