LIQUIDITY CREATION ON BANK'S PERFORMANCE BETWEEN SINGLE AND DUAL BANKING SYSTEM IN SOUTHEAST ASIA

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DECLARATION

We hereby declare that:

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

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

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

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LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
CESEE	Central, Eastern, and South Eastern Europe
DEP	Total Deposits
EURIBOR	Euro Interbank Offered Rate
GDP	Gross Domestic Product
INFL	Inflation Rate
LOAN	Total Loans
MENA	Middle East and North America
NIM	Net Interest Margin
NPL	Non-Performing Loans
ROA	Return on Asset
ROA	A Return on Average Asset
ROE	Return on Equity
ROAE	Return on Average Equity
UNEM	Unemployment Rate

ABSTRACT

This research investigates liquidity creation on the bank's performance between single and dual banking systems in Southeast Asia. Cambodia, Singapore and Vietnam are the countries chosen as the proxy of single banking system; whereas Malaysia, Indonesia and Brunei are the countries of dual banking system. The explanatory variables are total loans, non-performing loans, total deposits, gross domestic product, inflation rate and unemployment rate. Secondary data is being adopted. Net interest margin as the dependent variable and the six independent variables were collected on an annual basis from 2007 to 2017, mainly through the source from the World Bank. Several empirical testing as well as diagnostic checking such as Phillips-Perron Unit Root Test, Poolability Hypothesis Testing, Breusch and Pagan Lagrange Multiplier Test, Hausman Test and Normality Test have been carried out to ensure the validity of the regression model. The results proved that FEM is preferable as compared to POLS or REM in examining the relationship of the liquidity creation determinants to the bank profitability in both the single and dual banking system. In single banking system, all of the independent variables are insignificant; whereas total loans, total deposits and unemployment rate in dual banking system are significant to bank performance. Therefore, it can be concluded that the performance of dual banking system is overall superior to single banking system in considering the number of significant variables in FEM, R square value and F statistic. This study could bring significant implications towards several parties which are policymakers, individuals, stakeholders and future researchers. Some recommendations have been proposed to resolve the limitations of the study for the sake for future further research.

CHAPTER ONE: RESEARCH OVERVIEW

1.0 Introduction

This chapter commences with an introduction on liquidity creation and the performance of banks located in Southeast Asia as a single banking system or dual banking system, followed by past studies, problem statements, research questions, research objectives, and significance of study. The last part has outlined the summary for each of chapters in this research and ended with a short conclusion.

1.1 Research Background

Research background introduces the research topic by understanding the background of the research topic in terms of liquidity creation, banks performance, single and dual banking systems.

1.1.1 Liquidity Creation

Banking industry plays a vital role as a backbone for the economy of a country. According to financial intermediation theory proposed by Allen and Santomero (1997), liquidity creation is a fundamental reason for banks to exist, which can be expressed as a clutch service that financial institutions

provide to the economy (Jiang, Ross & Chen, 2016). Berger and Bouwman (2017) showed that banks should be conscious of fragility when creating high degrees of liquidity as there is a higher possibility of failure will occur. Besides, Berger and Bouwman (2017) argued that banks create extensive liquidity by following the lending policies, which will generate asset price bubbles but lead to greater opportunities to make the banking industry more vulnerable.

Nevertheless, Díaz and Huang (2017) explained that the changes in liquidity were dramatic. This is because liquidity evaporated within a moment in literally, and resulting illiquidity lasted for an extended period during the financial crisis of 2007 to 2009, which causes the people suffering in living. This issue shows the importance of liquidity creation and financial institutions with sufficient capital levels. Banks should emphasize on solvency and liquidity at the same time instead of focusing on solvency only when the Basel Committee strengthened the capital requirements. This can be described as liquidity will be lower and less bank's profitability if banks pay attention to solvency only by following the leverage ideas (Hassan & Chowdhury, 2004).

Horvath, Seidler and Weill (2014) revealed that the objective of stringent capital requirements is to enhance the flexibility of the banking sectors: "A strong and resilient banking system is the groundwork for sustainable growth as banks are at the centre of the credit intermediation process between depositors and investors." Thus, banks play a role as liquidity creators by financing illiquid assets with liquid liabilities that facilitate transactions between economic agents. This is known as credit intermediation where banks provide vital services to customers. This is supported by Berger and Bouwman (2017) stated that banks create liquidity on the balance sheet by financing moderately illiquid assets which are

business loans with moderately liquid liabilities on the transaction deposits via loan commitments of the balance sheet.

Berger and Bouwman (2009) stated that the concept of liquidity creation is a wide-ranging measure of a bank's overall ability to transform maturity in the economy, accounting for both the on and off-balance sheet activities of banks. The inclusion of off-balance sheet activities in the liquidity creation is significant to banks performance between single and dual banking systems compared to other indicators as it captures only the bank's lending activity like credit-to-total asset ratio (Horvath, Seidler, and Weill 2014).

There are three steps in assessing the bank's liquidity creation. First, assort the bank's assets, liability, and equity into three categories such as liquid, semi-liquid, and illiquid based on the time period, cost, and accessibility characteristics of consumer requests for funds and banks convert as liquidity assets. Subsequently, categorizing the three categories with different weights. The weight is allocated according to the theory of maximization of the use of liquidity for a greater return. For example, the illiquid assets to generate cash flow from liquid liabilities. However, banks use liquid assets for the activities of illiquid liabilities or equity will reduce the liquidity creation. The last step is sets four different liquidity creation measurement combinations such as category that include off-balance sheet activities, category that does not include off-balance sheet activities, maturity that include off-balance sheet activities, and maturity that does not include off-balance sheet activities but subject to change in the size of the banks, wholesale or retail orientation, merger status, and bank holding company status (Berger & Bouwman, 2009).

1.1.2 Bank Performance

Profitability of banks plays a crucial part in the soundness of the banking sector as well as the whole economy (Lipunga, 2014). Profitability is the most effective financial performance indicator not only for banks else's profit-oriented companies (Eljelly, 2004). This indicator is important to stakeholders such as depositors, investors, bank managers and regulators (Jha & Hui, 2012). Economy and country able to stay competitive and undergo any unfavourable shocks if banks are sound, profitable, financially stable and well managed (Jamal, Hamidi & Karim, 2012).

Banks have to generate more income to cover operational costs for sustaining in the market as sustainability relies on profitability. Higher profitability provides a higher dividend which contributes to the income of investors and improves standard of living. However, lower profitability causes banks to face failure and standard of living of people will be affected. There are several financial ratios to measure on banks' financial performance such as Return on Asset (ROA), Return on Equities (ROE) and Net Interest Margin (NIM) (Putra, Hakim & Tambunan, 2020). However, net interest margin is one of the main financial indicators to indicate the bank's efficiency.

Liquidity creation affects the bank's performance in several ways. The differences in maturity between assets and liabilities cause banks to minimize the probability of holding more liquid assets. This is because it produces lower income than illiquid assets which will destroy a bank's liquidity and significantly affect a bank's profitability. In addition, banks who focus on excessive liquidity creation gain lower profitability but involve higher liquidity risk which leads to failure in liquidity management. Banks who create more liquidity that provide more income or benefits to

stakeholders of company, government entities, businesses, which cause increment in bank value. However, banks that hold more liquid assets will reduce the possibility of default and illiquidity risk because of the reduction of chance and costs to obtain funds (Sahyouni & Wang, 2018).

Horváth, Seidler and Weill (2014) proposed that banks' profit will reduce at a greater scale when there is an increase in intensity of competitiveness among banks as the higher chances of banks becoming fragile. As a result, the motivation to reduce liquidity by controlling the volume of loans and deposits minimizes the possibility of bank runs. Besides, banks who wish to secure a safety spot in the competition will reduce liquidity creation and bring harm to the market as there will be lesser cash flow in the market. On the contrary, Hainz, Weill, and Godlewski (2013) proposed that higher degrees of competitiveness among banks will stimulate demand for loans as banks will increase the liquidity creation to fulfil the market demand. As a consequence, banks perform well by providing more loans which leads to increased transactions and more cash flow in the market.

The importance for banks to understand and determine self-performance is to stay in line with competitors, which allows policymakers to develop suitable policies and regulations in supporting the bank's development ahead of other countries. The 4th largest trading region is the Association of Southeast Asian Nations (ASEAN) in the world where the competition of the banking industry in ASEAN is intense as the pace of financial market liberalization is fast. Thus, banks who are efficient have more competitive advantage over those with less efficient; inefficient banks will face failure and be eliminated from the market (Wong & Deng, 2016).

There are ten members among ASEAN which are Malaysia, Singapore, Brunei, Indonesia, Thailand, Cambodia, Vietnam, Laos, Philippines and

Myanmar. According to the Global Finance report, ASEAN banks are performing steadily even though the external environment is faced with challenging changes. This is subject to the bank's willingness in accepting challenges on innovation and providing lower credit cost. For example, the deposits and loans of CB Bank, Myanmar grew 32% and 19% respectively in 2019 as the CB Bank was the first bank in ASEAN to launch the innovation lab on the platform for collaboration between FinTech and financial institutions, which is Apix platform (Hananto, 2020).

1.1.3 Single and Dual Banking System

There are two categories of banking systems being adopted across the world which are single banking systems and dual banking systems. Single banking system implies the system whereby a particular country is following either a conventional banking system or Islamic banking system. Conventional banking system is named as interest-based banking system; whereas Islamic banking system is named as interest-free banking system. Conventional and Islamic banking systems vary according to goals and objectives, products and services offered as well the banking practices and regulations. Banks who under conventional or Islamic banking systems compete in satisfying the customer expectations while meeting the economy expectation in the long-term gains (Ramlan & Adnan, 2016).

Other than that, there are two different types of dual banking systems, which are the banks that operate conventional and Islamic banking systems or state banks and national banks at the same time. The study of Salman and Nawaz (2018) showed that there are many conventional banks with separate Islamic banking branches that operate side-by side. Amin and Isa (2008) said that Islamic banking system operates side by side with conventional banking

systems in Malaysia. On the contrary, the United States adopts a dual banking system where state banks and national banks are regulated at different rates. Federal agencies control the national bank with federal law and regulations, while the state banks are governed in compliance with state laws and regulations (Kenton, 2019). As there are two different types of dual banking system, the operation of conventional and Islamic banking systems is being concerned in this research as countries in Southeast Asia follow this type of dual banking systems.

Conventional banking system offers a predetermined and prefixed interest rate, whereas Islamic banking system emphasizes the profit-sharing mode of operation. Islamic banking system refers to the system whereby all the banking activities must be transacted based on Shariah (Islamic Law) principles within the context of Islamic economics (Masruki, Ibrahim, Osman & Wahab, 2011). One of the Islamic laws, Fiqh al-muamalat trade rules, considers the issues of social justice, equality and fairness, which banks have to comply with this Islamic law in the operation. Besides that, Fiqh al-muamalat trade rules encourage entrepreneurship, preserves property rights and stresses the transparency of contractual responsibilities in compliance with Allah's divine law (Salman & Nawaz, 2018). This refers to usury, payment and receipt of interest (riba) as well gharar and gambling are strictly prohibited by Islamic law.

On the other hand, the conventional banking system focuses on earning profit through offering lower interest rates to the depositors, while giving out financing to the borrowers at a higher interest rate. Banks make profit from the differences between the interest received and interest payment from borrowers and depositors respectively (Masruki, Ibrahim, Osman & Wahab, 2011). However, the Islamic banking system allows income but prohibits fixed sum of returns to predetermined causes of facing fluctuations

in risk of loss and benefit when earning returns (Ariss, 2010). Despite the distinction between both banking systems, profitability level is considered a key indicator towards investors and managers in measuring the performance and stability of the respective banks. Numerous studies have shown mixed results on the comparison between the performances of both banks. Islamic banks showed less cost and profit efficiency as compared to those of conventional banks in overall (Doumpos, Hasan & Pasiouras, 2017).

Masruki, Ibrahim, Osman and Wahab (2011) pointed out that the conventional banking system is better off than the Islamic banking system in view of a long established banking history and experience, receiving interest as a primary source for bank revenues, requesting collaterals and securities in the transactions, possessing large amount of capital, acquiring more advanced technologies, without bearing the loss with the clients as well as enjoying the opportunity to join the Islamic banking system. Sufian, Ashif and Kamarudin (2014) stated that the Islamic banking system has greater resilience and recovery ability in comparison to those conventional ones during that critical period. The credit and asset growth were the two factors which contributed to the viability of Islamic banks in promoting financial and economic stability during those tough times.

According to Rashid (2020), the intrinsic structural feature of interest-free Islamic banking transactions offers greater advantage to the Islamic banks as a feasible option in boosting economic growth and expansion while also cushioning the financial shocks in the macroeconomic environment. This is due to all the Islamic products and contracts offered are Shariah-compliant which lower down the uncertainty in the financial system.

1.2 Past Studies

Hassan and Bashir (2003) pointed that higher loan to asset and capital ratio lead to higher bank performance by controlling external factors which are financial structure, taxation, and country dummies on Islamic banks. However, implicit and explicit taxes show a negative relationship with bank profitability. Petria, Capraru and Ihnatov (2015) proved that the factors such as business mix, management efficiency, concentration of market, economic growth, liquidity, and credit risk are significantly affecting bank profitability in EU27 countries. Guru, Staunton and Balashanmugam (2002) stated that the management of overhead expenses is the most significant variable that affects commercial bank's performance in Malaysia.

Onuonga (2014) found that performance of commercial banks is being affected by loan to asset ratio, bank ownership and size, strength of capital, and operational expenses in Kenya. Gul, Irshad and Zaman (2011) said that Pakistan banks that possess more assets, capital, deposits, and loans obtain benefits from safety and profitability over the period of 2005 to 2009. San and Heng (2013) investigated the effect of bank specific variable and macroeconomic conditions on financial performance of commercial banks in Malaysia between 2003 and 2009. The macroeconomic determinants such as GDP growth and inflation seem negligible towards profitability. Furthermore, Almazari (2014) stated the internal factors affecting 23 of Saudi and 161 of Jordanian banks profitability between 2005 to 2011.

Javaid, Anwar, Zaman and Gafoor (2011) provided an overview of the internal determinants of the profitability in Pakistan over 2004 to 2008. The results showed that higher total assets may not necessarily generate higher profits because of the scale disease economies. Sahyouni and Wang (2018) investigated the relationship between liquidity creation and the bank performance in Middle East and North Africa (MENA) by using panel data techniques. The findings showed a significant

negative correlation on the return on average equity, whereas an insignificant relationship on the return on average assets to bank performance.

Sahyouni and Wang (2019) ascertained the liquidity creation effect on bank profitability in emerging countries (BRICS nations) during 2011 to 2015. The results indicated a positive correlation on asset management, bank size, capital ratio, inflation rate and GDP; while a negative correlation on the quality of credit and efficiency of operational activities with the bank's profitability. Sufian and Habibullah (2009) attempted to investigate the performance of commercial banks in Bangladesh from 1997 to 2004. Bank size was negatively influencing return on average equity (ROAE) but positively influencing on net interest margins (NIM) and return on average assets (ROAA). Menicucci and Paolucci (2016) revealed that bank size, capital ratio, loan ratio, total deposits and loan loss allowances are statistically significant to banks' profitability in European countries.

Misra (2015) conducted a research on examining the factors which are asset quality, loans to total assets ratio, net interest margin, non-interest income to assets ratio, bank size and capital adequacy ratio, inflation rate, GDP and real interest rate were the significant to profitability determinants in India. In the research paper of Berger and Bouwman (2009) pointed out that higher net surpluses are being shared among stakeholders such as depositors and borrowers when more liquidity is created. Therefore, the effect of liquidity creation on bank's performance is positively correlated. Based on the identification by Molyneux and Thornton (1992) shows that there is an inverse effect of liquidity on the performance of banks across European countries during 1986 to 1989 by using cross-sectional data only.

According to Chen, Liang and Yu (2018) studied the consequences of asset diversification on banks' performance in three Asian countries that adopted dual banking systems during the 2006 to 2012. Islamic banks tend to have higher asset

quality and capitalization but less cost-efficient when compared with conventional banks. The differences between Islamic and conventional banks due to the compliance of Shariah law on lending and investing in Islamic banks. There is a negative effect on asset diversification and the performance of conventional banks whereas least effect on Islamic banks.

1.3 Problem Statement

In the economic perspective, banks create liquidity and provide services to individuals is crucial in affecting the economic situation. There are several ways to create liquidity by offering loans to customers by using demand deposits which is the transformation of liquid liability to illiquid assets. Besides, banks offer standby letters of credit and loan commitments for companies as a long-term investment strategy by creating liquidity off the balance sheet. Thus, banks help to stimulate economic growth and benefit from the management of capital via liquidity creation (Jiang, Levine, & Chen, 2016).

In Southeast Asia countries, financial institutions offer single banking or dual banking services. Single banking systems are either Islamic or conventional banking while dual banking systems are operating Islamic and conventional banking side by side that concerns on liquidity management to prevent crumble and instability in the financial system. Both financial systems offer different methods and financial instruments in creating liquidity (Hassan, Razzaque & Tahir, 2013). Islamic banking emphasizes prohibition of interest and any activities that involve uncertainty, gambling, tobacco, and alcohol with the compliance of Shariah principles, but conventional banking does not have any restrictions in performing any transactions (Prabhakar & Lane, 2008). Therefore, Islamic banks only offer

equity finance instruments, while conventional banks offer equity and debt finance instruments (Hassan, et al., 2013).

Conventional banking system (conventional banking) offers various types of financial instruments such as bills of exchange and other commercial papers that are used in debt financing. Bills of exchange is to finance export and import services where market value derives from interest rate and maturity duration, but interest rate is not mentioned in the contract. Islamic banking system (Islamic banking) offers similar products as conventional but without interest rate (Hassan, et al., 2013). In conventional banking, deposit is the major source of liquidity as depositors receive interest from the deposit, and the amount increases when the central bank adopts monetary policy with an increase of interest rate debt financing. On the contrary, Islamic banking offers several types of instruments for funds utilization such as Murabaha which banks sell products to customers by informing the amount of cost and profit. Bay Salam and Bay Istasna are short term investments that allow customers to transfer ownership of assets to other parties but provide lower rate of return, so banks unable to utilize the fund to create a large profit (Hassan, et al., 2013).

Furthermore, conventional banking issues long or intermediate term bonds to suit the needs of different institutions. Bonds are fixed income securities where banks provide interest to bondholders. In Islamic banking, sukuk has similar characteristics with bond, but it is not considered as a loan certificate as higher risk due to the asset not belonging to the business. There are several types of sukuk such as Istina, Murabahah, Ijarah, and so on that finance according to the sukuk characteristics as every sukuk has different features. Individuals who use the asset of sukuk to obtain yield will share equally between stakeholders at the end of contract (Hassan, et al., 2013).

Other than that, conventional banking uses securities, preferred or common shares to raise funds by issuing to the public and customers who possess ownership title of the company assets. Islamic securitization is a security against the shares in equal amounts which are distributed to firms by issuing certificates against the ownership of the business's assets, however, banks do not allow the issuance of debt securities. Islamic securities or shares prohibit trading in the secondary market unless the company buys the assets, then only allow to issue shares in contrast to the assets, but conventional banks are not being restricted by these principles (Hassan, et al., 2013).

Al-Mamun, Yasser, Entebang, Rahman, Nathan & Abu Mansor (2014) indicated Islamic banking obtained a higher average liquidity ratio than conventional banking. This is because Islamic banking has more liquidity in providing cash to customer deposits, and faces less financial stress in producing excessive loans. Besides, conventional banking generates loans by focusing on liquidity creation, while Islamic banking conducts in an opposite way. In profitability analysis, conventional banking generates higher profit in using assets and equity capital than Islamic banking as the conventional banking utilizes shareholders' invested money in efficient ways by generating a minimum of 1% of return for every single asset used. Islamic banking is restricted in investing freely, only allowed to invest in projects that are being approved by the Shariah Board and hold most of the investment in government bonds which generate lower returns compared to other investments. However, conventional banks are allowed to make any type of investment as long with the objectives of higher profit not subjected to any restrictions (Al-Mamun, et al., 2014).

Most of the banks in different countries are forced to provide Islamic banking products and services in order to compete with others banking institutions rather than standing alone. This leads to development of new rules and regulations, standards and practices, and policies in order to stay in line with the changes

(Hassan, Mohamad & Bader, 2009). For countries that adopt dual banking systems which operate conventional and Islamic banking systems at the same time provide more choice for citizens to choose the preferable banking services. In Malaysia, Malaysian benefits with a full and robust banking alternative as the banks offer a variety of conventional and Islamic products and services to suit different customers' needs (Bank Negara Malaysia, 2020). Commercial banks generate profit by raising deposits from depositors at a lower interest rate and use the deposited money to create loans at a higher interest rate. Profit is the difference between interest rate earned from borrowers and interest rate charged to depositors. Islamic banks perform the same intermediary roles as commercial banks but the revenue is focused on profit sharing arrangements with depositors or borrowers without any interest (Alam, 2012).

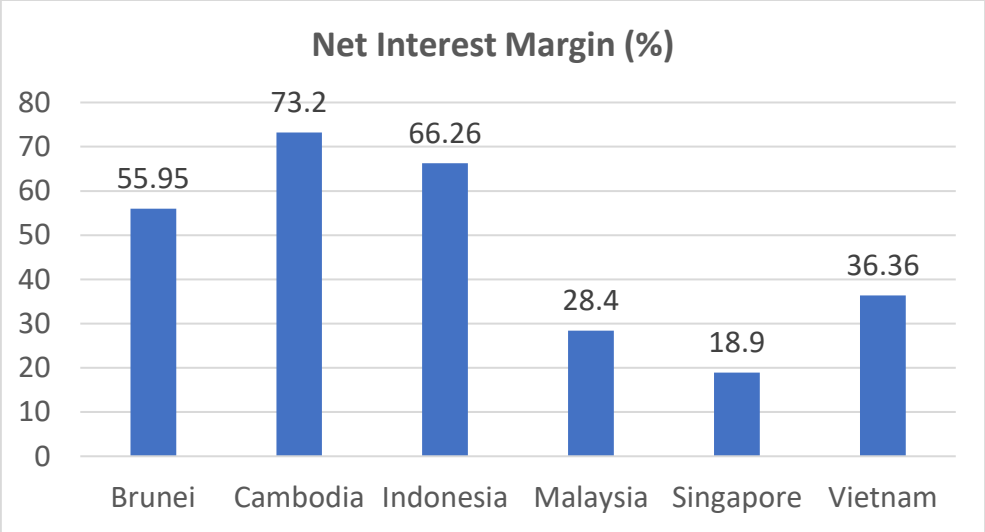


Figure 1.1: Net Interest Margin from year 2007 to 2017. Adapted from World Bank.

Figure 1.2: Total loans from year 2007 to 2017. Adapted from Central Bank of Each Countries.

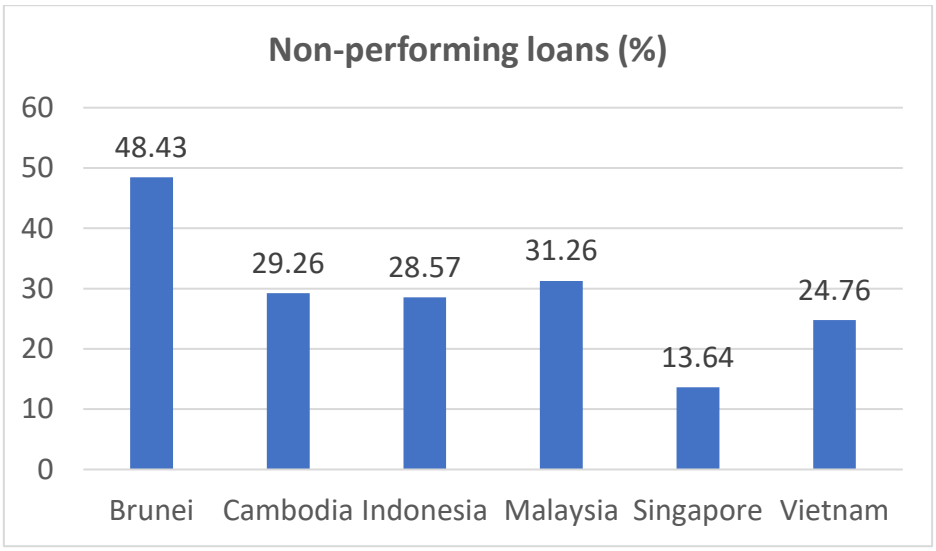


Figure 1.3: Non-Performing Loans from year 2007 to 2017. Adapted from World Bank.

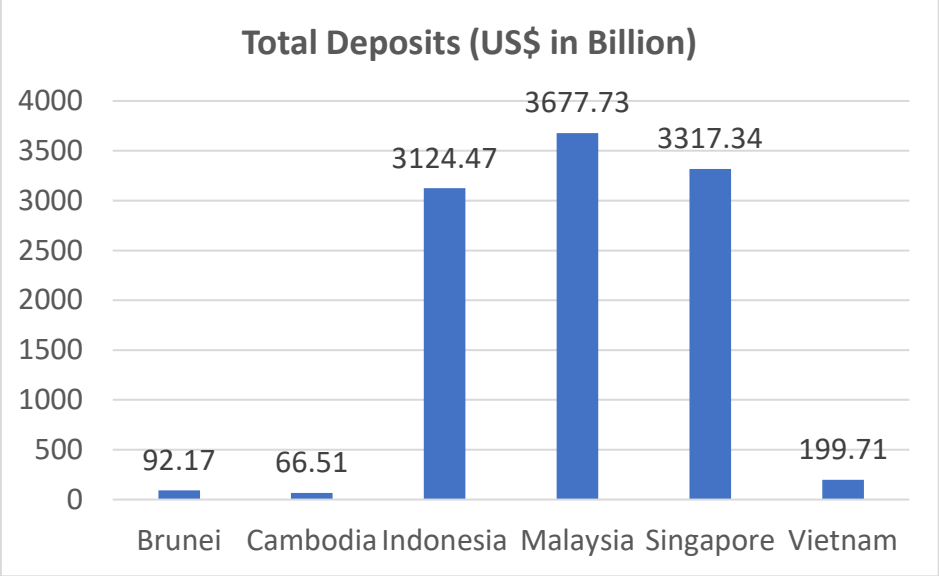


Figure 1.4: Total Deposits from year 2007 to 2017. Adapted from World Bank and CEIC.

Figures 1.1 to 1.4 indicate bank's liquidity and profitability by making comparison in single and dual banking system. Cambodia, Singapore and Vietnam are the countries as proxy of single banking system, whereas Brunei, Indonesia and Malaysia as proxy of dual banking system. Total loans, non-performing loans and total deposits are the variables to analyse bank's liquidity. Figure 1.1 shows profitability of dual banking system is higher than single banking system by analysing the average performance of three countries in banking system. Total loans are higher than total deposits in single banking system can be known that banks have insufficient liquidity to meet any unforeseen funding needs. It can be said that dual banking system has higher liquidity by attracting more deposits from customers, thus generates more loans which lead to create greater profit.

Nevertheless, Islamic banking is considered as a separate type of banking from conventional as it excludes interest and replaces benefit sharing by depending on the degree of the party's risk involvement (Alam, 2012). In short, banks that operate dual banking systems at the same time have to manage and ensure each of the institutions follows their own rules and regulations. This causes complexity in

managing as rules and regulations of both banking systems have various differences and lead to a certain extent in liquidity creation on the bank's performance. This is the motive to conduct such research as there is less research is conducting to analyse the comparison of liquidity creation on the bank's performance between single and dual banking systems in Southeast Asia.

1.4 Research Questions

The following research questions were developed from the problem statement of this research:

1. Do total loans (Loan) significantly affect banks' net interest margin (NIM) between single and dual banking systems in Southeast Asia?

2. Do non-performing loans (NPL) significantly affect banks' net interest margin (NIM) between single and dual banking systems in Southeast Asia?

3. Do total deposits (DEP) significantly affect banks' net interest margin (NIM) between single and dual banking systems in Southeast Asia?

4. Does gross domestic product (GDP) significantly affect banks' net interest margin between single and dual banking systems in Southeast Asia?

5. Does inflation rate (INFL) significantly affect banks' net interest margin (NIM) between single and dual banking systems in Southeast Asia?

6. Does unemployment rate (UNEM) significantly affect banks' net interest margin (NIM) between single and dual banking systems in Southeast Asia?

1.5 Research Objectives

The objective of the research paper is to solve problem statements by analysing the liquidity creation on bank's performance between single and dual banking systems in Southeast Asia. There are two types of research objectives which are general objectives and specific objectives.

1.5.1 General Objectives

This research is to investigate the liquidity creation of banks' performance between single and dual banking systems in Southeast Asia. Determinants that are involved are total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL) and unemployment rate (UNEM).

1.5.2 Specific Objectives

There are six specific objectives in this research which are:

1. To examine the relationship between Loan and bank's NIM between single and dual banking systems in Southeast Asia.

2. To examine the relationship between NPL and bank's NIM between single and dual banking systems in Southeast Asia.

3. To examine the relationship between DEP and bank's NIM between single and dual banking systems in Southeast Asia.

4. To examine the relationship between GDP and bank's NIM between single and dual banking systems in Southeast Asia.

5. To examine the relationship between INFL and bank's NIM between single and dual banking systems in Southeast Asia.

6. To examine the relationship between UNEM and bank's NIM between single and dual banking systems in Southeast Asia.

1.6 Significance of study

Liquidity creation is significant to the bank performance and every bank has a different approach on dealing with liquidity creation. The paper studies the impact of liquidity creation on bank performance between single and dual banking systems in Southeast Asia.

Based on the central bank perspective, the study would benefit in making decisions by anticipating the inflation and unemployment in the following year to make adjustments on the monetary policy. Central bank can formulate the monetary policy by controlling the inflation and unemployment rate through money supply as this study helps them to have a better understanding on the impact of liquidity creation on bank performance between single and dual banking systems. For example, Bank Negara Malaysia can adjust the annual budget of Malaysia according to the monetary policy.

Moreover, the study will be very helpful for individuals who are focusing on the banking industry by understanding the impact of liquidity creation on bank performance between single and dual banking systems such as shareholders, borrowers, lenders, investors, and employees. The more understanding about the type of policies adopted by the banks and implications, stakeholders more effectively in managing the works related to the banking sector.

Lastly, the findings will fulfil the academic gap by providing the comparison results and interpretation on the impact of liquidity creation on bank's performance between single and dual banking systems in Southeast Asia. This research would be beneficial to future researchers who are going to study a similar topic as there is less research being conducted. We hope that this study will be a starting point that encourages more researchers to conduct similar research.

1.7 Chapter Layout

The summary of chapter 1 to 5 as stated in below:

Chapter 1 briefly provides an introduction of this study by discussing the background, problem, objectives to be achieved, and the usefulness of this study for practitioners or academic purposes.

Chapter 2 focuses on the theory and past studies of researchers for the net interest margin and six independent variables which are total loans, non-performing loans, total deposits, gross domestic product, inflation rate and unemployment rate. This is to figure out the similarity and differences of this study with other researches by

determining the academic gap. Besides, the expected sign of this study for each variable will derive from numerous past studies.

Chapter 3 shows the details of data, variables, and research methodology that are being adopted in this study. This study will use empirical testing procedures to test econometric framework through several tests to provide the information in the following chapter.

Chapter 4 makes interpretation on data through the descriptive and inferential analysis after generating the data by using E-view 10. This chapter will investigate the relationship and significance of the liquidity creation and bank's performance.

Chapter 5 summarizes the details from chapter 1 to 4 by showing the discussion and findings, limitation of study, and providing recommendations for future researchers to make adjustments.

1.8 Conclusion

This chapter highlights the impact of liquidity creation on banks performance between single and dual banking systems in Southeast Asia. In detail, this chapter provides information about the background of study while the problem statement and research questions are discussed. The significance of study for the academic or practitioners described after the research objectives and hypotheses.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter indicates past research and studies the liquidity creation on bank performance. Several common theoretical models will be implemented to examine the results of the variables in the study. Furthermore, literature will be reviewed and findings are summarized from the studies. Lastly, theoretical framework and hypothesis have been developed.

2.1 Theoretical Review

There are several relevant theories being indicated to describe the relationship between variables and bank performance. It provides fundamentals to create proposed theories. Theories that had been used in this part were credit creation theory, credit default theory, classical principal-agent theory, financial intermediation theory, fisher effect theory and financial accelerator theory.

2.1.1 Credit Creation Theory

Credit creation theory was proposed by McLeay, Radia & Thomas (2014). Financial institutions create money through lending by using the deposited

money provided. However, total funds are not constrained by the activity of deposit where the acts of lending create new purchasing power that did not exist before. Moreover, the capacity of banks to generate credit money stems from the combination of lending and deposit taking. Thus, banks get benefits from interest earned on loans exceeding interest charged on bank liabilities such as interest paid on deposited money and bondholders. Credit creation increases banks to offer more loan opportunities and leads to increased profitability (University of Bristol, 2020).

2.1.2 Credit Default Theory

Credit default theory was newly developed by Sy (2007) after the investigation and measurement on the existing credit risk models. This theory is mainly for the estimation of expected losses from lending. Most of the existing theories in estimating expected losses from lending face difficulties in statistical estimation and do not strongly rely on empirical data. These theories suffer from historical sampling bias due to shortage of high qualities and massive data. Besides, the rapid change in the environment leads to the existing theories being unable to measure the credit risk. Thus, credit default theory is able to evaluate credit risk in a variation of environment.

Sy (2007) stated the main reasons for the occurrence of credit default are delinquency and insolvency. Delinquency can be known as inability to make payment on the debt on the due date. Most of the credit default happened due to delinquency. Insolvency occurs when the assets of the borrower are lesser than liabilities which can be explained as they have insufficient assets to pay back debts and thus may face bankruptcy. Risk factors that have

necessarily causal impact on delinquency and insolvency are considered relevant. In the changing market environments, only Sy's approach can be used to measure the credit risk dynamically.

Credit default theory is applicable and related in the study as non-performing loans is one of the indicators of credit risk and it directly affects a bank's profitability. The higher the amount of non-performing loans, the lower the bank's profitability. This is because bank's liabilities increase when borrowers are unable to make repayments on their debts.

2.1.3 Classical Principal-Agent Theory

Classical principal-agent theory was proposed by Michael Jensen and William Meckling. This theory has been developed within the framework of "new institutional economics" which was proposed by Rudolf Richter and shared the basic characteristics of the framework (Braun and Guston, 2003). For example, institutions can constrain actors' choices so that the problem brought by this principal-agent relationship could be avoided.

According to Khan, Scheule & Wu (2017), bank managers tend to take more risk by antagonistically lowering the lending rate to increase loan volumes in order to enhance their own benefits when banks have a lower funding liquidity risk as a result of large amounts of deposit inflows. Subsequently, most of the bank managers require higher levels of compensation to maintain their living standard. Hence, they will pursue more aggressive lending strategies when liquidity is in great quantity and not being questioned. However, if bank managers could handle the deposit inflows with a right and competitive strategy, it could still bring a certain profitability to financial

institutions. In short, the higher the amount of deposit, the higher the bank's profitability as the bank can use those deposits to fund for more action.

2.1.4 Financial Intermediation Theory

Financial intermediation theory was proposed by Gurley & Shaw (1960). In accordance to Wasiuzzaman & Tarmizi (2010), Gross Domestic Product (GDP) increases proportionally to bank profitability due to the expectation that when GDP increases, consumers will demand for more financial products and services such as loan to cope with the extra requirements on funds and capitals for carrying out business activities in the economy. As such, it creates extra incentives to banks for generating larger earnings and returns. Besides, lower purchasing power leads to higher possibility of credit default during economic downturn. Following an increase in business activities, GDP growth increases as well, according to the "Financial Intermediation Theory" (Vejzagic & Zarafat, 2014).

This theory takes into account agency theory and information asymmetry. The presence of financial intermediaries is essential in allocating and channelling resources optimally as well as mobilizing funds from surplus fund units (SFUs) to deficit fund units (DFUs). The primary business of financial intermediaries focuses on attracting more deposits while granting loans mainly to the businesses and governments for expansion or investment purposes. Financial intermediaries achieve these roles by issuing banks' products and services and alternating the nature of their financial instruments. As a result, banks serve as financial intermediaries that could benefit during economic expansion to increase their profitability. In other words, bank profitability is proportionally correlated to the GDP (Andries, 2009)

2.1.5 Fisher Effect Theory

Fisher effect theory was proposed by Irving Fisher (1930). This theory explains the relationship between inflation rate and interest rate from a long-term point of view (Mishkin, 1991). It is anticipated that nominal interest rate exhibits no change to the forecasted movement in inflation, either the rate is increased or decreased. This is the rationale behind the interest rate being kept constant to any shocks in the long run. Hence, the expected relationship between predicted rate of inflation and nominal interest rate is one-to-one. The Fisher Effect is affected by real economy factors instead of market forces (Edirisinghe, Sivarajasingham & Negel, 2015).

According to Chen (2015), the purchasing power of citizens declines as the rate of inflation rises. The reduction in purchasing power would lead to decreased investments and productions that could result in poor economic growth for a particular country. As such, Chen pointed out that the deposit rate of a country will increase if the predicted inflation rate rises. Goods and services become more expensive associated with rising inflation rate. Consequently, bank profitability grows associated with the uprising currency deposit rate.

2.1.6 Financial Accelerator Theory

Financial accelerator theory was proposed by Bernanke, Gertler, & Gilchrist (1994) that adopts the principal-agent approach in the credit market by analyzing the costs of the lender (principals) in obtaining information about chances, features, and borrower's behaviors. It shows that the cost of external financing is higher than internal financing due to asymmetric information

which causes higher agency cost of lending to reduce the possibility of non-payment, but the cost of external financing will be lower when being fully fledged or guaranteed (Bernanke, Gertler, & Gilchrist, 1994).

The net worth of borrowers affects the premium charged on external financing. The lower the value of net worth, the higher the premium charged with the given total amount of finance requested. Economic downturn will significantly affect creditors' net worth, increase in the premium charged, requested extra funds on external financing, and higher agency cost on lending lowers down the ability of borrowers in spending and production. Therefore, the government strengthens monetary policy when there is an economic downturn as it creates an unfavourable impact on interest rate in the balance sheet, and controls on funds reduce credit transactions in the banking sectors (Bernanke, et al., 1994).

The credit crunch refers to the situation in which it is difficult to raise funds via borrowing and happens during an increase in the interest rate or a decline in economic growth. Credit crunch happens when the banking industry's autonomous response to the rise in the actual intermediation costs as there is a deterioration of information asymmetry during the great depression. This interference affects the efficiency of the financing sector in performing services as borrowers find that the credit cost is high and hard to obtain when the cost of intermediation increases. Thus, there is a reduction in the personal demands for loans (Coric, 2011).

2.2 Literature Review

Literature review introduces the research that has been conducted by other researchers and drops a conclusion of the expected relationship.

2.2.1 Total Loans

Gul, Irshard and Zaman (2011) mentioned that loan has positive relationship with return on assets (ROA). The more deposits are turned into loans will lead to higher rates of interest and income by keeping other variables constant. A reduction in banks profit when banks try to increase the risk to get a higher loan to assets ratio. Samad (2015) stated that loan to deposit ratio is significant to Bangladesh banking industry's profitability and loans have a large proportion in bank's interest earning assets. The loan to deposit ratio is higher if banks turn more deposits into loans, the greater the bank's profitability and the greater the bank's liquidity risk. Therefore, total loan to total assets ratio increases when profitability of a bank increases.

According to Abdullah, Parvez and Ayreen (2014), loan to total assets which results from banks inability to absorb lower liabilities or to finance rises on the balance sheet side of the assets which is considered a significant determinant of profitability. These studies also showed that there is a positive impact between profitability of loans to the asset ratio (Olweny & Shipho, 2011; Alper & Anbat, 2011; Khrawish, 2011; Sufian, 2011; Syafri, 2012). Ramadan, Kilani and Kaddumi (2011) found that deposits and loans are the bank's most relevant financial statements metrics to represent the primary function of a bank. The higher the rate of transformation of deposits

into loans, the greater the profitability. The results showed that Jordanian banking lending activities are correlated with profit and banks in Jordan should maintain a large amount of lending activities in order to maximize profit.

Kolapo, Aveni and Oke (2012) stated a positive impact between loan and advance coefficient and profitability across financial institutions with constant time effect. The economic meltdown does not affect all of the variables of bank success used in our model which are non-performing loan, loan loss provision and loan and advance. According to Kayode, Obamuyi, Ayodeleowoputi and Ademolaadeyefa (2015), total loans and advances are linked to bank profitability in a positive and significant way. This study is supported by Boahene, Dasah and Agyei (2012). Total loan to total assets indicated a positive but minimal relationship with return on assets (Javaid, Anwar, Zaman & Gafoor, 2011). This shows that the return on assets will be lower with more loans but the relationship is not conclusive. From their result, it stated that higher loans contribute to profitability but their impact is not significant, revealing that more reliance on one major asset may result in profitability but with less impact on overall profitability.

On the contrary, Vong and Chan (2009) concluded banks have a negative effect on profitability if loan books of banks rapidly increase and need to pay for higher lending cost. Loan to total asset ratio (LOTA) decreases return on assets. Similar result was found by Vong (2005). Thus, higher loan to total asset ratio does not result in higher profit rates because of the interest spread due to the tight credit market situation and the subsequent interest rate cuts. It is inferred from the findings that the profitability of banks is inversely affected by the rate of loans and advance, non-performing loans and deposits by placing them at a high risk of illiquidity and distress.

Over the past few years, loan and growth has been relatively rapid and is not entirely supported by the deposit base. Thus, banks are worried that it may endanger their liquidity position as loans are generally the most volatile among the assets. Better management of credit risk results in better bank profitability (Kargi, 2011). Anbar and Alper (2011) showed that loan to total asset ratio is expected to have a positive impact on profitability unless the bank assumes an unreasonable risk level. Loan to asset ratio and loans under follow up to loan ratio has a negative impact on return on assets. suggests that the amount of the credit portfolio and poor quality of the assets have a negative effect on asset return.

As there are numerous relationships between total loans and bank performance, thus it should be analyzed with the positive expected signs between loan and bank's performance.

2.2.2 Non-Performing Loan

According to Clementina and Isu (2014), NPLs adversely affected the bank's performance in Nigeria in terms of liquidity and profitability as it deteriorates the assets of the bank. Banks have insufficient capital and funds to supply deficit funds units as NPLs weaken the activities in the financial system. As a result, investment activities cannot be conducted as NPLs obstruct the efficient performance of the economy. Osuagwu (2014) found out that the profit of banks in Nigeria decreases when loan default increases as it measures the strength of environmental determinants on the bank performance. The higher the ratio of NPLs, the lower the profit received by the bank. NPLs reduce loan amount and interest income of banks (Ugoani,

2016). Therefore, it generates a negative impact on the loan growth rate and also banks profitability.

Bhattarai (2016) mentioned the NPLs ratio negatively affected the bank's profitability in terms of ROA, whereby it positively affected the bank's profitability in terms of ROE. Roman and Danuletiu (2013) indicated high value of NPL ratios negatively affected the bank's profitability as it deteriorated the bank assets' quality in Romania. Duraj and Moci (2015) pointed out the increment of NPLs generates increment in the provisions from banks which cause decrease in the profitability of banks in Albania. Profitability of Albanian banks is affected by the poor credit quality as when there is an increment in the doubtful assets, it generates more provisions expenses in order to cover the credit losses which lower the bank's profitability.

On the contrary, Roman and Danuletiu (2013); Abiola and Olausi (2014) investigated that a high value of a non-performing loan has a positive correlation with a bank's profitability as it increases the exposure to credit risk and is compensated by higher return. Profitability of banks in Ghana increases even though there is an increase in the level of default and credit risk due to the extremely high lending rates in the economy (Boahene, Dasah & Agyei, 2012). Banks in Ghana enjoy experience in high NPLs that were evoked by forbidden interest rates, fees and commission. In the research of Marshal and Onyekachi (2014), the selected banks are not crucial enough in worsening the bank profitability as they have small amounts of non-performing loans in their loan portfolio. Kiran and Jones (2016) stated that linkage between non-performing assets and return on equity will be dissimilar based on the management of the non-performing asset.

However, Weersainghe and Perera (2013) pointed out that NPLs of banks in Sri Lanka show no relationship with profitability. This can be explained by well capitalized banks in Sri Lanka having excessive operations and lower levels of return that caused inefficiencies in the operations. There is also an insignificant relationship between credit risk and banks performance in Pakistan from 2006 to 2009 which adopted the ordinary least square method in the research (Akhtar, Ali & Sadaqat, 2011).

As the results are inconsistent from several studies, therefore this research has been conducted to investigate the relationship between non-performing loans and bank's profitability with the expected sign of negative.

2.2.3 Deposit

According to Christaria and Kurnia (2016), the increasing amount of deposit helps banks to extend more loans. However, credit risk is snowballing as the amount of funds required to finance credit is progressively large where the interest needed to pay customers is also increasing at the same time. Thus, a negative relationship is found as the risk is much greater when the amount of deposit is too high for a bank. The amount of deposit which plays a liability role in a bank's balance sheet increases, the liquidity will decrease (Dietrich & Wanzenried, 2011). This is because banks need to reserve a certain level of liquidity to meet the demand of depositors when they want to withdraw the deposit, hence banks will have less funds to generate more profit.

Besides that, Saeed (2014) found out that there is a negative relationship between deposit and bank profitability. As the stability of financial

institutions was heavily being harmed and caused customers to lose confidence in the financial institutions during the financial crisis. Thus, the issues caused customers were unwilling to deposit additional money in banks. Studies from Athanasoglou, Delis and Staikouras (2006) indicated that deposit negatively affects bank profitability. The more the amount of deposit will lead to creating more loans to customers. At the same time, the chance of financial institutions facing high-risk loans or default loans is also getting higher. The higher is the accumulation of this type of loan, bank profitability will be harmed at a certain level. Similar results were generated by Bejaoui and Bouzgarrou (2014). They debated that loan is an illiquid asset and stated that the more illiquid assets a bank holds, the lower the bank profitability. Hence, the overuse of deposits to finance loans is likely to fluctuate the bank profitability as this resource's structural inadequacy is met by the use of special resources and refinancing in the money market.

However, according to Van den End (2016), there is a significance between deposit and bank profitability within context of financial flow in a positive way. In this context, deposit can create loans and loans can be considered as one of the bank assets. Liquidity position of banks increases when deposit increases, thus banks are able to extend more loans and gain more profit theoretically. Javaid, Anwar, Zaman and Gafoor (2011) concluded that there is a significance between deposit and bank profitability in Pakistan. Profitability of banks will be affected by deposit as it is the main source of bank's funding. Loans will be increased when banks are more dependent on deposit for funding which can lead to a better return on assets. Kawshala and Panditharathna (2017) have similar results as banks provide more loan opportunities to customers when they have more deposits which mean there is more opportunity to generate profit.

On contrast, Ali and Puah (2019) revealed that deposit has insignificant relationship with bank profitability. The more aggressive a financial

institution tries to generate, more deposits will increase operational cost as a result of increasing promotional programmes, offering low and attractive interest rates to consumers. Thus, bank profitability will not be affected if the financial institution does not try to take an aggressive initiation to generate more deposit. According to Adusei (2015), bank profitability is insignificantly related to deposit. From their study, low deposit will result in a lower level of consumer confidence and vice versa. The evidence to prove the statement above is that consumers will doubt the stability of a particular financial institution if that particular financial institution was unable to offer a high level of deposit.

As there are inconsistent results from several studies, therefore our study will conduct an analysis by observing the relationship between deposit and bank's profitability with the expected sign of negative.

2.2.4 Gross Domestic Product (GDP)

Roman and Danuletiu (2013); Curak, Poposki and Pepur (2012) concluded GDP is significantly influencing Romania commercial banks' profits in a positive way. Increase in GDP will cause an increase in economic growth which encourages demand for financial products and services as well provide an opportunity to the banks for giving more lending activities respectively. On the contrary, bank profitability is expected to decline during the economic crisis due to the increasing amount of non-performing loans (NPL). In accordance to San and Heng (2013), during economic expansion, increasing demand for credit (loan) and rising quality of bank assets would lead to higher earnings. Meanwhile, default risk and the cost

of provisions are rising as it creates an impact on the reduction of lending activities, causing the bank profitability to decline.

In examining the profitability determinants for Pakistan banks, Ali, Akhtar and Ahmed (2011) pointed out that GDP growth rate is statistically significant in increasing assets and equity returns during 2006 to 2009. Athanasoglou, Brissimis and Delis (2008) observed that the upper phase of the business cycle in Greek is having an impact on the bank's profitability. They predicted that the rate of GDP growth will make an impact on the demand for loans for banks. Investigation of macroeconomic determinants was conducted by Zeitun (2012) proved positive relation of GDP to ROA and return on equity (ROE) for banks in Gulf Cooperation Council countries.

On the other hand, Staikouras and Wood (2004) debated that negative correlation is found between GDP growth and bank profitability in the commercial banks and saving banks in European countries. They claimed that countries that are experiencing higher GDP growth rate normally own fully-developed banking systems which would bring higher levels of competitive interest rate and profit margin. However, due to the intense competition that exists in the banking industry, those banks could not easily acquire profits from economic growth. The findings are consistent with the research by Ameur and Mhiri (2013) that discovered a negative relationship between GDP and ROE and net interest margin (NIM) in Tunisia.

Notwithstanding, the impact of GDP on bank profitability remains indefinite. Studies conducted by Ramadan, Kilani and Kaddumi (2011) in Jordan revealed insignificant negative relationships on the profitability of banks. No impact of economic growth is found from the study of Ben Neceur (2003). There were two reasons that contributed to this insignificant result. Firstly, it was suggested that banks were inclined to not gain advantage in

growing their profits during the inflationary conditions. Secondly, it was mentioned that economic growth does not reflect any aspect of the regulations as well the technology advancement in the banking sectors. Arias (2011) in the US proved that the profitability level of banks is not directly influenced by GDP.

Athanasoglou, Delis and Staikouras (2006) argued there is no evidence to prove GDP exerts significant impact on profitability of banks in South-Eastern European countries. This can be explained by implementing tight monetary policy during the examined time of the research. Once the price stability is achieved in the particular country, there is an expectation that stronger relationship should be observed between the economic growth and bank profitability by means of offering more lending activities, improving the quality of bank assets as well reducing the strictness from the supervisory side in view of the instability in the macroeconomic environment. Study from Pasiouras and Kosmidou (2007) reported that the impact of GDP on bank performance remains doubtful to domestic and foreign samples respectively.

Since the results from the past studies are inconsistent, an analysis was conducted by our study on examining the relationship between GDP rate and bank's profitability with the expected sign of positive.

2.2.5 Inflation Rate

Vong and Chan (2009) stated that inflation will cause an effect on bank profitability, determined by the factor whether inflation is anticipated or otherwise. If inflation is being fully anticipated, interest rates could be adjusted accordingly to realize a positive impact on the profitability. Study from Athanasoglou, Brissimis and Delis (2008) further highlighted that bank profitability can be determined by contrasting the increasing rate of wages and other operating costs to the rising rate of inflation. The profitability determinants will depend on whether the banks could adjust their operating expenses according to the inflation expectation by raising the interest rates to increase revenues faster than the costs they would have incurred to acquire profits.

Pan and Pan (2014) discovered there is a positive relationship between inflation on the profitability of commercial banks in China. As citizens are making both saving and investment decisions in relation to their nominal incomes, they will definitely save and invest more, since inflation would raise their nominal incomes. During inflation, revenues earned from bank floats rise more than the bank costs incurred in business operations and branch network, resulting in higher bank profits (Tariq, Usman, Mir, Aman & Ali, 2014).

Studies from Molyneux and Thornton (1992) in ascertaining the factors that affect the performance of banks in European countries from the period of 1986 to 1989 found a positive relationship between inflation rate and bank profitability. Results from Athanasoglou, Delis and Staikouras (2006) showed that high earning level in South-Eastern European banks is noticeable during inflationary periods. Consistent results to Alexiou & Sofoklis (2009) highlighted that the impact of inflation to bank profitability is positive, but the effect is minor. Guru, Staunton and Balashanmugam

(2002) in Malaysia both conclude higher levels of profitability are associated with higher levels of inflation.

On the contrary, if inflation unpredicted rise would ultimately create cash flow problems to the borrowers that resulted in premature termination of loan contracts. If that is the case whereby the banks are reacting slowly to adjust their interest rates associated with the increasing inflation, there is increasing chances the banks would suffer losses due to higher costs incurred in comparison to the revenues earned. Furthermore, inflation could adversely influence the planning and negotiation on loans, and thus reduce the profitability (Sufian, 2011).

Studies from Muda, Shaharuddin & Embaya (2013) also argued that inflation is negatively correlated with return on equity (ROE) on both local and foreign banks. In the study from Pasiouras and Kosmidou (2007) examined negative correlation between inflation and profitability of foreign banks while minor positive correlation on profitability of domestic banks studied as local banks might make adjustments on the interest rate according to the predicted inflation level, while external banks might not.

However, Anbar and Alper (2011) discovered inflation does not cause any impact to ROE and ROA of banks in Turkey. Findings from Ben Naceur (2003) were found to be inconclusive to bank performance. At the same time the banks failed to fully and accurately anticipate future inflation and failed to seize the opportunity to gain advantage from inflationary conditions in increasing profits. This implies that the banks have not benefited from the economic growth as well as the business opportunities as a means to grow their profits. This is supported by Ramadan, Kilani & Kaddumi (2011) said

that one of the probable reasons is due to the fierce competition as a result of the entry of new banks into the banking industry.

As there are inconsistent results generated from distinct studies, we conducted the study in observing the relation between inflation rate and bank's profitability with the expected positive sign.

2.2.6 Unemployment Rate

Klein (2013) found that higher unemployment rate causes higher levels of non-performing loans in most of the Central, Eastern, and South Eastern Europe (CESEE) countries. Weak economic conditions lower down capacity of borrowers to repay loans which causes banks incur losses. Similar result was found by Messai & Jouini (2013) in Italy, Greece and Spain as the unemployment rate reduces household's purchasing power and increased burden on repaying loans. It also influences on company's production as it lowers down the effective demand and decreases in company's profit but still has to pay for long term and short-term debts. The influences on household and company cause the capability of repaying the financial obligations to drop which reduces the bank's profitability.

The study from Mileris (2015) in EU countries indicated that EURIBOR rate falls when demand of loan is less where economic downturn occurs in 2009 which cause reduction of interest income and increment in average margin of new loan. Banks in Hong Kong have more ability to manage cost efficiently during good economic conditions as they are able to provide lower loan prices and increase its profitability (Wong, Fong, Wong & Choi, 2008). Larger banks receive more benefits than smaller banks in offering attractive prices by receiving similar or higher profit due to its cost

efficiency. This shows that banks are able to charge higher prices on the loan products when good economic conditions lead to higher profit but lower prices when increase in unemployment rate leads to reduced profit (Wong, Fong, Wong & Choi, 2008).

Tan and Li (2018) determined the unemployment rate is negatively related to the bank's profitability. When unemployment rate increases, banks tend to reduce credit risk by increasing loan loss provision and monitor strictly on lenders activities. Profit of banks will be reduced as loan loss provision is extracted from retained earnings and banks incur higher cost to adopt more strategies and monitor borrowers' activities. The rising unemployment rate in the United States causes the absolute value of coefficient of smaller banks tends to be greater than larger banks which indicate that they have lesser capability in handling credit risk. Zhang & Dai (2019) showed that unemployment rate in the United States significantly affected banks profitability as it affected customers' demand on banks products and services which affects commercial activities.

Samhan and Al-Khatib (2015) stated that the result of all the dependent variables is significantly related and has a negative correlation with the unemployment rate by analysing the Jordan Islamic banks. Vodova (2011) determined higher unemployment rate reduces commercial banks liquidity in Slovakia during 2001 to 2010. Instability of the economy causes borrowers to face greater difficulty in repaying debts that reduces banks liquidity especially after the occurrence of financial crisis. When there is a rise in unemployment rate, all of the banks except OTP Banka Slovensko have increased its lending activity as the demand for loans increases which reduces liquidity and lower profitability.

On the other hand, Zou, Miller and Malamud (2011) found that there is an increase in non-performing loan ratio, loan losses ratio, and net loan losses when the unemployment rate rises across all the larger and smaller banks in the United State. Ozili (2018) indicated that unemployment rate is significantly associated with the bank's stability in Africa. There is a high chance of non-payment in principal and interest of the loans when there is a rise in unemployment rate and customers demand more loans from the bank. However, banks tried to improve their stability by taking steps to control excessive lending and make predictions on customers that do not have ability to repay on loan and leads to reducing non-performing loans as a precaution. Thus, the research shows a positive significance between bank stability and unemployment rate.

The rising unemployment rate in MENA and EU regions increases bank's profitability as banks increase their spread and margins to safeguard profitability when there are changes in the economic environment. The increase of margin helps to compensate in the decrease of loan provision which increases banks profit. This situation is only applicable to small banks in EU regions. However, all the macroeconomic factors are not significantly related to the bank's profitability in MENA regions (Eldomiaty, Mabrouk, & El-Shater, 2015). Based on the study of Shaha, Khan & Syed Sadaqat Ali Shaha (2018), unemployment rate has a negative relationship with banks liquidity in Pakistan as customers will reduce the demand for loans when there is a high unemployment rate. However, the results show that the impact of unemployment rate on bank's liquidity is relatively low because it is significant to the dependent variable of liquid assets relative to total assets but insignificant to the dependent variable of total loan to total deposit ratio. The limitation of the study is taking into consideration 23 banks in Pakistan without analysing the effect of unemployment rate on banks in other countries.

As there are inconsistent results from several studies, therefore it is crucial for researchers to conduct such analysis by observing the relationship between unemployment rate and bank's profitability with the expected sign of negative.

2.3 Conceptual Framework

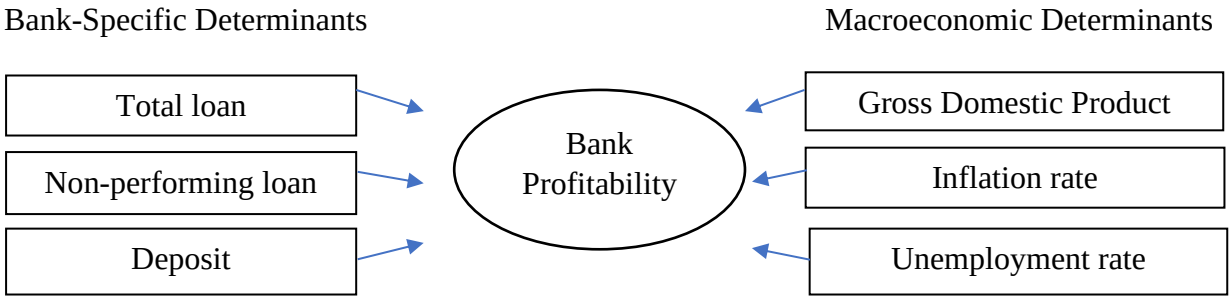


Figure 2.1: Determinants of Liquidity Creation on Bank Profitability

The following hypotheses are derived based on the conceptual framework.

H_1: Total loans have a significant relationship to net interest margin.

H_2: Non-performing loans have a significant relationship to net interest margin.

H_3: Total deposits have a significant relationship to net interest margin.

H_4: Gross domestic product has a significant relationship to net interest margin.

H_5: Inflation rate has a significant relationship to net interest margin.

H_6: Unemployment rate has a significant relationship to net interest margin.

2.4 Conclusion

Theoretical framework is proposed in the study. In addition, literature reviews related to the field of study were done in this chapter. The analysing and interpreting of findings from past studies is done to determine the relationship between liquidity creation and bank's performance. Lastly, methodology that is used to conduct the study is going to be discussed in the following chapter.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter discusses research methodology where the flow of procedures for determining, selecting, processing, evaluating information in this study. Section 3.1 and 3.2 explain the details of data and chosen variables. Section 3.3 introduces the econometric framework that will be used with the expected sign of coefficients. Furthermore, Section 3.4 will construct empirical testing on the descriptive statistic and inferential analysis with the econometric framework. Lastly, diagnostic checking presents the validity, credibility and reliability of the econometric model.

3.1 Data Collection Procedure

3.1.1 Research Design

This study examines the relationship of liquidity creation on bank's performance between single and dual banking systems in Southeast Asia from 2007 to 2017. In this research, Cambodia, Singapore, and Vietnam are used as a proxy of a single banking system while Brunei, Indonesia, and Malaysia are the proxy of dual banking systems.

Research design is a framework that adopts techniques to link the components of the research jointly in a sound manner. It is vital to design

before collecting data from various sources. There are three different types of methods in research design which are qualitative, quantitative and mixed methods (Geoffrey, 2019).

Quantitative method is adopted in the research paper as it is a more relevant method compared to qualitative methods. It is characterized by accumulating quantifiable data and implementing statistical, mathematical or computational methods as a systematic analysis. Lartey, Antwi and Boadi (2013) indicated that quantitative research was adopted to determine the correlation between dependent and independent variables. Net interest margin (NIM) is chosen to represent dependent variables and independent variables are total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL) and unemployment rate (UNEM).

3.1.2 Data Collection Method

In this study, panel data is being introduced to examine the relationship of bank specific and macroeconomic variables on the bank performance between single and dual banking systems in Southeast Asia by collecting secondary data. Secondary data refers to the data that has already been collected or generated by others (Ajayi, 2017). It is an analysis of primary data and publicly available that requires less effort and is cost effective for researchers to obtain compared to primary data.

In this research, secondary data of net interest margin and six independent variables including total loans, non-performing loans, total deposits, gross domestic product, inflation rate, and unemployment rate are collected from

various sources that are stated below in Table 3.1. The data is being evaluated from 2007 to 2017 on an annual basis with six different countries in Southeast Asia including Brunei, Cambodia, Indonesia, Malaysia, Singapore, and Vietnam. In this research, Cambodia, Singapore, and Vietnam are used as a proxy of a single banking system while Brunei, Indonesia, and Malaysia are the proxy of dual banking systems. As the data of total loan amount taken from numerous sources with different units of measurement, transforming the total loan variable into log function will be simple for making interpretation in the analysis part. In short, there are 66 sample sizes in total to conduct the empirical testing, thus the generated results are expected to be accurate and consistent with the past studies.

Table 3.1

Variables and Sources of Data

Variables	**Notation**	**Unit of Measurement**	**Data Source**
Net Interest Margin	NIM	Percentage (%)	World Bank
Total Loans	Loan	BND in Billion	Authoriti Monetari Brunei Darussalam
		KHR in Million	National Bank of Cambodia
		Rp in Billion	OJK
		RM in Million	Bank Negara Malaysia
		US$ in Million	Singapore Government Agency
		VND in Million	CEIC
Non-Performing Loans	NPL	Percentage (%)	World Bank
Total Deposits	DEP	US$ in Billion	World Bank / CEIC
Gross Domestic Product	GDP	Percentage (%)	World Bank
Inflation rate	INFL	Percentage (%)	World Bank
Unemployment rate	UNEM	Percentage (%)	World Bank

3.1.3 Data Processing

Table 3.1 displays various sources of data collected such as the World Bank, CEIC, and banks of respective countries. Data is being keyed in and arranged wisely in Microsoft Excel after collection. Moreover, EViews 10 is being used to generate results by constructing empirical testing and diagnostic checking with the collected data. Thereafter, the outcomes are being taken through several processes of presenting, analysing, justifying, and interpretation specifically, as well as examining the consistency with expected sign of coefficients and past studies in the literature review part.

3.2 The Rationale of Variable Choices

3.2.1 Net Interest Margin (NIM)

Net interest margin is a profitability ratio that measures the performance of a company or financial institution in investment decisions with the consideration of income, expenses, and debt ("Net interest margin," 2021). Net interest income expressed as a percentage of earning assets. The higher of the net interest margin shows the bank or financial institution performing well in profitability by earning more interest than interest that paid out (Nguyen, 2012).

$$Formula = \frac{Investment\ income - Interest\ expenses}{Average\ earning\ assets}\ x\ 100\% \qquad (3.1)$$

3.2.2 Total Loans (Loan)

Loan can be defined as a form of credit vehicle in which, in return for future repayment of the value or principal amount, a sum of money is lent to another party. In addition to the principal balance, the lender also applies interest and finance charges to the principal amount that the borrower must repay. Moreover, loans may be a fixed, one-time amount or they may be available up to a specified limit as an open-ended line of credit (Kagan, 2020). Regarding the study of Samad (2015), loan to deposit is higher if banks turn more deposits into loan, the greater the bank's profitability and the greater the bank's liquidity risk.

3.2.3 Non-Performing Loans (NPL)

Non-performing loans refer to loan facilities that borrowers are not able to make payment on time (Clementina & Isu, 2014). Most of the researchers deemed NPLs as bad debts due to its highly doubtful recovery.

3.2.4 Total Deposits (DEP)

According to Focarelli and Panetta (2003), deposits can be known as customer deposits and can be calculated as dividing total customer deposits by total assets of the financial institutions. In their study, deposits are known as a secondary source of income for financial institutions.

3.2.5 Gross Domestic Product (GDP)

Gross Domestic Product (GDP) is referring to the total income generated by the outputs produced within a country during a stipulated time period. GDP growth rate is the proxy in measuring the GDP of a particular country. GDP growth is defined as the annual change in the GDP which is used as an indicator to the demand for banking products and services (San & Heng, 2013). The formula of GDP is calculated as shown below (Fernando, 2020).

C: Consumption

G: Government Spending

I: Investment

NX: Net Exports

3.2.6 Inflation Rate (INFL)

Inflation refers to the rate that is capturing the general rising price level for all the selected goods and services in an economy. Inflation will make an impact in the purchasing power of the consumers in buying lesser goods and services given each unit of the currency (San & Heng, 2013). The formula for measuring the rate of inflation is as shown below (Fernando, 2020).

3.2.7 Unemployment Rate (UNEM)

The unemployment rate represents the total percentages of the unemployed labour force in a country (Singh & Sharma, 2016). According to the International Labour Organisation (ILO), measurement of unemployment rate is individuals who categorise as an individual being employed by employer without any work or job in the past four weeks, but search job actively ("Unemployment," 2021).

$$Formula = \frac{Number\ of\ employed + unemployed}{Total\ population}\ x\ 100\% \qquad (3.2)$$

3.3 Econometric Framework

This study introduces an econometric model to test the significance of net interest margin with six variables including total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM). In this model, total loans transformed into log function for simple understanding and interpretation as obtained total loans data from various sources that shows total loans amount in different units of measurement.

3.3.1 Panel Data Regression Model:

$$NIM_{it} = \beta_0 + \beta_1 In(Loan)_{it} - \beta_2(NPL)_{it} - \beta_3(DEP)_{it} + \beta_4(GDP)_{it} + \beta_5(INFL)_{it} - \beta_6(UNEM)_{it} + \varepsilon_{it} \qquad (3.3)$$

Where,

NIM= Net Interest Margin (in percentage)

Loan= Total Loans (BND in Billion / KHR in Million / Rp in Billion / RM in Million / US$ in Million / VND in Million)

NPL= Non-Performing Loans (in percentage)

DEP= Total Deposits (US$ in Billion)

GDP= Gross Domestic Product (in percentage)

INFL= Inflation Rate (in percentage)

UNEM= Unemployment Rate (in percentage)

i = country (Brunei, Cambodia, Indonesia, Malaysia, Singapore, and Vietnam)

t = period (2007 to 2017)

In this study, panel data regression model is used to test single and dual banking systems respectively with net interest margin and six independent variables which are total loans, non-performing loans, total deposits, gross domestic product, inflation rate, and unemployment rate from 2007 to 2017. As shown in the panel data regression model applied in this research to resolve the literature gap that indicated in Chapter 2 of the literature review part by analysing the impact of bank specific and macroeconomic variables on bank's performance between single and dual banking systems over six countries.

3.4 Empirical Testing Procedure

3.4.1 Descriptive Analysis

The usefulness of descriptive analysis is gathering the raw data from a sample or population and provides a brief idea of the main point of the data by analysing the dependent and independent variables. In this study, the purpose to analyse the liquidity creation on bank's performance between single and dual banking system in Southeast Asia with different variables including net interest margin (NIM), total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM). Descriptive analysis is crucial to be conducted before making inferential analysis comparisons as it provides the foundation of information for the inferential analysis (Kaur, Stoltzfus, & Yellapu, 2018).

Descriptive statistics provide information by measuring the frequency, dispersion, position, and central tendency. Nevertheless, interpretation of data analysis for the descriptive analysis concentrates on central tendency and dispersion part only out of four measurements. Central tendency is the value that illustrates the whole set of data in a single measurement. In the central tendency, there are three parts that could be categories which are the mean, median, and mode. The mean is the average value of a variable by dividing the total number of observations of the particular variable, median is the middle number of the single-item variable, and mode is the value that occurs the most frequently in a single item of variable. For the dispersion, this study focuses on the variance and standard deviation measures of spread that indicate how closely each data is to the mean value for a single item variable (Kaur, Stoltzfus, & Yellapu, 2018).

3.4.2 Inferential Analysis

3.4.2.1 Phillips-Perron Unit Root Test

Unit root test is one of the tests that has important implications on economics as this test hypothesizes the rational use of information that is available to economic agents (Phillips & Perron, 1988). Before proceeding to the Phillips-Perron unit root test, researchers shall know that the Dickey-Fuller test involves fitting the regression model by ordinary least squares (OLS), but there will arise a problem of serial correlation which is a trouble. Thus, our study chooses to run with Phillips-Perron unit root test due to this test can be viewed as Dickey-Fuller statistics that have been made robust to serial correlation by applying Newey-West estimator (1987) (Rothe, & Sibbertsen, 2006). In particular, the unit root test helps in determining whether the trend is stochastic or deterministic. According to Phillips and Perron (1988), stochastic trend means that the outcome caused by one particular variable involves randomness or uncertainty while deterministic trend means that the outcome caused by one particular variable can be forecasted. Phillips-Perron unit root test can help to deal with serial correlation and heteroscedasticity in the error term.

H_0 : Presence of a unit root

H_1: Absence of a unit root

3.4.2.2 Panel Data Regression Model

According to Gujariti and Porter (2009), the panel data regression model uses panel data which consists of cross sectional and time series data to conduct the analysis. In this study, the researchers use the model to analyse the effects of banks specific factors and macroeconomics factors on the bank's performance over six countries in Southeast Asia from 2007 to 2017. There are several reasons for choosing panel data where it is more comprehensive in analysing variation of observations over the time period rather than using cross sectional or time series data only. This is because cross section data focuses on variation of observation in a particular year, while time series data emphasizes the time effect of one observation only. Besides, panel data captures heterogeneity in different units, thus the estimation is more accurate because it does not treat all of the observations as the same or equal. Subsequently, panel data takes into consideration the dynamic of changes such as financial crises.

Panel data regression model has three different types which are pooled ordinary least square model (POLS), fixed effect model (FEM), and random effect model (REM) which are applicable to different situations and assumptions. The similarity between the fixed effect model and the random effect model is both models considered as a heterogeneous model, while the differences in the individual specific error components of the random effect model are not correlated with the independent variables but the fixed effect model does. Therefore, this study will use three different hypotheses testing to determine which model is the most appropriate (Gujariti & Porter, 2009).

3.4.2.2.1 Pooled Ordinary Least Square Model (POLS)

Pooled regression or pooled ordinary least square model (POLS) is the easiest way to estimate with a sample *NT* as observation, at the same time not recognizing panel structure of data ("Models for Pooled and Panel Data,"n. d.). In this model, the assumptions are that all the coefficients of each observation will be the same and do not change according to time, which can be said as a homogeneous model. Besides, the error term under this model can be known as clustered standard errors where this type standard error is robust to correlation between error terms of that coefficients of each observation will be the same and heteroskedasticity over time. The disadvantages of POLS are that all observations are equal in which not taking consideration of the effects or specification of observations over the time leads to the estimator or coefficient value imprecise (Gujariti & Porter, 2009).

3.4.2.2.2 Fixed Effect Model (FEM)

For the fixed effect model, the assumptions are that the coefficient of each of the observations will be different but there can be two situations where time variant and no time variant. The specification of the FEM is the individual specific error components are correlated with the explanatory variables. For the time variant model, dummy variables are used to capture the effects. As there are an excessive number of dummy variables that leads to degrees of freedom (k) losses which will lose a lot of information and higher chance of multicollinearity problems occur. The degree of freedom is important when calculating the test statistic value where k is the number of independent variables in the model (Gujariti & Porter, 2009).

3.4.2.2.3 Random Effect Model (REM)

The assumptions of random effect models are that all the coefficients are different by using a large number of populations to estimate the individual intercept with a constant mean value and do not respond to time. The intercept value of the model is showing the value deviation from the constant mean value. The awareness of REM is to use Generalised Least Square (GLS) to estimate the REM instead of using Ordinary Least Square or else the error term is found not constant which leads to autocorrelation problems. Thus, the individual error components are not related to each other and do not correlate with the time series or cross-sectional data (Gujariti & Porter, 2009).

3.4.2.2.4 Poolability Hypothesis Test

Poolability hypothesis test is used to measure the pooled ordinary least square model and fixed effect model by using the test statistic of the restricted F test or p-value. In this test, researchers analyse the null hypothesis and reject the null hypothesis if the p value is less than all the significance levels (1%, 5% and 10%). The rejecting decision shows that the fixed effect model is more suitable for this study compared to the pooled ordinary least square model (Gujariti & Porter, 2009).

H_0: There is a common intercept on bank performance in the banking system. (POLS is preferred).

H_1: There is no common intercept on bank performance in the banking system. (Fixed Effect Model is preferred).

3.4.2.2.5 Breusch and Pagan Lagrange Multiplier Test

Breusch and Pagan Lagrange Multiplier test examines the pooled ordinary least square model against the random effect model in the heterogeneity error as both models make different assumptions where pooled ordinary least squares assume homogeneity while the random effect model assumes heterogeneity. When p value is less than all the significance levels (1%, 5% and 10%), researchers will reject null hypothesis and make a conclusion that a random effect model is more preferable (Gujariti & Porter, 2009).

H_0 : There is a common intercept on bank performance in the banking system. (POLS is preferable).

H_1 : There is no common intercept on bank performance in the banking system. (Random Effect Model is preferable).

3.4.2.2.6 Hausman Test

The Hausman test is used to determine the suitability of a fixed effect model compared to a random effect model in this study by using the decision rule of rejecting the null hypothesis where p value is less than all the significance levels (1%, 5% and 10%). Otherwise, do not reject. If the result shows rejection of the null hypothesis, it means that the fixed effect model is more suitable in the model (Gujariti & Porter, 2009).

H_0 : There is a common intercept on bank performance in the banking system. (Random Effect Model is preferable).

H_1 : There is no common intercept on bank performance in the banking system. (Fixed Effect Model is preferable).

3.4.2.3 Diagnostic Checking

3.4.2.3.1 Normality Test

The Jarque-Bera (JB) test is a large sample test that focuses on skewness and kurtosis to measure the residuals of Ordinary Least Square (OLS). The test statistic for JB test is as follow:

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \quad (3.4)$$

If the p-value of JB test is less than the significance level, the null hypothesis can be rejected and concluded that the residuals are normally distributed (Gurajati & Porter, 2009).

3.4.2.3.2 Multicollinearity

The occurrence of multicollinearity is due to two or more independent variables in a multiple regression model being highly correlated to each other. Multicollinearity will make the statistical inferences less reliable (Hayes, 2020).

Generally, there are three ways to detect the degree of multicollinearity. Firstly, multicollinearity is detected if high R^2 is observed with few significant t ratios. This implies that the overall statistic result is significant while the individual statistic result is not significant. High pairwise correlation is the second method to prove multicollinearity problems. It can be concluded that the independent variables are correlated if correlation is more than 0.80. Other than that, highly collinearity exists if Variance Inflation Factor (VIF) is 10 or higher while Tolerance Factors (TOL) that is near to 0 indicates serious multicollinearity. The closer the TOL to 0, the higher the degree of collinearity between the two independent variables; and vice versa ("Statistics Solutions," 2021).

The equation of VIF and TOL can be known as:

$$VIF = \frac{1}{(1 - R^2)} \tag{3.5}$$

$$TOL = \frac{1}{R^2} \tag{3.6}$$

Table 3.2

Rules of Thumbs of VIF

VIF value	Indication
VIF > 10	Serious multicollinearity
1 < VIF < 10	No serious multicollinearity
VIF = 1	No multicollinearity
VIF = ∞	Perfect multicollinearity

Table 3.3

Rules of Thumbs of VIF

TOL value	Indication
TOL ≈ 0	Serious multicollinearity
TOL ≈ 1	No serious multicollinearity
TOL = 1	No multicollinearity

3.4.2.3.3 Heteroscedasticity

Heteroscedasticity occurs when the standard deviation of an expected variable is non-constant, measured over various values of an independent variable or connected to previous time periods. Furthermore, there are two forms of heteroscedasticity that often occur which are conditional and

unconditional. Conditional heteroscedasticity identifies non constant volatility related to volatility of the preceding period while unconditional heteroskedasticity refers to general structural changes in volatility not related to the volatility of the preceding period (Hayes, 2020). Besides that, in datasets which have a wide range between the largest and smallest values observed, heteroscedasticity occurs more frequently. There are various explanations on the occurrence of heteroscedasticity but the common reason is that the variance of error varies with a factor in proportion. A variable in the model may be this factor (Frost, n. d.).

However, heteroscedasticity may generate some consequences and problems. Linear regression assumes that the distribution of the residuals is constant throughout the maps which were stated by the researcher earlier. There is a risk that the statistical findings will not be trusted when assumptions are violated at any time. Therefore, there are two reasons for using homoscedasticity instead of heteroscedasticity. Firstly, heteroscedasticity in the coefficient estimates does not cause any bias, but it reduces its accuracy. Lower accuracy raises the probability that the estimates of the coefficient are further away from the right population value. Besides that, heteroscedasticity appears to create smaller p-values than what it should be. This effect arises because the variance of the coefficient estimates increases by heteroscedasticity, but this increment is not observed by the OLS method. Subsequently, the p-value of test statistic and F statistic will be affected with an underestimated amount of variance that leads to inaccurate significant results (Frost, n. d.).

In this research, Breusch-Pagan Lagrange Multiplier test is used to test for heteroscedasticity in linear regression models derived from the principle of Lagrange multiplier test in order to examine the variance of error term significance to the independent variable. If the variance of error term is significant to the independent variable shows that heteroscedasticity occurs.

The estimated linear regression model:

$$Y = \beta_0 + \beta_1 x + \beta_p x_p + \mu \quad (3.7)$$

Where μ, the error term that is normally and independently distributed with zero mean and variance. If the residual is not normally and independently distributed with zero mean and variance shows that the variance is significant to independent variables. Thus, an auxiliary regression equation is used to determine by regressing the squared residuals on the independent variables.

The auxiliary regression equation:

$$\hat{u}^2 = \alpha_0 + \alpha_1 x_1 + \alpha_p x_p + v \quad (3.8)$$

Where û, the residual obtained from the regression model is used in analysing samples out of the population. x denotes the vector of explanatory variables, and v denotes the white noise error term.

Breusch pagan test follows chi square distribution where the test statistic is nX^2 with the number of degrees of freedom or p-value of the test statistic. If the BP test statistic nX^2 is greater than the chi square critical value or p value is less than all the significance levels (1%,5%,10%) shows that rejecting the null hypothesis. This indicates that the error term is significant to the explanatory variables.

3.4.2.3.4 Autocorrelation

Autocorrelation is a statistical representation of the degree of similarity between a given time series over a successive time interval and a lagged version of itself. This is the same as measuring the correlation between two separate time series except that autocorrelation uses twice the same series which is once in its original form and one more time interval once lagged (Smith, 2020). Autocorrelation is crucial due to several reasons such as the validity of inferential statements associated with conventional hypothesis tests and confidence intervals may be affected, knowledge of their presence may lead a researcher to select a more appropriate statistical analysis and the accuracy of predictions based on regression equations may be improved by using autocorrelation information (Huitema & Laraway, 2006).

In this study, Durbin Watson was chosen where the Durbin Watson statistic is a predictive regression analysis test for autocorrelation in the residuals. The value of the Durbin Waston statistic will be always within 0 and 4. There is no autocorrelation being detected if the value of d-test is within d_U and $4 - d_U$. However, autocorrelation is being detected if d-test is less than d_L or more than $4 - d_L$. Otherwise, the result is inclusive.

Table 3.4

Decision Rule of Autocorrelation

Decision Rule						
Reject H_0		Do Not Reject H_0				Reject H_0
0	**d_L**	**d_U**	**2**	**4- d_U**	**4- d_L**	**4**
	Inconclusive			Inconclusive		

3.5 Conclusion

In conclusion, this chapter explained the variables, sources of data, and methodology adopted in this study. In this study, the panel data regression model is being chosen to make an analysis and discussion about the empirical results in the following chapter by running the data through EViews 10.

CHAPTER FOUR: DATA ANALYSIS

4.0 Introduction

In this chapter, empirical data results that were generated by EViews 10 are interpreted in detail. There are two types of statistical methods being explained which are descriptive analysis and inferential analysis. Descriptive analysis is the measure of central tendency, variability and position, whereas all the methodologies in inferential analysis as mentioned in Chapter 3 are thoroughly conducted and interpreted. Diagnostic checking covered in the last section of this chapter is to ensure the accuracy of the estimated models.

4.1 Descriptive Analysis

Definition of mean is an arithmetic average whereby the summation of a series of numbers in a dataset is divided by the total count of the observations. Whereas, standard deviation measures the spread of how close each observation in a dataset is relative to its mean value. Standard deviation is computed by taking the square root of the variance. Lower standard deviation is observed whereby all the values in a dataset are close to the mean value. Datasets yielding greater spread from its mean concluded a larger deviation (Kaur, Stoltzfus & Yellapu, 2018).

4.1.1 Single Banking System

Table 4.1

Results of Descriptive Statistic

	NIM	LNLOAN	NPL	DEP	GDP	INFL	UNEM
Mean	3.892727	17.37159	2.114375	108.5927	5.927879	5.331212	2.208788
Median	3.360000	17.17500	2.080000	15.07000	6.240000	3.520000	1.880000
Maximum	8.420000	20.47786	4.800000	381.9200	14.53000	25.00000	5.860000
Minimum	1.390000	14.74704	0.760000	1.770000	0.090000	-0.660000	0.390000
Standard deviation	2.152882	1.855990	0.931814	143.2087	2.662650	6.128866	1.497061
Skewness	0.525878	0.228484	0.807973	0.872373	0.398518	2.002872	0.536671
Kurtosis	1.885010	1.642111	3.487389	1.947563	5.544313	6.584497	2.171839
Observations	33	31	32	33	33	33	33

Notes: Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).

According to table 4.1, the mean value of net interest margin (NIM) is 3.89% with a maximum value of 8.42% and minimum value of 1.39%. The net interest margin (NIM) has a standard deviation of 2.15%. The mean value of total loans (Loan) is 17.37% after adding the log function into this variable. Total loans (Loan) indicated the highest figure of 20.48% and lowest figure of 14.75%. The total loans (Loan) have a spread of 1.86% to the mean value.

Non-performing loans (NPL) have an average value of 2.11% with maximum and minimum value of 4.80% and 0.76% respectively. The standard deviation of non-performing loans (NPL) is captured at 0.93%. On the other hand, the average amount of total deposits (DEP) is US$108.59 billion over the three countries in the single banking system. Total deposits (DEP) have recorded a maximum value of US$381.92 billion and minimum value of US$1.77 billion. The total deposits (DEP) show a standard deviation of 143.21% by following the mean.

In terms of the macroeconomic variables, the average mean of gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM) are 5.93%, 5.33%, and 2.21% with the standard deviation of 2.66%, 6.13%, and 1.50% respectively. The maximum value of GDP is computed at 14.53% with a minimum value of 0.09%. Subsequently, the highest and lowest value of inflation rate are 25.00% and -0.66%. Unemployment rate has the positive minimum value of 0.39% and maximum figure of 5.86%.

4.1.2 Dual Banking System

Table 4.2

Results of Descriptive Statistic

	NIM	LNLOAN	NPL	DEP	GDP	INFL	UNEM
Mean	4.563939	11.80844	3.492258	208.9203	3.398788	2.816970	5.170909
Median	5.450000	15.02063	3.190000	242.9100	4.880000	2.100000	4.510000
Maximum	6.840000	16.71946	9.360000	414.0000	7.420000	10.23000	9.320000
Minimum	1.800000	1.629241	1.550000	5.390000	-2.510000	-1.260000	2.880000
Standard Deviation	1.729729	6.256059	1.855124	154.7946	3.185459	2.634022	1.885720
Skewness	-0.384846	-1.002813	1.284517	-0.306727	-0.819609	0.675202	0.521419
Kurtosis	1.489892	2.080773	4.512184	1.516066	2.114130	3.082728	2.081646
Observations	33	30	31	33	33	33	33

Notes: Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).

Net interest margin (NIM) has a mean value of 4.56% and standard deviation of 1.73%. 6.84% and 1.80% are the maximum and minimum values for net interest margin (NIM). The average value of total loans (Loan) is 11.81% by adding the log function into the variable. The highest and lowest figures of total loans (Loan) are 16.72% and 1.63%. Total loans (Loan) illustrate a 6.26% of spread in relative to its mean value.

On the other hand, an average value of 3.49% is captured by non-performing loans (NPL) with a standard deviation of 1.86%. The highest and lowest figures among the dataset for non-performing loans (NPL) are 9.36% and 1.55% separately. The average total deposits (DEP) are US$208.92 billion among the three studied dual banking countries. Total deposits (DEP) included a minimum value of US$5.39 billion and maximum value of US$414.00 billion. There is a 154.79% deviation of the values in the dataset to its relative mean for the variable of total deposits (DEP).

From the perspective of macroeconomic determinants, gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM) are showing the average means of 3.90%, 2.82% and 5.17% on top of the standard deviation of 3.16%, 2.63% and 1.89% respectively. The largest GDP value is captured at positive 7.42% while the lowest GDP at negative 2.51%. While, positive 10.23% and negative 1.26% are both the highest and lowest rate of inflation (INFL). Unemployment rate (UNEM) computed a positive value for both the maximum and minimum rate at 9.32% and 2.88% distinctly.

4.2 Inferential Analysis

4.2.1 Unit Root Test

In this study, Phillips-Perron Unit Root Test was chosen in analysing the unit root test. The significance level applied to the test is 10%, 5% and 1%. From the study of Hlouskova and Wagner (2006), Phillips-Perron Unit Root Test can be carried out due to it has the ability to allow for individual specific autoregressive structures and individual specific variances. Phillips-Perron Unit Root Test will take into account the limited sample size effect of the different lag lengths chosen. The study of Maddala and Wu (1999) that proved Phillips-Perron Unit Root Test can be carried out as long as the p-values can be simulated or available. Phillips-Perron Unit Root Test neither requires a balanced panel nor identical lag lengths in the individual equations.

4.2.1.1 Single Banking System

Table 4.3

Results of Phillips-Perron Unit Root Test

Variables	Phillips-Perron (PP) Test			
	Intercept		Trend and Intercept	
	Level	First Difference	Level	First Difference
NIM	4.0757	17.8876***	5.29538	20.8541***

	(0.6664)	(0.0065***)	(0.5065)	(0.0019***)
LNLOAN	12.5087*	5.19948	0.36181	12.5076*
	(0.0515*)	(0.5185)	(0.9991)	(0.0516*)
NPL	3.09905	13.7604**	1.87843	15.6908**
	(0.7963)	(0.0324**)	(0.9305)	(0.0155**)
DEP	16.3271**	11.7532*	4.983	40.1664***
	(0.0121**)	(0.0677*)	(0.5460)	(0.0000***)
GDP	18.1545***	40.8169***	21.2361***	29.6796***
	(0.0059***)	(0.0000***)	(0.0017***)	(0.0000***)
INFL	11.0412*	58.8522***	32.812***	48.4434***
	(0.0871*)	(0.0000***)	(0.0000***)	(0.0000***)
UNEM	17.3773***	34.7213***	14.9408**	37.2767***
	(0.0080***)	(0.0000***)	(0.0207**)	(0.0000***)

*Notes: *, **, *** represent rejection of null hypothesis at 10%, 5% and 1 % significance level, respectively. P-value is written in parentheses. The bandwidth selection is based on Newey-West Bandwidth using the Bartlett kernel method for PP test. Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).*

Table 4.3 showing the results of unit root tests that run using the data from countries which adopt a single banking system which are Cambodia, Singapore, and Vietnam. Based on the table, it can be concluded that countries which adopt a single banking system where net interest margin and non-performing loans contain the presence of unit root regardless at

any significance level. Thus, the trend of net interest margin and non-performing loans are totally unpredictable regardless of any situation. On the other side, there is absence of unit root in two variables which are gross domestic product and unemployment regardless at any significance level. However, the testing of first difference has significantly shown that NIM, GDP, INFL, and UNEM will cause this series in a random walk although NIM is proven to contain unit root at the testing level. Hence, NIM is a variable that has an even chance of causing this model where it studies a single banking system to be either deterministic or stochastic.

4.2.1.2 Dual Banking System

Table 4.4

Results of Phillips-Perron Unit Root Test

Variables	Phillips-Perron (PP) Test			
	Intercept		Trend and Intercept	
	Level	First Difference	Level	First Difference
NIM	6.08653	26.0646***	10.019	18.012***
	(0.4136)	(0.0002***)	(0.1239)	(0.0062***)
LNLOAN	11.1621*	5.67958	0.22812	5.0535
	(0.0835*)	(0.4600)	(0.9998)	(0.537)
NPL	40.5141***	23.26***	26.3231***	11.5153*
	(0.0000***)	(0.0007***)	(0.0002***)	(0.0737*)

DEP	11.1386*	24.3104***	19.4728***	22.003***
	(0.0842*)	(0.0005***)	(0.0034***)	(0.0012***)
GDP	14.0826**	38.5716***	17.7707***	25.8878***
	(0.0287**)	(0.0000***)	(0.0068***)	(0.0002***)
INFL	19.8102***	40.2473***	20.0306***	36.7402***
	(0.0030***)	(0.0000***)	(0.0027***)	(0.0000***)
UNEM	13.792**	11.9314*	2.07215	17.5359***
	(0.0320**)	(0.0635*)	(0.9129)	(0.0075***)

*Notes: *, **, *** represent rejection of null hypothesis at 10%, 5% and 1 % significance level, respectively. P-value is written in parentheses. The bandwidth selection is based on Newey-West Bandwidth using the Bartlett kernel method for PP test. Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).*

Table 4.4 showing the results of unit root tests that run using the data from countries which adopt a dual banking system which are Brunei, Indonesia, and Malaysia. Based on the table, it can be summarized as countries which adopt a dual banking system where net interest margin is the only variable that contains the presence of unit root regardless at any significance level. Thus, the trend of net interest margin is totally unpredictable regardless of any situation. Non-performing loans in a dual banking system do not show any sign of presence of unit root regardless at any significance level in which not similar with the results in a single banking system where it contains unit root. Other than non-performing loans, inflation is one of the variables that does not show any sign of presence of unit root regardless at any significance level. However, the testing of first difference has significantly shown that NIM, GDP, INFL, and NPL will cause this series

in a random walk even though NIM is proven to contain unit root at the testing level. Hence, NIM is a variable that has an even chance of causing this model where it studies a dual banking system to be either deterministic or stochastic.

4.2.2 Panel Data Regression Model

4.2.2.1 Single Banking System

4.2.2.1.1 Poolability Hypothesis Testing (Redundant Fixed Effect)

Table 4.5

Results of Poolability Hypothesis Test

Effect Test	Statistic	d.f.	Prob.
Cross-section F	27.838515	(2,21)	0.0000

In conclusion, Fixed Effect Model (FEM) is preferable at all significance levels compared to the POLS model.

4.2.2.2 Dual Banking System

4.2.2.2.1 Poolability Hypothesis Testing (Redundant Fixed Effect)

Table 4.6

Results of Poolability Hypothesis Test

Effect Test	Statistic	d.f.	Prob.
Cross-section F	35.439921	(2,21)	0.0000

Fixed Effect Model (FEM) is preferable at all significance levels compared to the POLS model.

4.2.3 Fixed Effect Model (FEM)

4.2.3.1 Single Banking System

$$NIM_{it} = 6.565873 - 0.182716In(Loan)_{it} + 0.089051(NPL)_{it} - 0.000714(DEP)_{it} - 0.008395(GDP)_{it} + 0.029326(INFL)_{it} + 0.025188(UNEM)_{it} + \varepsilon_t \quad (4.1)$$

Table 4.7

Results of Fixed Effect Model

Variable	**Coefficient**	**T-Statistic**	**P-value**
C	6.565873	2.085485**	0.0494**
LNLOAN	-0.182716	-1.010412	0.3238
NPL	0.089051	0.702694	0.4900
DEP	-0.000714	-0.337118	0.7394
GDP	-0.008395	-0.300309	0.7669
INFL	0.029326	1.681304	0.1075
UNEM	0.025188	0.144647	0.8864
R-Square	0.979811		
F statistic	127.3937***		
P-value (F statistics)	0.000000***		

*Notes: *, ** and *** implies that the rejection of the null hypothesis of non-stationary at 10%, 5% and 1% significance level respectively. P-value is written in parentheses. Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).*

Panel data regression model can be defined as the data is collected over an extended time frame via a series of repeated observations of the same subjects and is useful for calculating a change (Hayes, 2020). In addition, an empirical model that is used in a panel data environment to track individual characteristics that can be correlated with the independent variable for unnoticed time invariants can be known as Fixed Effect Model (Encyclopedia, 2020).

According to table 4.7, R-square shows the degree of variation of net interest margin (NIM) that is collectively explained by total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), total loans (Loan), non-performing loans (NPL) and unemployment rate (UNEM). Based on the result, the R-square value for a single banking system is 0.979811, which indicates that 97.98% of net interest margin variation can be explained by all of the independent variables. The greater the R-square value shows that findings are fit into the regression model (Frost, n. d.). F-test is a statistical test that is used to assess if there are the same variance or standard deviations in two populations with a normal distribution (MBA Skool Team, 2018). The p-value of the F-statistics for a single banking system is 0.0000 which is lower than all of the significance levels (1%, 5% and 10%). Hence, the p-value of F-statistics states that all the independent variables are significant to the dependent variable.

Table 4.8

Comparison between expected and actual results

Variables	Expected sign and significant	Results
LNLOAN	Positive and significant	Negative and insignificant
NPL	Negative and significant	Positive and insignificant
DEP	Negative and significant	Negative and insignificant
GDP	Positive and significant	Negative and insignificant
INFL	Positive and significant	Positive and insignificant
UNEM	Negative and significant	Positive and insignificant

Notes: Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).

Constant Coefficient

On average, the net interest margin is 6.57 percentage point, when other independent variables are zero, ceteris paribus.

Total Loans (Loan)

According to table 4.8, total loans are insignificant and negatively correlated with net interest margin. If total loan rises by 1 percent, on average, net interest margin decreases by 0.18 percentage point by keeping others variable constant. In chapter 2 of the literature review part, this study expected a positive relationship between total loan and net interest margin, but obtained a negative result. This may be due to banks utilizing a larger portion of deposits to provide loans to customers with an exception of generating higher revenue leads to the higher loan to deposit ratio. However, the greater the profitability, the higher the liquidity risk is taken where supported by Gul, Irshard and Zaman (2011).

On the contrary, Vong and Chan (2009) said that banks have to bear a higher cost of leading when there is an increase in the loan books which leads to a negative impact on profitability. Besides that, study of Javaid, Anwar, Zaman and Gafoor (2011) shows that the chance of return on assets will decrease when loan is increasing, but the relationship is not definitive. Higher loans contribute to profitability, but the effect is insignificant which shows that greater dependence on one major asset can lead to profitability but with less impact on overall profitability.

Non-Performing Loans (NPL)

Non-performing loans have reflected a positive relationship and are insignificant with the bank performance in the single banking system. If non-performing loans increase by 1 percent, on average, net interest margin

will increase by 0.089 percentage point by keeping others variable constant. Furthermore, the expected relationship of non-performing loans is negative, but it shows a positive relationship. The expected relationship is derived from the study of Clementina and Isu (2014) illustrate that financial institutions that do not have adequate resources and funds to supply the deficit parties in Nigeria caused by non-performing loans minimize the activities of the financial system. As a result, investment activities are unperformed as the efficient output of the economy is obstructed by non-performing loans.

In the finding of Boahene, Dasah and Agyei (2012), the rise of level of default and credit risk brings more profitability towards banks in Ghana when there are extremely high loan rates in the economy. Nevertheless, Weersainghe and Perera (2013) figured out that bank's non-performing loans in Sri Lanka show no correlation with profitability. This is because well-capitalized banks in Sri Lanka that have excessive operations and lower levels of return that induce operational inefficiencies.

Total Deposits (DEP)

The impact of total deposits on the bank's performance of single banking systems over three countries shows that there is insignificant and negative correlation with the net interest margin (NIM). If total deposits increase by US$1 billion, on average, net interest margin will reduce by 0.00071 percentage point by keeping others variable constant. The result is similar to the expected sign that was introduced in Chapter 2 after numerous findings were proven. For example, Dietrich and Wanzenried (2011) claimed that the liquidity will be reduced as total deposits play a liability role on the bank's balance sheet. This is because banks will reserve the deposit amount to fulfil requests of withdrawal by depositors. Thus, banks are not capable of generating more profit by utilizing the deposit amount.

Ali and Puah (2019) supported that there is an insignificant relationship between total deposits (DEP) and net interest margin (NIM) because of the occurrence of higher operating cost as banks use more advertising activities to attract customers for making deposits but provide low and competitive interest rates. However, banks will not suffer losses when they do not attempt to take an ambitious effort to attract more deposits, thus bank profitability will not be affected.

Gross Domestic Product (GDP)

In the macroeconomic variables, the gross domestic product (GDP) stated that there is a negative and insignificant relationship with the dependent variable net interest margin (NIM). If GDP improves by 1 percent, on average, net interest margin will decrease by 0.0084 percentage point by keeping others variable constant. The expected sign for GDP is positive but the result obtained shows a negative relationship. The positive expected sign has proven by the study of Roman and Danuletiu (2013) discovered that GDP has a major positive impact on the earnings of banks where populations contribute more towards GDP leading to an economic situation well performed where boosting the demand for financial goods and services and banks have ability to provide more lending services.

Staikouras and Wood (2004) argued that GDP growth in European commercial and saving banks have a negative correlation with bank performance. They indicated that higher GDP growth rates possess a fully integrated banking system that would offer higher competitive interest rates as a result of higher profit margins. However, empirical reports from Athanasoglous, Delis and Staikouras (2006) debated that there is no evidence to prove that GDP has a major effect on bank profitability in South-Eastern European countries. This is because tight monetary policy was being enforced during the study period. Once market stability in a given

country has been achieved, it is predicted that there will be a stronger relationship between economic growth and bank profitability by providing more lending activities, improving the quality of bank assets and reducing supervisory strictness in the face of uncertainty in the macroeconomic climate.

Inflation Rate (INFL)

Table 4.8 displays that inflation rate has a positive relationship and insignificant with net interest margin (NIM). If inflation increases by 1 percent, on average, net interest margin (NIM) will increase 0.029 percentage point by keeping others variable constant. The result of inflation rate is the same with the expected sign which explained by Athanasoglou, Brissimis and Delis (2008) discovered that banks can predict the profit by comparing the rising rate of wages and other operating costs when the rising rate of inflation. The determinants of profitability rely on the banks capability to make adjustments on the operating expenses when expecting inflation to occur in terms of raising interest rates to generate more revenues greater than the cost. Ben Naceur (2003) indicated that there is an insignificant relationship between inflation and bank performance. Ben mentioned that the instability of the bank's profitability with an incorrect prediction on the rise of inflation. This is because banks do not benefit from economic growth and market opportunities to increase the profit in size.

Unemployment Rate (UNEM)

The empirical result shows that the unemployment rate is positively affecting and insignificant to the bank's performance over three countries in the single banking system from 2007 to 2017. If unemployment rate improves by 1 percent, on average, net interest margin will improve 0.025 percentage point by keeping others variable constant. The result shows the opposite sign with the expectation. Tan and Li (2018) discovered that banks

increase the amount of provision of loan loss and monitor the borrower strictly when the unemployment rate increases as a result of a borrower unable to repay their obligation. Banks taking this action with higher cost as provision of loan losses is a part of retained earnings than normal economic situation shows a negative relationship with bank performance.

However, the study of Eldomiaty, Mabrouk and ElShater (2015) stated the rise in unemployment rate leads to higher profitability of small banks in EU regions as banks increase the spread and margins to protect profit. The increase in margin helps to compensate for the decline in the provision of loans, which raises profit for banks. All the macroeconomic factors are not significantly related to the bank's profitability in MENA regions but significant to the EU region.

4.2.3.2 Dual Banking System

$$NIM_{it} = 54.31078 - 3.955749In(Loan)_{it} - 0.135859(NPL)_{it} + 0.011872(DEP)_{it} + 0.027585(GDP)_{it} - 0.013138(INFL)_{it} - 1.077899(UNEM)_{it} + \varepsilon_t \quad (4.2)$$

Table 4.9

Results of Fixed Effect Model

Variable	**Coefficient**	**T-Statistic**	**P-value**
C	54.31078	3.954959	0.0007***
LNLOAN	-3.955749	-3.551366	0.0019***
NPL	-0.135859	-0.812397	0.4257
DEP	0.011872	2.314510	0.0308**
GDP	0.027585	0.350364	0.7296
INFL	-0.013138	-0.124614	0.9020
UNEM	-1.077899	-4.054851	0.0006***
R-Square	0.875302		
F statistic	18.42583***		
P-value (F statistics)	0.000000***		

*Notes: *, ** and *** implies that the rejection of the null hypothesis of non-stationary at 10%, 5% and 1% significance level respectively. P-value is written in parentheses. Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).*

Based on the result, the value of R-square for dual banking systems is 0.875302 from 2007 to 2017, which indicates that there is 87.53% of net interest margin variation that can be explained by all independent variables. Meanwhile, the p-value of F statistics is 0.0000 lower than all of the

significance levels which is 1%, 5% and 10% shows that all the independent variables are significant to the net interest margin.

Table 4.10

Comparison between expected and actual results

Variables	Expected sign and significant	Result
LNLOAN	Positive and significant	Negative and significant
NPL	Negative and significant	Negative and insignificant
DEP	Negative and significant	Positive and significant
GDP	Positive and significant	Positive and insignificant
INFL	Positive and significant	Negative and insignificant
UNEM	Negative and significant	Negative and significant

Notes: Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).

Constant Coefficient

On average, the net interest margin is 54.31 percentage point, when other independent variables are zero, ceteris paribus.

Total Loans (Loan)

Total loans have reflected a negative relationship and significant with the bank performance in the dual banking system. If total loans rise by 1 percent, on average, net interest margin will decrease 3.96 percentage point by keeping others variable constant. The expected relationship of total loans is positive which is different from the results. The study of Samad (2015)

illustrated that a positive relationship of higher gross loan to total assets ratio leads to higher profitability. The higher the loan to deposit ratio when banks use deposits to create more loans but the greater the bank's liquidity risk incurred. Besides, Vong's (2005) discussed that the factors of intense credit market competition and the interbank placement of idle funds abroad influences the bank profitability negatively. Hence, there is a negative relationship between loan to total asset ratio and return on asset.

Non-performing loans (NPL)

According to table 4.10 indicates that non-performing loans insignificant and negatively correlated with the net interest margin. If non-performing loans increase by 1 percent, on average, net interest margin will decrease 0.14 percentage point by keeping others variable constant. The result is similar to the expected sign which is supported by numerous findings in Chapter 2. One of the studies pointed out that there are two reasons that influence bank's profitability where banks prepare more provision when there is an increase in non-performing loans and low credit quality as more doubtful assets incur higher provisional expenses to cover credit losses in Albanian (Duraj & Moci, 2015). On the insignificant to the dependent variables can be explained by Akhtar, Ali and Sadaqat (2011) discovered the insignificant relationship between credit risk and banks performance in Pakistan from 2006 to 2009 by using the ordinary least square method to measure.

Total Deposits (DEP)

Total deposits have a positive relationship and are significantly related to net interest margin (NIM) in dual banking systems. If total deposits increase by US$1 billion, on average, net interest margin will increase 0.012 percentage point by keeping others variable constant. In the literature review on Chapter 2, this study expected a negative relationship between total

deposits and net interest margin, but obtained a positive result. Béjaoui and Bouzgarrou (2014) claimed that credit is an illiquid asset where the more illiquid assets a bank holds, the lower the profitability of the bank. Thus, the overuse of deposits to fund loans will influence bank profitability as the structural inadequacy of this resource is met by the use of special tools and refinancing in the money market. On the contrary, Van den End (2016) explained about banks using deposits to create loans and loans considered as one of the assets of the bank. As deposits grow, the liquidity position of banks increases, thus banks are able to lend more loans and potentially earn more benefit.

Gross Domestic Product (GDP)

The impact of Gross Domestic Product (GDP) on the bank's performance in dual banking systems over three countries is insignificant and positive correlation. If GDP improves by 1 percent, on average, net interest margin will increase 0.028 percentage point by keeping others variable constant. The expected positive sign is similar to the result which was proven by Saksonova and Solovjova (2011) shown that GDP contributes positively to earnings, while inflation is inversely linked to Return on Assets (ROA). Moreover, Ben Neceur (2003) stated that economic growth does not have any correlation with any aspect of the regulations, nor does it reflect the advancement of technology in the banking sector.

Inflation Rate (INFL)

In the macroeconomic variables, the inflation rate (INFL) shows that there is a negative and insignificant relationship with net interest margin (NIM). If inflation rate (INFL) increases by 1 percent, on average, net interest margin (NIM) decreases 0.013 percentage point by keeping other variables constant. The result of the inflation rate is different with the expected sign which is positive. Pan and Pan (2014) discovered that inflation has a

favourable relationship with commercial banks profitability in China where citizens will undertake saving and investment decisions without a doubt as nominal income when inflation increases.

However, Perry (1992) reported an unexpected surge in inflation will potentially cause cash flow issues for borrowers, resulting in premature termination of credit contracts. Thus, banks respond slowly to change the interest rates associated with rising inflation which have a higher chance to incur losses due to higher costs relative to income received. For the insignificant results, Anbar and Alper (2011) argue that inflation does not cause any impact to bank performance in Turkey by using return on equity and return on asset as dependent variables.

Unemployment rate (UNEM)

The empirical result shows that the unemployment rate is negatively affecting and significant to the bank's performance. If the unemployment rate improves by 1 percent, on average, net interest margin declines 1.08 percentage point by keeping others variable constant. The result shows similarity with the expected negative sign. Klein (2013) proved that high unemployment rate influences non-performing loans as it influences borrowers repay loans to banks in most of the Central, Eastern, and South Eastern Europe (CESEE) countries.

In conclusion, the R-square of single banking system is higher than the dual banking system as it shows that there is 97.78% of net interest margin variation can be explained by all independent variables which are total loans, non-performing loans, total deposits, gross domestic product, inflation and unemployment rate from 2007 to 2017. The p-value of F statistic shows that all of the independent variables are significant to net interest margin at all the significance levels (1%, 5% and 10%) in both fixed effect models.

However, all the independent variables are insignificant to the dependent variables according to the p-value of test statistic greater than all of the significance levels (1%, 5% and 10%) in the single banking system. By only looking at the t-test, there are three independent variables which are non-performing loans, gross domestic product, and inflation rate show significant to net interest margin in the dual banking system. Therefore, it can be concluded that the bank performance in a dual banking system is superior than a single banking system.

4.3 Diagnostic Checking

In order to ensure the assumptions of Classical Linear Regression Model (CLRM) and Best Linear Unbiased Estimators (BLUE) are not violated, this research is going to run the diagnostic tests, such as normality test, multicollinearity, heteroscedasticity and autocorrelation.

4.3.1 Normality Test

Normality test plays an important role in making a decision for measuring the central tendency of data analysis (Mishra, Pandey, Sing, Gupta, Sahu & Keshri, 2019). If there is violation of the normality assumption, parameters of the model are not normally distributed and the outcomes might be invalid or inaccurate. The adoption of Jarque-Bera Test can detect the normality of error term.

4.3.1.1 Single Banking System

Table 4.11

Result of Normality Test

Jarque-Bera Test	P-value
0.23	0.89

4.3.1.2 Dual Banking System

Table 4.12

Result of Normality Test

Jarque-Bera Test	P-value
1.33	0.51

Table 4.11 and 4.12 show there is adequate evidence to conclude that the error term in both of the models is normally distributed as the p-value (0.89) for single banking systems and p-value (0.51) for dual banking systems are greater than all of the significance level. Parameters of the model are normally distributed since error term is normally distributed in the model.

4.3.2 Multicollinearity

Multicollinearity occurs when two or more independent variables are highly correlated to each other in a multiple regression model. Correlation, Variance Inflation Factor (VIF) and Tolerance (TOL) are the methods to detect multicollinearity problems in a model. High collinearity occurs when VIF is higher than 10 (Gurajati & Porter, 2009).

4.3.2.1 Correlation

4.3.2.1.1 Single Banking System

Table 4.13

Results of Correlation among Independent Variables

	NIM	**LNLOAN**	**NPL**	**DEP**	**GDP**	**INFL**	**UNEM**
NIM	1.00	0.23	0.55	-0.77	0.14	0.05	-0.89
LNLOAN	0.23	1.00	0.45	-0.71	0.17	0.38	-0.55
NPL	0.55	0.45	1.00	-0.70	-0.15	0.19	-0.57
DEP	-0.77	-0.71	-0.70	1.00	-0.24	-0.35	0.88
GDP	0.14	0.17	-0.15	-0.24	1.00	0.12	-0.25
INFL	0.05	0.38	0.19	-0.35	0.12	1.00	-0.20
UNEM	-0.89	-0.55	-0.57	0.88	-0.25	-0.20	1.00

Notes: Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).

4.3.2.1.2 Dual Banking System

Table 4.14

Results of Correlation among Independent Variables

	NIM	LNLOAN	NPL	DEP	GDP	INFL	UNEM
NIM	1.00	-0.20	0.09	-0.24	0.07	0.35	0.40
LNLOAN	-0.20	1.00	-0.65	0.94	0.76	0.63	-0.82
NPL	0.09	-0.65	1.00	-0.76	-0.42	-0.43	0.49
DEP	-0.24	0.94	-0.76	1.00	0.70	0.53	-0.81
GDP	0.07	0.76	-0.42	0.70	1.00	0.66	-0.56
INFL	0.35	0.63	-0.43	0.53	0.66	1.00	-0.24
UNEM	0.40	-0.82	0.49	-0.81	-0.56	-0.24	1.00

Notes: Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).

Pairwise correlation is being adopted to determine correlation of independent variables in both of the models. Rule of thumb of this method shows that serious multicollinearity happens if the correlation between independent variables exceeds 0.80.

Based on table 4.13 there is a serious multicollinearity between total deposits and unemployment rate as the value (0.88) exceeds the rule of thumb, 0.80. The remaining variables show weak multicollinearity as the correlation figures do not exceed 0.80. However, table 4.14 shows that there is a serious multicollinearity occurring among total deposits and loans as

their correlation value (0.94) exceeds 0.80. The remaining variables also show weak multicollinearity as the correlation figures do not exceed 0.80.

4.3.2.2 Variance Inflation Factor (VIF) and Tolerance (TOL)

4.3.2.2.1 Single Banking System

Table 4.15

Results of VIF and TOL among Independent Variables

Independent Variable	**VIF**	**TOL =** $\frac{1}{VIF}$
LNLOAN	2.23	0.45
NPL	2.63	0.38
DEP	9.89	0.10
GDP	1.35	0.74
INFL	1.25	0.80
UNEM	4.91	0.20

Notes: Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).

4.3.2.2.2 Dual Banking System

Table 4.16

Results of VIF and TOL among Independent Variables

Independent Variable	**VIF**	**TOL =** $\frac{1}{VIF}$
LNLOAN	17.64	0.06
NPL	2.87	0.35
DEP	15.16	0.07
GDP	2.88	0.35
INFL	3.21	0.31
UNEM	4.95	0.20

Notes: Net interest margin (NIM), Total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM).

According to table 4.15, all of the independent variables in the single banking system suffer from weak multicollinearity as all of the VIF values are within 1 and 10 and TOL values are close to 1.

Based on table 4.16, only loans and total deposits in the dual banking system are suffering from serious multicollinearity as the VIF values exceed 10, which are 17.64 and 15.16 respectively whereas TOL values are close to 0, which are 0.06 and 0.07 respectively. However, other independent variables including non-performing loans, GDP, inflation and unemployment rate suffer from weak multicollinearity as the VIF values fall within 1 and 10

whereas TOL values are not near 0. High VIF values in loans and total deposits are still being adopted because both of them are vital liquid assets that will bring impact to the bank's performance.

4.3.3 Heteroscedasticity

Heteroscedasticity occurs when variance of error term is unequal which violates the assumptions of classical linear regression model (CLRM). Thus, this test is being adopted to determine and analyse whether the error term in the model suffers from unequal variance.

4.3.3.1 Single Banking System

Table 4.17

Result of Breusch-Pagan Test

Breusch-Pagan	P-value
6.86	0.08

4.3.3.2 Dual Banking System

Table 4.18

Result of Breusch-Pagan Test

Breusch-Pagan	P-value
5.05	0.17

Heteroscedasticity occurs in the model of a single banking system at 10% of significance level as there is adequate evidence to reject null hypothesis because p-value (0.08) is less than 10%. However, homoscedasticity occurs at 5% and 1% of significance level.

Heteroscedasticity also occurs in the model of dual banking system at 10% of significance level as p-value (0.17) is less than 10%. On the contrary, there is no heteroscedasticity that happens in the model when the significance level is at 5% and 1% as p-value is greater than 5% and 1%. The occurrence of heteroscedasticity causes standard errors to be biased which turns test statistic and confidence intervals to be biased too (Williams, 2005).

4.3.4 Autocorrelation

Autocorrelation happens when the error terms are correlated between two periods. Error terms capture the omitted variables and unobserved factors.

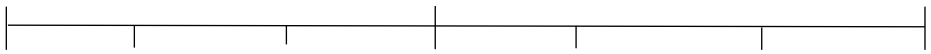
The adoption of the Durbin-Watson Test can detect autocorrelation problems in the research.

4.3.4.1 Single Banking System

Table 4.19

Result of Autocorrelation Test

Test statistic	1.48



4.3.4.2 Dual Banking System

Table 4.20

Result of Autocorrelation Test

Test statistic	1.24

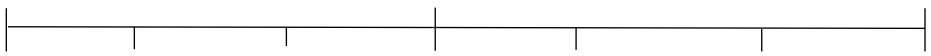


Table 4.19 indicates that the result is inconclusive as d-test (1.48) in the model of single banking system falls within d_L (1.40) and d_U (1.81) which

is an inconclusive area. However, table 4.20 shows there is an autocorrelation problem occurring in the model of dual banking system as d-test (1.24) less than d_L (1.40).

CHAPTER FIVE: DISCUSSION, CONCLUSION, AND IMPLICATION

5.0 Introduction

In this final chapter, the overall statistical analyses that are discussed in the preceding chapters will be summarized. Besides that, this chapter discusses the major findings as to validate the research objectives and hypotheses mentioned in Chapter 1. Implications of the study are also being addressed from the perspectives of academicians, stakeholders and policy makers. Detailed recommendations with respect to the limitations of this study will also be suggested. Lastly, a conclusion is drawn to sum up the overall of our study.

5.1 Discussion of Major Findings

This research is to analyse the liquidity creation on bank's performance between single and dual banking systems in Southeast Asia. There are six independent variables which are total loans (Loan), non-performing loans (NPL), total deposits (DEP), gross domestic product (GDP), inflation rate (INFL), and unemployment rate (UNEM) that significantly affecting net interest margin (NIM) which is the dependent variable to examine banks' performance. In this research, six different countries are chosen as a proxy of single and dual banking systems from Southeast Asia which are Cambodia, Singapore, and Vietnam for a single banking system, while dual banking systems consist of Brunei, Indonesia, and Malaysia.

5.1.1 Single banking system

In pooled ordinary least square model (POLS), total loans and unemployment rate are significantly at all the significance levels while total deposits are significant at two significance levels which are 5% and 10% only to the net interest margin but other variables insignificant regardless the significance level. However, all of the independent variables are insignificant to the net interest margin in the fixed effect model (FEM). Based on F statistic, both models show that they are significant to the dependent variables. Fixed effect model (FEM) is more preferable compared to a pooled ordinary least square model by using the poolability hypothesis test. Therefore, a fixed effect model is taken to make further clarification on the expected sign and significance.

The results of the fixed effect model (FEM) illustrate that total deposits and inflation rate have similar results with the expected relationship but insignificant to net interest margin. This can be explained by banks will not suffer losses without any action taken to attract customers for making deposits as total deposits do not influence the bank's profit (Ali & Puah, 2019). Besides that, the bank's performance is unrelated to inflation rate when there is an incorrect estimation as the bank does not benefit from new market chance and economic growth (Naceur, 2003). Total loans, non-performing loans, gross domestic product, and unemployment rate indicate that the relationship is opposite to the expected sign and insignificantly with the bank performance in the single banking system. Numerous studies were found to prove the actual results although all of the results of variables showed dissimilarity.

5.1.2 Dual banking system

In the pooled ordinary least square model (POLS), inflation rate is significant to the net interest margin yet at the significance level of 5% and 10% only out of six independent variables. However, total loans, total deposits, and unemployment rate are correlated to the dependent variables in the fixed effect model (FEM). The non-performing loans and gross domestic product insignificant regardless of the significance level and models. F statistic is to test whether the whole model is significant to the dependent variable. In the F statistic, both models show that significant to the dependent variables. Fixed effect model (FEM) is more preferable compared with POLS via poolability hypothesis test. Therefore, a fixed effect model is chosen to make further explanation on the expected sign and significance.

The total loans, total deposits, and inflation rate showed an inverse relationship with the expected sign. Vong's (2005) discussed that interbank placement of idle funds abroad and bank competitions leads to a reduction in bank profit. This shows that there is a negative relationship between total loans and bank performance. Financial institutions are capable of creating more loans when there are more deposits to earn a greater profit shows a positive relationship between total deposits and bank profitability. The positive sign of inflation with bank performance was supported by Pan and Pan (2014) discovered that populations in China willing to make saving and investment as a nominal income when there is a rise in inflation. For the non-performing loans and gross domestic product indicate the same relationship with the expected sign but insignificantly to the net interest margin. The finding of Akhtar, Ali & Sadaqat (2011) argued that credit risk in non-performing loans leave insignificant results with bank performance by using the ordinary least square method to analyze the banks in Pakistan from 2006 to 2009. Ben Neceur (2003) stated that there is no correlation between economic growth with any aspects of regulations and technology

advancement in banking sectors proven the insignificant results of GDP and bank performance.

In short, three ways are taken to compare the single and dual banking systems which are R square value, F statistic, and the number of significant variables in the fixed effect model. The R square value of a single banking system is 0.9787 which is slightly higher than dual banking systems of 0.8735. Both models are significant to the dependent variables of net interest margin following the results of F statistic. However, all the independent variables are insignificant in a single banking system, while total loans, total deposits, and unemployment rate are significant in the dual banking system to the net interest margin. It can be drawn that the inference that the dual banking system is superior than single banking systems as the independent variables are significant to the study with the proof of numerous past studies shown in Chapter 2.

5.2 Implications of Study

Current research could bring significance towards the decision making of every national bank in each country which are Brunei, Cambodia, Indonesia, Malaysia, Singapore, and Vietnam. From the findings from chapter 5.1, inflation rate and unemployment rate are categorised as insignificant variables in affecting the liquidity creation on bank performance of countries who are adopting a single banking system. For countries who are adopting a dual banking system, inflation rate is still an insignificant variable while unemployment rate is a significant variable. Thus, most of the policymakers could maintain the same perspective on current strategy when implementing monetary policy as they are not required to worry too much about whether the monetary policy implemented will affect the

bank performance based on this study. For instance, policy makers who wish to control inflation could try to adopt a strategy named monetary targeting.

From the study of Mishkin (2007), money targeting is a strategy where the key element is reliance on information transformed by a monetary aggregate to implement monetary policy and shall be decided by policymakers of the central bank only instead of making discussion with the policymakers from other aspects. The major advantage of monetary targeting enables the central bank to choose goals for inflation that may different from those of other countries, and that provides the central bank an ability to design their monetary policy where it can deal with transitory output fluctuations and certain external shocks (Mishkin, 2007). For instance, Cambodia, Singapore, and Vietnam which listed as adopting single banking system in this study, policymakers from their central bank are not necessary to implement the monetary policy same as other country who previously successfully designed a monetary policy that are able to control inflation well, they can use this strategy to design a monetary policy that are more suitable to their country's economy condition. Likewise, this strategy could be adopted by policymakers of each central bank when they wish to design and implement a monetary policy for their country to control the unemployment rate.

Furthermore, this study will be able to help those individuals such as shareholders, borrowers, lenders, investors, and employees get a more understanding on the impact of liquidity creation on bank performance between a single banking system and dual banking system as this research provides information regarding the single banking system and dual banking system. For instance, the dual banking system in this study is different from the dual banking system adopted by the United States. From the study of Butler and Macey (1987), the dual banking system adopted by the United States refers to the fact that their financial institutions work under a state and federal system. Thus, their financial institutions are allowed to choose between two different sets of primary regulations to define their authorities and to regulate their activities and investments. Also, these individuals are able to know the

relationship and significance between the selected variables and bank performance by referring to the findings above.

Last but not least, the current findings contribute to future research by providing researchers a synthesis on what has been done. As mentioned in Chapter 1, there is less research conduct on the similar topic yet, thus we hope that this study could benefit the future researchers on conducting the similar topic and act as an initiative to attract more future researchers on studying this kind of topic. This can be described as a snowball effect when there is someone started, then more people will do the same things. Thus, more researchers willing to conduct similar studies on this research.

5.3 Limitations of Study

Liquidity creation on bank's performance between single and dual banking systems is the concern to conduct this research. However, there are some limitations that obstruct the process in investigating the topic.

There is an insufficient database in independent variables and journals which limits the research. Some of the countries provide limited data on total loans and non-performing loans such as Brunei, Cambodia and Vietnam. Lack of data in independent variables in some of the years leaves a doubt when using empirical testing procedure to generate results as unbalanced panel data may lead to results that may not be completely accurate. For example, Brunei, Cambodia, and Vietnam do not have 2007-2009 data but the data is considered to measure because there was a financial crisis during that period which impacted total loans and non-performing loans on the individuals as well as bank performance. Thus, lack of data in the particular countries may influence the significance towards net interest margin and cause inaccurate derivation of conclusion. In addition, there is limited empirical

research on explaining the relationship between independent variables and net interest margin such as total loans and non-performing loans towards the dependent variable of net interest margin. This is because there are numerous studies found in the past that used some of the proxy for the total loans which are loans to assets, loans to deposits, and loans to total assets rather than describe total loans towards bank performance explicitly. The derivation of significance and expected sign between the independent and dependent variables may be imprecise before the study is conducted.

Furthermore, the results show that all of the independent variables are insignificant to the net interest margin in the single banking system while there are only three variables significant to the net interest margin in the dual banking system. As net interest margin measures the differences between income received and income charged from the interest rate but Islamic banks do not charge interest rate on the products and services by following Islamic laws (Shariah principle) as interest rate is prohibited elements, thus net interest margin may not be the appropriate indicator in analysing the impacts of liquidity creation on bank's performance between single and dual banking systems.

Lastly, each of the countries has distinct cultures, political environments, rules and regulations. The results and explanation will be helpful and meaningful for researchers to conduct the similar topics within Southeast Asia as this research only focuses on the banking systems in Southeast Asia. This research can be only used as a referral but it's not recommended and encouraged for researchers to apply the findings into countries that are not within Southeast Asia as the results show the significance is relatively low. This may be due to there being eleven countries in Southeast Asia and most of them adopting a single banking system, but this research only uses three of the countries as representatives of a single banking system in order to compare with the dual banking systems. Thus, the results and explanation generated do not wholly represent banks' performance in Southeast Asia.

5.4 Recommendations for Future Research

First and foremost, lack of data creates a certain extent for researchers. Prospective researchers are encouraged to collect data from multiple sources to obtain more detailed data. This is to ensure the availability of data before conducting the research to receive accurate results. For instance, researchers can request data collection from certain companies or organizations by emailing the person in charge. This helps to access some of the confidential data that allows it to be published with a confidential declaration to safeguard the security of the companies or organizations. However, researchers should schedule and allocate time rationally in collecting data as it is time consuming. Besides that, future researchers may incorporate some of the new variables such as bank's capital and bank' size to replace the variables with insufficient data in the model.

Moreover, future studies should address other dimensions of financial results. Researchers can take other indicators such as return on asset (ROA) and return on equity (ROE) as a proxy of performance rather than net interest margin to conduct the similar research. For example, return on assets (ROA) is the ratio of total net income over the average total assets and most of the past studies stated in Chapter 2 using return on asset as indicator also. This shows that ROA is widely being used in measuring a bank's performance. One of the studies from Javaid, Anwar, Zaman and Gafoor (2011) stated that there is an effect of distortion due to the differences between financial leverage and complexity in tax laws but ROA is able to eliminate the distortion as it indicates the ability of each unit of assets in generating profit. Thus, other facets of financial results to be found and discussed in order to expand the report.

Last but not least, future researchers are encouraged not to only limit the studies in Southeast Asia countries. The changing of perspectives can widen the number of countries in this study by including more single banking systems such as Philippines,

Myanmar, Europe, and so on. There are 22 countries that operate dual banking systems internationally that consist of conventional and Islamic financial systems which are Saudi Arabia, Qatar, Turkey, and so forth (Abedifar, Hasan & Tarazi, 2016). This helps to get more precise and accurate results as this research is only conducted based on six Southeast Asia countries and leads to relatively low significance. Thus, policy makers can use the accurate and precise results that are suitable for decision purposes such as monetary policy. Nevertheless, researchers are recommended to focus on a single banking system if they are conducting similar research within Southeast Asia countries.

5.5 Conclusion

The objective of this research project is to investigate how liquidity creation could influence the performance of the banks in Southeast Asian countries across single and dual banking systems. Panel data across the six Southeast Asian countries including Cambodia, Singapore and Vietnam (single banking system) as well Brunei, Malaysia and Indonesia (dual banking system) on the period of 2007 to 2017 are being adopted in conducting this research. Six variables which consist of total loans, non-performing loans, total deposits and the three macroeconomic determinants of gross domestic product, inflation and unemployment rate are identified as the indicators to measure the banks' profitability.

The fixed effect model (FEM) is chosen as the most preferable model in this research. In a single banking system, the results of FEM revealed that all of the six independent variables are insignificant to the net interest margin (NIM) as a proxy to the performance of the banks in the countries at all the significance levels. For countries that adopt a dual banking system, total deposits and inflation rate are positively related to bank performance; while total loans are negatively related to

performance. Non-performing loans and gross domestic products are insignificant to the net interest margin at the significance levels. In short, it can be concluded that the dual banking system is more preferable by comparison to the single banking systems.

In conclusion, this study has achieved its objectives in investigating the impact of liquidity creation on the banks' performance across single and dual banking systems.

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APPENDICES

Appendix 4.1: Unit Root Test (Intercept and Level) of Single Banking System

Net Interest Margin

Null Hypothesis: Unit root (individual unit root process)
Series: NIM
Date: 02/09/21 Time: 10:02
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	4.07567	0.6664
PP - Choi Z-stat	0.18999	0.5753

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results NIM

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.7691	9.0	10
Singapore	0.5126	1.0	10
Vietnam	0.3305	1.0	10

Total Loans

Null Hypothesis: Unit root (individual unit root process)
Series: LNLOAN
Date: 02/09/21 Time: 10:06
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 28
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	12.5087	0.0515
PP - Choi Z-stat	-1.75639	0.0395

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results LNLOAN

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0206	5.0	8
Singapore	0.3689	1.0	10
Vietnam	0.2526	4.0	10

Non-Performing Loans

Null Hypothesis: Unit root (individual unit root process)
Series: NPL
Date: 02/09/21 Time: 10:08
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 29
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	3.09905	0.7963
PP - Choi Z-stat	0.48604	0.6865

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results NPL

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.7314	6.0	10
Singapore	0.4695	1.0	10
Vietnam	0.6184	1.0	9

Total Deposits

Null Hypothesis: Unit root (individual unit root process)
Series: DEP
Date: 02/09/21 Time: 10:10
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	16.3271	0.0121
PP - Choi Z-stat	2.08615	0.9815

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results DEP

Cross section	Prob.	Bandwidth	Obs
Cambodia	1.0000	0.0	10
Singapore	0.0003	9.0	10
Vietnam	0.9981	1.0	10

Gross Domestic Product

Null Hypothesis: Unit root (individual unit root process)
Series: GDP
Date: 02/09/21 Time: 10:12
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	18.1545	0.0059
PP - Choi Z-stat	-2.84531	0.0022

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results GDP

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0718	0.0	10
Singapore	0.0206	4.0	10
Vietnam	0.0770	1.0	10

Inflation Rate

Null Hypothesis: Unit root (individual unit root process)
Series: INFL
Date: 02/09/21 Time: 10:14
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	11.0412	0.0871
PP - Choi Z-stat	-1.65763	0.0487

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results INFL

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0649	1.0	10
Singapore	0.2729	0.0	10
Vietnam	0.2259	0.0	10

Unemployment Rate

Null Hypothesis: Unit root (individual unit root process)
Series: UNEM
Date: 02/09/21 Time: 10:16
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	17.3773	0.0080
PP - Choi Z-stat	-2.63715	0.0042

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results UNEM

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0098	0.0	10
Singapore	0.1075	0.0	10
Vietnam	0.1604	2.0	10

Appendix 4.2: Unit Root Test (Intercept Trend and Level) of Single Banking System

Net Interest Margin

Null Hypothesis: Unit root (individual unit root process)
Series: NIM
Date: 02/09/21 Time: 10:02
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	5.29538	0.5065
PP - Choi Z-stat	0.16785	0.5666

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results NIM

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.1227	6.0	10
Singapore	0.7034	1.0	10
Vietnam	0.8208	3.0	10

Total Loans

Null Hypothesis: Unit root (individual unit root process)
Series: LNLOAN
Date: 02/09/21 Time: 10:07
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 28
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	0.36181	0.9991
PP - Choi Z-stat	3.87202	0.9999

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results LNLOAN

Cross section	Prob.	Bandwidth	Obs
Cambodia	1.0000	7.0	8
Singapore	0.9303	1.0	10
Vietnam	0.8970	5.0	10

Non-Performing Loans

Null Hypothesis: Unit root (individual unit root process)
Series: NPL
Date: 02/09/21 Time: 10:09
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 29
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	1.87843	0.9305
PP - Choi Z-stat	1.40262	0.9196

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results NPL

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.5185	2.0	10
Singapore	0.8056	1.0	10
Vietnam	0.9359	1.0	9

Total Deposits

Null Hypothesis: Unit root (individual unit root process)
Series: DEP
Date: 02/09/21 Time: 10:11
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	4.98300	0.5460
PP - Choi Z-stat	1.96764	0.9754

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results DEP

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.9952	1.0	10
Singapore	0.0844	2.0	10
Vietnam	0.9858	1.0	10

Gross Domestic Product

Null Hypothesis: Unit root (individual unit root process)
Series: GDP
Date: 02/09/21 Time: 10:12
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	21.2361	0.0017
PP - Choi Z-stat	-3.27128	0.0005

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results GDP

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0507	4.0	10
Singapore	0.0254	7.0	10
Vietnam	0.0190	7.0	10

Inflation Rate

Null Hypothesis: Unit root (individual unit root process)
Series: INFL
Date: 02/09/21 Time: 10:15
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	32.8120	0.0000
PP - Choi Z-stat	-4.34181	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results INFL

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0440	2.0	10
Singapore	0.0199	5.0	10
Vietnam	0.0001	9.0	10

Unemployment Rate

Null Hypothesis: Unit root (individual unit root process)
Series: UNEM
Date: 02/09/21 Time: 10:17
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	14.9408	0.0207
PP - Choi Z-stat	-2.30321	0.0106

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results UNEM

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.1174	0.0	10
Singapore	0.2091	2.0	10
Vietnam	0.0232	5.0	10

Appendix 4.3: Unit Root Test (Intercept and Level) of Dual Banking System

Net Interest Margin

Null Hypothesis: Unit root (individual unit root process)
Series: NIM
Date: 02/09/21 Time: 10:36
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	6.08653	0.4136
PP - Choi Z-stat	-0.39511	0.3464

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results NIM

Cross section	Prob.	Bandwidth	Obs
Brunei	0.7384	0.0	10
Indonesia	0.2630	1.0	10
Malaysia	0.2455	0.0	10

Total Loans

Null Hypothesis: Unit root (individual unit root process)
Series: LNLOAN
Date: 02/09/21 Time: 10:38
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	11.1621	0.0835
PP - Choi Z-stat	-1.51762	0.0646

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results LNLOAN

Cross section	Prob.	Bandwidth	Obs
Brunei	0.5583	2.0	7
Indonesia	0.1017	2.0	10
Malaysia	0.0664	0.0	10

Non-Performing Loans

Null Hypothesis: Unit root (individual unit root process)
Series: NPL
Date: 02/09/21 Time: 10:39
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 28
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	40.5141	0.0000
PP - Choi Z-stat	-4.86995	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results NPL

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0001	7.0	8
Indonesia	0.1594	1.0	10
Malaysia	0.0001	9.0	10

Total Deposits

Null Hypothesis: Unit root (individual unit root process)
Series: DEP
Date: 02/09/21 Time: 10:41
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	11.1386	0.0842
PP - Choi Z-stat	-0.62983	0.2644

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results DEP

Cross section	Prob.	Bandwidth	Obs
Brunei	0.6489	3.0	10
Indonesia	0.8372	1.0	10
Malaysia	0.0070	3.0	10

Gross Domestic Product

Null Hypothesis: Unit root (individual unit root process)
Series: GDP
Date: 02/09/21 Time: 10:44
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	14.0826	0.0287
PP - Choi Z-stat	-2.03324	0.0210

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results GDP

Cross section	Prob.	Bandwidth	Obs
Brunei	0.3257	3.0	10
Indonesia	0.1908	0.0	10
Malaysia	0.0141	2.0	10

Inflation Rate

Null Hypothesis: Unit root (individual unit root process)
Series: INFL
Date: 02/09/21 Time: 10:47
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	19.8102	0.0030
PP - Choi Z-stat	-1.49092	0.0680

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results INFL

Cross section	Prob.	Bandwidth	Obs
Brunei	0.9678	9.0	10
Indonesia	0.1495	3.0	10
Malaysia	0.0003	9.0	10

Unemployment Rate

Null Hypothesis: Unit root (individual unit root process)
Series: UNEM
Date: 02/09/21 Time: 10:50
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	13.7920	0.0320
PP - Choi Z-stat	-0.73518	0.2311

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results UNEM

Cross section	Prob.	Bandwidth	Obs
Brunei	0.9631	3.0	10
Indonesia	0.0027	1.0	10
Malaysia	0.3907	2.0	10

Appendix 4.4: Unit Root Test (Intercept Trend and Level) of Dual Banking System

Net Interest Margin

Null Hypothesis: Unit root (individual unit root process)
Series: NIM
Date: 02/09/21 Time: 10:36
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	10.0190	0.1239
PP - Choi Z-stat	-1.13116	0.1290

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results NIM

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0282	7.0	10
Indonesia	0.5456	1.0	10
Malaysia	0.4344	4.0	10

Total Loans

Null Hypothesis: Unit root (individual unit root process)
Series: LNLOAN
Date: 02/09/21 Time: 10:38
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	0.22812	0.9998
PP - Choi Z-stat	3.78459	0.9999

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results LNLOAN

Cross section	Prob.	Bandwidth	Obs
Brunei	0.9324	2.0	7
Indonesia	0.9573	1.0	10
Malaysia	0.9996	2.0	10

Non-Performing Loans

Null Hypothesis: Unit root (individual unit root process)
Series: NPL
Date: 02/09/21 Time: 10:39
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 28
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	26.3231	0.0002
PP - Choi Z-stat	-2.91105	0.0018

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results NPL

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0094	7.0	8
Indonesia	0.7811	1.0	10
Malaysia	0.0003	9.0	10

Total Deposits

Null Hypothesis: Unit root (individual unit root process)
Series: DEP
Date: 02/09/21 Time: 10:41
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	19.4728	0.0034
PP - Choi Z-stat	-0.99527	0.1598

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results DEP

Cross section	Prob.	Bandwidth	Obs
Brunei	0.6189	4.0	10
Indonesia	0.0001	6.0	10
Malaysia	0.9547	3.0	10

Gross Domestic Product

Null Hypothesis: Unit root (individual unit root process)
Series: GDP
Date: 02/09/21 Time: 10:44
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	17.7707	0.0068
PP - Choi Z-stat	-1.85224	0.0320

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results GDP

Cross section	Prob.	Bandwidth	Obs
Brunei	0.7118	3.0	10
Indonesia	0.2867	2.0	10
Malaysia	0.0007	9.0	10

Inflation Rate

Null Hypothesis: Unit root (individual unit root process)
Series: INFL
Date: 02/09/21 Time: 10:47
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	20.0306	0.0027
PP - Choi Z-stat	-2.95257	0.0016

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results INFL

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0916	2.0	10
Indonesia	0.1378	1.0	10
Malaysia	0.0035	9.0	10

Unemployment Rate

Null Hypothesis: Unit root (individual unit root process)
Series: UNEM
Date: 02/09/21 Time: 10:50
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 30
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	2.07215	0.9129
PP - Choi Z-stat	0.94981	0.8289

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results UNEM

Cross section	Prob.	Bandwidth	Obs
Brunei	0.6972	1.0	10
Indonesia	0.6987	3.0	10
Malaysia	0.7285	2.0	10

Appendix 4.5: Unit Root Test (Intercept and First Differences) of Single Banking System

Net Interest Margin

Null Hypothesis: Unit root (individual unit root process)
Series: D(NIM)
Date: 02/09/21 Time: 10:03
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	17.8876	0.0065
PP - Choi Z-stat	-2.59245	0.0048

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(NIM)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0043	5.0	9
Singapore	0.1386	0.0	9
Vietnam	0.2187	3.0	9

Total Loans

Null Hypothesis: Unit root (individual unit root process)
Series: D(LNLOAN)
Date: 02/09/21 Time: 10:07
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 25
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	5.19948	0.5185
PP - Choi Z-stat	-0.19727	0.4218

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(LNLOAN)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.7202	1.0	7
Singapore	0.2951	1.0	9
Vietnam	0.3496	1.0	9

Non-Performing Loans

Null Hypothesis: Unit root (individual unit root process)
Series: D(NPL)
Date: 02/09/21 Time: 10:09
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 26
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	13.7604	0.0324
PP - Choi Z-stat	-2.02529	0.0214

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(NPL)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0283	8.0	9
Singapore	0.0934	2.0	9
Vietnam	0.3894	1.0	8

Total Deposits

Null Hypothesis: Unit root (individual unit root process)
Series: D(DEP)
Date: 02/09/21 Time: 10:11
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	11.7532	0.0677
PP - Choi Z-stat	-0.69897	0.2423

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(DEP)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.9048	1.0	9
Singapore	0.0063	0.0	9
Vietnam	0.4891	2.0	9

Gross Domestic Product

Null Hypothesis: Unit root (individual unit root process)
Series: D(GDP)
Date: 02/09/21 Time: 10:13
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	40.8169	0.0000
PP - Choi Z-stat	-5.25416	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(GDP)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0045	8.0	9
Singapore	0.0001	8.0	9
Vietnam	0.0021	8.0	9

Inflation Rate

Null Hypothesis: Unit root (individual unit root process)
Series: D(INFL)
Date: 02/09/21 Time: 10:15
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	58.8522	0.0000
PP - Choi Z-stat	-6.66475	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(INFL)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0005	1.0	9
Singapore	0.0000	8.0	9
Vietnam	0.0000	8.0	9

Unemployment Rate

Null Hypothesis: Unit root (individual unit root process)
Series: D(UNEM)
Date: 02/09/21 Time: 10:18
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	34.7213	0.0000
PP - Choi Z-stat	-4.71745	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(UNEM)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0111	0.0	9
Singapore	0.0010	7.0	9
Vietnam	0.0026	2.0	9

Appendix 4.6: Unit Root Test (Intercept Trend and First Differences) of Single Banking System

Net Interest Margin

Null Hypothesis: Unit root (individual unit root process)
Series: D(NIM)
Date: 02/09/21 Time: 10:05
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	20.8541	0.0019
PP - Choi Z-stat	-2.69114	0.0036

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(NIM)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0007	8.0	9
Singapore	0.0931	4.0	9
Vietnam	0.4384	2.0	9

Total Loans

Null Hypothesis: Unit root (individual unit root process)
Series: D(LNLOAN)
Date: 02/09/21 Time: 10:08
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 25
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	12.5076	0.0516
PP - Choi Z-stat	-1.35644	0.0875

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(LNLOAN)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0072	6.0	7
Singapore	0.5635	2.0	9
Vietnam	0.4758	0.0	9

Non-Performing Loans

Null Hypothesis: Unit root (individual unit root process)
Series: D(NPL)
Date: 02/09/21 Time: 10:10
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 26
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	15.6908	0.0155
PP - Choi Z-stat	-2.45480	0.0070

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(NPL)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0644	8.0	9
Singapore	0.1878	5.0	9
Vietnam	0.0324	6.0	8

Total Deposits

Null Hypothesis: Unit root (individual unit root process)
Series: D(DEP)
Date: 02/09/21 Time: 10:11
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	40.1664	0.0000
PP - Choi Z-stat	-5.24142	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(DEP)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0011	8.0	9
Singapore	0.0014	6.0	9
Vietnam	0.0013	8.0	9

Gross Domestic Product

Null Hypothesis: Unit root (individual unit root process)
Series: D(GDP)
Date: 02/09/21 Time: 10:14
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	29.6796	0.0000
PP - Choi Z-stat	-4.15172	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(GDP)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0466	8.0	9
Singapore	0.0010	8.0	9
Vietnam	0.0078	8.0	9

Inflation Rate

Null Hypothesis: Unit root (individual unit root process)
Series: D(INFL)
Date: 02/09/21 Time: 10:16
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	48.4434	0.0000
PP - Choi Z-stat	-5.90042	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(INFL)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0002	3.0	9
Singapore	0.0016	5.0	9
Vietnam	0.0001	8.0	9

Unemployment Rate

Null Hypothesis: Unit root (individual unit root process)
Series: D(UNEM)
Date: 02/09/21 Time: 10:18
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	37.2767	0.0000
PP - Choi Z-stat	-4.86392	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(UNEM)

Cross section	Prob.	Bandwidth	Obs
Cambodia	0.0001	7.0	9
Singapore	0.0145	6.0	9
Vietnam	0.0066	3.0	9

Appendix 4.7: Unit Root Test (Intercept and First Differences) of Dual Banking System

Net Interest Margin

Null Hypothesis: Unit root (individual unit root process)
Series: D(NIM)
Date: 02/09/21 Time: 10:36
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	26.0646	0.0002
PP - Choi Z-stat	-3.74244	0.0001

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(NIM)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0013	8.0	9
Indonesia	0.0592	0.0	9
Malaysia	0.0274	2.0	9

Total Loans

Null Hypothesis: Unit root (individual unit root process)
Series: D(LNLOAN)
Date: 02/09/21 Time: 10:38
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 24
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	5.67958	0.4600
PP - Choi Z-stat	0.02630	0.5105

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(LNLOAN)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.3735	0.0	6
Indonesia	0.1729	1.0	9
Malaysia	0.9051	2.0	9

Non-Performing Loans

Null Hypothesis: Unit root (individual unit root process)
Series: D(NPL)
Date: 02/09/21 Time: 10:40
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 25
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	23.2600	0.0007
PP - Choi Z-stat	-3.40529	0.0003

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(NPL)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0100	6.0	7
Indonesia	0.1402	1.0	9
Malaysia	0.0063	8.0	9

Total Deposits

Null Hypothesis: Unit root (individual unit root process)
Series: D(DEP)
Date: 02/09/21 Time: 10:41
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	24.3104	0.0005
PP - Choi Z-stat	-2.84777	0.0022

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(DEP)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0997	8.0	9
Indonesia	0.0001	7.0	9
Malaysia	0.5279	3.0	9

Gross Domestic Product

Null Hypothesis: Unit root (individual unit root process)
Series: D(GDP)
Date: 02/09/21 Time: 10:44
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	38.5716	0.0000
PP - Choi Z-stat	-4.65297	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(GDP)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.1907	3.0	9
Indonesia	0.0009	8.0	9
Malaysia	0.0000	8.0	9

Inflation Rate

Null Hypothesis: Unit root (individual unit root process)
Series: D(INFL)
Date: 02/09/21 Time: 10:47
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	40.2473	0.0000
PP - Choi Z-stat	-5.22759	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(INFL)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0037	2.0	9
Indonesia	0.0014	0.0	9
Malaysia	0.0003	8.0	9

Unemployment Rate

Null Hypothesis: Unit root (individual unit root process)
Series: D(UNEM)
Date: 02/09/21 Time: 10:55
Sample: 2007 2017
Exogenous variables: Individual effects
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	11.9314	0.0635
PP - Choi Z-stat	-1.76212	0.0390

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(UNEM)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0743	1.0	9
Indonesia	0.4078	1.0	9
Malaysia	0.0846	5.0	9

Appendix 4.8: Unit Root Test (Intercept Trend and First Differences) of Dual Banking System

Net Interest Margin

Null Hypothesis: Unit root (individual unit root process)
Series: D(NIM)
Date: 02/09/21 Time: 10:37
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	18.0120	0.0062
PP - Choi Z-stat	-2.73017	0.0032

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(NIM)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0271	8.0	9
Indonesia	0.2271	0.0	9
Malaysia	0.0199	6.0	9

Total Loans

Null Hypothesis: Unit root (individual unit root process)
Series: D(LNLOAN)
Date: 02/09/21 Time: 10:39
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 24
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	5.05350	0.5370
PP - Choi Z-stat	0.37532	0.6463

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(LNLOAN)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.3169	2.0	6
Indonesia	0.2624	0.0	9
Malaysia	0.9610	8.0	9

Non-Performing Loans

Null Hypothesis: Unit root (individual unit root process)
Series: D(NPL)
Date: 02/09/21 Time: 10:40
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total number of observations: 25
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	11.5153	0.0737
PP - Choi Z-stat	-1.16496	0.1220

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(NPL)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.7747	6.0	7
Indonesia	0.2752	2.0	9
Malaysia	0.0148	7.0	9

Total Deposits

Null Hypothesis: Unit root (individual unit root process)
Series: D(DEP)
Date: 02/09/21 Time: 10:42
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	22.0030	0.0012
PP - Choi Z-stat	-2.41449	0.0079

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(DEP)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.3985	6.0	9
Indonesia	0.0001	7.0	9
Malaysia	0.4185	7.0	9

Gross Domestic Product

Null Hypothesis: Unit root (individual unit root process)
Series: D(GDP)
Date: 02/09/21 Time: 10:45
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	25.8878	0.0002
PP - Choi Z-stat	-3.22872	0.0006

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(GDP)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.5017	3.0	9
Indonesia	0.0138	6.0	9
Malaysia	0.0003	8.0	9

Inflation Rate

Null Hypothesis: Unit root (individual unit root process)
Series: D(INFL)
Date: 02/09/21 Time: 10:48
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	36.7402	0.0000
PP - Choi Z-stat	-4.80857	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(INFL)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.0133	3.0	9
Indonesia	0.0095	0.0	9
Malaysia	0.0001	8.0	9

Unemployment Rate

Null Hypothesis: Unit root (individual unit root process)
Series: D(UNEM)
Date: 02/09/21 Time: 10:57
Sample: 2007 2017
Exogenous variables: Individual effects, individual linear trends
Newey-West automatic bandwidth selection and Bartlett kernel
Total (balanced) observations: 27
Cross-sections included: 3

Method	Statistic	Prob.**
PP - Fisher Chi-square	17.5359	0.0075
PP - Choi Z-stat	-2.62418	0.0043

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results D(UNEM)

Cross section	Prob.	Bandwidth	Obs
Brunei	0.2420	1.0	9
Indonesia	0.0100	8.0	9
Malaysia	0.0646	8.0	9

Appendix 4.9: Descriptive Analysis of Single Banking System

	NIM	LNLOAN	NPL	DEP	GDP	INFL	UNEM
Mean	3.892727	17.37159	2.114375	108.5927	5.927879	5.331212	2.208788
Median	3.360000	17.17500	2.080000	15.07000	6.240000	3.520000	1.880000
Maximum	8.420000	20.47786	4.800000	381.9200	14.53000	25.00000	5.860000
Minimum	1.390000	14.74704	0.760000	1.770000	0.090000	-0.660000	0.390000
Std. Dev.	2.152882	1.855990	0.931814	143.2087	2.662650	6.128866	1.497061
Skewness	0.525878	0.228484	0.807973	0.872373	0.398518	2.002872	0.536671
Kurtosis	1.885010	1.642111	3.487389	1.947563	5.544313	6.584497	2.171839
Jarque-Bera	3.230417	2.651382	3.798437	5.708678	9.774593	39.73008	2.527133
Probability	0.198849	0.265619	0.149686	0.057594	0.007542	0.000000	0.282644
Sum	128.4600	538.5192	67.66000	3583.560	195.6200	175.9300	72.89000
Sum Sq. Dev.	148.3169	103.3409	26.91659	656279.1	226.8706	1202.016	71.71815
Observations	33	31	32	33	33	33	33

Appendix 4.10: Descriptive Analysis of Dual Banking System

	NIM	LNLOAN	NPL	DEP	GDP	INFL	UNEM
Mean	4.563939	11.80844	3.492258	208.9203	3.398788	2.816970	5.170909
Median	5.450000	15.02063	3.190000	242.9100	4.880000	2.100000	4.510000
Maximum	6.840000	16.71946	9.360000	414.0000	7.420000	10.23000	9.320000
Minimum	1.800000	1.629241	1.550000	5.390000	-2.510000	-1.260000	2.880000
Std. Dev.	1.729729	6.256059	1.855124	154.7946	3.185459	2.634022	1.885720
Skewness	-0.384846	-1.002813	1.284517	-0.306727	-0.819609	0.675202	0.521419
Kurtosis	1.489892	2.080773	4.512184	1.516066	2.114130	3.082728	2.081646
Jarque-Bera	3.950172	6.084389	11.47857	3.545280	4.773729	2.516851	2.654966
Probability	0.138749	0.047730	0.003217	0.169884	0.091917	0.284101	0.265144
Sum	150.6100	354.2532	108.2600	6894.370	112.1600	92.96000	170.6400
Sum Sq. Dev.	95.74279	1135.010	103.2445	766763.6	324.7088	222.0183	113.7901
Observations	33	30	31	33	33	33	33

Appendix 4.11: Pooled Ordinary Least Square Model (POLS) of Single Banking System

Dependent Variable: NIM
Method: Panel Least Squares
Date: 02/04/21 Time: 22:41
Sample: 2007 2017
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.03834	1.809336	8.864215	0.0000
LNLOAN	-0.516923	0.088366	-5.849802	0.0000
NPL	0.002461	0.204922	0.012007	0.9905
DEP	-0.006606	0.002389	-2.764589	0.0110
GDP	-0.053151	0.048575	-1.094201	0.2852
INFL	-0.028847	0.023980	-1.202954	0.2412
UNEM	-0.971597	0.160131	-6.067497	0.0000

R-squared	0.926283	Mean dependent var	3.634667
Adjusted R-squared	0.907052	S.D. dependent var	1.963777
S.E. of regression	0.598704	Akaike info criterion	2.012864
Sum squared resid	8.244260	Schwarz criterion	2.339810
Log likelihood	-23.19295	Hannan-Quinn criter.	2.117456
F-statistic	48.16711	Durbin-Watson stat	1.475608
Prob(F-statistic)	0.000000		

Appendix 4.12: Pooled Ordinary Least Square Model (POLS) of Dual Banking System

Dependent Variable: NIM
Method: Panel Least Squares
Date: 02/04/21 Time: 22:59
Sample: 2007 2017
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.552123	3.075056	1.805536	0.0841
LNLOAN	-0.201017	0.179497	-1.119886	0.2743
NPL	-0.148251	0.296573	-0.499882	0.6219
DEP	-0.001663	0.007054	-0.235808	0.8157
GDP	0.138068	0.153688	0.898361	0.3783
INFL	0.441465	0.176133	2.506426	0.0197
UNEM	0.050852	0.302472	0.168121	0.8680

R-squared	0.454417	Mean dependent var	4.409667
Adjusted R-squared	0.312091	S.D. dependent var	1.735844
S.E. of regression	1.439714	Akaike info criterion	3.767730
Sum squared resid	47.67389	Schwarz criterion	4.094676
Log likelihood	-49.51595	Hannan-Quinn criter.	3.872323
F-statistic	3.192786	Durbin-Watson stat	1.235521
Prob(F-statistic)	0.019839		

Appendix 4.13: Fixed Effect Model of Single Banking System

Dependent Variable: NIM
Method: Panel Least Squares
Date: 02/04/21 Time: 22:43
Sample: 2007 2017
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.565873	3.148367	2.085485	0.0494
LNLOAN	-0.182716	0.180833	-1.010412	0.3238
NPL	0.089051	0.126728	0.702694	0.4900
DEP	-0.000714	0.002118	-0.337118	0.7394
GDP	-0.008395	0.027953	-0.300309	0.7669
INFL	0.029326	0.017442	1.681304	0.1075
UNEM	0.025188	0.174136	0.144647	0.8864

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.979811	Mean dependent var	3.634667
Adjusted R-squared	0.972119	S.D. dependent var	1.963777
S.E. of regression	0.327901	Akaike info criterion	0.851117
Sum squared resid	2.257905	Schwarz criterion	1.271476
Log likelihood	-3.766758	Hannan-Quinn criter.	0.985594
F-statistic	127.3937	Durbin-Watson stat	1.519556
Prob(F-statistic)	0.000000		

Appendix 4.14: Fixed Effect Model of Dual Banking System

Dependent Variable: NIM
Method: Panel Least Squares
Date: 02/04/21 Time: 23:01
Sample: 2007 2017
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	54.31078	13.73233	3.954959	0.0007
LNLOAN	-3.955749	1.113867	-3.551366	0.0019
NPL	-0.135859	0.167233	-0.812397	0.4257
DEP	0.011872	0.005129	2.314510	0.0308
GDP	0.027585	0.078734	0.350364	0.7296
INFL	-0.013138	0.105432	-0.124614	0.9020
UNEM	-1.077899	0.265830	-4.054851	0.0006

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.875302	Mean dependent var	4.409667
Adjusted R-squared	0.827798	S.D. dependent var	1.735844
S.E. of regression	0.720328	Akaike info criterion	2.425104
Sum squared resid	10.89631	Schwarz criterion	2.845463
Log likelihood	-27.37656	Hannan-Quinn criter.	2.559581
F-statistic	18.42583	Durbin-Watson stat	1.650396
Prob(F-statistic)	0.000000		

Appendix 4.15: Poolability Hypothesis Testing of Single Banking System

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

Effects Test	Statistic	d.f.	Prob.
Cross-section F	27.838515	(2,21)	0.0000
Cross-section Chi-square	38.852392	2	0.0000

Cross-section fixed effects test equation:
Dependent Variable: NIM
Method: Panel Least Squares
Date: 02/04/21 Time: 22:44
Sample: 2007 2017
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.03834	1.809336	8.864215	0.0000
LNLOAN	-0.516923	0.088366	-5.849802	0.0000
NPL	0.002461	0.204922	0.012007	0.9905
DEP	-0.006606	0.002389	-2.764589	0.0110
GDP	-0.053151	0.048575	-1.094201	0.2852
INFL	-0.028847	0.023980	-1.202954	0.2412
UNEM	-0.971597	0.160131	-6.067497	0.0000

R-squared	0.926283	Mean dependent var	3.634667
Adjusted R-squared	0.907052	S.D. dependent var	1.963777
S.E. of regression	0.598704	Akaike info criterion	2.012864
Sum squared resid	8.244260	Schwarz criterion	2.339810
Log likelihood	-23.19295	Hannan-Quinn criter.	2.117456
F-statistic	48.16711	Durbin-Watson stat	1.475608
Prob(F-statistic)	0.000000		

Appendix 4.16: Poolability Hypothesis Testing of Dual Banking System

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

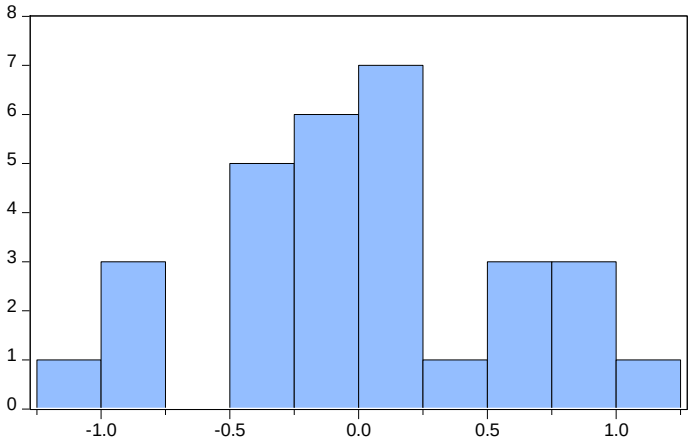
Effects Test	Statistic	d.f.	Prob.
Cross-section F	35.439921	(2,21)	0.0000
Cross-section Chi-square	44.278776	2	0.0000

Cross-section fixed effects test equation:
Dependent Variable: NIM
Method: Panel Least Squares
Date: 02/04/21 Time: 23:01
Sample: 2007 2017
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.552123	3.075056	1.805536	0.0841
LNLOAN	-0.201017	0.179497	-1.119886	0.2743
NPL	-0.148251	0.296573	-0.499882	0.6219
DEP	-0.001663	0.007054	-0.235808	0.8157
GDP	0.138068	0.153688	0.898361	0.3783
INFL	0.441465	0.176133	2.506426	0.0197
UNEM	0.050852	0.302472	0.168121	0.8680

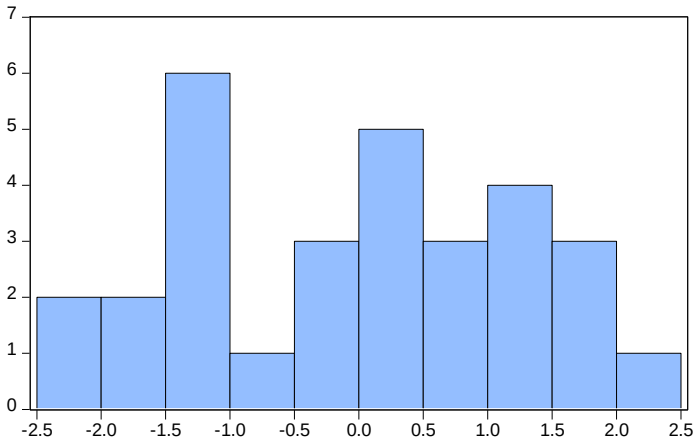
R-squared	0.454417	Mean dependent var	4.409667
Adjusted R-squared	0.312091	S.D. dependent var	1.735844
S.E. of regression	1.439714	Akaike info criterion	3.767730
Sum squared resid	47.67389	Schwarz criterion	4.094676
Log likelihood	-49.51595	Hannan-Quinn criter.	3.872323
F-statistic	3.192786	Durbin-Watson stat	1.235521
Prob(F-statistic)	0.019839		

Appendix 4.17: Normality Test of Single Banking System



Series: Standardized Residuals	
Sample 2007 2017	
Observations 30	
Mean	2.15e-16
Median	0.002197
Maximum	1.008930
Minimum	-1.033927
Std. Dev.	0.533184
Skewness	-0.027758
Kurtosis	2.572604
Jarque-Bera	0.232187
Probability	0.890392

Appendix 4.18: Normality Test of Dual Banking System



Series: Standardized Residuals	
Sample 2007 2017	
Observations 30	
Mean	2.52e-16
Median	0.237199
Maximum	2.455884
Minimum	-2.192133
Std. Dev.	1.282157
Skewness	-0.010398
Kurtosis	1.967664
Jarque-Bera	1.332688
Probability	0.513583

Appendix 4.19: Multicollinearity of Single Banking System

Variance Inflation Factors

Variance Inflation Factors
Date: 02/04/21 Time: 22:48
Sample: 2007 2017
Included observations: 30

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	3.273696	273.9907	NA
LNLOAN	0.007809	198.6469	2.226216
NPL	0.041993	16.95507	2.632996
DEP	5.71E-06	16.64917	9.888371
GDP	0.002360	7.811309	1.350816
INFL	0.000575	2.224400	1.250962
UNEM	0.025642	16.19134	4.910730

Correlation

	NIM	LNLOAN	NPL	DEP	GDP	INFL	UNEM
NIM	1	0.231039345156 9657	0.554374147602 5326	-0.765148300713 6584	0.142021659732 7396	0.051809940125 51665	-0.889934732497 6309
LNLOAN	0.231039345156 9657	1	0.450254421571 2236	-0.711014686908 8788	0.167089624467 1093	0.383227837043 3861	-0.546446706918 7872
NPL	0.554374147602 5326	0.450254421571 2236	1	-0.704397509599 9271	-0.152273133228 2633	0.189567095938 2453	-0.568243606428 5028
DEP	-0.765148300713 6584	-0.711014686908 8788	-0.704397509599 9271	1	-0.236122315649 7084	-0.350156175230 2284	0.876517358286 2665
GDP	0.142021659732 7396	0.167089624467 1093	-0.152273133228 2633	-0.236122315649 7084	1	0.118681394664 8741	-0.249051369236 0334
INFL	0.051809940125 51665	0.383227837043 3861	0.189567095938 2453	-0.350156175230 2284	0.118681394664 8741	1	-0.201452724881 1564
UNEM	-0.889934732497 6309	-0.546446706918 7872	-0.568243606428 5028	0.876517358286 2665	-0.249051369236 0334	-0.201452724881 1564	1

Appendix 4.20: Multicollinearity of Dual Banking System

Variance Inflation Factors

Variance Inflation Factors
Date: 02/04/21 Time: 23:05
Sample: 2007 2017
Included observations: 30

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	9.455967	136.8594	NA
LNLOAN	0.032219	82.66612	17.64264
NPL	0.087955	16.70639	2.871331
DEP	4.98E-05	52.98759	15.16296
GDP	0.023620	7.965766	2.880071
INFL	0.031023	7.147176	3.206974
UNEM	0.091489	39.80356	4.951442

Correlation

	NIM	LNLOAN	NPL	DEP	GDP	INFL	UNEM
NIM	1	-0.20353992657027	0.0855308027600 6312	-0.24430604704647 91	0.0656557865857574	0.3546966457680 13	0.3982362885000 499
LNLOAN	-0.20353992657027	1	-0.65156872636548 61	0.9415690427825 872	0.7587735507868 922	0.6335721527789 72	-0.81696214626403 04
NPL	0.0855308027600 6312	-0.65156872636548 61	1	-0.75640864581650 76	-0.41548356661184 8	-0.42512509395790 68	0.4933289779948 003
DEP	-0.24430604704647 91	0.9415690427825 872	-0.75640864581650 76	1	0.6977404767695 681	0.5256241490754 311	-0.80924689952418 58
GDP	0.0656557865857574	0.7587735507868 922	-0.41548356661184 8	0.6977404767695 681	1	0.6617083530985 929	-0.56257670845675 26
INFL	0.3546966457680 13	0.6335721527789 72	-0.42512509395790 68	0.5256241490754 311	0.6617083530985 929	1	-0.24480522468867 51
UNEM	0.3982362885000 499	-0.81696214626403 04	0.4933289779948 003	-0.80924689952418 58	-0.56257670845675 26	-0.24480522468867 51	1

Appendix 4.21: Heteroscedasticity of Single Banking System

Residual Cross-Section Dependence Test
Null hypothesis: No cross-section dependence (correlation) in residuals
Equation: Untitled
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 30
Note: non-zero cross-section means detected in data
Test employs centered correlations computed from pairwise samples

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	6.862374	3	0.0764
Pesaran scaled LM	1.576808		0.1148
Pesaran CD	-0.818456		0.4131

Appendix 4.22: Heteroscedasticity of Dual Banking System

Residual Cross-Section Dependence Test
Null hypothesis: No cross-section dependence (correlation) in residuals
Equation: Untitled
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 30
Note: non-zero cross-section means detected in data
Test employs centered correlations computed from pairwise samples

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	5.052688	3	0.1680
Pesaran scaled LM	0.838006		0.4020
Pesaran CD	0.670636		0.5025

Appendix 4.23: Statistical Table for Durbin-Watson

Table B-4 Critical Values of the Durbin–Watson Test Statistics d_L and d_U: 5-Percent One-Sided Level of Significance (10-Percent Two-Sided Level of Significance)

N	K = 1		K = 2		K = 3		K = 4		K = 5		K = 6		K = 7	
	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U
15	1.08	1.36	0.95	1.54	0.81	1.75	0.69	1.97	0.56	2.21	0.45	2.47	0.34	2.73
16	1.11	1.37	0.98	1.54	0.86	1.73	0.73	1.93	0.62	2.15	0.50	2.39	0.40	2.62
17	1.13	1.38	1.02	1.54	0.90	1.71	0.78	1.90	0.66	2.10	0.55	2.32	0.45	2.54
18	1.16	1.39	1.05	1.53	0.93	1.69	0.82	1.87	0.71	2.06	0.60	2.26	0.50	2.46
19	1.18	1.40	1.07	1.53	0.97	1.68	0.86	1.85	0.75	2.02	0.65	2.21	0.55	2.40
20	1.20	1.41	1.10	1.54	1.00	1.68	0.89	1.83	0.79	1.99	0.69	2.16	0.60	2.34
21	1.22	1.42	1.13	1.54	1.03	1.67	0.93	1.81	0.83	1.96	0.73	2.12	0.64	2.29
22	1.24	1.43	1.15	1.54	1.05	1.66	0.96	1.80	0.86	1.94	0.77	2.09	0.68	2.25
23	1.26	1.44	1.17	1.54	1.08	1.66	0.99	1.79	0.90	1.92	0.80	2.06	0.72	2.21
24	1.27	1.45	1.19	1.55	1.10	1.66	1.01	1.78	0.93	1.90	0.84	2.04	0.75	2.17
25	1.29	1.45	1.21	1.55	1.12	1.66	1.04	1.77	0.95	1.89	0.87	2.01	0.78	2.14
26	1.30	1.46	1.22	1.55	1.14	1.65	1.06	1.76	0.98	1.88	0.90	1.99	0.82	2.12
27	1.32	1.47	1.24	1.56	1.16	1.65	1.08	1.76	1.00	1.86	0.93	1.97	0.85	2.09
28	1.33	1.48	1.26	1.56	1.18	1.65	1.10	1.75	1.03	1.85	0.95	1.96	0.87	2.07
29	1.34	1.48	1.27	1.56	1.20	1.65	1.12	1.74	1.05	1.84	0.98	1.94	0.90	2.05
30	1.35	1.49	1.28	1.57	1.21	1.65	1.14	1.74	1.07	1.83	1.00	1.93	0.93	2.03
31	1.36	1.50	1.30	1.57	1.23	1.65	1.16	1.74	1.09	1.83	1.02	1.92	0.95	2.02
32	1.37	1.50	1.31	1.57	1.24	1.65	1.18	1.73	1.11	1.82	1.04	1.91	0.97	2.00
33	1.38	1.51	1.32	1.58	1.26	1.65	1.19	1.73	1.13	1.81	1.06	1.90	0.99	1.99
34	1.39	1.51	1.33	1.58	1.27	1.65	1.21	1.73	1.14	1.81	1.08	1.89	1.02	1.98
35	1.40	1.52	1.34	1.58	1.28	1.65	1.22	1.73	1.16	1.80	1.10	1.88	1.03	1.97
36	1.41	1.52	1.35	1.59	1.30	1.65	1.24	1.73	1.18	1.80	1.11	1.88	1.05	1.96
37	1.42	1.53	1.36	1.59	1.31	1.66	1.25	1.72	1.19	1.80	1.13	1.87	1.07	1.95
38	1.43	1.54	1.37	1.59	1.32	1.66	1.26	1.72	1.20	1.79	1.15	1.86	1.09	1.94
39	1.43	1.54	1.38	1.60	1.33	1.66	1.27	1.72	1.22	1.79	1.16	1.86	1.10	1.93
40	1.44	1.54	1.39	1.60	1.34	1.66	1.29	1.72	1.23	1.79	1.18	1.85	1.12	1.93
45	1.48	1.57	1.43	1.62	1.38	1.67	1.34	1.72	1.29	1.78	1.24	1.84	1.19	1.90
50	1.50	1.59	1.46	1.63	1.42	1.67	1.38	1.72	1.34	1.77	1.29	1.82	1.25	1.88
55	1.53	1.60	1.49	1.64	1.45	1.68	1.41	1.72	1.37	1.77	1.33	1.81	1.29	1.86
60	1.55	1.62	1.51	1.65	1.48	1.69	1.44	1.73	1.41	1.77	1.37	1.81	1.34	1.85
65	1.57	1.63	1.54	1.66	1.50	1.70	1.47	1.73	1.44	1.77	1.40	1.81	1.37	1.84
70	1.58	1.64	1.55	1.67	1.53	1.70	1.49	1.74	1.46	1.77	1.43	1.80	1.40	1.84
75	1.60	1.65	1.57	1.68	1.54	1.71	1.52	1.74	1.49	1.77	1.46	1.80	1.43	1.83
80	1.61	1.66	1.59	1.69	1.56	1.72	1.53	1.74	1.51	1.77	1.48	1.80	1.45	1.83
85	1.62	1.67	1.60	1.70	1.58	1.72	1.55	1.75	1.53	1.77	1.50	1.80	1.47	1.83
90	1.63	1.68	1.61	1.70	1.59	1.73	1.57	1.75	1.54	1.78	1.52	1.80	1.49	1.83
95	1.64	1.69	1.62	1.71	1.60	1.73	1.58	1.75	1.56	1.78	1.54	1.80	1.51	1.83
100	1.65	1.69	1.63	1.72	1.61	1.74	1.59	1.76	1.57	1.78	1.55	1.80	1.53	1.83

Source: N. E. Savin and Kenneth J. White, "The Durbin–Watson Test for Serial Correlation with Extreme Sample Sizes or Many Regressors," *Econometrica*, November 1977, p. 1994. Reprinted with permission.

Note: N = number of observations, K = number of explanatory variables excluding the constant term. We assume that the equation contains a constant term and no lagged dependent variables.