

COVID-19 IMPACT ON CREDIT RISK TO THE  
BANKING SECTOR IN MALAYSIA: COMPARATIVE  
ANALYSIS BETWEEN CONVENTIONAL AND  
ISLAMIC BANKING

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


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## DECLARATION

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- (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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## DEDICATION

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## LIST OF ABBREVIATIONS

BNM	Bank Negara Malaysia
CAR	Capital Adequacy Ratio
FDR	Financing to Deposit Ratio
FEM	Fixed Effect Model
IMF	International Monetary Fund
LDR	Loan to Deposit Ratio
LSDV	Least Square Dummy Variable
MIDF	Malaysia Industrial Development Finance Berhad
MPC	Monetary Policy Committee
NPF	Non-Performing Financing
NPL	Non-Performing Loan
OECD	Organization for Economic Co-operation and Development
OPR	Overnight Policy Rate
REM	Random Effect Model
ROA	Return on Asset
TC	Total Credit
TF	Total Financing
US	United States

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## PREFACE

Global banks have developed, or are currently developing, complex forward-looking provisioning models to accommodate various projected economic situations. These simulations involve "downturn" economic scenarios intended to put the bank's reserves and capital levels under pressure. Today, the COVID-19 epidemic has virtually destroyed the entire world's economy, and the global GDP loss, as well as other macroeconomic indicators has much worse than the predicted in banks' forward-looking forecasts. The effects of COVID-19 are anticipated to considerably increase credit losses and default rates, which will result in a major increase in provisioning needs.

Since conventional and Islamic banking are two major banking systems performing in Malaysia, this research intends to compare the impact of COVID-19 on the credit risk for both banking systems. At the same time, this research also attempts to examine the significance of the relationship between the underlying factors and both conventional and Islamic banks in Malaysia. On the other hand, this research is useful to the bank's risk management department to identify the important variables that significantly increase the effect of COVID-19 on the credit risk to the banks. Besides, From the government's perspective, it can assist regulators to observe the entire credit risk system and implement a proper policy to control the credit risk of banks in Malaysia. Lastly, this research also benefits future researchers to extend their studies by including more variables that will affect the credit risk during the pandemic.

## ABSTRACT

The COVID-19 pandemic has affected various commercial segments in Malaysia, banking industry as one of the sectors that facing the credit risk because of this issue. The objective of this study is to assess the impact of COVID-19 on the credit risk to the conventional, Islamic, and overall banking in Malaysia. The independent variables comprise total credit/total financing, Capital Adequacy Ratio (CAR), Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR) and Return on Asset (ROA).

For the data collection, the research data of this study is attained and re-purposed to investigate the existing data by analyzing the annual report from 2011 to 2021 for nine conventional and nine Islamic banks in ten years of balanced data. All the descriptive data collected is analysed by using EViews, Panel Data Regression, Fixed Effect Model (FEM), and Random Effect Model (REM) were used as the regression model in this study. Besides, Hausman Test is applied in this study to determine which model is suitable and appropriate for this study.

The finding shows that COVID-19 has a significant relationship with the credit risk to the banking sector in Malaysia. For the Islamic bank model, the total financing and capital adequacy ratio are the most significant variables. While for the conventional bank model, the total credit and capital adequacy ratio are the main essential variables. In sort, a total credit or total financing, and CAR are the most significant variables for the overall banking system.



# CHAPTER 1: RESEARCH OVERVIEW

## 1.0 Introduction

In the first chapter, the background and concept of this study will be discussed. Several areas will be included in this chapter, which is the research background, research problems, research objectives, research questions and the significance of the study.

## 1.1 Research Background

According to Manab et al. (2015), credit risk is becoming pervasive as it might bring economic loss to one party when the counterparty fails to meet its contractual obligations. The banking sector has been recognized as a risky business that rapidly and dynamically changed in the global financial landscape, posing various risks (Rosle et al., 2017). Basel Committee on Banking Supervision (2001) has pointed out that credit risk is a critical uncertainty for the banking sector because it is significantly associated with the elemental business of banks, which involves fund depositing and loan lending operations. Also, the banking industry has been a hindrance to economic stability when there is a prominent level of credit risk on its overall financial performance. Therefore, credit problems are part of the crucial occasion behind banking difficulties (Martynova, 2015).

Referring to the World Health Organization (2020), 190 out of 233 countries were facing an outbreak of COVID-19 by the end of 2020. Additionally, the accumulated case count has reached 80 million, causing more than 1.8 million deaths around the globe. The global economic situation has been drastically affected by the COVID-

19 pandemic. Being the sector which crucially linked to the economy and financial volatility, the banking sector has been impacted negatively, mainly in terms of the credit risk, profitability, scale of social financing, and vulnerability of financial institutions (Yan & Jia, 2022).

The COVID-19 pandemic is unfavourably influencing the banks' credit performances in every country. The mortgage forbearance in the United States shown an upward trend, with nearly 3,000% rise from March 2020 to May 2020. Additionally, the applications of auto loan modification increased almost ten times in the banking industry since the pandemic ongoing. The inquiries for auto loans, mortgages and credit card dropped by 30% to 50% compared to last year. Overall, the total loss for most of the banks in the US increased by three to four times for the first quarter in 2020 compared to fourth quarter in 2019 (Rafic et al., 2022). The situation in Malaysia is similar to the US, whereby the government had announced an automatic loan moratorium with immediate temporary financial relief to the consumers and households to cope with their difficulties. Approximately 90% of household borrowers were having almost 87% of outstanding household loans in the banks, which were under the moratorium by the end of 2020. The Bank Negara Malaysia (2020) estimates that household borrowers are unlikely to service their debt by about 15% of the total borrowed due to income and unemployment shocks. The BNM also expected that the borrowers are about to default if the economic uncertainties go beyond an uncontrollable situation.

Remarkably, the banking sector in Malaysia has continuously suffered from the monetary policies. Bank Negara Malaysia (BNM) has aggressively lowered the Overnight Policy Rate (OPR), leading to notably reduced interest income in the banks. As mentioned by the Monetary Policy Committee (MPC) of BNM on 7<sup>th</sup> July 2020, it decided to cut the OPR by 25 basis points, reaching 1.75%. Besides, the floor and ceiling rates of the OPR's corridor are reduced to 1.50% and 2.00%, respectively. (Monetary Policy Statement, 2022). According to Khoo (2020), the banking sector in Malaysia has faced a significant loss in its primary deposit income since the public is no longer saving their money in saving accounts due to the lower

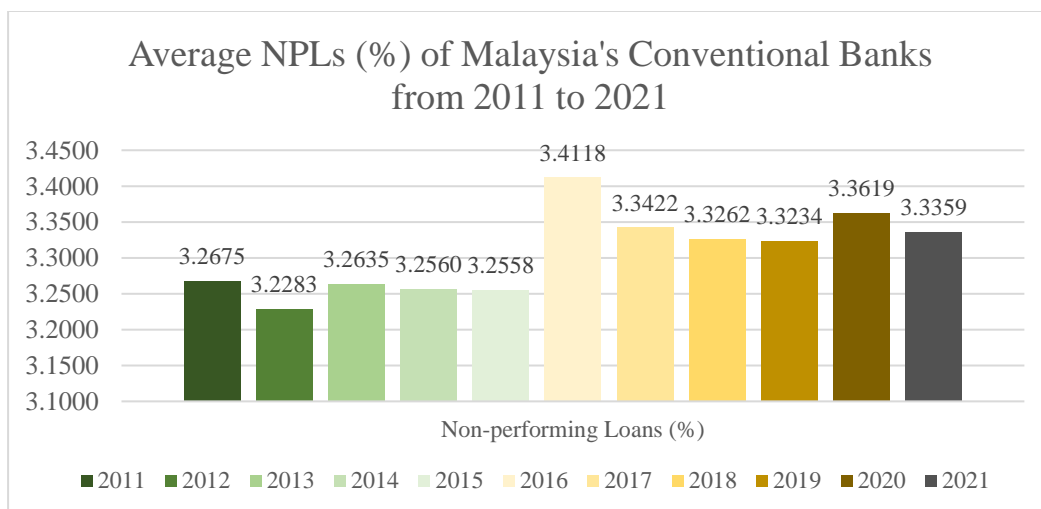
interest rate. Essentially, the banks were being worst-off by the policy. They would likely suffer from credit risk when the counterparties were not paying back the interest or principal of loans at the agreed date. Hence, COVID-19 and consequent monetary policy might undermine the banks' profitability.

In Malaysia, conventional and Islamic banking systems are both financial institutions that contribute various financial services to clients. Similarly, these two banking systems mentioned are undeniably affected by the outbreak of COVID-19. Based on the research from Fah & Hassani (2014), Islamic Banking is an alternative to society apart from conventional banks. While holding other functions or roles remained constant, Islamic banks needed to comply with Shariah principles. Incredibly, there is a significant difference in the financial terms used as compared to the conventional banks. According to Wahyuni et al. (2022), conventional banks are more exposed to COVID-19 than Islamic banks in Indonesia. However, the conventional banks' profitability is more stable compared to Islamic banks during the COVID-19 pandemic. Besides, Islamic banks' return on asset (ROA) was slightly affected by the changing of new norms. In contrast, conventional banks are relatively stable regarding non-performing loans (NPLs) and ROA.

Credit risk can be a valuable indicator for better comparison between the banking systems. Various researches examine the relationship of both banking systems in terms of the nonperforming loans (NPLs) and nonperforming financing (NPFs) for conventional and Islamic banks, respectively. The studies from Setiawan & Sherwin (2017) found that NPFs and NPLs are proper financial ratios to measure the banks' credit risks. Hence, the analysis results show that the credit risk of conventional banks is higher than that of Islamic banks during the COVID-19 pandemic.

The average NPLs of Malaysia's conventional banks from 2011 to 2021 have been obtained from the banks' annual reports and the Refinitive Terminals. Figure 1.1 shows that the NPLs of Malaysia's conventional banks are considered stable from

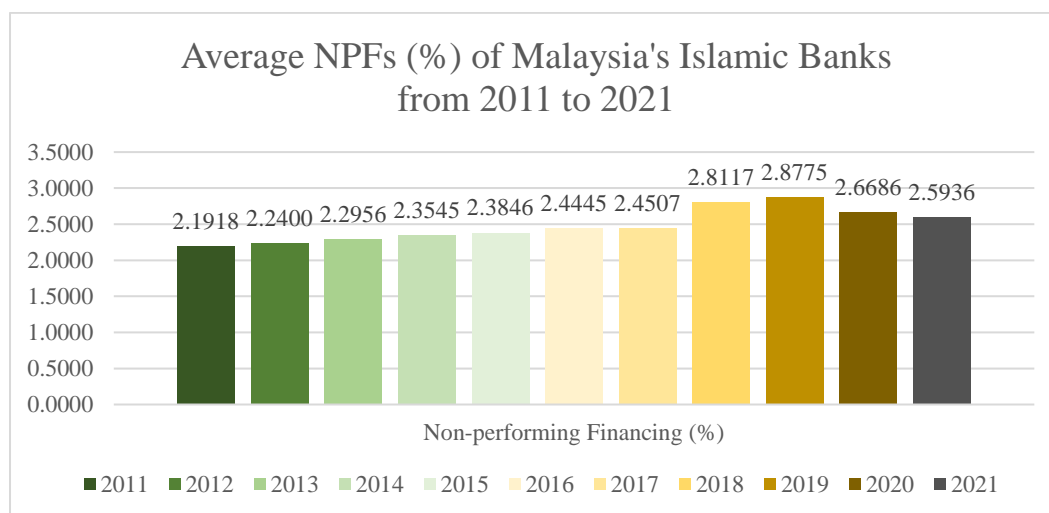
2011 to 2015. However, a sharp increase in NPLs by about 4.79% was recorded in the year 2016. Referring to The Star Online (2016), Asian banks' bad debts worsened, reaching an amount of \$171 billion at the end of 2015 for all Asian banks. An increase in bad debts might affect the increase in bad loans in 2016. After the financial shock of the bad debts had over, the NPLs dropped by about 2.04 from 2016 to 2017. The percentage of average NPLs for Malaysia's conventional banks remained consistently until the end of 2019, which is the last year before the outbreak of the COVID-19 pandemic in Malaysia. After the pandemic occurred in year 2020, the NPLs increased by about 1.16% from 2019 to 2020, which achieved the second highest percentage among these 10 years. The figure also reflected that when the COVID-19 pandemic became relatively stable in the year 2021, the NPLs had decreased by about 0.77%. Overall, the NPLs of Malaysia's conventional banks is solid before the financial shock in 2016. While the NPLs about to back to their normal rate, they had increased again after the outbreak of the COVID-19 pandemic.



*Figure 1. 1 Average Non-performing loans (%) of Malaysia's Conventional Banks from 2018 – 2021.*

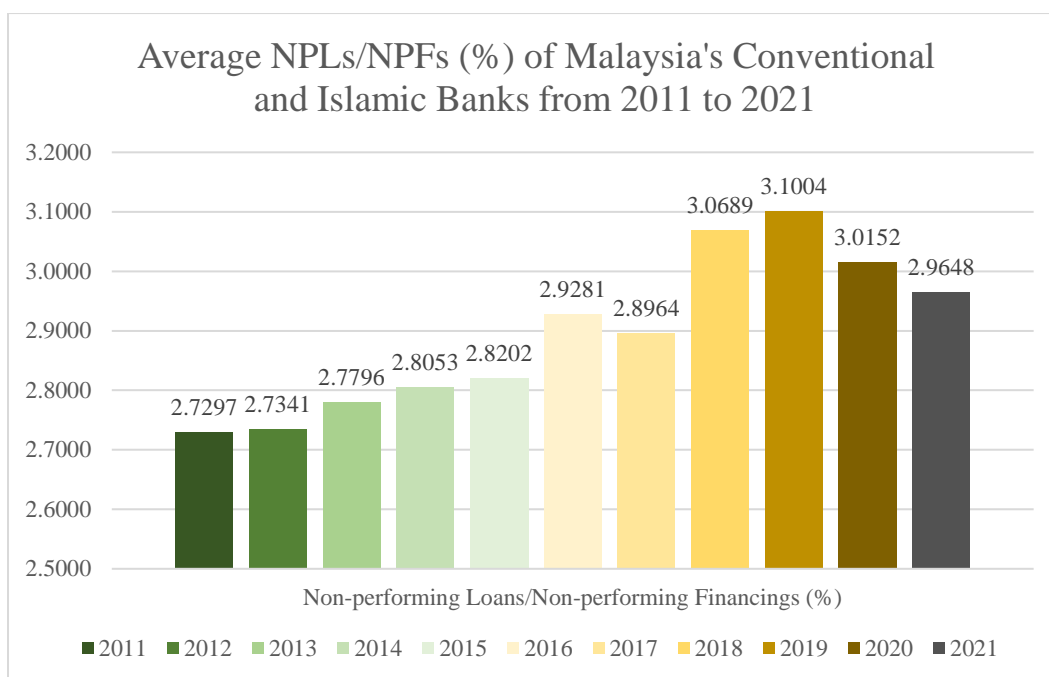
Referring to Figure 1.2 shows the average NPFs of Malaysia's Islamic banks from 2011 to 2021 obtained from the banks' annual reports and the Refinitive Terminals. The NPFs percentages are considered stable, with a slight increment from 2011 to 2017. A sharp rise in NPFs has been recorded from 2017 to 2018, and it increased once more and reached the highest value in 2019 by about 17.42%. Unlike the

situation that happened for Malaysia's conventional banks, the NPFs of Islamic banks started to decline from 2019 to 2021 with a decline of about 9.87%. Overall, the COVID-19 pandemic that occurred in 2020 seemed not significant to impact the performance of Islamic banks in Malaysia.



*Figure 1. 2 Average Non-performing Financings (%) of Malaysia's Islamic Banks from 2018 – 2021.*

Figure 1.3 has recorded the average NPLs and NPFs by combining the average data for both banking systems from 2011 to 2021. From the figure, the overall banks in Malaysia remained stable in NPLs and NPFs from 2011 to 2015 while incurring an increment in 2016 due to the financial shocks about the worsening of bad debts in Malaysia. Although the value has slightly decreased in 2017, it started to rise aggressively from 2018 to 2019. According to the research, 2018 is the worst year in a decade for most countries concerning the rising interest rate, global trade spats, and Brexit uncertainty in most stock markets (Deutsche Welle, 2019). The volatility in stock markets had negatively affected the purchasing power of investors and eventually increased the NPLs and NPFs of overall banks when the borrowers failed to meet their contractual obligations. Besides, The New York Times also reported that the financial crisis was predicted to occur in 2019. The mountain of student debt was one of the key issues that might increase the credit risk of overall banks (Williams, 2018).



*Figure 1. 3 Average NPLs/NPFs (%) of Malaysia's Conventional and Islamic Banks from 2011 to 2021.*

Nevertheless, NPFs and NPLs refer to the loans that experience repayment default due to issues that beyond the prospective debtors' control (Yurttadur et al., 2019). In addition, both are the credit measurements predicted to be affected by the COVID-19 announcement phenomenon. Therefore, only the financial terms used are different between two banking systems, whereby the NPFs ratio indicates the nonperforming loans for Islamic banks while NPLs ratio nonperforming loans for conventional banks. It is widely known that the higher percentage of NPLs indicated higher bank failures. Plenty of evidence shows that East Asia's financial or banking crises were preceded by high NPLs (Khemraj, T. & Pasha, S., 2009). Due to the large scale of conventional and Islamic banking, the credit risk impacted by the COVID-19 of both banking systems is consistently being measured, as a slight impact might lead to massive volatility in Malaysia's whole financial and economy market.

## 1.2 Research Problem

When the COVID-19 pandemic occurred in Malaysia, credit risk exposure was the most affected part of the banking sector. Many banks in Malaysia have prepared various analyses and reports on credit risks to generate credit risk management to minimize the risk. According to the research, the credit risk analysis used by the banks is not limited to their own banks but should be applied to other sectors of banks to have a better view of overall credit risk in the whole of Malaysia's banking industry. For instance, a commercial bank's credit risk analysis can also be applied to Islamic banks. By comparing both banking systems, a more comprehensive analysis can be developed, and the risk department can generate a greater credit risk management to mitigate credit risk (Siddique et al., 2021). Therefore, it is significant to identify the credit risk in the overall banking sector, the Islamic banking sector and the conventional banking sector, respectively.

The MIDF Research Vice President, Mr. Imran Yassin Mohd Yusof, has mentioned that the NPLs in Malaysia were expected to remain stable during the COVID-19 pandemic. He elaborated that the pandemic will not impact the banks' profitability as the spread of viruses is not as severe as in 2021. On the other hand, the Chief Economist of Bank Islam Malaysia, Dr. Mohd Afzanizam Abdul Rashid, opposed the former statement by stating that the NPLs will rise in the coming quarters as the economy in Malaysia remained vulnerable to the shocks (Jalil & Shaheera, 2021). Limited knowledge has been reported about the actual impact of COVID-19 on the credit risk to the banking sector. Hence, this study is expected to prove the correctness of the statements above. Additionally, the study is aimed to identify the significance of the COVID-19 pandemic to affect the credit risk to the banking sector in Malaysia.

Additionally, it is vital to identify the essential variables that can affect the credit risk to the banking sector in Malaysia during this highly uncertain period. The value of NPLs and NPFs can be affected by various variables related to loans and

financing, which should be closely considered and investigated. The Return on Assets (ROA), Total Credit (TC), Total Financing (TF), Loan to Deposit Ratio (LDR), and Financing to Deposit Ratio (FDR) are the variables that are likely to be useful in the study of COVID-19 pandemic impact on credit risk to the banking sector in Malaysia (Riani, 2021).

## **I.3 Research Question**

### **1.3.1 General Research Question**

What is the impact of COVID-19 on the banking sector in Malaysia?

### **1.3.2 Specific Research Question**

- I. What is the impact of COVID-19 on the credit risks to the conventional banking in Malaysia?
- II. What is the impact of COVID -19 on the credit risks to the Islamic banking in Malaysia?
- III. What is the impact of COVID -19 on the credit risks to the overall banking sector in Malaysia?
- IV. What variables that are most significant in determining the credit risks of the banking sectors in Malaysia during the COVID-19 pandemic?



- V. Does conventional and Islamic banking have comparative effects on the credit risks in their financial performance during COVID-19?

## **1.4 Research Objectives**

- I. To assess the impact of COVID-19 on the credit risk to the conventional banking in Malaysia.
- II. To assess the impact of COVID-19 on the credit risk to the Islamic banking in Malaysia.
- III. To assess the impact of COVID-19 on the credit risk to the overall banking sector in Malaysia.
- IV. Since conventional and Islamic banking is two major banking systems performing in Malaysia, this research intends to compare the impact of COVID-19 on the credit risk for both banking systems.
- V. This research also attempts to examine the significance of the relationship between the underlying factors and both conventional and Islamic banks in Malaysia.

## **1.5 Research Significance**

This research focused on a time period when the world was caught up with the economic and financial problems due to the COVID-19 pandemic. It is hoped that the findings of this comparative analysis of the credit risk of conventional and

Islamic banks can assist financial institutions such as the risk department of banks, regulators, and researchers to make proper risk management in the future.

For instance, this is beneficial to the bank's risk management department to identify the important variables that significantly increase the effect of COVID-19 on the credit risk to the banks, giving them a reference to mitigate the credit risk. Since COVID-19 has been spread widely and became one of the causes for the economic recession in Malaysia, a high magnitude of NPLs and NPFs are associated to the crisis.

Furthermore, financial institutions are also able to recognize the in-depth results generated by the mentioned terms, to clearly identify the credit risk level that occurred in their companies. From the government's perspective, it can assist regulators to observe the entire credit risk system and implement a proper policy to control the credit risk of banks in Malaysia.

On top of that, this research also benefits future researchers to extend their studies by including more variables that will affect the credit risk during the pandemic, leading to higher accuracy of results. As a benchmark or guideline to assess the credit risk, this study is convenient for investors in selecting high-risk or low-risk investments.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.0 Introduction**

Within this chapter, the dependent variable and the independent variables that make up the core of this research are discussed. To review and support the dependent variable (credit risk proxy to NPL & NPF) of this research, as well as the independent variables (total credit/total financing, CAR, LDR/FDR, ROA), we will be going deeper deeply into prior studies. The following will provide a thorough explanation of each of the variables.

### **2.1 Underlying Theories**

#### **2.1.1 Information Asymmetry Theory**

When two individuals enter to a transaction have access to the identical vital information, a symmetrical corporate relationship exists. Information asymmetry is a phenomenon that occurs when one side in a transaction has access to more or better information than the other. When two business parties are interacting, there is information asymmetry, meaning one party has more information than the other. A party's access to more pertinent and current information might lead to business imbalances and even exploitation. George Akerlof, Michael Spence, and Joseph Stiglitz, three economists, established the idea of information asymmetry in the 1970s (Ross, 2022). Their assessments of markets with asymmetric knowledge brought them the

Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel in 2001.

Information asymmetry on the credit market contributes to two significant problems: adverse selection and moral hazard across the bank and borrower credit relationship. Due to the knowledge gap between the bank and the borrower, the phenomenon of adverse selection is obvious before signing the loan agreement. After the loan agreement is signed and credit is supplied, information asymmetry also causes moral hazard. In addition, adverse selection also describes a business arrangement in which the buyer and the seller have access to distinct types of information. In contrast to the other, each side is free to make decisions based on the knowledge they perceive to possess. The information asymmetry has an impact on the retail and labour sectors as well. Additionally, it could be detrimental to one's interpersonal relationships (MasterClass, 2021).

By definition, a party entering a contract is aware that, in a circumstance of moral hazard, the other party will be responsible for their actions. This is because they would not suffer any consequences if they were encouraged to take risks without thinking about how dangerous the situation is. For instance, since they will not lose money if the fund fails, fund managers may choose to invest in riskier assets than they would in their own personal portfolio. Given the opportunity, it is possible that the fund participants would not choose to accept this level of financial risk given that the fund manager has access to knowledge about their assets that the fund participants do not (MasterClass, 2021).

According to Crouzille et al. (2004, p. 445), the debtor is at a disadvantage in the credit market because it lacks considerably more detailed information regarding the financing project. When agents do not know the same quantity of information, an information asymmetry situation arises. Due to the

challenge of determining credit risk, the bank encounters an information asymmetry issue in a credit transaction. If the bank can collect and process information when loan applications are accepted, credit risk is decreased. The bank requests key information on the borrower both before approving a loan application and after the credit has been granted. By using valuable information, the bank can influence the borrower's actions. For this reason, the bank is faced with the information asymmetry problem when seeking for information.

Apart from this, it is necessary for a bank to adopt the optimal strategies for comprehending and controlling the sources of information asymmetry, such as moral hazard and adverse selection. Stiglitz and Weiss (1981) claimed that borrowers should be concerned about minimizing the negative effects of information asymmetry. Both borrowers and banks have diverse perspectives on information asymmetry. To give an example, quality borrowers are concerned about adverse selection since it could lead to the rejection of their loan applications. The way that borrowers behave and the information that they withhold makes banks more vulnerable to credit risk.

Additionally, we believe that COVID-19 is a "black swan" scenario about which several governments and institutions have been alerted and informed of the horrific repercussions of a major global pandemic but have shown only a limited level of awareness. Black swan circumstances (COVID-19) are defined by information asymmetry, where an organization must either deal with incomplete or ambiguous information in order to make timely decisions. To reach a set level of performance, more data must be collected and evaluated when an organization is exposed to increase the complexity and uncertainty in such environment.

### **2.1.2 Credit Default Theory**

An entity's financial failure is represented by a credit default, which means there is an inverse relationship between the impacts of loan default (NFL) and financial performance (ROA) that exists. This theory aims to establish a link between the macroeconomic factors influencing the shifting financial panorama and their microeconomic consequences on shifting individual or company financial conditions, potentially resulting in loan defaults. Most definitions of credit default originate with delinquency and insolvency. A borrower is said to be delinquent when they are unable to repay a debt upon the due date owing to a lack of cash flow, as opposed to insolvent when their assets are less than their liabilities.

The probability of excessive losses by the marketplace lending sector is raised by the ongoing economic slowdown brought on by the COVID-19 pandemic. Over a significant economic downturn, losses in the sector are predicted to grow significantly, which could rapidly deplete investor funds. According to analysis, before the pandemic period, the likelihood of a credit default rises from 0.056 to 0.079 in the post-pandemic period. The Organization for Economic Co-operation and Development (OECD) (2020) reports that sales volume has decreased dramatically and that businesses are having severe problems paying their creditors, employees, suppliers, and investors, which causes liquidity issues.

Financial difficulties faced by households, businesses, and public sector organizations may evolve into a more severe level when the current COVID-19 pandemic-related crisis moves into a later stage. Marketplace lending, one of the riskier financial sectors, may see a spike in defaults in 2021. This constant stream of defaults tends to weaken the industry's resilience and drive platforms to reevaluate their risk management strategies.

## **2.2 Review of the Variables**

### **2.2.1 Dependent Variables**

#### **2.2.1.1 Credit Risk**

The chance of experiencing a deficit due to a debtor's failure to fulfil contractual obligations or make loan payments is define by credit risk. Most of the time, this means the possibility that a creditor will not receive the principal and interest that is promised to pay by debtors, which would disrupt cash flows and increase collection costs. Credit risk management seeks to increase an institution's risk-adjusted rate of return by reducing the exposure to credit risk to a manageable level. Financial instruments include acceptances, interbank transactions, trade financing, foreign currency transactions, futures, swaps, bonds, options, transaction resolution, and others will cause the banks to face credit risk.

The biggest risk faced by most of the banks is the credit risk. The increasing in future banks losses and diminished confidence in the banking industry may result from ineffective credit risk management and a collapse to recognize credit quality deterioration in a timely way. Owing to the unique nature of the crisis and the extraordinary level of public sector support brought on by the COVID-19 outbreak, it is more difficult to identify the credit quality of borrowers. The effects of COVID-19 are anticipated to considerably increase credit losses and default rates, which will result in a major increase in provisioning needs.

The capacity of conventional and Islamic banks to tackle the COVID-19 outbreak will vary as a result of the fundamental differences between their corporate governance and business systems. Research claims that Islamic banks face a higher credit risk than commercial banks. According to Elgari et al. (2003), unlike conventional banks, Islamic banks do not have the necessary capabilities to manage debt-based contracts in accordance with Shariah-compliant tools. In the same way, there is proof that Islamic banks are less likely to default on their loans than commercial banks. According to Boumediene (2011), credit risk in Islamic banks comes when consumers cancel the purchase of commodities using Murabahah financing, ultimately resulting in losses for the bank.

#### **2.2.1.2 Non-performing Loans / Non-performing Financing**

NPL / NPF is referred to as a loan that is in default and for which the borrower has not made any periodic instalments of principal or interest for a predetermined amount of time. The macroeconomic condition and sound financial transactions between lenders and borrowers are the key factors that affect banks' credit risk, which is the oldest type of risk. This risk is primarily empirically described by a proxy from NPLs or NPFs. According to the International Monetary Fund (IMF), loans should be classified as NPL (1) when the borrower owes a payment that is more than 90 days past due, (2) when the interest has been capitalized, refinanced, or rolled over for more than 90 days, or (3) when instalments are less than 90 days past due but are never again anticipated (Chavan and Gambacorta, 2016). Hardiyanti and Aziz (2021) define Non-performing Loans are loans divided into categories such as sub-standard credit, doubtful credit, and bad credit. A loan with poor credit is one that has unreliable payments because of the borrower's actions or uncontrollable external circumstances.



NPLs are a significant indicator of credit risk that has an impact on the country's banking sector. Handley (2010) stresses that NPLs can be used as a signal of a banking crisis since they restrict the nation's ability to develop credit, which has an impact on economic growth. A country's monetary system is strong when NPLs are at a low level, on the other hand, a large level indicates a risky financial situation. In the long-term, the rising level of NPLs will first have an impact on the commercial banks before having an impact on the country's financial situation (Souza and Feijó, 2011). The NPLs will obstruct interest income, restrict investment opportunities, and cause financial system liquidity crises, which will exacerbate the bankruptcy issue and weaken the economy.

We are all acutely aware of how prominent levels of NPLs might restrict banks' capacity to support the real economy as a result of the big financial crisis. NPLs are anticipated to increase as the COVID-19 crisis's effects on the actual economy become more pronounced. The operational capability of banks to deal with NPLs quickly and completely at an early stage must be ensured. As we learnt from the great financial crisis, banks will be less able to make income, will have higher funding costs, and will ultimately lend less to the real economy if their balance sheets are filled with a lot of depreciating assets over an extended period.

## **2.2.2 Independent Variables**

### **2.2.2.1 Total Credit / Total Financing**

Total Credit is defined as the sum of the total commitments for revolving loans and term loans at any one moment, or, if the term loans were committed earlier, the total principal amount of all term loans outstanding at that time (*Totak Credit Definition*, n.d). On the other hand, total financing

signifies that the attitude of banks in their goal of maximizing profits and risk-taking. This action allows Islamic banking to provide long-term funding for projects with high yields and a high-risk profile (*What is Total Financing (TF)*, n.d). Besides, bank credit is known as the entire quantity of credit readily accessible to a person or corporation from a banking institution in the form of loans. Meaning to say, the entire sum of capital that an individual or corporation can borrow from a financial institution. The quantity of credit that a banking organization has available to offer and the borrower's capability to repay any loans are what determine the borrower's bank credit.

Credits and loans are two distinct types of financing. Both are banking products that give the borrower capital, but their definitions and goals are different. While a loan offers all the desired funds in one lump sum now it is provided, in the case of a credit, the bank gives the customer an amount of money that can be used as needed, whether it be with the full amount borrowed, part of it, or none. A loan is a financial product that enables a user to access a defined amount of money at the beginning of the transaction on the understanding that this amount, plus the agreed-upon interest, would be paid back within a given time frame. Loan repayment is made in periodic instalments. With a credit, you have more financial flexibility because you can use the loaned amount as needed at any given time. A maximum credit amount is specified, which the consumer may use all or part of. The customer has the option of using all, some, or none of the allocated funds.

#### **2.2.2.2 Capital Adequacy Ratio**

CAR sometimes referred to the capital to risk-weighted assets ratio, is a capital comparative value that demonstrates a bank's capacity to finance the growth of its banking operations and to accommodate and, if possible,

predict risk that may arise. It is a measure of all bank assets that are exposed to risk and are funded by capital in addition to funds from sources other than banks, such as public funding, loans, and other sources. Banks need capital to grow their operations and their ability to handle losses (Allahrakha et al., 2018; Akinci & Olmstead-Rumsey, 2018). In the research of Anwar & Murwaningsari (2017), the bank's growth and expansion, as well as efforts to uphold public confidence, depend greatly on capital. Bank capital should be employed as a business entity to reduce the risk of losses from changes in bank assets that are predominantly sourced from third party loans. The CAR demonstrates if the bank's capital has been adequate to meet its needs and serves as a basis for evaluating the bank's prospects for continuing to operate.

The recession brought on by COVID-19 puts bank profitability in jeopardy and results in losses because of defaulted debtors. Capital adequacy ratios can prevent loan default. Higher capital ratios enhance bank productivity and earnings (Bitar et al., 2018). The ability of the bank to reduce the credit risk that arises is inversely correlated with the CAR, meaning that the bank can cover the credit risk that arises with the amount of fund reserves determined by comparing capital and risk-weighted assets (ATMR). In the same way, a bank with a strong capital adequacy ratio is seen as being above the minimal standards necessary to suggest solvency in an equivalent manner. As a result, a bank is more likely to be able to endure a financial crisis or other unanticipated losses if its CAR is larger. According to the findings of research done by Astrini et al. (2014), the CAR has a negative and considerable impact on NPLs.

### **2.2.2.3 Loan to Deposit Ratio / Financing to Deposit Ratio**

LDR / FDR is a ratio used to determine how much capital and public funds were used to finance the loan (Kasmir, 2012). The LDR details the extent to which the bank will be able to recoup the funds that depositors have withdrawn by depending on the allocated credits as a source of liquidity. According to the research of B. Murphy (2020), lenders monitor banks' LDRs to guarantee there is sufficient liquidity to service loans in the scenario of a recession that causes defaults. The LDR also aids in demonstrating how effectively a bank draws in new customers and retains existing ones. A bank will receive more additional funds and consumers if its deposits increase. Consequently, the banking institution will have extra money to lend which will boost profits. Even though it seems illogical, loans are a bank's asset because they allow it to earn interest. Banks are required to pay interest on deposits, even at an extremely low rate, hence deposits are liabilities.

In addition, finding the ideal LDR is a challenging task for banks. If banks lend too much of their deposit money, especially during an economic downturn, they may overextend themselves. Nevertheless, if banks only lend a small portion of their deposits, they may lose out on opportunities because their savings would be sitting on their financial statements earning nothing. Banks with low LDR ratios may see a decline in interest income and profits (B. Murphy, 2020). Since this ratio is one of the bank's liquidity ratings, the greater the LDR of a bank, the more likely it is that a credibility issue will arise. The results of research conducted by Astrini et al. (2014) claims that the LDR has a positive and marginally significant impact on the NPL.

#### **2.2.2.4 Return on Asset**

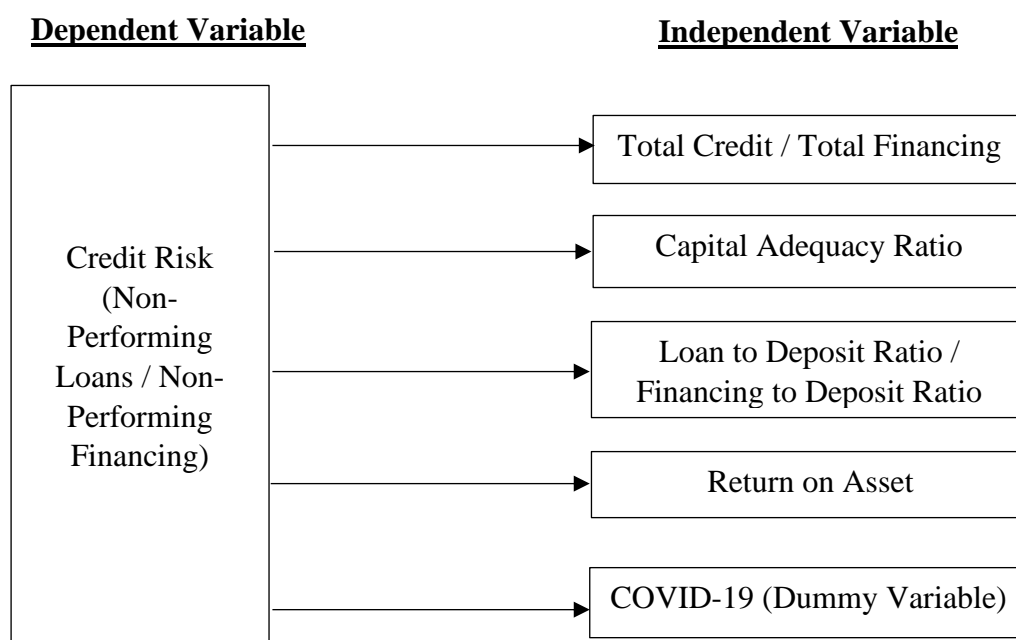
The calculation of the ROA is done by dividing the total assets by the net income, is used to assess the profitability of banks (Rajan, 1994). The ability of a bank to profit from its operations through its active capabilities is the focus. It is a metric for profitability. In addition, ROA used to assess a management team's capacity to produce total income through asset management (Anwar & Murwaningsari, 2017). Defaults have an adverse impact on a bank's profitability. Based on the research of Abaidoo & Opong (2015), income from good loans is directly deducted to make provisions for bad and uncertain debts. The credit and recovery processes are linearly correlated with a bank's performance. Also, banks are not able to make money from defaulted credits. The reliability of credit documentation is a method used to prevent defaults; hence the study has direct bearing on how well a bank performs. Banks' overall loan portfolio is reduced by loan default provisions, which has an impact on the interest earned on those assets.

According to analysis of bank financial statements, the profitability of banks is directly impacted by unsecured loans. This is due to charges for bad debts are viewed as expenses on the profit and loss statement, which has a detrimental effect on banks' profit balances (Abaidoo & Opong, 2015). Since there is less incentive to create profits, banks with high ROA indicate that their financial position is stable and that they are not interested in engaging in riskier loans. At the same time, a bank's profitability and asset utilization position improve with higher ROA. According to Godlewski (2005), there is a strong correlation between NPLs and ROA; the higher the NPLs, the lower the ROA, and vice versa. Furthermore, Ahmad and Bashir (2013) also stated that ROA and NPLs have a direct relationship.

#### **2.2.2.5 COVID-19 (Dummy variable)**

The outbreak of COVID-19 is an unforeseen global shock, and both the virus itself and the remedies taken to mitigate it, such as social isolation policies and partial or complete lockdowns have a substantial influence on the economy. The effects of COVID-19 are anticipated to increase credit losses and default rates, which will result in a major increase in provisioning needs. In the immediate aftermath, it was anticipated that the financial sector, in particular banks, would play a significant role in shock absorption by providing crucial loans to the business sector and households. Central banks and governments around the world implemented a broad variety of monetary policy measures to increase liquidity and boost the movement of credit to assist this. All the sample banks experienced an increase in non-performing loans because of COVID-19. One of the most negative impacts of COVID-19 for banks was the rise in non-performing loans, which decreased the value of the loan portfolio (Riani, 2021).

### 2.3 Proposed Theoretical / Conceptual Framework



*Figure 2. 1 Proposed model of the variables affecting the credit risk of the Conventional and Islamic banks during COVID-19 pandemic Source: Developed for research*

Besides, based on the research by Riani (2021), CAR variable and credit risk are negatively correlated. As a result, a rise in the CAR variable will result in a specific percentage reduction in the NPL/NPF variable.

According to the study done by Riani (2021), the findings show that loan to deposit ratio (LDR) in conventional bank have a demonstrably negative association with NPL, which means that as loans rise, the NPL level falls.

In addition, Riani (2021) also discovered a negative correlation between credit risk and ROA in both conventional banks as represented by NPL and Islamic banks as represented by NPF. This indicates that the two banks' performance will suffer as credit risk rises.

Finally, Riani (2021) believed that all the sample banks experienced an increase in non-performing loans because of COVID-19. One of the most detrimental effects of COVID-19 for banks was the rise in non-performing loans, which decreased the value of the loan portfolio. Thus, COVID-19 has a positive relationship to the credit risk.

## **2.4 Hypotheses Development**

### **2.4.1 Independent Variables**

#### **2.4.1.1 Total Credit / Total Financing**

H<sub>0</sub>: There is no significant relationship between Total Credit / Total Financing and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Total Credit / Total Financing and NPLs / NPFs.

#### **2.4.1.2 Capital Adequacy Ratio (CAR)**

H<sub>0</sub>: There is no significant relationship between Capital Adequacy Ratio (CAR) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Capital Adequacy Ratio (CAR) and NPLs / NPFs.

#### **2.4.1.3 Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR)**

H<sub>0</sub>: There is no significant relationship between Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR) and NPLs / NPFs.

#### **2.4.1.4 Return on Asset (ROA)**

H<sub>0</sub>: There is no significant relationship between Return on Asset (ROA) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Return on Asset (ROA) and NPLs / NPFs.



## **2.4.2 Dummy Variable**

### **2.4.2.1 COVID-19**

H<sub>0</sub>: There is no significant relationship between COVID-19 and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between COVID-19 and NPLs / NPFs.

## **2.5 Conclusion**

This chapter illuminates the variables affecting the credit risk of conventional and Islamic Banks during COVID-19 pandemic, which is collaborated by several findings and journals. The formulation of hypotheses in relation to the subtopics in Chapter 1 is also covered in this chapter. In Chapter 3, there will be discussion about the research of methodology.

## **CHAPTER 3: METHODOLOGY**

### **3.0 Introduction**

The previous chapter explains the theories involved in this research as well as a summary of the literature review. However, this chapter demonstrates the data collection method, description of the independent and dependent variables, economic framework, and model selection used in the study.

For this study, the data is obtained from the annual report of each bank and Refinitiv. Next, several independent and dependent variables are used in this study, for example, NPL, ROA and others.

Several regression models were used in this study which includes Fixed Effect Model (FEM) and Random Effect Model. The FEM assumes the variable is constant and fixed across the data by contrast; the REM assumes that the variables are random across the data.

The last part of this study is model selection Hausman Test is applied to test whether FEM or REM is more appropriate and applicable to this study.

### **3.1 Research Design**

The quantitative data is applied in this research. Quantitative data analysis involves the calculation of frequencies of variables and changes among variables (Saunders et al., 2012). A quantitative method is commonly correlated with discovering

evidence to either support or reject hypotheses. In addition, descriptive research is carried out to elucidate the relationships between the dependent and independent variables used in this research. Descriptive data may be used in quantitative research designs since it provides researchers with valuable information to utilise as a reference as they proceed with hypothesis testing. Moreover, regression analysis also included in this study. Regression captures the correlation between the variables observed in data collection and assesses the statistical significance of these correlations (Beers, 2022). Not only is it also a statistical tool used in finance, investment, and other fields to identify the degree and type of connection between a series of independent and one dependent variables (Beers, 2022).

### **3.2 Data Collection Methods**

Since the research is particularly related to the banking industry in Malaysia, internal data such as loan financing data, sales data, financial data, equity data and operations data will be attained and re-purposed to investigate research questions about several aspects. For example, analyse the annual report from various conventional banks and Islamic banks.

For research objective, the external data research is used to obtain the existing data from government statistics (such as Bursa Malaysia and Bank Negara Malaysia) and different international organizations, international institutions and published market research reports. This study compiles ten years of balanced data from 2011 to 2021 for nine conventional and nine Islamic banks.

The first independent variable in the study is the total credit. In the banking industry, a company or individual's ability to get financing in the form of loans is called "total credit." (Twin, 2020). The second independent variable is The Capital Adequacy Ratio, often known as CAR, is a method for determining how much money a bank has. This ratio is expressed as a percentage of the bank's risk-weighted credit

exposures. The CAR serves the objective of ensuring that financial institutions have sufficient capital in reserve to deal with the possibility of suffering losses without putting themselves in jeopardy of going bankrupt (Beers, 2022). Next, the FDR is utilised as an independent variable to evaluate a bank's liquidity. The ratio is calculated by comparing a bank's total loans and total deposits over a period (Murphy, 2021). The last independent variable ROA which is a metric that evaluated the company's profitability in relation its total assets. ROA can be used by management, analysts, and investors to figure out if a company uses its assets effectively to make money (Hargrave, 2022).

Besides, the dependent variable used in this study is Non-Performing Loan (NPL), which means the level representation of credit risk in conventional banks that has a direct influence on bank profitability. Another dependent variable is Non-Performing Financing (NPF) that indicate the financing risk in Islamic banks. To ensure the authenticity of this study, all the sources of the dependent and independent variable data is obtained from Bank Negara Malaysia, Bloomberg, and the financial reports from each of the bank selected for further analysis.

### **3.3 Data Description**

Panel data, also known as pooled data, is created by combining time series data and cross-sectional data. In this research, we compile balanced ten-year-based data of 9 conventional and 9 Islamic banks from the year 2011 until the year 2021. The banks involved in this study are those that can provide both conventional and Islamic banking services.

Nine conventional banks involved are Affin Bank Berhad, AmBank (M) Berhad, CIMB Bank Berhad, Hong Leong Bank Berhad, Malayan Banking Berhad, OCBC Bank (Malaysia) Berhad, Public Bank Berhad, RHB Bank Berhad and Standard Chartered Bank Malaysia Berhad. On top of that, nine Islamic Bank that used in

this study are Affin Islamic Bank Berhad, AmBank Islamic Berhad, CIMB Islamic Bank Berhad, Hong Leong Islamic Bank Berhad, Maybank Islamic Bank Berhad, OCBC Al-Amin Bank Berhad, Public Islamic Bank Berhad, RHB Islamic Bank Berhad and Standard Chartered Saadiq Bank Berhad.

As there is lack of data for certain banks, this study can compile only ten years of balanced data from 2011 to 2021 for nine conventional and nine Islamic banks. For example, the annual report for the Alliance Islamic Bank Berhad shown on the official website is until the year 2016 only and cannot find the data on other platforms such as Bursa Malaysia and Refinitiv. Hence, incomplete data forced us to abandon some of the banks in this study.

Aside from that, one of the research objectives of this study is to compare the effect of COVID-19 on credit risk in conventional and Islamic banking systems. Therefore, the number of banks that provide conventional and Islamic banking services is also one of the reasons why this study only complies with nine banks for each banking system. According to Bank Negara Malaysia's official website, there are 16 Islamic banks in Malaysia. However, there are only ten banks that provide Islamic banking services along with conventional banking services. Suppose a comparison is to be made in this study. In that case, it is best to compare both banking systems within the same company or group to provide a clearer picture of whether Islamic or conventional banking systems are most affected by COVID-19. Therefore, there is a limit to the number of banks that provide both conventional and Islamic banking services, which is cause this study can compile only ten years of balanced data from 2011 to 2021 for nine conventional and nine Islamic banks.

Furthermore, the data used as the dependent variable is the credit risk of conventional banks and Islamic banks proxies by NPL and NPF. The independent variables include of the dummy variable as substituted of COVID-19 outbreak. In the meantime, we added control variables from bank specific indicators such as Total Cr, CAR, FDR and ROA.

## 3.4 Proposed Data Analysis Tool

### 3.4.1 Panel Data Regression

Several independent variables are included in this study: total credit, total financing, loan to deposit ratio and others. In addition, the independent variable consists of a dummy variable that is a proxy for the period before and during the COVID-19 pandemic. Besides, the dependent variables used in this study are credit risk and financing risk. The credit risk of conventional banks is proxied by non-performing loans (NPL), whereas the financing risk of Islamic banks is proxied by non-performing financing (NPF).

Panel Regression is a modelling approach suited to panel data, a mix of cross-sectional and time series data in which the same unit cross-section is examined at different points in time (Zulfikar, 2018). In other words, panel data is data collected from some of the same people throughout the course of a given time period.

The model was utilized in this study is the panel regression model. The impact of COVID-19 on credit risk to banking sector in Malaysia can be study by using the regression analysis below:

Proposed Models:

$$CR_{it} = \alpha + \beta_1 DCovid_{it} + \beta_2 \ln Total Cr_{it} + \beta_3 CAR_{it} + \beta_4 LDR_{it} + \beta_5 ROA_{it} + e_{it}$$

Conventional Bank Model:

$$NPL_{it} = \alpha + \beta_1 DCovid_{it} + \beta_2 \ln Total Cr_{it} + \beta_3 CAR_{it} + \beta_4 LDR_{it} + \beta_5 ROA_{it} + e_{it}$$

Islamic Bank Model:

$$NPF_{it} = \alpha + \beta_1 DCovid_{it} + \beta_2 \ln Total Fn_{it} + \beta_3 CAR_{it} + \beta_4 FDR_{it} + \beta_5 ROA_{it} + e_{it}$$

Three models are involved in this research, which include proposed model, conventional bank model, and Islamic bank model. There is a total of one dependent variable, one dummy variable, and several independent variables involved in each model. The dependent variable for the overall model is the credit risk to the banking sector in Malaysia, and it is proxied by credit risk (CR). On top of that, the dependent variables used in the conventional bank and Islamic Bank models are the credit risk and financing risk, respectively. The conventional bank model's credit risk is proxied by non-performing loan (NPL). In contrast, the financing risk is proxied by non-performing financing (NPF) in the Islamic bank model. Besides, one dummy variable is involved in each model which is the period before and after the COVID-19 pandemic. It is proxied by DCovid in the model.

There are also several independent variables involved in the overall model and conventional model, which include Total CR, CAR, LDR, and ROA. The independent variable for the Islamic model will be slight differences compared to the overall model and conventional model. The ROA and CAR remain unchanged and same with another model. However, the Total Financing of Islamic Bank (Total FN) replaces the Total Credit of conventional Bank (Total CR), and the Financing to Deposit Ratio (FDR) substitutes the Loan to Deposit Ratio (LDR). These are the difference between the Islamic Bank model and another model. Lastly, there are also several elements involved in each model, which are intercept ( $\alpha$ ), Error Term ( $\epsilon$ ), the cross-section for bank ( $i$ ), a period of study ( $t$ ), and Log Natural ( $\ln$ ).

There were two reasons for choosing panel data in this study. First-panel data can provide more accurate inferences of modal parameters. The most significant differences between cross-sectional data and panel data are the degree of freedom and sample variability. Panel data, as opposed to cross-sectional data, often have a greater number of degrees of freedom and a more substantial sample variability, which contributes to an increase in the economic estimate efficiency (Hsiao, 2006). Another reason panel data was chosen for this study is that it is a better way to show how complicated human behaviour is. Panel data may give more accurate predictions of individual outcomes by combining the data instead of using the data and information about the person in question to make predictions of individual outcomes (Hsiao, 2006). If individual behaviours are comparable, subject to certain characteristics, panel data gives the potential to learn a person's behaviour by witnessing the behaviour of others. Thus, it is possible to obtain a more accurate picture of a person's behaviour by combining observations of the person in question with other persons' data (Hsiao, 2006). Consequently, panel data is required to be used in this research to determine how the COVID-19 pandemic may affect the credit risk of the banking sector in Malaysia.

## **3.5 Panel Regression Model**

### **3.5.1 Random Effect Model (REM)**

According to Rizka Zulkifar (2018), the Random Effect Model is also known as Generalized Least Square (GLS) technique. It is a technique that is often used to analyse the influence of individual-specific attributes on the response variable of a panel data set. In general, the random effect model is distinguishable from the common effect model and the fixed effect model.



This is because this model does not, like Fixed Effect Model, apply the principle of ordinary least square but instead Random Effect Model will apply the principle of maximum likelihood (Zulfikar, 2018). The equation of the model is shown below:

$$Y_{it} = \bar{\beta}_1 + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + e_i + \mu_{it}$$

Number of individual or cross section is proxies by  $i$  in the equation while  $t$  refers to the number of time period. The dependent variable of  $i$  at time period  $t$  is denotes by  $Y_{it}$  in the equation.  $\bar{\beta}_1$  denotes the intercept parameter.  $\beta_2$  to  $\beta_k$  indicates the coefficient of independent variables while the independent variable of  $i$  at time period  $t$  is denotes by  $X_{it}$  in the equation. Lastly the symbol of  $e_i$  refer to the error term of the random individuals where the  $\mu_{it}$  refer to the error term for the model where  $i$  and  $t$  refer to the combination between time series and cross-sectional error component. The dependent variable of  $I$  at time period of  $t$  is denote by  $y_{it}$  in the equation.

### 3.5.2 Fixed Effect Model (FEM)

The Fixed Effect Model is also known as the Least Square Dummy Variable (LSDV). This approach assumes that differences between individuals may be accounted for by using various intercepts. When calculating the Fixed Effect Model with different intercepts between individuals, the dummy variable is always involved in this model (Zulfikar, 2018). The FEM model uses the ordinary least square principle. Not only for that, but this model also carries several assumptions, such as intercepts being different across companies, slopes being constant across companies, as well as time invariant.

The equation of the model is shown as below:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + (e_{it} + u_i)$$

Number of individual or cross section is proxies by  $i$  in the equation while the number of time period is denoted by  $t$  in the equation. The dependent variable of  $i$  at time period  $t$  is denoted by  $Y_{it}$  in the equation. The intercept now contains a subscript  $i$  which suggests that the value of  $\beta_1$  may be different for each individual unit (Twumasi-Ankrah et al., 2015).  $\beta_2$  to  $\beta_k$  refers to the coefficient of independent variables while the independent variable of  $i$  at time period  $t$  is denoted by  $X_{it}$  in the equation.

After the dummy variable added into each variable, the equation will change and transform, and the transformed equation is shown as below.

$$Y_{it} = \beta_{1i} D_{1i} + \beta_2 X_{2it} D_{2i} + \dots + \beta_k X_{kit} + e_{it}$$

## 3.6 Model Selection

### 3.6.1 Hausman Test

The Hausman Test is applied to analyse whether the Fixed Effect Model or Random Effect Model is more suitable in interpreting the results in the following chapter. The hypothesis for Hausman Test is shown as below:

$H_0$ : Use REM

$H_1$ : Use FEM

If the p-value is less than significance level of 5%, reject  $H_0$  and accept  $H_1$  to prove that FEM is more suitable compared to REM. By contrast, if the p-value is greater than the significance level of 5%, then need to accept  $H_0$  prove that random effect model is more appropriate to use in interpret the result in following chapter.

### **3.7 Conclusion**

This chapter discusses the source of data and the methodology used in this study. FEM and REM will be used as the regression model in this study. Besides, to determine which model is suitable and appropriate for this study. Hausman Test are applied and used in this study.

## CHAPTER 4: DATA ANALYSIS

### 4.0 Introduction

The focus of chapter four is the evaluation and interpretation of relevant data. All the data must be gathered, organized, and then subjected to the analysis described in the preceding chapter. The descriptive analysis is used initially to determine the overall concept of the data set, followed by the discussion of the regression results, and finally the selection of the regression model.

### 4.1 Descriptive Analysis

Descriptive analysis is referred to an act of gathering and summarizing the data in ways that are pertinent and significant (e.g., mean, percentage, standard deviation, etc.). The researchers or readers can quickly analyse the information and form a broad picture in their minds by looking at the analysis results. Table 4.1 shows descriptive statistics on bank credit risk and bank-specific variables, namely NPL / NPF proxies to credit risk, dummy variable indicating the COVID period pandemic, TOTAL Cr / TOTAL Fn, CAR, LDR / FDR, and bank performance variables derived by ROA. The following facts are found regarding the banking industry in Malaysia which are captured.

*Table 4. 1 Descriptive Statistics.*

Variables	Overall Bank		Conventional Banks		Islamic Banks	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation

Cr / NPL / NPF	2.894797	0.625185	3.306597	0.394519	2.482997	0.536130
COVID	0.181818	0.386672	0.181818	0.387657	0.181818	0.387657
TOTAL Cr / TOTAL Fn	4.693334	0.541128	5.036585	0.384719	4.350083	0.450079
CAR	0.165967	0.028212	0.167861	0.020609	0.164074	0.034176
LDR / FDR	0.835945	0.117204	0.844880	0.064226	0.827011	0.152733
ROA	0.010289	0.007332	0.013007	0.009127	0.007571	0.003136

Source: Developed for research.

From the descriptive statistics, the credit risk owned by conventional banks has an average of much higher than Islamic banks ( $3.306597 > 2.482997$ ). The COVID-19 dummy for all the models are the same. Furthermore, the average total credit issued by conventional banks show a much larger number than Islamic banks ( $5.036585 > 4.350083$ ). This is because the total assets owned by conventional banks are several times larger than the total assets of Islamic banks. In addition, in the variable capital adequacy ratio, conventional banks have a higher average value than Islamic banks ( $0.167861 > 0.164074$ ). The variable loan to deposit ratio of conventional banks has a higher value than Islamic banks ( $0.844880 > 0.827011$ ). Although in fact, the two values are almost equal. Furthermore, the variable return on assets of conventional banks has a higher average than Islamic banks ( $0.013007 > 0.007571$ ). This means that the performance of conventional banks shows greater results, which is supported by large total assets.

## 4.2 Panel Regression Analysis

### 4.2.1 Random Effect Model (REM)

Table 4. 2 Summary Result of REM.

	Proposed Model	Conventional Bank Model	Islamic Bank Model
C	-1.707830 (0.0001***)	1.488648 (0.0837*)	-1.905908 (0.0081***)
COVID	-0.119984 (0.0324**)	-0.075154 (0.133300)	-0.147685 (0.147200)
Total Cr / Total Fn	0.893603 (0.000***)	0.241013 (0.200000)	0.910284 (0.000***)
CAR	3.882019 (0.0002***)	3.084194 (0.0037***)	4.549793 (0.0068*)
LDR / FDR	-0.282417 (0.243500)	0.206583 (0.651600)	-0.364697 (0.318000)
ROA	2.410302 (0.648600)	-5.729385 (0.236000)	1.460020 (0.909500)
R-squared	0.409446	0.198910	0.360631
Adjusted R-square	0.394067	0.155840	0.326256
Prob (F-statistic)	0.000000	0.000000	0.000000

Source: Developed for research.

The result shown is the result for the random effect model (REM). Constant variable is the first variable that shown in the table. According to the result, the coefficient of constant is in negative for both proposed model and Islamic banks model while positive for conventional banks model. The second variable is the dummy variable, which is the period of pre-COVID and during the COVID-19 pandemic. Based on the result coefficient of the dummy variable is in negative sign for all models.

The third variable is the TOTAL Cr / TOTAL Fn for proposed model, conventional banks and Islamic banks. According to the result, the coefficient of TOTAL Cr / TOTAL Fn is in positive sign for all the models. This means that when the TOTAL Cr / TOTAL Fn increase by 1%, the credit risk of the banking sector increases by 0.893603% (proposed models) 0.24103% (conventional banks), and 0.910284% (Islamic banks), holding other constant.

Moreover, the CAR had positive sign for its coefficient in all models. This can be explained by when the CAR increase by 1%, the credit risk of the banking sector increases by 3.882019% in proposed models, 3.084194% in conventional banks, and 4.549793 in Islamic banks, holding other constant. Besides, the p-value for CAR in all models are less than significance level of 1%. This result also meets with the hypothesis development that had been proposed in Chapter 2 which is CAR has a significant and negative effect on NPL / NPF.

Furthermore, the coefficient in all regression model for LDR / FDR is in negative sign for proposed and Islamic banks model while positive sign for conventional banks model. When the LDR increase by 1%, the credit risk of banking sector is expected to drop by 1% and vice versa. However, the p-value for LDR in all regression model are greater than the significance level of 10%.

Besides, ROA had a positive sign for proposed and Islamic banks model while there is a negative sign for conventional banks model. Next is the p-value for the ROA. The p-value for the ROA is identical to the LDR / FDR that mentioned at above. The p-value for ROA for all models are greater than the 10% significance level.

The probability value of F-statistic in all models are 0.000000 which is the highly significance results, so the independent variable and dummy variable affect the dependent variables. Hence it can be sum out that the use of the model is reasonable and reliable. The Adjusted R Square value for proposed model, conventional banks model, and Islamic banks model are 39.41%, 15.58% and 32.63% respectively. This means that the independent variable can be explain by the dependent variable.

#### 4.2.2 Fixed Effect Model (FEM)

*Table 4. 3 Summary Result of FEM.*

	Proposed Model	Conventional Bank Model	Islamic Bank Model
C	-0.871980 (0.226500)	3.781427 (0.0018***)	-1.943278 (0.0462**)
COVID	-0.102754 (0.0848*)	-0.046231 (0.372800)	-0.150807 (0.155400)
Total Cr / Total Fn	0.695684 (0.0001***)	-0.314435 (0.251600)	0.913372 (0.0004***)
CAR	3.698842	3.496813	4.659110



	(0.0004***)	(0.0014***)	(0.0063*)
LDR / FDR	-0.098258 (0.717000)	0.735163 (0.149300)	-0.363170 (0.356300)
ROA	-1.104751 (0.864000)	-6.984567 (0.185000)	2.160530 (0.868700)
R-squared	0.854487	0.871694	0.688313
Adjusted R-square	0.836194	0.852070	0.640643
Prob (F-statistic)	0.000000	0.000000	0.000000

Source: Developed for research.

The result shown is the result for the fixed effect model (FEM). Constant variable is the first variable that shown in the table. According to the result, we can observe that the coefficient of constant for conventional banks model is in positive while proposed model and Islamic banks model are in negative value. The second variable is the dummy variable, which is the period of pre-COVID and during the COVID-19 pandemic. Based on the result coefficient of the dummy variable is in negative sign for all models.

The third variable is the TOTAL Cr / TOTAL Fn for proposed model, conventional banks and Islamic banks. According to the result, the coefficient of TOTAL Cr / TOTAL Fn is in positive sign for all the models except conventional banks model. This means that when the TOTAL Cr / TOTAL Fn increase by 1%, the credit risk of the banking sector increases by 0.695684% (proposed models) and 0.913372% (Islamic banks), holding other constant. On the other hand, for conventional banks model, when the TOTAL Cr / TOTAL Fn increase by 1%, the credit risk of the banking sector decreases by 0.314435%

Moreover, the CAR had positive sign for its coefficient in all models. This can be explained by when the CAR increase by 1%, the credit risk of the banking sector increases by 3.698842% in proposed models, 3.496813% in conventional banks, and 4.659110 in Islamic banks, holding other constant. Besides, the p-value for CAR in all models are less than significance level of 1%. This result also meets with the hypothesis development that had been proposed in Chapter 2 which is CAR has a significant and negative effect on NPL / NPF.

Furthermore, the coefficient in all regression model for LDR / FDR is in negative sign for proposed and Islamic banks model while positive sign for conventional banks model. When the LDR increase by 1%, the credit risk of banking sector is expected to drop by 1% and vice versa. However, the p-value for LDR in all regression model are greater than the significance level of 10%.

Besides ROA had a positive sign only in Islamic banks model while there is a negative sign for proposed banks model and conventional banks model. Next is the p-value for the ROA. The p-value for the ROA is same as the LDR / FDR that mentioned at above. The p-value for ROA for all models are greater than the significance level of 10%.

The probability value of F-statistic in all models are 0.000000 which is the highly significance results, so the independent variable and dummy variable affect the dependent variables. Hence it can be sum out that the use of the model is reasonable and reliable. The Adjusted R-Square value for proposed model, conventional banks model, and Islamic banks model are 83.62%, 85.21% and 64.06% respectively. These means that the independent variable can be explain by the dependent variable.

### 4.2.3 Selection of Regression Model

*Table 4. 4 Hausman test for Proposed Models, Conventional Banks Model and Islamic Banks model.*

	Proposed Models	Conventional Banks Model	Islamic Banks Model
Hausman test	0.0000 (1.0000)	0.0000 (1.0000)	0.0000 (1.0000)

Source: Developed for research.

Hausman Test is the best appropriate model which applied in this research to determine whether FEM / REM is more suitable for interpreting the results. Based on the result of p-value of Hausman Test are all in 1.0000 which exceeds the significance level of 10%. The Null Hypothesis for Hausman Test is “REM is appropriate than FEM”. If the p-value is higher than 0.05 then it shows that REM is more appropriate than FEM. On the other hand, if the p-value is smaller than 0.05 then it shows that FEM is more appropriate than REM. The p-value for proposed model, conventional bank model and Islamic bank model is greater than the significance level hence do not reject the null hypothesis prove that REM is more appropriate than the FEM. Sum of all, according to Hausman Test, we can conclude that REM is more suitable than FEM. Hence REM is the most suitable model that used in this study to interpret the result.

### 4.3 Hypothesis Conclusion

Above all, we can use the summary result of REM as stated in Table 4.2 to conclude the hypothesis stated in Chapter 2.

### **4.3.1 Total Credit / Total Financing**

H<sub>0</sub>: There is no significant relationship between Total Credit / Total Financing and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Total Credit / Total Financing and NPLs / NPFs.

From the hypothesis development, H<sub>1</sub> indicates that there is significant relationship between TOTAL Cr / TOTAL Fn and NPLs / NPFs. On the other hand, H<sub>0</sub> indicates that there is no significant relationship between TOTAL Cr / TOTAL Fn and NPLs / NPFs. From the result of Table 4.2, it shows the coefficient of TOTAL Cr / TOTAL Fn is in positive sign for all the models. This means that TOTAL Cr / TOTAL Fn has positive relationship with NPLs / NPFs. Hence, the results reject H<sub>0</sub>.

### **4.3.2 Capital Adequacy Ratio (CAR)**

H<sub>0</sub>: There is no significant relationship between Capital Adequacy Ratio (CAR) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Capital Adequacy Ratio (CAR) and NPLs / NPFs.

From the hypothesis development, H<sub>1</sub> indicates that there is significant relationship between CAR and NPLs / NPFs. On the other hand, H<sub>0</sub> indicates that there is no significant relationship between CAR and NPLs / NPFs. From the result of Table 4.2, it shows the CAR had positive sign for

its coefficient in all models. This means that CAR has positive relationship with NPLs / NPFs. As a result, the findings reject  $H_0$ .

### **4.3.3 Loan to Deposit Ratio (LDR)**

$H_0$ : There is no significant relationship between Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR) and NPLs / NPFs.

$H_1$ : There is significant relationship between Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR) and NPLs / NPFs.

From the hypothesis development,  $H_1$  indicates that there is significant relationship between LDR / FDR and NPLs / NPFs. On the other hand,  $H_0$  indicates that there is no significant relationship between LDR / FDR and NPLs / NPFs. From the result of Table 4.2, the coefficient in all regression model for LDR / FDR is in negative sign for proposed and Islamic banks model while positive sign for conventional banks model. Since both proposed and Islamic banks model have a negative sign on the LDR / FDR, so we can say that LDR / FDR is negative relationship and no significant to NPLs / NPFs. Therefore, the results fail to reject  $H_0$ .

### **4.3.4 Return on Asset (ROA)**

$H_0$ : There is no significant relationship between Return on Assets (ROA) and NPLs / NPFs.

$H_1$ : There is significant relationship between Return on Assets (ROA) and NPLs / NPFs.

From the hypothesis development,  $H_1$  indicates that there is significant relationship between ROA and NPLs / NPFs. On the other hand,  $H_0$  indicates that there is no significant relationship between ROA and NPLs / NPFs. From the result of Table 4.2, ROA had a positive sign for proposed and Islamic banks model while there is a negative sign for conventional banks model. Thus, it shows there is no any significance to the dependent variable, thus the findings fail to reject  $H_0$ .

### **4.3.5 COVID-19**

$H_0$ : There is no significant relationship between COVID-19 and NPLs / NPFs.

$H_1$ : There is significant relationship between COVID-19 and NPLs / NPFs.

From the hypothesis development,  $H_1$  indicates that there is significant relationship between COVID-19 and NPLs / NPFs. On the other hand,  $H_0$  indicates that there is no significant relationship between COVID-19 and NPLs / NPFs. From the result of Table 4.2, the coefficient of the dummy variable is in negative sign for all models. COVID-19 for banks was the rise in non-performing loans, which resulted in a decrease in the quality of the loan portfolio. As a result, COVID-19 has a positive relationship to the credit risk. Hence, the results reject  $H_0$ .

## **4.4 Conclusion**

In this chapter, all the data collected is analysed using EViews. This chapter presents the findings of many analyses, including descriptive analysis, FEM, REM

and Hausman Test. Additionally, all the results and their corresponding interpretations are collected in table form in this chapter. The following chapter will go into deeper details regarding the outcomes.

## **CHAPTER 5: DISCUSSION, CONCLUSION, AND IMPLICATIONS**

### **5.0 Introduction**

In this final chapter, discussion and conclusion of the study will be discussed. The discussions of major findings, implications of the study, limitations of the study, and recommendations for future research will also be investigated.

### **5.1 Discussions of Major Findings**

This study has examined the impact of COVID-19 on the credit risk among the Islamic and conventional banks in Malaysia. This study found that COVID-19 has a positive relationship with the credit risk to the banking sector in Malaysia. It shows that the credit risk to the banking sector has increased in the case of COVID-19 exists in Malaysia. COVID-19 is a major impact to increase the credit risk for banks in Malaysia whereby decline in the quality of the bank's loan portfolio (Goodell, 2020). The banking sectors allowed the borrowers in extending their loan payments during the pandemic, leading to an increase in the default risk of a loan (Bank Negara Malaysia, 2020). The results shown determined that COVID-19 is a significant variable, showing a real impact on the credit risk of the Islamic banks and conventional banks in Malaysia.

Secondly, the significant variables have been determined in measuring the impact of COVID-19 on the credit risk among the Islamic and conventional banks in Malaysia. For the Islamic bank model, the total financing and capital adequacy ratio (CAR) are the most significant variables to show the impact of COVID-19 on the credit risk of Islamic banks in Malaysia. Thus, the overall Islamic banks model is



significant and sufficient to explain the credit risk of Islamic banks. While for the conventional bank model, the total credit and capital adequacy ratio are the essential variables to identify the impact of COVID-19 on the credit risk to conventional banks in Malaysia. The overall conventional banks model can also justify the banks' credit risk sufficiently. In summary, a total credit or total financing, and CAR are the most essential variables for the overall banking system. In research from Widarjono & Rudatin (2021), CAR indicates the banks' ability to support businesses and consumers by providing sufficient funds. In addition, it shows the ability of banks to cope with the risk of funds lost in bank operations. Studies by Hajja (2017), stated that the CAR used to measure banks' capital, will affect the NPLs and NPFs of banks in Malaysia.

In addition, the comparison of Islamic and conventional banks is determined concerning the bank-performance variables. This study has found that the conventional banks in Malaysia are at higher levels than Islamic banks in terms of credit risk, total credits, capital adequacy ratio (CAR) and return on assets (ROA). However, the loan-to-deposit ratio (LDR) is the only variable for Islamic banks to occupy a higher level than conventional banks. Still, the difference in LDR between both banks is minimum. In short, conventional banks are considered more vulnerable to economic uncertainty during the outbreak of COVID-19 than Islamic banks. According to the research, the COVID-19 pandemic has significantly distressed conventional banks while has only lightly affected Islamic banks (Wijana & Widnyana, 2022).

## **5.2 Implications of the Study**

This study has quantitatively evaluated the direct impact of COVID-19 on the credit risk to the banking sector in Malaysia. This study has further developed three independent models to illustrate the impact of COVID-19 on the banks' credit risks,

including the Islamic banks model, the conventional bank model and the overall banks model. This study has an important implication for the risk department of banks. Instead of conducting an analysis that focuses only on their banks and is compared to the benchmark in the market, the banks' risk department in Malaysia can find the direct impact of the COVID-19 pandemic by looking into three independent models to fulfill their needs. As a result, the risk department should be able to identify the underlying impact and thus establish relevant credit risk management to cope with the credit risk. Also, the financial authorities can apply this study as a basis to assess the relevant policies, especially in the case of banking restructuring to suit the new norms. Identifying significant variables can help the authorities consider improving the value of significant variables while removing or reducing the insignificant factors in their banks' operations.

In addition, this study can also be applied by the Malaysian' government to identify the COVID-19 impact on the credit risk to the banking sector in Malaysia. As mentioned previously, the government is responsible for conducting monetary policies to maintain the country's economic and financial stability. Hence, it is helpful when the government deeply investigates the direct impact of COVID-19 on credit risk. As a result, the government should be able to conduct better policies to secure the country and society's welfare. Also, the available information regards of the actual impact of COVID-19 on the credit risk to the banking sector in Malaysia is improved. Thus, the government authorities should have a sharp vision of the impact and significance of COVID-19 and should take further actions to mitigate the risks.

Furthermore, this study also aimed to provide comprehensive information related to the COVID-19 impact on the credit risk to the banking sector in Malaysia. This study also encourages more comparative studies in Malaysia. Hence, the researchers can apply this study for their future research to enhance the quality of their previous studies.

### **5.3 Limitations of the Study**

One of the limitations that have been detected in this study is the limited number of banks involved. These drawbacks ought to take into consideration in the future research. As this study only involved those banks that can provide both conventional and Islamic banking services, there is insufficient number of banks to be considered. Hence, the comparison in terms of performances between the banks are hard to be determined within the COVID-19 pandemic periods. For instance, this research only includes 9 conventional and 9 Islamic banks within a 10-year trend analysis. However, there is a total of 27 conventional and 18 Islamic banks in Malaysia. The greater the number of banks and years involved in the study would provide more accurate results to the study.

The type of variables also needs to be increased. There are only five variables involved in this study, which might not provide a comprehensive view on the actual impact of COVID-19 impact to the entire banking organization in Malaysia. The significance of variables is to assist in the operationalization and procession of models for data collection. We believe that by including extra variables, the validity of study can be increased. The variables involved in this study should contain several attributes that would increase the validity of result, such as excellent rationality, objectivity, clarity, acceptance, reliability, and consistency.

Moreover, the number of comparative studies is still limited as the COVID-19 pandemic in Malaysia has affected the relevant information in Malaysia to be undermined and faced scarcity. The lack of relevant research that related to this study will impact the reliability and validity of this study negatively. Overall, these limitations should be utilized as a valuable prospect to illustrate the necessity of conducting more relevant studies.

## **5.4 Recommendations for Future Research**

Throughout this study, there are some recommendations to overcome the limitations. Future researchers are encouraged to take earlier action in setting a particular period for the data organization process. This is because the greater number of banks investigated, the higher the range of the study. Therefore, it might need to take a longer period in calculating and restructuring the data from different banks.

Apart from that, future researchers are recommended to focus on either the conventional or Islamic banking industry. This may help future researchers to investigate the issues more precisely and specifically. Besides, the leverage ratio of banks is also recommended for future research to involve as an additional variable to assess the credit risk issues that influence investors' intention. By using this technique, future researchers can better describe the correlation between the impact of COVID-19 and the credit risk management of banks in Malaysia.

Next, future researchers are suggested to explore more areas to extend the comparative research that are related to this issue. By comparing the banks between Southeast East Asia, Middle East and Oceania countries. Since this topic has not been fully discovered and investigated. More studies and research works will make the outcomes of results more reliable and accurate. Banking industries, financial institutions, and investors are able to use it as a reference in their future financial planning and strategy. Therefore, the overall results of this research can represent a guideline for bank risk management behaviour in Malaysia.

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## APPENDICES

## Appendix A: Descriptive Statistic Results

## i. Overall Bank

Date: 07/23/22 Time: 15:43

Sample: 2011 2021

	CR	COVID	TOTAL_CR...	CAR	LDR_FDR	ROA
Mean	2.894797	0.181818	4.693334	0.165967	0.835945	0.010289
Median	2.943532	0.000000	4.690692	0.162000	0.840000	0.009000
Maximum	5.043578	1.000000	5.733910	0.285000	1.410000	0.040400
Minimum	1.267406	0.000000	3.455789	0.119000	0.450000	-0.017000
Std. Dev.	0.625185	0.386672	0.541128	0.028212	0.117204	0.007332
Skewness	0.219234	1.649916	-0.132029	1.446801	0.366518	2.167628
Kurtosis	3.615751	3.722222	2.389495	6.666326	7.025512	10.55511
Jarque-Bera	4.714077	94.13657	3.650157	179.9728	138.1222	625.9615
Probability	0.094700	0.000000	0.161205	0.000000	0.000000	0.000000
Sum	573.1699	36.00000	929.2801	32.86150	165.5172	2.037200
Sum Sq. Dev.	76.99864	29.45455	57.68545	0.156795	2.706147	0.010590
Observations	198	198	198	198	198	198

## ii. Conventional Bank

Date: 07/23/22 Time: 15:47

Sample: 2011 2021

	NPL	COVID	TOTAL_CR	CAR	LDR	ROA
Mean	3.306597	0.181818	5.036585	0.167861	0.844880	0.013007
Median	3.156661	0.000000	5.032744	0.168000	0.840000	0.011000
Maximum	5.043578	1.000000	5.733910	0.233000	0.990000	0.040400
Minimum	2.573695	0.000000	4.360268	0.121000	0.680000	-0.017000
Std. Dev.	0.394519	0.387657	0.384719	0.020609	0.064226	0.009127
Skewness	1.276478	1.649916	0.098629	0.365230	-0.331482	1.479832
Kurtosis	5.517804	3.722222	1.844748	3.296999	2.767620	6.410267
Jarque-Bera	53.03479	47.06829	5.665761	2.564840	2.035773	84.10682
Probability	0.000000	0.000000	0.058843	0.277365	0.361358	0.000000
Sum	327.3531	18.00000	498.6219	16.61820	83.64310	1.287700
Sum Sq. Dev.	15.25324	14.72727	14.50488	0.041623	0.404252	0.008163
Observations	99	99	99	99	99	99

## iii. Islamic Bank

Date: 07/23/22 Time: 15:50

Sample: 2011 2021

	NPF	COVID	TOTAL_FN	CAR	FDR	ROA
Mean	2.482997	0.181818	4.350083	0.164074	0.827011	0.007571
Median	2.491573	0.000000	4.359911	0.155000	0.810000	0.008000
Maximum	4.782258	1.000000	5.308921	0.285000	1.410000	0.017500
Minimum	1.267406	0.000000	3.455789	0.119000	0.450000	-0.004000
Std. Dev.	0.536130	0.387657	0.450079	0.034176	0.152733	0.003136
Skewness	1.253864	1.649916	0.095355	1.666430	0.503627	-0.172621
Kurtosis	7.968935	3.722222	2.414923	6.146558	4.935518	5.329121
Jarque-Bera	127.7884	47.06829	1.562079	86.66123	19.63826	22.86899
Probability	0.000000	0.000000	0.457930	0.000000	0.000054	0.000011
Sum	245.8167	18.00000	430.6582	16.24330	81.87410	0.749500
Sum Sq. Dev.	28.16869	14.72727	19.85196	0.114462	2.286090	0.000964
Observations	99	99	99	99	99	99

## Appendix B: Overall Bank Eviews Results

## i. Random-Effect Model (REM)

Dependent Variable: CR  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 07/23/22 Time: 15:56  
 Sample: 2011 2021  
 Periods included: 11  
 Cross-sections included: 18  
 Total panel (balanced) observations: 198  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.707830	0.428053	-3.989763	0.0001
COVID	-0.119984	0.055660	-2.155669	0.0324
TOTAL_CR_TOTAL_FN	0.893063	0.097535	9.156290	0.0000
CAR	3.882019	1.008931	3.847655	0.0002
LDR_FDR	-0.282417	0.241389	-1.169966	0.2435
ROA	2.410302	5.280760	0.456431	0.6486

## Effects Specification

	S.D.	Rho
Cross-section random	0.246410	0.4867
Idiosyncratic random	0.253031	0.5133

## Weighted Statistics

R-squared	0.409446	Mean dependent var	0.856170
Adjusted R-squared	0.394067	S.D. dependent var	0.324233
S.E. of regression	0.252389	Sum squared resid	12.23042
F-statistic	26.62368	Durbin-Watson stat	1.290767
Prob(F-statistic)	0.000000		

## Unweighted Statistics

R-squared	0.715686	Mean dependent var	2.894797
Sum squared resid	21.89179	Durbin-Watson stat	0.721121

## ii. Fixed-Effect Model (FEM)

Dependent Variable: CR  
 Method: Panel Least Squares  
 Date: 07/23/22 Time: 16:00  
 Sample: 2011 2021  
 Periods included: 11  
 Cross-sections included: 18  
 Total panel (balanced) observations: 198

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.871980	0.718496	-1.213618	0.2265
COVID	-0.102754	0.059280	-1.733375	0.0848
TOTAL_CR_TOTAL_FN	0.695684	0.172583	4.031005	0.0001
CAR	3.698842	1.024826	3.609240	0.0004
LDR_FDR	-0.098258	0.270654	-0.363040	0.7170
ROA	-1.104751	6.440520	-0.171531	0.8640

## Effects Specification

## Cross-section fixed (dummy variables)

R-squared	0.854487	Mean dependent var	2.894797
Adjusted R-squared	0.836194	S.D. dependent var	0.625185
S.E. of regression	0.253031	Akaike info criterion	0.198230
Sum squared resid	11.20429	Schwarz criterion	0.580201
Log likelihood	3.375218	Hannan-Quinn criter.	0.352839
F-statistic	46.71105	Durbin-Watson stat	1.402800
Prob(F-statistic)	0.000000		

## iii. Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

\* Cross-section test variance is invalid. Hausman statistic set to zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
COVID	-0.102754	-0.119984	0.000416	0.3983
TOTAL_CR_TOTAL_FN	0.695684	0.893063	0.020272	0.1657
CAR	3.698842	3.882019	0.032325	0.3083
LDR_FDR	-0.098258	-0.282417	0.014985	0.1325
ROA	-1.104751	2.410302	13.593866	0.3404

Cross-section random effects test equation:

Dependent Variable: CR

Method: Panel Least Squares

Date: 07/23/22 Time: 15:59

Sample: 2011 2021

Periods included: 11

Cross-sections included: 18

Total panel (balanced) observations: 198

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.871980	0.718496	-1.213618	0.2265
COVID	-0.102754	0.059280	-1.733375	0.0848
TOTAL_CR_TOTAL_FN	0.695684	0.172583	4.031005	0.0001
CAR	3.698842	1.024826	3.609240	0.0004
LDR_FDR	-0.098258	0.270654	-0.363040	0.7170
ROA	-1.104751	6.440520	-0.171531	0.8640

## Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.854487	Mean dependent var	2.894797
Adjusted R-squared	0.836194	S.D. dependent var	0.625185
S.E. of regression	0.253031	Akaike info criterion	0.198230
Sum squared resid	11.20429	Schwarz criterion	0.580201
Log likelihood	3.375218	Hannan-Quinn criter.	0.352839
F-statistic	46.71105	Durbin-Watson stat	1.402800
Prob(F-statistic)	0.000000		

## Appendix C: Conventional Bank Eviews Results

## i. Random-Effect Model (REM)

Dependent Variable: NPL  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 07/23/22 Time: 16:23  
 Sample: 2011 2021  
 Periods included: 11  
 Cross-sections included: 9  
 Total panel (balanced) observations: 99  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.488648	0.851449	1.748370	0.0837
COVID	-0.075154	0.049625	-1.514431	0.1333
TOTAL_CR	0.241013	0.186744	1.290606	0.2000
CAR	3.084194	1.034979	2.979958	0.0037
LDR	0.206583	0.455963	0.453069	0.6516
ROA	-5.729385	4.803527	-1.192745	0.2360

Effects Specification		S.D.	Rho
Cross-section random		0.267124	0.7560
Idiosyncratic random		0.151738	0.2440

Weighted Statistics			
R-squared	0.198910	Mean dependent var	0.558199
Adjusted R-squared	0.155840	S.D. dependent var	0.169715
S.E. of regression	0.155931	Sum squared resid	2.261240
F-statistic	4.618351	Durbin-Watson stat	1.435293
Prob(F-statistic)	0.000828		

Unweighted Statistics			
R-squared	0.388308	Mean dependent var	3.306597
Sum squared resid	9.330292	Durbin-Watson stat	0.347850



## ii. Fixed-Effect Model (FEM)

Dependent Variable: NPL  
 Method: Panel Least Squares  
 Date: 07/23/22 Time: 16:24  
 Sample: 2011 2021  
 Periods included: 11  
 Cross-sections included: 9  
 Total panel (balanced) observations: 99

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.781427	1.173916	3.221207	0.0018
COVID	-0.046231	0.051603	-0.895889	0.3728
TOTAL_CR	-0.314435	0.272384	-1.154381	0.2516
CAR	3.496813	1.057684	3.306104	0.0014
LDR	0.735163	0.505166	1.455290	0.1493
ROA	-6.984567	5.226353	-1.336413	0.1850

## Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.871694	Mean dependent var	3.306597
Adjusted R-squared	0.852070	S.D. dependent var	0.394519
S.E. of regression	0.151738	Akaike info criterion	-0.802958
Sum squared resid	1.957086	Schwarz criterion	-0.435971
Log likelihood	53.74642	Hannan-Quinn criter.	-0.654475
F-statistic	44.42135	Durbin-Watson stat	1.685401
Prob(F-statistic)	0.000000		

## iii. Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

\* Cross-section test variance is invalid. Hausman statistic set to zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
COVID	-0.046231	-0.075154	0.000200	0.0410
TOTAL_CR	-0.314435	0.241013	0.039320	0.0051
CAR	3.496813	3.084194	0.047513	0.0584
LDR	0.735163	0.206583	0.047290	0.0151
ROA	-6.984567	-5.729385	4.240888	0.5422

Cross-section random effects test equation:

Dependent Variable: NPL

Method: Panel Least Squares

Date: 07/23/22 Time: 16:24

Sample: 2011 2021

Periods included: 11

Cross-sections included: 9

Total panel (balanced) observations: 99

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.781427	1.173916	3.221207	0.0018
COVID	-0.046231	0.051603	-0.895889	0.3728
TOTAL_CR	-0.314435	0.272384	-1.154381	0.2516
CAR	3.496813	1.057684	3.306104	0.0014
LDR	0.735163	0.505166	1.455290	0.1493
ROA	-6.984567	5.226353	-1.336413	0.1850

## Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.871694	Mean dependent var	3.306597
Adjusted R-squared	0.852070	S.D. dependent var	0.394519
S.E. of regression	0.151738	Akaike info criterion	-0.802958
Sum squared resid	1.957086	Schwarz criterion	-0.435971
Log likelihood	53.74642	Hannan-Quinn criter.	-0.654475
F-statistic	44.42135	Durbin-Watson stat	1.685401
Prob(F-statistic)	0.000000		

## Appendix D: Islamic Bank Eviews Results

## i. Random-Effect Model (REM)

Dependent Variable: NPF  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 07/23/22 Time: 16:26  
 Sample: 2011 2021  
 Periods included: 11  
 Cross-sections included: 9  
 Total panel (balanced) observations: 99  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.905908	0.703970	-2.707372	0.0081
COVID	-0.147685	0.101026	-1.461852	0.1472
TOTAL_FN	0.910284	0.174680	5.211141	0.0000
CAR	4.549793	1.643852	2.767764	0.0068
FDR	-0.364697	0.363265	-1.003941	0.3180
ROA	1.460020	12.81544	0.113927	0.9095

Effects Specification		S.D.	Rho
Cross-section random		0.277158	0.4265
Idiosyncratic random		0.321391	0.5735

Weighted Statistics			
R-squared	0.360631	Mean dependent var	0.819487
Adjusted R-squared	0.326256	S.D. dependent var	0.384974
S.E. of regression	0.315994	Sum squared resid	9.286262
F-statistic	10.49118	Durbin-Watson stat	1.325826
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.523613	Mean dependent var	2.482997
Sum squared resid	13.41921	Durbin-Watson stat	0.917489

## ii. Fixed-Effect Model (FEM)

Dependent Variable: NPF  
 Method: Panel Least Squares  
 Date: 07/23/22 Time: 16:27  
 Sample: 2011 2021  
 Periods included: 11  
 Cross-sections included: 9  
 Total panel (balanced) observations: 99

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.943278	0.960460	-2.023279	0.0462
COVID	-0.150807	0.105216	-1.433312	0.1554
TOTAL_FN	0.913372	0.246430	3.706414	0.0004
CAR	4.659110	1.662165	2.803037	0.0063
FDR	-0.363170	0.391556	-0.927505	0.3563
ROA	2.160530	13.03067	0.165803	0.8687

## Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.688313	Mean dependent var	2.482997
Adjusted R-squared	0.640643	S.D. dependent var	0.536130
S.E. of regression	0.321391	Akaike info criterion	0.698040
Sum squared resid	8.779811	Schwarz criterion	1.065027
Log likelihood	-20.55300	Hannan-Quinn criter.	0.846524
F-statistic	14.43920	Durbin-Watson stat	1.403533
Prob(F-statistic)	0.000000		

## iii. Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.903103	5	0.9700

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
COVID	-0.150807	-0.147685	0.000864	0.9154
TOTAL_FN	0.913372	0.910284	0.030215	0.9858
CAR	4.659110	4.549793	0.060546	0.6568
FDR	-0.363170	-0.364697	0.021354	0.9917
ROA	2.160530	1.460020	5.562902	0.7665

Cross-section random effects test equation:

Dependent Variable: NPF

Method: Panel Least Squares

Date: 07/23/22 Time: 16:26

Sample: 2011 2021

Periods included: 11

Cross-sections included: 9

Total panel (balanced) observations: 99

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.943278	0.960460	-2.023279	0.0462
COVID	-0.150807	0.105216	-1.433312	0.1554
TOTAL_FN	0.913372	0.246430	3.706414	0.0004
CAR	4.659110	1.662165	2.803037	0.0063
FDR	-0.363170	0.391556	-0.927505	0.3563
ROA	2.160530	13.03067	0.165803	0.8687

## Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.688313	Mean dependent var	2.482997
Adjusted R-squared	0.640643	S.D. dependent var	0.536130
S.E. of regression	0.321391	Akaike info criterion	0.698040
Sum squared resid	8.779811	Schwarz criterion	1.065027
Log likelihood	-20.55300	Hannan-Quinn criter.	0.846524
F-statistic	14.43920	Durbin-Watson stat	1.403533
Prob(F-statistic)	0.000000		

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entitled“ Covid-19 Impact on the Credit Risk to the Banking Sector in Malaysia:  
Comparative Analysis between Conventional and Islamic Banking  
”

under the supervision of Mr Lee Chee Loong (*Name of the Supervisor*)  
from the Department of Finance, Faculty  
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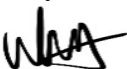
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(ID No: 18ABB06246) has completed this final year project  
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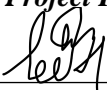
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<b>Full Name(s) of Candidate(s)</b>	Lim Jee Yi; Poh Tun Lin; Wendy Khoo Hui Wen; Wong Kar Xin;
<b>ID Number(s)</b>	18ABB06928; 18ABB06903; 18ABB06354; 18ABB06246;
<b>Programme / Course</b>	FN
<b>Title of Final Year Project</b>	Covid-19 Impact on Credit Risk to the Banking Sector in Malaysia: Comparative Analysis between Conventional and Islamic Banking

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Signature of Supervisor

Name : Mr Lee Chee Loong

Date : 26/8/2022

# COVID-19 Impact on Credit Risk to the Banking Sector in Malaysia: Comparative Analysis between Conventional and Islamic Banking

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# COVID-19 Impact on Credit Risk to the Banking Sector in Malaysia: Comparative Analysis between Conventional and Islamic Banking

*by* 22FN02J LIM JEE YI

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**Submission date:** 25-Aug-2022 06:04PM (UTC+0800)

**Submission ID:** 1874142926

**File name:** mparative\_Analysis\_between\_Conventional\_and\_Islamic\_Banking.docx (142.93K)

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**1.1 Background of the Study**

According to Manab, Theng & Md-Rus (2015), credit risk is becoming pervasive as it might bring economic loss to one party when the counterparty fails to meet its contractual obligations. The banking sector has been recognized as a risky business that rapidly and dynamically changed in the global financial landscape, posing various risks (Rosle, Jamil & Musa, 2017). Basel Committee (2001) has pointed out that credit risk is a critical uncertainty for the banking sector because it is significantly associated with the elemental business of banks, which involves fund depositing and loan lending operations. Also, the banking industry has been a hindrance to economic stability when there is a prominent level of credit risk on its overall financial performance. Therefore, credit problems are part of the crucial occasion behind banking difficulties (Martynova, 2015).

Referring to the World Health Organization (2020), 190 out of 233 countries were facing an outbreak of COVID-19 by the end of 2020. Additionally, the accumulated case count has reached 80 million, causing more than 1.8 million deaths around the globe. The global economic situation has been drastically affected by the COVID-19 pandemic. Being the sector which crucially linked to the economy and financial volatility, the banking sector has been impacted negatively, mainly in terms of the credit risk, profitability, scale of social financing, and vulnerability of financial institutions (Yan & Jia, 2022).

The COVID-19 pandemic is unfavourably influencing the banks' credit performances in every country. The mortgage forbearance in the United States shown an upward trend, with nearly 3,000% rise from March 2020 to May 2020. Additionally, the applications of auto loan modification increased almost ten times in the banking industry since the pandemic ongoing. The inquiries for auto loans, mortgages and credit card dropped by 30% to 50% compared to last year. Overall, the total loss for most of the banks in the US increased by three to four times

for the first quarter in 2020 compared to fourth quarter in 2019 (Rafic, Jyotiska & Mohammad, 2022). The situation in Malaysia is similar to the US, whereby the government had announced an automatic loan moratorium with immediate temporary financial relief to the consumers and households to cope with their difficulties. Approximately 90% of household borrowers were having almost 87% of outstanding household loans in the banks, which were under the moratorium by the end of 2020. The Bank Negara Malaysia (2020) estimates that household borrowers are unlikely to service their debt by about 15% of the total borrowed due to income and unemployment shocks. The BNM also expected that the borrowers are about to default if the economic uncertainties go beyond an uncontrollable situation.

Remarkably, the banking sector in Malaysia has continuously suffered from the monetary policies. Bank Negara Malaysia (BNM) has aggressively lowered the Overnight Policy Rate (OPR), leading to notably reduced interest income in the banks. As mentioned by the Monetary Policy Committee (MPC) of BNM on 7<sup>th</sup> July 2020, it decided to cut the OPR by 25 basis points, reaching 1.75%. Besides, the floor and ceiling rates of the OPR's corridor are reduced to 1.50% and 2.00%, respectively. (Monetary Policy Statement, 2022). According to Khoo (2020), the banking sector in Malaysia has faced a significant loss in its primary deposit income since the public is no longer saving their money in saving accounts due to the lower interest rate. Essentially, the banks were being worst-off by the policy. They would likely suffer from credit risk when the counterparties were not paying back the interest or principal of loans at the agreed date. Hence, COVID-19 and consequent monetary policy might undermine the banks' profitability.

In Malaysia, conventional and Islamic banking systems are both financial institutions that contribute various financial services to clients. Similarly, these two banking systems mentioned are undeniably affected by the outbreak of COVID-19. Based on the research from Fah & Hassani (2014), Islamic Banking is an alternative to society apart from conventional banks. While holding other functions or roles remained constant, Islamic banks needed to comply with Shariah principles. Incredibly, there is a significant difference in the financial terms used as compared to the conventional banks. According to Wahyuni, Pujiharto, Nur Azizah and Zulfikar (2022), conventional banks are more exposed to COVID-19 than Islamic banks in Indonesia. However, the conventional banks' profitability is more stable compared to

Islamic banks during the COVID-19 pandemic. Besides, Islamic banks' return on asset (ROA) was slightly affected by the changing of new norms. In contrast, conventional banks are relatively stable regarding non-performing loans (NPLs) and ROA.

Credit risk can be a valuable indicator for better comparison between the banking systems. Various researches examine the relationship of both banking systems in terms of the nonperforming loans (NPLs) and nonperforming financing (NPFs) for conventional and Islamic banks, respectively. The studies from Setiawan & Sherwin (2017) found that NPFs and NPLs are proper financial ratios to measure the banks' credit risks. Hence, the analysis results show that the credit risk of conventional banks is higher than that of Islamic banks during the COVID-19 pandemic.

The average NPLs of Malaysia's conventional banks from 2011 to 2021 have been obtained from the banks' annual reports. Figure 1.1 shows that the NPLs of Malaysia's conventional banks are considered stable from 2011 to 2015. However, a sharp increase in NPLs by about 4.79% was recorded in the year 2016. Referring to The Star Online (2016), Asian banks' bad debts worsened, reaching an amount of \$171 billion at the end of 2015 for all Asian banks. An increase in bad debts might affect the increase in bad loans in 2016. After the financial shock of the bad debts had over, the NPLs dropped by about 2.04 from 2016 to 2017. The percentage of average NPLs for Malaysia's conventional banks remained consistently until the end of 2019, which is the last year before the outbreak of the COVID-19 pandemic in Malaysia. After the pandemic occurred in year 2020, the NPLs increased by about 1.16% from 2019 to 2020, which achieved the second highest percentage among these 10 years. The figure also reflected that when the COVID-19 pandemic became relatively stable in the year 2021, the NPLs had decreased by about 0.77%. Overall, the NPLs of Malaysia's conventional banks is solid before the financial shock in 2016. While the NPLs about to back to their normal rate, they had increased again after the outbreak of the COVID-19 pandemic.

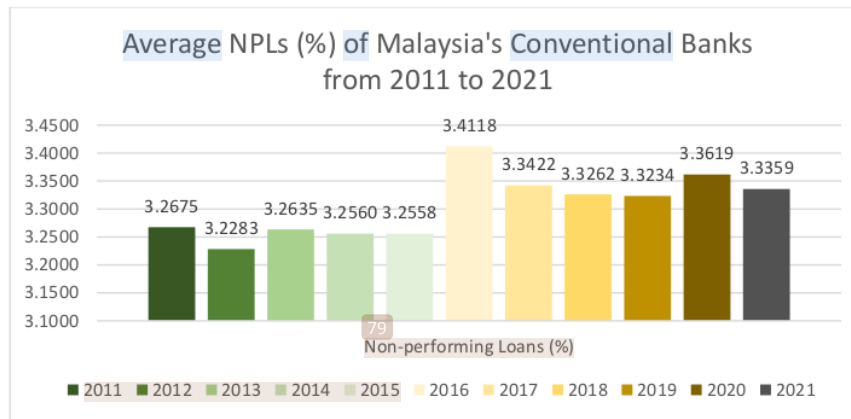


Figure 1.1: Average Non-performing loans (%) of Malaysia’s Conventional Banks from 2018 – 2021

Referring to Figure 1.2 shows the average NPFs of Malaysia’s Islamic banks from 2011 to 2021 obtained from the banks’ annual reports. The NPFs percentages are considered stable, with a slight increment from 2011 to 2017. A sharp rise in NPFs has been recorded from 2017 to 2018, and it increased once more and reached the highest value in 2019 by about 17.42%. Unlike the situation that happened for Malaysia’s conventional banks, the NPFs of Islamic banks started to decline from 2019 to 2021 with a decline of about 9.87%. Overall, the COVID-19 pandemic that occurred in 2020 seemed not significant to impact the performance of Islamic banks in Malaysia.

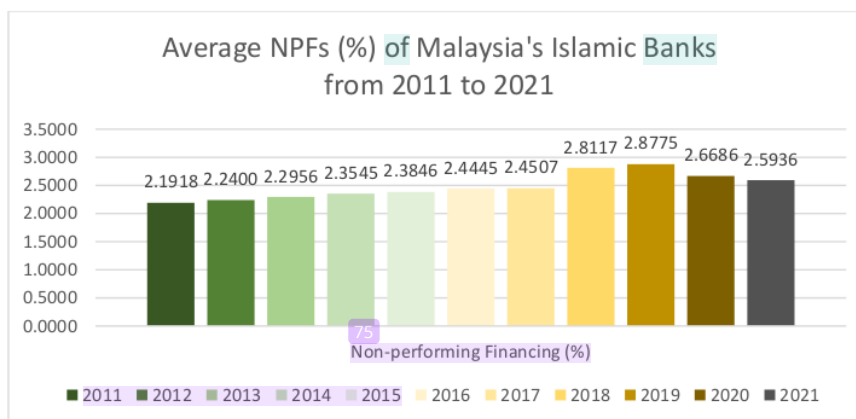




Figure 1.2: Average Non-performing Financings (%) of Malaysia's Islamic Banks from 2018 – 2021

Figure 1.3 has recorded the average NPLs and NPFs by combining the average data for both banking systems from 2011 to 2021. From the figure, the overall banks in Malaysia remained stable in NPLs and NPFs from 2011 to 2015 while incurring an increment in 2016 due to the financial shocks about the worsening of bad debts in Malaysia. Although the value has slightly decreased in 2017, it started to rise aggressively from 2018 to 2019. According to the research, 2018 is the worst year in a decade for most countries concerning the rising interest rate, global trade spats, and Brexit uncertainty in most stock markets (Deutsche Welle, 2019). The volatility in stock markets had negatively affected the purchasing power of investors and eventually increased the NPLs and NPFs of overall banks when the borrowers failed to meet their contractual obligations. Besides, The New York Times also reported that the financial crisis was predicted to occur in 2019. The mountain of student debt was one of the key issues that might increase the credit risk of overall banks (Williams, 2018).

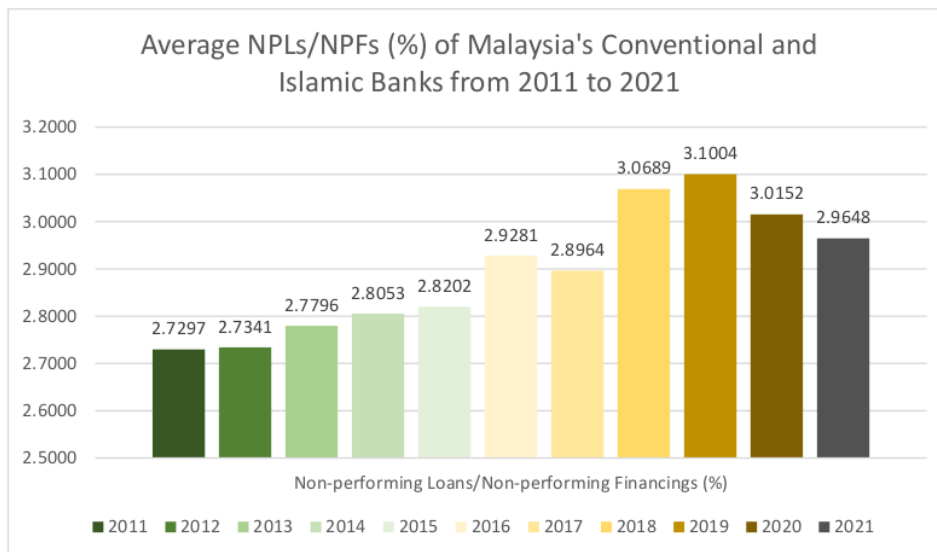


Figure 1.3: Average NPLs/NPFs (%) of Malaysia's Conventional and Islamic Banks from 2011 to 2021

Nevertheless, NPFs and NPLs refer to the loans that experience repayment default due to issues that beyond the prospective debtors' control (Yurttadur et al., 2019). In addition, both are the credit measurements <sup>61</sup> predicted to be affected by the COVID-19 announcement phenomenon. Therefore, only the financial terms used are different between two banking systems, whereby the NPFs ratio indicates the nonperforming loans for Islamic banks while NPLs ratio nonperforming loans for conventional banks. It is widely known that the higher percentage of NPLs indicated higher bank failures. Plenty of evidence shows that East Asia's financial or banking crises were preceded by high NPLs (Khemraj, T. & Pasha, S., 2009). Due to the large scale of conventional and Islamic banking, the credit risk impacted by the COVID-19 of both banking systems is consistently being measured, as a slight impact might lead to massive volatility in Malaysia's whole financial and economy market.

## 1.2 Problem Statement

When the COVID-19 pandemic occurred in Malaysia, credit risk exposure was the most affected part of the banking sector. Many banks in Malaysia have prepared various analyses and reports on credit risks to generate credit risk management to minimize the risk. According to the research, the credit risk analysis used by the banks is not limited to their own banks but should be applied to other sectors of banks to have a better view of overall credit risk in the whole of Malaysia's banking industry. For instance, a commercial bank's credit risk analysis can also be applied to Islamic banks. By comparing both banking systems, a more comprehensive analysis can be developed, and the risk department can generate a greater credit risk management to mitigate credit risk (Siddique, Khan, & Khan, 2021). Therefore, it is significant to identify the credit risk in the overall banking sector, the Islamic banking sector and the conventional banking sector, respectively.

The MIDF Research Vice President, Mr. Imran Yassin Mohd Yusof, has mentioned that the NPLs in Malaysia were expected to remain stable during the COVID-19 pandemic. He elaborated that the pandemic will not impact the banks' profitability as the spread of viruses is not as severe as in 2021. On the other hand, <sup>48</sup> the Chief Economist of Bank Islam Malaysia, Dr.

Mohd Afzanizam Abdul Rashid, opposed the former statement by stating that the NPLs will rise in the coming quarters as the economy in Malaysia remained vulnerable to the shocks (Jalil and Shah, 2021). Limited knowledge has been reported about the actual impact of COVID-19 on the credit risk to the banking sector. Hence, this study is expected to prove the correctness of the statements above. Additionally, the study is aimed to identify the significance of the COVID-19 pandemic to affect the credit risk to the banking sector in Malaysia.

Additionally, it is vital to identify the essential variables that can affect the credit risk to the banking sector in Malaysia during this highly uncertain period. The value of NPLs and NPFs can be affected by various variables related to loans and financing, which should be closely considered and investigated. The Return on Assets (ROA), Total Credit (TC), Total Financing (TF), Loan to Deposit Ratio (LDR), and Financing to Deposit Ratio (FDR) are the variables that are likely to be useful in the study of COVID-19 pandemic impact on credit risk to the banking sector in Malaysia Riani, R. (2021).

## **1.3 Research Question**

### **1.3.1 General Research Question**

What is the impact of COVID-19 on the banking sector in Malaysia?

### **1.3.2 Specific Research Question**

- I. What is the impact of COVID-19 on the credit risks to the conventional banking in Malaysia?

- II. What is the impact of COVID -19 on the credit risks to the Islamic banking in Malaysia?
- III. What is the impact of COVID -19 on the credit risks to the overall banking sector in Malaysia?
- IV. What variables that are most significant in determining the credit risks of the banking sectors in Malaysia during the COVID-19 pandemic?
- V. Does conventional and Islamic banking have comparative effects on the credit risks in their financial performance during COVID-19?

## 1.4 Research Objectives

- I. To assess the impact of COVID-19 on the credit risk to the conventional banking in Malaysia.
- II. To assess the impact of COVID-19 on the credit risk to the Islamic banking in Malaysia.
- III. To assess the impact of COVID-19 on the credit risk to the overall banking sector in Malaysia.
- IV. Since conventional and Islamic banking is two major banking systems performing in Malaysia, this research intends to compare the impact of COVID-19 on the credit risk for both banking systems.

- V. This research also attempts to examine the significance of the relationship between the underlying factors and both conventional and Islamic banks in Malaysia.

## 1.5 Significance of the Study

This research focused on a time period when the world was caught up with the economic and financial problems due to the COVID-19 pandemic. It is hoped that the findings of this comparative analysis of the credit risk of conventional and Islamic banks can assist financial institutions such as the risk department of banks, regulators, and researchers to make proper risk management in the future.

For instance, this is beneficial to the bank's risk management department to identify the important variables that significantly increase the effect of COVID-19 on the credit risk to the banks, giving them a reference to mitigate the credit risk. Since COVID-19 has been spread widely and became one of the causes for the economic recession in Malaysia, a high magnitude of NPLs and NPFs are associated to the crisis.

Furthermore, financial institutions are also able to recognize the in-depth results generated by the mentioned terms, to clearly identify the credit risk level that occurred in their companies. From the government's perspective, it can assist regulators to observe the entire credit risk system and implement a proper policy to control the credit risk of banks in Malaysia.

On top of that, this research also benefits future researchers to extend their studies by including more variables that will affect the credit risk during the pandemic, leading to higher accuracy of results. As a benchmark or guideline to assess the credit risk, this study is convenient for investors in selecting high-risk or low-risk investments.

## <sup>2</sup> CHAPTER 2: LITERATURE REVIEW

### 2.1 Introduction

Within this chapter, the dependent variable and the independent variables that make up the core of this research are discussed. To review and support the dependent variable (credit risk proxy to NPL & NPF) of this research, as well as the independent variables (total credit/total financing, CAR, LDR/FDR, ROA), we will be going deeper deeply into prior studies. The following will provide a thorough explanation of each of the variables.

### 2.2 Underlying Theories

#### 2.2.1 Information Asymmetry Theory

When two individuals enter to a transaction have access to the identical vital information, a symmetrical corporate relationship exists. Information asymmetry is a phenomenon that occurs when one side in a transaction has access to more or better information than the other. When two business parties are interacting, there is information asymmetry, meaning one party has more information than the other. A party's access to more pertinent and current information might lead to business imbalances and even exploitation. George Akerlof, Michael Spence, and Joseph Stiglitz, three economists, established the idea of information asymmetry in the 1970s (Ross, 2022). Their assessments of markets with asymmetric knowledge brought them the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel in 2001.

**Information** asymmetry on the credit market contributes to two significant problems: adverse selection and moral hazard across the bank and borrower credit relationship. Due to the knowledge gap between the bank and the borrower, the phenomenon of adverse selection is obvious before signing the loan agreement. After the loan agreement is signed and credit is supplied, information asymmetry also causes moral hazard. In addition, adverse selection also describes a business arrangement in which the buyer and the seller have access to distinct types of information. In contrast to the other, each side is free to make decisions based on the knowledge they perceive to possess. The information asymmetry has an impact on the retail and labour sectors as well. Additionally, it could be detrimental to one's interpersonal relationships (MasterClass, 2021).

By definition, a party entering a contract is aware that, in a circumstance of moral hazard, the other party will be responsible for their actions. This is because they would not suffer any consequences if they were encouraged to take risks without thinking about how dangerous the situation is. For instance, since they will not lose money if the fund fails, fund managers may choose to invest in riskier assets than they would in their own personal portfolio. Given the opportunity, it is possible that the fund participants would not choose to accept this level of financial risk given that the fund manager has access to knowledge about their assets that the fund participants do not (MasterClass, 2021).

According to Crouzille et al. (2004, p. 445), the debtor is at a disadvantage in the credit market because it lacks considerably more detailed information regarding the financing project. When agents do not know the same quantity of information, an information asymmetry situation arises. Due to the challenge of determining credit risk, the bank encounters an information asymmetry issue in a credit transaction. If the bank can collect and process information when loan applications are accepted, credit risk is decreased. The bank requests key information on the borrower both before approving a loan application and after the credit has been granted. By using valuable information,

the bank can influence the borrower's actions. For this reason, the bank is faced with the information asymmetry problem when seeking for information.

Apart from this, it is necessary for a bank to adopt the optimal strategies for comprehending and controlling the sources of information asymmetry, such as moral hazard and adverse selection. Stiglitz and Weiss (1981) claimed that borrowers should be concerned about minimizing the negative effects of information asymmetry. Both borrowers and banks have diverse perspectives on information asymmetry. To give an example, quality borrowers are concerned about adverse selection since it could lead to the rejection of their loan applications. The way that borrowers behave and the information that they withhold makes banks more vulnerable to credit risk.

Additionally, we believe that COVID-19 is a "black swan" scenario about which several governments and institutions have been alerted and informed of the horrific repercussions of a major global pandemic but have shown only a limited level of awareness. Black swan circumstances (COVID-19) are defined by information asymmetry, where an organization must either deal with incomplete or ambiguous information in order to make timely decisions. To reach a set level of performance, more data must be collected and evaluated when an organization is exposed to increase the complexity and uncertainty in such environment.

### **2.2.2 Credit Default Theory**

An entity's financial failure is represented by a credit default, which means there is an inverse relationship between the impacts of loan default (NFL) and financial performance (ROA) that exists. This theory aims to establish a link between the macroeconomic factors influencing the shifting financial panorama and their microeconomic consequences on shifting individual or company financial conditions, potentially resulting in loan defaults. Most definitions of credit default originate with



delinquency and insolvency. A borrower is said to be delinquent when they are unable to repay a debt upon the due date owing to a lack of cash flow, as opposed to insolvent when their assets are less than their liabilities.

The probability of excessive losses by the marketplace lending sector is raised by the ongoing economic slowdown brought on by the COVID-19 pandemic. Over a significant economic downturn, losses in the sector are predicted to grow significantly, which could rapidly deplete investor funds. According to analysis, before the pandemic period, the likelihood of a credit default rises from 0.056 to 0.079 in the post-pandemic period. <sup>71</sup> The Organization for Economic Co-operation and Development (OECD) (2020) reports that sales volume has decreased dramatically and that businesses are having severe problems paying their creditors, employees, suppliers, and investors, which causes liquidity issues.

Financial difficulties faced by households, businesses, and public sector organizations may evolve into a more severe level when the current COVID-19 pandemic-related crisis moves into a later stage. Marketplace lending, one of the riskier financial sectors, may see a spike in defaults in 2021. This constant stream of defaults tends to weaken the industry's resilience and drive platforms to reevaluate their risk management strategies.

## **2.3 Dependent Variables**

### **2.3.1 Credit Risk**

The chance of experiencing a deficit due to a debtor's failure to fulfil contractual obligations or make loan payments is define by credit risk. Most of the time, this means

the possibility that a creditor will not receive the principal and interest that is promised to pay by debtors, which would disrupt cash flows and increase collection costs. Credit risk management seeks to increase an institution's risk-adjusted rate of return by reducing the exposure to credit risk to a manageable level. Financial instruments include acceptances, interbank transactions, trade financing, foreign currency transactions, futures, swaps, bonds, options, transaction resolution, and others will cause the banks to face credit risk.

The biggest risk faced by most of the banks is the credit risk. The increasing in future banks losses and diminished confidence in the banking industry may result from ineffective credit risk management and a collapse to recognize credit quality deterioration in a timely way. Owing to the unique nature of the crisis and the extraordinary level of public sector support brought on by the COVID-19 outbreak, it is more difficult to identify the credit quality of borrowers. The effects of COVID-19 are anticipated to considerably increase credit losses and default rates, which will result in a major increase in provisioning needs.

The capacity of conventional and Islamic banks to tackle the COVID-19 outbreak will vary as a result of the fundamental differences between their corporate governance and business systems. Research claims that Islamic banks face a higher credit risk than commercial banks. According to Elgari et al. (2003), unlike conventional banks, Islamic banks do not have the necessary capabilities to manage debt-based contracts in accordance with Shariah-compliant tools. In the same way, there is proof that Islamic banks are less likely to default on their loans than commercial banks. According to Boumediene (2011), credit risk in Islamic banks comes when consumers cancel the purchase of commodities using Murabahah financing, ultimately resulting in losses for the bank.

### **2.3.2 Non-performing Loans / Non-performing Financing**

NPL / NPF is referred to as a loan that is in default and for which the borrower has not made any periodic instalments of principal or interest for a predetermined amount of time. The macroeconomic condition and sound financial transactions between lenders and borrowers are the key factors that affect banks' credit risk, which is the oldest type of risk. This risk is primarily empirically described by a proxy from NPLs or NPFs. According to the International Monetary Fund (IMF), loans should be classified as NPL (1) when the borrower owes a payment that is more than 90 days past due, (2) when the interest has been capitalized, refinanced, or rolled over for more than 90 days, or (3) when instalments are less than 90 days past due but are never again anticipated (Chavan and Gambacorta, 2016). Hardiyanti and Aziz (2021) define Non-performing Loans as loans divided into categories such as sub-standard credit, doubtful credit, and bad credit. A loan with poor credit is one that has unreliable payments because of the borrower's actions or uncontrollable external circumstances.

NPLs are a significant indicator of credit risk that has an impact on the country's banking sector. Handley (2010) stresses that NPLs can be used as a signal of a banking crisis since they restrict the nation's ability to develop credit, which has an impact on economic growth. A country's monetary system is strong when NPLs are at a low level, on the other hand, a large level indicates a risky financial situation. In the long-term, the rising level of NPLs will first have an impact on the commercial banks before having an impact on the country's financial situation (Souza and Feijó, 2011). The NPLs will obstruct interest income, restrict investment opportunities, and cause financial system liquidity crises, which will exacerbate the bankruptcy issue and weaken the economy.

We are all acutely aware of how prominent levels of NPLs might restrict banks' capacity to support the real economy as a result of the big financial crisis. NPLs are anticipated to increase as the COVID-19 crisis's effects on the actual economy become more pronounced. The operational capability of banks to deal with NPLs quickly and completely at an early stage must be ensured. As we learnt from the great financial

crisis, banks will be less able to make income, will have higher funding costs, and will ultimately lend less to the real economy if their balance sheets are filled with a lot of depreciating assets over an extended period.

## 2.4 Independent Variables

### 2.4.1 Total Credit / Total Financing

Total Credit is defined as the sum of the total commitments for revolving loans and term loans at any one moment, or, if the term loans were committed earlier, the total principal amount of all term loans outstanding at that time (*Totak Credit Definition*, n.d). On the other hand, total financing signifies that the attitude of banks in their goal of maximizing profits and risk-taking. This action allows Islamic banking to provide long-term funding for projects with high yields and a high-risk profile (*What is Total Financing (TF)*, n.d). Besides, bank credit is known as the entire quantity of credit readily accessible to a person or corporation from a banking institution in the form of loans. Meaning to say, the entire sum of capital that an individual or corporation can borrow from a financial institution. The quantity of credit that a banking organization has available to offer and the borrower's capability to repay any loans are what determine the borrower's bank credit.

Credits and loans are two distinct types of financing. Both are banking products that give the borrower capital, but their definitions and goals are different. While a loan offers all the desired funds in one lump sum now it is provided, in the case of a credit, the bank gives the customer an amount of money that can be used as needed, whether it be with the full amount borrowed, part of it, or none. A loan is a financial product that enables a user to access a defined amount of money at the beginning of the transaction on the understanding that this amount, plus the agreed-upon interest, would

be paid back within a given time frame. Loan repayment is made in periodic instalments. With a credit, you have more financial flexibility because you can use the loaned amount as needed at any given time. A maximum credit amount is specified, which the consumer may use all or part of. The customer has the option of using all, some, or none of the allocated funds.

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## 2.4.2 Capital Adequacy Ratio

CAR sometimes referred to the capital to risk-weighted assets ratio, is a capital comparative value that demonstrates a bank's capacity to finance the growth of its banking operations and to accommodate and, if possible, predict risk that may arise. It is a measure of all bank assets that are exposed to risk and are funded by capital in addition to funds from sources other than banks, such as public funding, loans, and other sources. Banks need capital to grow their operations and their ability to handle losses (Allahrakha et al., 2018; Akinci & Olmstead-Rumsey, 2018). In the research of Anwar & Murwaningsari (2017), the bank's growth and expansion, as well as efforts to uphold public confidence, depend greatly on capital. Bank capital should be employed as a business entity to reduce the risk of losses from changes in bank assets that are predominantly sourced from third party loans. The CAR demonstrates if the bank's capital has been adequate to meet its needs and serves as a basis for evaluating the bank's prospects for continuing to operate.

The recession brought on by COVID-19 puts bank profitability in jeopardy and results in losses because of defaulted debtors. Capital adequacy ratios can prevent loan default. Higher capital ratios enhance bank productivity and earnings (Bitar et al., 2018). The ability of the bank to reduce the credit risk that arises is inversely correlated with the CAR, meaning that the bank can cover the credit risk that arises with the amount of fund reserves determined by comparing capital and risk-weighted assets (ATMR). In the same way, a bank with a strong capital adequacy ratio is seen as being above the minimal standards necessary to suggest solvency in an equivalent manner. As a result,

a bank is more likely to be able to endure a financial crisis or other unanticipated losses if its CAR is larger. According to the findings of research done by Astrini et al. (2014), the CAR has a negative and considerable impact on NPLs.

### **2.4.3 Loan to Deposit Ratio / Financing to Deposit Ratio**

LDR / FDR is a ratio used to determine how much capital and public funds were used to finance the loan (Kasmir, 2012). The LDR details the extent to which the bank will be able to recoup the funds that depositors have withdrawn by depending on the allocated credits as a source of liquidity. According to the research of B. Murphy (2020), lenders monitor banks' LDRs to guarantee there is sufficient liquidity to service loans in the scenario of a recession that causes defaults. The LDR also aids in demonstrating how effectively a bank draws in new customers and retains existing ones. A bank will receive more additional funds and consumers if its deposits increase. Consequently, the banking institution will have extra money to lend which will boost profits. Even though it seems illogical, loans are a bank's asset because they allow it to earn interest. Banks are required to pay interest on deposits, even at an extremely low rate, hence deposits are liabilities.

In addition, finding the ideal LDR is a challenging task for banks. If banks lend too much of their deposit money, especially during an economic downturn, they may overextend themselves. Nevertheless, if banks only lend a small portion of their deposits, they may lose out on opportunities because their savings would be sitting on their financial statements earning nothing. Banks with low LDR ratios may see a decline in interest income and profits (B. Murphy, 2020). Since this ratio is one of the bank's liquidity ratings, the greater the LDR of a bank, the more likely it is that a credibility issue will arise. The results of research conducted by Astrini et al. (2014) claims that the LDR has a positive and marginally significant impact on the NPL.

#### **2.4.4 Return on Asset**

The calculation of the ROA is done by dividing the total assets by the net income, is used to assess the profitability of banks (Rajan, 1994). The ability of a bank to profit from its operations through its active capabilities is the focus. It is a metric for profitability. In addition, ROA used to assess a management team's capacity to produce total income through asset management (Anwar & Murwaningsari, 2017). Defaults have an adverse impact on a bank's profitability. Based on the research of Abaidoo & Opong (2015), income from good loans is directly deducted to make provisions for bad and uncertain debts. The credit and recovery processes are linearly correlated with a bank's performance. Also, banks are not able to make money from defaulted credits. The reliability of credit documentation is a method used to prevent defaults; hence the study has direct bearing on how well a bank performs. Banks' overall loan portfolio is reduced by loan default provisions, which has an impact on the interest earned on those assets.

According to analysis of bank financial statements, the profitability of banks is directly impacted by unsecured loans. This is due to charges for bad debts are viewed as expenses on the profit and loss statement, which has a detrimental effect on banks' profit balances (Abaidoo & Opong, 2015). Since there is less incentive to create profits, banks with high ROA indicate that their financial position is stable and that they are not interested in engaging in riskier loans. At the same time, a bank's profitability and asset utilization position improve with higher ROA. According to Godlewski (2005), there is a strong correlation between NPLs and ROA; the higher the NPLs, the lower the ROA, and vice versa. Furthermore, Ahmad and Bashir (2013) also stated that ROA and NPLs have a direct relationship.

#### **2.4.5 COVID-19 (Dummy variable)**



The outbreak of COVID-19 is an unforeseen global shock, and both the virus itself and the remedies taken to mitigate it, such as social isolation policies and partial or complete lockdowns have a substantial influence on the economy. The effects of COVID-19 are anticipated to increase credit losses and default rates, which will result in a major increase in provisioning needs. In the immediate aftermath, it was anticipated that the financial sector, in particular banks, would play a significant role in shock absorption by providing crucial loans to the business sector and households. Central banks and governments around the world implemented a broad variety of monetary policy measures to increase liquidity and boost the movement of credit to assist this. All the sample banks experienced an increase in non-performing loans because of COVID-19. One of the most negative impacts of COVID-19 for banks was the rise in non-performing loans, which decreased the value of the loan portfolio (Riani, 2021).

## 2.5 Proposed Theoretical / Conceptual Framework

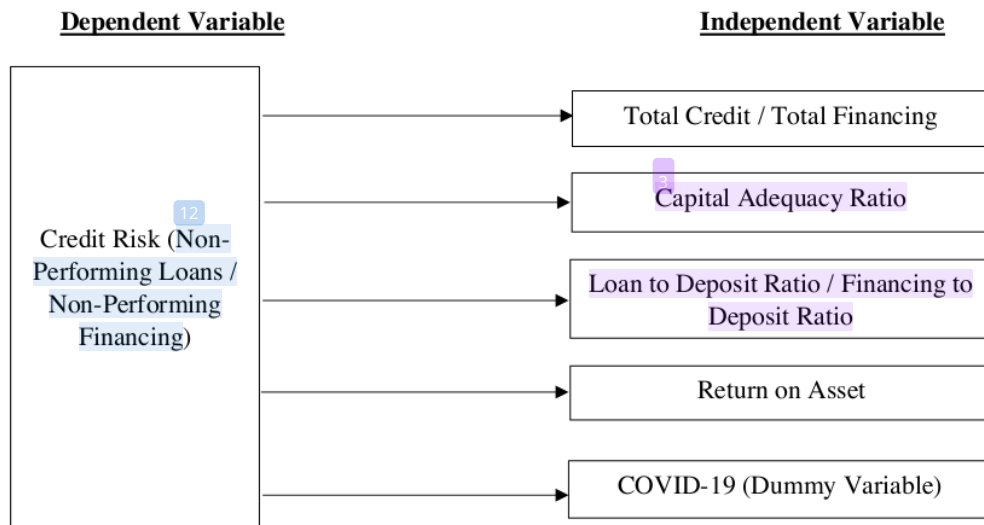


Figure 2.5.1 Proposed model of the variables affecting the credit risk of the Conventional and Islamic banks during COVID-19 pandemic



Source: Developed for research

Besides, based on the research by Riani (2021), CAR variable and credit risk are negatively correlated. As a result, a rise in the CAR variable will result in a specific percentage reduction in the NPL/NPF variable.

According to the study done by Riani (2021), the findings show that loan to deposit ratio (LDR) in conventional bank have a demonstrably negative association with NPL, which means that as loans rise, the NPL level falls.

In addition, Riani (2021) also discovered a negative correlation between credit risk and ROA in both conventional banks as represented by NPL and Islamic banks as represented by NPF. This indicates that the two banks' performance will suffer as credit risk rises.

Finally, Riani (2021) believed that all the sample banks experienced an increase in non-performing loans because of COVID-19. One of the most detrimental effects of COVID-19 for banks was the rise in non-performing loans, which decreased the value of the loan portfolio. Thus, COVID-19 has a positive relationship to the credit risk.

## **2.6 Hypotheses Development**

### **2.6.1 Independent variables**

#### **2.6.1.1 Total Credit / Total Financing**

<sup>1</sup>  
H<sub>0</sub>: There is no significant relationship between Total Credit / Total Financing and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Total Credit / Total Financing and NPLs / NPFs.

#### <sup>2</sup> **2.6.1.2 Capital Adequacy Ratio (CAR)**

H<sub>0</sub>: There is no significant relationship between Capital Adequacy Ratio (CAR) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Capital Adequacy Ratio (CAR) and NPLs / NPFs.

#### <sup>3</sup> **2.6.1.3 Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR)**

H<sub>0</sub>: There is no significant relationship between <sup>15</sup> Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between <sup>57</sup> Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR) and NPLs / NPFs.

#### <sup>2</sup> **2.6.1.4 Return on Asset (ROA)**

H<sub>0</sub>: There is no significant relationship between Return on Asset (ROA) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Return on Asset (ROA) and NPLs / NPFs.

## 2.6.2 Dummy Variable

### 2.6.2.1 COVID-19

<sup>23</sup>  
H<sub>0</sub>: There is no significant relationship between COVID-19 and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between COVID-19 and NPLs / NPFs.

## 2.7 Conclusion

This chapter illuminates the variables affecting the credit risk of conventional and Islamic Banks during COVID-19 pandemic, which is collaborated by several findings and journals. The formulation of hypotheses in relation to the subtopics in Chapter 1 is also covered in this chapter. In Chapter 3, there will be discussion about the research of methodology.

### **3.0 Introduction**

The previous chapter explains the theories involved in this research as well as a summary of the literature review. However, this chapter demonstrates the data collection method, description of the independent and dependent variables, economic framework, and model selection used in the study.

For this study, the data is obtained from the annual report of each bank and Refinitiv. Next, several independent and dependent variables are used in this study, for example, NPL, ROA and others.

Several regression models were used in this study which includes Fixed Effect Model (FEM) and Random Effect Model. The FEM assumes the variable is constant and fixed across the data by contrast; the REM assumes that the variables are random across the data.

The last part of this study is model selection Hausman Test is applied to test whether FEM or REM is more appropriate and applicable to this study.

### **3.1 Research design**

The quantitative data is applied in this research. Quantitative data analysis involves the calculation of frequencies of variables and changes among variables (Saunders, Lewis,

&Thornhill, 2012). A quantitative method is commonly correlated with discovering evidence to either support or reject hypotheses. In addition, descriptive research is carried out to elucidate the relationships between the dependent and independent variables used in this research. Descriptive data may be used in quantitative research designs since it provides researchers with valuable information to utilise as a reference as they proceed with hypothesis testing. Moreover, regression analysis also included in this study. Regression captures the correlation between the variables observed in data collection and assesses the statistical significance of these correlations (Beers, 2022). Not only is it also a statistical tool used in finance, investment, and other fields to identify the degree and type of connection between a series of independent and one dependent variables (Beers, 2022).

### 3.2 Data collection methods

Since the research is particularly related to the banking industry in Malaysia, internal data such as loan financing data, sales data, financial data, equity data and operations data will be attained and re-purposed to investigate research questions about several aspects. For example, analyse the annual report from various conventional banks and Islamic banks.

For research objective, the external data research is used to obtain the existing data from government statistics (such as Bursa Malaysia and Bank Negara Malaysia) and different international organizations, international institutions and published market research reports. This study compiles ten years of balanced data from 2011 to 2021 for nine conventional and nine Islamic banks.

The first independent variable in the study is the total credit. In the banking industry, a company or individual's ability to get financing in the form of loans is called "total credit." (Twin, 2020). The second independent variable is The Capital Adequacy Ratio, often known as CAR, is a method for determining how much money a bank has. This ratio is expressed as a percentage of the bank's risk-weighted credit exposures. The CAR serves the objective of

ensuring that financial institutions have sufficient capital in reserve to deal with the possibility of suffering losses without putting themselves in jeopardy of going bankrupt (Beers, 2021). Next, the FDR is utilised as an independent variable to evaluate a bank's liquidity. The ratio is calculated by comparing a bank's total loans and total deposits over a period (Murphy, 2021). The last independent variable ROA which is a metric that evaluated the company's profitability in relation its total assets. ROA can be used by management, analysts, and investors to figure out if a company uses its assets effectively to make money (Hargrave, 2022).

Besides, the dependent variable used in this study is Non-Performing Loan (NPL), which means the level representation of credit risk in conventional banks that has a direct influence on bank profitability. Another dependent variable is Non-Performing Financing (NPF) that indicate the financing risk in Islamic banks. To ensure the authenticity of this study, all the sources of the dependent and independent variable data is obtained from Bank Negara Malaysia, Bloomberg, and the financial reports from each of the bank selected for further analysis.

### 3.3 Data Description

Panel data, also known as pooled data, is created by combining time series data and cross-sectional data. In this research, we compile balanced ten-year-based data of 9 conventional and 9 Islamic banks from the year 2011 until the year 2021. The banks involved in this study are those that can provide both conventional and Islamic banking services.

Nine conventional banks involved are Affin Bank Berhad, AmBank (M) Berhad, CIMB Bank Berhad, Hong Leong Bank Berhad, Malayan Banking Berhad, OCBC Bank (Malaysia) Berhad, Public Bank Berhad, RHB Bank Berhad and Standard Chartered Bank Malaysia Berhad. On top of that, nine Islamic Bank that used in this study are Affin Islamic Bank Berhad, AmBank Islamic Berhad, CIMB Islamic Bank Berhad, Hong Leong Islamic Bank Berhad,

Maybank Islamic Bank Berhad, OCBC Al-Amin Bank Berhad, Public Islamic Bank Berhad, RHB Islamic Bank Berhad and Standard Chartered Saadiq Bank Berhad.

As there is lack of data for certain banks, this study can compile only ten years of balanced data from 2011 to 2021 for nine conventional and nine Islamic banks. For example, the annual report for the Alliance Islamic Bank Berhad shown on the official website is until the year 2016 only and cannot find the data on other platforms such as Bursa Malaysia and Refinitiv. Hence, incomplete data forced us to abandon some of the banks in this study.

Aside from that, one of the research objectives of this study is to compare the effect of COVID-19 on credit risk in conventional and Islamic banking systems. Therefore, the number of banks that provide conventional and Islamic banking services is also one of the reasons why this study only complies with nine banks for each banking system. According to Bank Negara Malaysia's official website, there are 16 Islamic banks in Malaysia. However, there are only ten banks that provide Islamic banking services along with conventional banking services. Suppose a comparison is to be made in this study. In that case, it is best to compare both banking systems within the same company or group to provide a clearer picture of whether Islamic or conventional banking systems are most affected by COVID-19. Therefore, there is a limit to the number of banks that provide both conventional and Islamic banking services, which is cause this study can compile only ten years of balanced data from 2011 to 2021 for nine conventional and nine Islamic banks.

Furthermore, the data used as the dependent variable is the credit risk of conventional banks and Islamic banks proxies by NPL and NPF. The independent variables include of the dummy variable as substituted of COVID-19 outbreak. In the meantime, we added control variables from bank specific indicators such as Total Cr, CAR, FDR and ROA.

### **3.4 Data Analysis**

### 3.4.1 Panel Data Regression

Several independent variables are included in this study: total credit, total financing, loan to deposit ratio and others. In addition, the independent variable consists of a dummy variable that is a proxy for the period before and during the COVID-19 pandemic. Besides, the dependent variables used in this study are credit risk and financing risk. The credit risk of conventional banks is proxied by non-performing loans (NPL), whereas the financing risk of Islamic banks is proxied by non-performing financing (NPF).

Panel Regression is a modelling approach suited to panel data, a mix of cross-sectional and time series data in which the same unit cross-section is examined at different points in time (Zulfikar, 2018). In other words, panel data is data collected from some of the same people throughout the course of a given time period.

The model was utilized in this study is the panel regression model. The impact of COVID-19 on credit risk to banking sector in Malaysia can be studied by using the regression analysis below:

Proposed Models:

$$CR_{it} = \alpha + \beta_1 DCovid_{it} + \beta_2 \ln Total Cr_{it} + \beta_3 CAR_{it} + \beta_4 LDR_{it} + \beta_5 ROA_{it} + e_{it}$$

Conventional Bank Model:

$$NPL_{it} = \alpha + \beta_1 DCovid_{it} + \beta_2 \ln Total Cr_{it} + \beta_3 CAR_{it} + \beta_4 LDR_{it} + \beta_5 ROA_{it} + e_{it}$$

Islamic Bank Model:

$$NPF_{it} = \alpha + \beta_1 DCovid_{it} + \beta_2 \ln Total Fn_{it} + \beta_3 CAR_{it} + \beta_4 FDR_{it} + \beta_5 ROA_{it} + e_{it}$$

Three models are involved in this research, which include proposed model, conventional bank model, and Islamic bank model. There is a total of one dependent



variable, one dummy variable, and several independent variables involved in each model. The dependent variable for the overall model is the credit risk to the banking sector in Malaysia, and it is proxied by credit risk (CR). On top of that, the dependent variables used in the conventional bank and Islamic Bank models are the credit risk and financing risk, respectively. The conventional bank model's credit risk is proxied by non-performing loan (NPL). In contrast, the financing risk is proxied by non-performing financing (NPF) in the Islamic bank model. Besides, one dummy variable is involved in each model which is the period before and after the COVID-19 pandemic. It is proxied by DCovid in the model.

There are also several independent variables involved in the overall model and conventional model, which include Total CR, CAR, LDR, and ROA. The independent variable for the Islamic model will be slight differences compared to the overall model and conventional model. The ROA and CAR remain unchanged and same with another model. However, the Total Financing of Islamic Bank (Total FN) replaces the Total Credit of conventional Bank (Total CR), and the Financing to Deposit Ratio (FDR) substitutes the Loan to Deposit Ratio (LDR). These are the difference between the Islamic Bank model and another model. Lastly, there are also several elements involved in each model, which are intercept ( $\alpha$ ), Error Term ( $\epsilon$ ), the cross-section for bank ( $i$ ), a period of study ( $t$ ), and Log Natural ( $\ln$ ).

There were two reasons for choosing panel data in this study. First-panel data can provide more accurate inferences of modal parameters. The most significant differences between cross-sectional data and panel data are the degree of freedom and sample variability. Panel data, as opposed to cross-sectional data, often have a greater number of degrees of freedom and a more substantial sample variability, which contributes to an increase in the economic estimate efficiency (Hsiao, 2006). Another reason panel data was chosen for this study is that it is a better way to show how complicated human behaviour is. Panel data may give more accurate predictions of individual outcomes by combining the data instead of using the data and information about the person in question to make predictions of individual outcomes (Hsiao, 2006). If individual behaviours are comparable, subject to certain characteristics, panel data

gives the potential to learn a person's behaviour by witnessing the behaviour of others. Thus, it is possible to obtain a more accurate picture of a person's behaviour by combining observations of the person in question with other persons' data (Hsiao, 2006). Consequently, panel data is required to be used in this research to determine how the COVID-19 pandemic may affect the credit risk of the banking sector in Malaysia.

### 3.5 Panel Regression Model

#### 3.5.1 Random Effect Model (REM)

According to Rizka Zulkiflar (2018), the Random Effect Model is also known as Generalized Least Square (GLS) technique. It is a technique that is often used to analyse the influence of individual-specific attributes on the response variable of a panel data set. In general, the random effect model is distinguishable from the common effect model and the fixed effect model. This is because this model does not, like Fixed Effect Model, apply the principle of ordinary least square but instead Random Effect Model will apply the principle of maximum likelihood (Zulfikar, 2018). The equation of the model is shown below:

$$Y_{it} = \bar{\beta}_1 + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + e_i + \mu_{it}$$

Number of individual or cross section is proxies by  $i$  in the equation while  $t$  refers to the number of time period. The dependent variable of  $i$  at time period  $t$  is denotes by  $Y_{it}$  in the equation.  $\bar{\beta}_1$  denotes the intercept parameter.  $\beta_2$  to  $\beta_k$  indicates the coefficient of independent variables while the independent variable of  $i$  at time period  $t$  is denotes by  $X_{it}$  in the equation. Lastly the symbol of  $e_i$  refer to the error term of the random individuals where the  $\mu_{it}$  refer to

the error term for the model where  $i$  and  $t$  refer to the combination between time series and cross-sectional error component. The dependent variable of  $I$  at time period of  $t$  is denote by  $y_{it}$  in the equation.

### 3.5.2 Fixed Effect Model (FEM)

The Fixed Effect Model is also known as the Least Square Dummy Variable (LSDV). This approach assumes that differences between individuals may be accounted for by using various intercepts. When calculating the Fixed Effect Model with different intercepts between individuals, the dummy variable is always involved in this model (Zulfikar, 2018). The FEM and POLS (Pooled Ordinary Least Square) model uses the ordinary least square principle. Not only for that, but this model also carries several assumptions, such as intercepts being different across companies, slopes being constant across companies, as well as time invariant.

The equation of the model is shown as below:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + (e_{it} + u_i)$$

Number of individual or cross section is proxies by  $i$  in the equation while the number of time period is denoted by  $t$  in the equation. The dependent variable of  $i$  at time period  $t$  is denotes by  $Y_{it}$  in the equation. The intercept now contains a subscript  $i$  which suggests that the value of  $\beta_1$  may be different for each individual unit (Twumasi-Ankrah, Ashaolu, & Ankrah, 2015).  $\beta_2$  to  $\beta_k$  refers to the coefficient of independent variables while the independent variable of  $i$  at time period  $t$  is denotes by  $X_{it}$  in the equation.

After the dummy variable added into each variable, the equation will change and transform, and the transformed equation is shown as below.

$$Y_{it} = \beta_{1i}D_{1i} + \beta_{2i}X_{2it}D_{2i} + \dots + \beta_k X_{kit} + e_{it}$$

## 3.6 Model Selection

### 3.6.1 Hausman Test

The Hausman Test is applied to analyse whether the Fixed Effect Model or Random Effect Model is more suitable in interpreting the results in the following chapter. The hypothesis for Hausman Test is shown as below:

$H_0$ : Use REM

$H_1$ : Use FEM

If the p-value is less than significance level of 5%, reject  $H_0$  and accept  $H_1$  to prove that FEM is more suitable compared to REM. By contrast, if the p-value is greater than the significance level of 5%, then need to accept  $H_0$  prove that random effect model is more appropriate to use in interpret the result in following chapter.

## 3.7 Conclusion

This chapter discusses the source of data and the methodology used in this study. POLS, FEM and REM, will be used as the regression model in this study. Besides, to determine which model is suitable and appropriate for this study. LM test and Hausman Test are applied and used in this study.

**4.1 Introduction**

The focus of chapter four is the evaluation and interpretation of relevant data. All the data must be gathered, organized, and then subjected to the analysis described in the preceding chapter. The descriptive analysis is used initially to determine the overall concept of the data set, followed by the discussion of the regression results, and finally the selection of the regression model.

**4.2 Descriptive Analysis**

Descriptive analysis is referred to an act of gathering and summarizing the data in ways that are pertinent and significant (e.g., mean, percentage, standard deviation, etc.). The researchers or readers can quickly analyse the information and form a broad picture in their minds by looking at the analysis results. Table 4.1 shows descriptive statistics on bank credit risk and bank-specific variables, namely NPL / NPF proxies to credit risk, dummy variable indicating the COVID period pandemic, TOTAL Cr / TOTAL Fn, CAR, LDR / FDR, and bank performance variables derived by ROA. The following facts are found regarding the banking industry in Malaysia which are captured.

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**Table 4.1: Descriptive Statistics**

<b>Variables</b>	<b>Overall Bank</b>	<b>Conventional Banks</b>	<b>Islamic Banks</b>
------------------	---------------------	---------------------------	----------------------

	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Cr / NPL / NPF	3244.586	9077.927	3171.818	3691.108	3317.355	12381.25
COVID	0.500000	0.503155	0.500000	0.506370	0.500000	0.506370
TOTAL Cr / TOTAL Fn	107568.3	134122.7	166046.0	162948.8	49090.56	53591.77
CAR	0.185656	0.028513	0.185280	0.016775	0.186033	0.036947
LDR / FDR	0.886426	0.094357	0.861750	0.043376	0.911103	0.122083
ROA	0.009013	0.0077768	0.011162	0.009977	0.006863	0.003636

Source: Developed for research.

From the descriptive statistics, the credit risk owned by Islamic banks has an average of much higher than conventional banks ( $3317.355 > 3171.818$ ). The COVID-19 dummy for all the models are the same. Furthermore, the average total credit issued by conventional banks show a much larger number than Islamic banks ( $166046.0 > 49090.56$ ). This is because the total assets owned by conventional banks are several times larger than the total assets of Islamic banks. In addition, in the variable capital adequacy ratio, Islamic banks have a higher average value than conventional banks ( $0.186033 > 0.185280$ ). The variable loan to deposit ratio of Islamic banks has a higher value than conventional banks ( $0.911103 > 0.861750$ ). Although in fact, the two values are almost equal. Furthermore, the variable return on assets of conventional banks has a higher average than Islamic banks ( $0.011162 > 0.006863$ ). This means that the performance of conventional banks shows greater results, which is supported by large total assets.

## 4.3 Panel Regression Analysis

### 4.3.1 Random Effect Model (REM)

**Table 4.3: Summary Result of REM**

	Proposed Model	Conventional Bank Model	Islamic Bank Model
C	-1.707830 (0.0001***)	1.488648 (0.0837*)	-1.905908 (0.0081***)
COVID	-0.119984 (0.0324**)	-0.075154 (0.133300)	-0.147685 (0.147200)
Total Cr / Total Fn	0.893603 (0.000***)	0.241013 (0.200000)	0.910284 (0.000***)
CAR	3.882019 (0.0002***)	3.084194 (0.0037***)	4.549793 (0.0068*)
LDR / FDR	-0.282417 (0.243500)	0.206583 (0.651600)	-0.364697 (0.318000)
ROA	2.410302 (0.648600)	-5.729385 (0.236000)	1.460020 (0.909500)
R-squared	0.409446	0.198910	0.360631
Adjusted R-square	0.394067	0.155840	0.326256
Prob (F-statistic)	0.000000	0.000000	0.000000

Source: Developed for research.

The result that shown as above is the result for the random effect model (REM). Constant variable is the first variable that shown in the table. According to the result, the coefficient of constant is in negative for both proposed model and Islamic banks model while positive for conventional banks model. The second variable is the dummy variable, which is the period of pre-COVID and during the COVID-19 pandemic. Based on the result coefficient of the dummy variable is in negative sign for all models.

The third variable is the TOTAL Cr / TOTAL Fn for proposed model, conventional banks and Islamic banks. According to the result, the coefficient of TOTAL Cr / TOTAL Fn is in positive sign for all the models. This means that when the TOTAL Cr / TOTAL Fn increase by 1%, the credit risk of the banking sector



increases by 0.893603% (proposed models) 0.24103% (conventional banks), and 0.910284% (Islamic banks), holding other constant.

Moreover, the CAR had positive sign for its coefficient in all models. This can be explained by when the CAR increase by 1%, the credit risk of the banking sector increases by 3.882019% in proposed models, 3.084194% in conventional banks, and 4.549793 in Islamic banks, holding other constant. Besides, the p-value for CAR in all models are less than significance level of 1%. This result also meets with the hypothesis development that had been proposed in Chapter 2 which is CAR has a significant and negative effect on NPL / NPF.

Furthermore, the coefficient in all regression model for LDR / FDR is in negative sign for proposed and Islamic banks model while positive sign for conventional banks model. When the LDR increase by 1%, the credit risk of banking sector is expected to drop by 1% and vice versa. However, the p-value for LDR in all regression model are greater than the significance level of 10%.

Besides, ROA had a positive sign for proposed and Islamic banks model while there is a negative sign for conventional banks model. Next is the p-value for the ROA. The p-value for the ROA is identical to the LDR / FDR that mentioned at above. The p-value for ROA for all models are greater than the 10% significance level.

The probability value of F-statistic in all models are 0.000000 which is the highly significance results, so the independent variable and dummy variable affect the dependent variables. Hence it can be sum out that the use of the model is reasonable and reliable. The Adjusted R Square value for proposed model, conventional banks model, and Islamic banks model are 39.41%, 15.58% and 32.63% respectively. This means that the independent variable can be explain by the dependent variable.

### 4.3.2 Fixed Effect Model (FEM)

**Table 4.4: Summary Result of FEM**

	Proposed Model	Conventional Bank Model	Islamic Bank Model
C	-0.871980 (0.226500)	3.781427 (0.0018***)	-1.943278 (0.0462**)
COVID	-0.102754 (0.0848*)	-0.046231 (0.372800)	-0.150807 (0.155400)
Total Cr / Total Fn	0.695684 (0.0001***)	-0.314435 (0.251600)	0.913372 (0.0004***)
CAR	3.698842 (0.0004***)	3.496813 (0.0014***)	4.659110 (0.0063*)
LDR / FDR	-0.098258 (0.717000)	0.735163 (0.149300)	-0.363170 (0.356300)
ROA	-1.104751 (0.864000)	-6.984567 (0.185000)	2.160530 (0.868700)
R-squared	0.854487	0.871694	0.688313
Adjusted R-square	0.836194	0.852070	0.640643
Prob (F-statistic)	0.000000	0.000000	0.000000

Source: Developed for research.

The result that shown as above is the result for the fixed effect model (FEM). Constant variable is the first variable that shown in the table. According to the result, we can observe that the coefficient of constant for conventional banks model is in positive while proposed model and Islamic banks model are in negative value. The second variable is the dummy variable, which is the period of pre-COVID and during the COVID-19 pandemic. Based on the result coefficient of the dummy variable is in negative sign for all models.

1 The third variable is the TOTAL Cr / TOTAL Fn for proposed model, conventional banks and Islamic banks. According to the result, the coefficient of TOTAL Cr / TOTAL Fn is in positive sign for all the models except conventional banks model. This means that when the TOTAL Cr / TOTAL Fn increase by 1%, the credit risk of the banking sector increases by 0.695684% (proposed models) and 0.913372% (Islamic banks), holding other constant. On the other hand, for conventional banks model, when the TOTAL Cr / TOTAL Fn increase by 1%, the credit risk of the banking sector decreases by 0.314435%

Moreover, the CAR had positive sign for its coefficient in all models. This can be explained by when the CAR increase by 1%, the credit risk of the banking sector increases by 3.698842% in proposed models, 3.496813% in conventional banks, and 4.659110 in Islamic banks, holding other constant. Besides, the p-value for CAR in all models are less than significance level of 1%. This result also meets with the hypothesis development that had been proposed in Chapter 2 which is CAR has a significant and negative effect on NPL / NPF.

Furthermore, the coefficient in all regression model for LDR / FDR is in negative sign for proposed and Islamic banks model while positive sign for conventional banks model. When the LDR increase by 1%, the credit risk of banking sector is expected to drop by 1% and vice versa. However, the p-value for LDR in all regression model are greater than the significance level of 10%.

Besides ROA had a positive sign only in Islamic banks model while there is a negative sign for proposed banks model and conventional banks model. Next is the p-value for the ROA. The p-value for the ROA is same as the LDR / FDR that mentioned at above. The p-value for ROA for all models are greater than the significance level of 10%.

The probability value of F-statistic in all models are 0.000000 which is the highly significance results, so the independent variable and dummy variable affect the dependent variables. Hence it can be sum out that the use of the model is reasonable and reliable. The Adjusted R-Square value for proposed model, conventional banks model, and Islamic banks model are 83.62%, 85.21% and 64.06% respectively. These means that the independent variable can be explain by the dependent variable.

### 4.3.3 Selection of Regression Model

Table 4.5: Breusch-Pagan (BP) test and Hausman test for Proposed Models, Conventional Banks Model and Islamic Banks model

	Proposed Models	Conventional Banks Model	Islamic Banks Model
Hausman test	0.0000 (1.0000)	0.0000 (1.0000)	0.0000 (1.0000)

Source: Developed for research.

Hausman Test is the best appropriate model which applied in this research to determine whether FEM / REM is more suitable for interpreting the results. Based on the result of p-value of Hausman Test are all in 1.0000 which exceeds the significance level of 10%. The Null Hypothesis for Hausman Test is "REM is appropriate than FEM". If the p-value is higher than 0.05 then it shows that REM is more appropriate than FEM. On the other hand, if the p-value is smaller than 0.05 then it shows that FEM is more appropriate than REM. The p-value for proposed model, conventional bank model and Islamic bank model is greater than the significance level hence do not reject the null hypothesis prove that REM is more appropriate than the FEM. Sum of all, according to Hausman Test, we can conclude that REM is more suitable than FEM. Hence REM is the most suitable model that used in this study to interpret the result.

## 4.4 Hypothesis Conclusion (reject / fail to reject)

Above all, we can use the summary result of REM as stated in Table 4.3 to conclude the hypothesis stated in Chapter 2.

### 4.4.1 Total Credit / Total Financing

<sup>1</sup>  
H<sub>0</sub>: There is no significant relationship between Total Credit / Total Financing and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Total Credit / Total Financing and NPLs / NPFs.

From the hypothesis development, H<sub>1</sub> indicates that there is significant relationship between TOTAL Cr / TOTAL Fn and NPLs / NPFs. On the other hand, H<sub>0</sub> indicates that there is no significant relationship between TOTAL Cr / TOTAL Fn and NPLs / NPFs. From the result of Table 4.3, it shows the coefficient of TOTAL Cr / TOTAL Fn is in positive sign for all the models. This means that TOTAL Cr / TOTAL Fn has positive relationship with NPLs / NPFs. Hence, the results reject H<sub>0</sub>.

### 4.4.2 Capital Adequacy Ratio (CAR)

H<sub>0</sub>: There is no significant relationship between Capital Adequacy Ratio (CAR) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Capital Adequacy Ratio (CAR) and NPLs / NPFs.

From the hypothesis development, H<sub>1</sub> indicates that there is significant relationship between CAR and NPLs / NPFs. On the other hand, H<sub>0</sub> indicates that there is no significant relationship between CAR and NPLs / NPFs. From the result of Table 4.3, it shows the CAR had positive sign for its coefficient in all models. This means that CAR has positive relationship with NPLs / NPFs. As a result, the findings reject H<sub>0</sub>.

#### 4.4.3 Loan to Deposit Ratio (LDR)

H<sub>0</sub>: There is no significant relationship between Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Loan to Deposit Ratio (LDR) / Financing to Deposit Ratio (FDR) and NPLs / NPFs.

From the hypothesis development, H<sub>1</sub> indicates that there is significant relationship between LDR / FDR and NPLs / NPFs. On the other hand, H<sub>0</sub> indicates that there is no significant relationship between LDR / FDR and NPLs / NPFs. From the result of Table 4.3, the coefficient in all regression model for LDR / FDR is in negative sign for proposed and Islamic banks model while positive sign for conventional banks model. Since both proposed and Islamic banks model have a negative sign on the LDR / FDR, so we can say that LDR / FDR is negative relationship and no significant to NPLs / NPFs. Therefore, the results fail to reject H<sub>0</sub>.

#### 4.4.4 Return on Asset (ROA)

H<sub>0</sub>: There is no significant relationship between Return on Assets (ROA) and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between Return on Assets (ROA) and NPLs / NPFs.

From the hypothesis development, H<sub>1</sub> indicates that there is significant relationship between ROA and NPLs / NPFs. On the other hand, H<sub>0</sub> indicates that there is no significant relationship between ROA and NPLs / NPFs. From the result of Table 4.3, ROA had a positive sign for proposed and Islamic banks model while there is a negative sign for conventional banks model. Thus, it shows there is no any significance to the dependent variable, thus the findings fail to reject H<sub>0</sub>.

#### 4.4.5 COVID-19

H<sub>0</sub>: There is no significant relationship between COVID-19 and NPLs / NPFs.

H<sub>1</sub>: There is significant relationship between COVID-19 and NPLs / NPFs.

From the hypothesis development, H<sub>1</sub> indicates that there is significant relationship between COVID-19 and NPLs / NPFs. On the other hand, H<sub>0</sub> indicates that there is no significant relationship between COVID-19 and NPLs / NPFs. From the result of Table 4.3, the coefficient of the dummy variable is in negative sign for all models. COVID-19 for banks was the rise in non-performing loans, which resulted in a decrease in the quality of the loan portfolio. As a result, COVID-19 has a positive relationship to the credit risk. Hence, the results reject H<sub>0</sub>.

## **4.5 Conclusion**

In this chapter, all the data collected is analysed using EViews. This chapter presents the findings of many analyses, including descriptive analysis, Pooled OLS, FEM, REM, and other tests. Additionally, all the results and their corresponding interpretations are collected in table form in this chapter. The following chapter will go into deeper details regarding the outcomes.



## CHAPTER 5: DISCUSSION, CONCLUSION, AND IMPLICATIONS

### 5.1 Major Findings of the Study

This study has examined the impact of COVID-19 on the credit risk among the Islamic and conventional banks in Malaysia. This study found that COVID-19 has a positive relationship with the credit risk to the banking sector in Malaysia. It shows that the credit risk to the banking sector has increased in the case of COVID-19 exists in Malaysia. COVID-19 is a major impact to increase the credit risk for banks in Malaysia whereby decline in the quality of the bank's loan portfolio (Goodell, 2020). The banking sectors allowed the borrowers in extending their loan payments during the pandemic, leading to an increase in the default risk of a loan (Bank Negara Malaysia, 2020). The results shown determined that COVID-19 is a significant variable, showing a real impact on the credit risk of the Islamic banks and conventional banks in Malaysia.

Secondly, the significant variables have been determined in measuring the impact of COVID-19 on the credit risk among the Islamic and conventional banks in Malaysia. For the Islamic bank model, the total financing and capital adequacy ratio (CAR) are the most significant variables to show the impact of COVID-19 on the credit risk of Islamic banks in Malaysia. Thus, the overall Islamic banks model is significant and sufficient to explain the credit risk of Islamic banks. While for the conventional bank model, the total credit and capital adequacy ratio are the essential variables to identify the impact of COVID-19 on the credit risk to conventional banks in Malaysia. The overall conventional banks model can also justify the banks' credit risk sufficiently. In summary, a total credit or total financing, and CAR are the most essential variables for the overall banking system. In research from Widarjono & Rudatin (2021), CAR indicates the banks' ability to support businesses and consumers by providing sufficient funds. In addition, it shows the ability of banks to cope with the risk of funds lost in

bank operations. Studies by Hajja (2017), stated that the CAR used to measure banks' capital, will affect the NPLs and NPFs of banks in Malaysia.

In addition, the comparison of Islamic and conventional banks is determined concerning the bank-performance variables. This study has found that the conventional banks in Malaysia are at higher levels than Islamic banks in terms of credit risk, total credits, capital adequacy ratio (CAR) and return on assets (ROA). However, the loan-to-deposit ratio (LDR) is the only variable for Islamic banks to occupy a higher level than conventional banks. Still, the difference in LDR between both banks is minimum. In short, conventional banks are considered more vulnerable to economic uncertainty during the outbreak of COVID-19 than Islamic banks. According to the research, the COVID-19 pandemic has significantly distressed conventional banks while has only lightly affected Islamic banks (Wijana & Widnyana, 2022).

## 5.2 Implications of the Study

This study has quantitatively evaluated the direct impact of COVID-19 on the credit risk to the banking sector in Malaysia. This study has further developed three independent models to illustrate the impact of COVID-19 on the banks' credit risks, including the Islamic banks model, the conventional bank model and the overall banks model. This study has an important implication for the risk department of banks. Instead of conducting an analysis that focuses only on their banks and is compared to the benchmark in the market, the banks' risk department in Malaysia can find the direct impact of the COVID-19 pandemic by looking into three independent models to fulfill their needs. As a result, the risk department should be able to identify the underlying impact and thus establish relevant credit risk management to cope with the credit risk. Also, the financial authorities can apply this study as a basis to assess the relevant policies, especially in the case of banking restructuring to suit the new norms. Identifying significant variables can help the authorities consider improving the value of significant variables while removing or reducing the insignificant factors in their banks' operations.

In addition, this study can also be applied by the Malaysian' government to identify the COVID-19 impact on the credit risk to the banking sector in Malaysia. As mentioned previously, the government is responsible for conducting monetary policies to maintain the country's economic and financial stability. Hence, it is helpful when the government deeply investigates the direct impact of COVID-19 on credit risk. As a result, the government should be able to conduct better policies to secure the country and society's welfare. Also, the available information regards of the actual impact of COVID-19 on the credit risk to the banking sector in Malaysia is improved. Thus, the government authorities should have a sharp vision of the impact and significance of COVID-19 and should take further actions to mitigate the risks.

Furthermore, this study also aimed to provide comprehensive information related to the COVID-19 impact on the credit risk to the banking sector in Malaysia. This study also encourages more comparative studies in Malaysia. Hence, the researchers can apply this study for their future research to enhance the quality of their previous studies.

### 5.3 Limitations of the Study

One of the limitations that have been detected in this study is the limited number of banks involved. These drawbacks ought to take into consideration in the future research. As this study only involved those banks that can provide both conventional and Islamic banking services, there is insufficient number of banks to be considered. Hence, the comparison in terms of performances between the banks are hard to be determined within the COVID-19 pandemic periods. For instance, this research only includes 9 conventional and 9 Islamic banks within a 10-year trend analysis. However, there is a total of 27 conventional and 18 Islamic banks in Malaysia. The greater the number of banks and years involved in the study would provide more accurate results to the study.

The type of variables also needs to be increased. There are only five variables involved in this study, which might not provide a comprehensive view on the actual impact of COVID-19 impact to the entire banking organization in Malaysia. The significance of variables is to assist in the operationalization and procession of models for data collection. We believe that by including extra variables, the validity of study can be increased. The variables involved in this study should contain several attributes that would increase the validity of result, such as excellent rationality, objectivity, clarity, acceptance, reliability, and consistency.

Moreover, the number of comparative studies is still limited as the COVID-19 pandemic in Malaysia has affected the relevant information in Malaysia to be undermined and faced scarcity. The lack of relevant research that related to this study will impact the reliability and validity of this study negatively. Overall, these limitations should be utilized as a valuable prospect to illustrate the necessity of conducting more relevant studies.

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## **5.4 Recommendations for Future Research**

Throughout this study, there are some recommendations to overcome the limitations. Future researchers are encouraged to take earlier action in setting a particular period for the data organization process. This is because the greater number of banks investigated, the higher the range of the study. Therefore, it might need to take a longer period in calculating and restructuring the data from different banks.

Apart from that, future researchers are recommended to focus on either the conventional or Islamic banking industry. This may help future researchers to investigate the issues more precisely and specifically. Besides, the leverage ratio of banks is also recommended for future research to involve as an additional variable to assess the credit risk issues that influence investors' intention. By using this technique, future researchers can better describe the

correlation between the <sup>8</sup> impact of COVID-19 and the credit risk management of banks in Malaysia.

Next, future researchers are suggested to explore more areas to extend the comparative research that are related to this issue. By comparing the banks between Southeast East Asia, Middle East and Oceania countries. Since this topic has not been fully discovered and investigated. More studies and research works will make the outcomes of results more reliable and accurate. Banking industries, financial institutions, and investors are able to use it as a reference in their future financial planning and strategy. Therefore, the overall results of this research can represent a guideline for bank risk management behaviour in Malaysia.

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