ISLAMIC BANK GOVERNANCE – SMOOTH SAILING OR STORMY WEATHER

LEONG CHUN YIP
LEOW ZHEN RAN
TAN WEI YAU
THIAM KOK LIANG
WOO JIUN HAO

BACHELOR OF FINANCE (HONS)

UNIVERSITI TUNKU ABDUL RAHMAN

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BY

LEONG CHUN YIP
LEOW ZHEN RAN
TAN WEI YAU
THIAM KOK LIANG
WOO JIUN HAO

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DECLARATION

We hereby declare that:

(1) This undergraduate research project 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 research project 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 research project.

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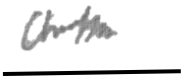
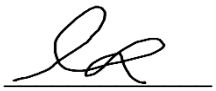
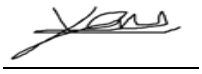
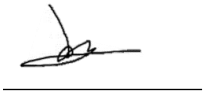
Name of Student:	Student ID:	Signature:
1. LEONG CHUN YIP	17ABB06532	
2. LEOW ZHEN RAN	16ABB06705	
3. TAN WEI YAU	17ABB06384	
4. THIAM KOK LIANG	16ABB04578	
5. WOO JIUN HAO	17ABB06281	

Date: 3 SEPTEMBER 2020

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2SLS	Two-Stage Least Square Regressions
AAOIFI	Accounting and Auditing Organization for Islamic Financial Institutions
BG	Breusch-Godfrey
BLUE	Best Linear Impartial Estimators
BNM	Bank Negara Malaysia
BOARD	Board Size
BOD	Board of Director
BPLM	Breusch-Pagan Lagrange Multiplier
BS	Bank Size
CAMELS	Capital Adequacy, Asset Quality, Management Soundness, Earnings Capacity and Liquidity
CEO	Chief Executive Officer
CEOD	CEO Duality
CI	Cost to Income Ratio
CLRM	Classical Linear Regression Model
ECM	Error Component Model
FEM	Fixed Effect Model
FER	Fixed Effect Model Robust Standard Errors Clustered by Islamic Banks
FRM	Financial Risk Management

GLS	Generalised Least Squares
GMM	Generalized Method of Moments
IB	Interbank Ratio
IBs	Islamic banks
IFI	Islamic Financial Institution
IFSB	Islamic Financial Services Board
LSDV	Least Square Dummy Variable
NIM	Net Interest Margin
OH	Overhead Ratio
OSSB	Shariah members who sit on Others' Shariah Board
PHD	PHD Degree Holder in Shariah Board
POLS	Pooled Ordinary Least Squares
REM	Random Effect Model
ROA	Return on Assets
SSB	Shariah Supervisory Board / Shariah Board Size
TOL	Tolerance
VIF	Variance-Inflating Factor

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PREFACE

This study titled "Islamic Bank Governance – Smooth Sailing or Stormy Weather" is conducted as our final year research project. This research project considers the risk-taking behaviour of 206 Islamic banks in different countries. The data is taken from the year 2009 to 2018 meanwhile Stata software is used to examine how the factors affect the risk-taking behaviour of Islamic banks.

Some governance and specific determinants, such as Shariah Board (PHD), Shariah members who sit on Others' Shariah Board (OSSB), Board Size (BOARD), CEO Duality (CEOD), Bank Size (BS), Net Interest Margin (NIM), Overhead Ratio (OH), Cost to Income Ratio (CI) and Interbank Ratio (IB) had been detected that it may influence the Islamic banks' risk-taking behaviour. In order to confirm whether these factors would affect the risk-taking behaviour of Islamic banks, few tests are conducted, such as Poolability Test, BPLM Test, Hausman Test and Sargan-Hansen test. The main purpose of conducting this research is to identify and ensure the relevant factors that are significant in explaining the Islamic bank's risk-taking behaviour.

Through hard work, we believe that this research could make important contributions to the future research of every related party.

ABSTRACT

The purpose of this study is to examine the Islamic banks' governance and specific factors to the risk-taking behaviour of Islamic banks in different countries from the year 2009 to 2018. Therefore, the exogenous variables deployed in this study include factors like shariah board size (SSB), PhD Degree Holder in Shariah Board (PHD), Shariah members who sit on Others' Shariah Board (OSSB), Board Size (BOARD), CEO Duality (CEOD), Bank Size (BS), Net Interest Margin (NIM), Overhead Ratio (OH), Cost to Income Ratio (CI) and Interbank Ratio (IB). In addition, unbalanced panel data is adopted in this study and data collection is on annual basis from the year 2009 to 2018 (10 years). The data collected through annual reports and BankFocus. Our samples are made up of 206 Islamic banks from different countries. However, we have 369 observations for our result which is filtered out by the Stata software. The findings of this study showed that exogenous variables like SSB, PHD, CEOD, BS, OH and NIM have a significant relationship with the Islamic banks' risk-taking behaviour.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

In this chapter, we will discuss the background on the Islamic banking industry, including the developments the industry has undergone. Moreover, we also go into detail on the research problem and current issues faced by the industry. Next are our research objectives and questions. Finally, there is the significance of study where we identify the place of our research in the literature on Islamic bank governance.

1.1 Research Background

Islamic banking provides an alternative option to conventional banking. Unlike conventional banking, Islamic banks were established with adherence to Shariah principles in mind. Conventional banks' practice often included the three prohibited elements in Islamic finance which are Riba (usury), Gharar (opacity) and Maysir (speculation), as pointed out by Hanif (2014). Islamic banks also believe in the concept of risk-sharing, rather than passing on the risk to investors.

Zaher and Hassan (2001) argued that the reason of adhering to shariah principles is the creation of value to society rather than maximizing profits. Thus, Islamic banks should ultimately be sustainable but not lose sight of its end goal to contribute to the community.

The total worth of the Islamic Finance industry was worth around $2.05 trillion in 2017, as stated in the Global Islamic Finance Market Growth, Trends, and Forecast (2018 - 2024). The important takeaway was that Islamic banking made up 70% of that total. Now compare that to the estimated net worth of the industry back in 2013, at $1.7 trillion. The industry is showing promising growth, and Islamic banking services are the main driver (World Islamic Banking Competitiveness Report, 2013).

The World Islamic Banking Competitiveness Report (2016) identified that new technologies and platforms such as digital banking would take off in the near future. It also reported that leading Islamic banks have shown promise in adapting to these new innovations. These signs bode well for the future of the entire Islamic banking industry. This is especially true in light of the current global climate, with the ongoing pandemic. The same report mentioned that the potential market for Islamic banking services was forecasted at 600 million people, and the industry had not yet reached 100 million customers as of 2016. The conclusion is that Islamic banking still has a lot of room for growth before reaching saturation. However, the current demand and growth for Islamic banking is centered around the GCC and Asia Pacific regions.

Hussain, Shahmoradi and Turk (2015) also observed that the unique structure of Islamic banks that require all operations and products to be Shariah compliant has opened up a can of worms as scholars from different schools of thought have vastly different opinions as to what constitutes a permissible product. These scholars happen to be the leading experts on further development of Islamic banking operations. It becomes even more complex when factoring in the regulations of Islamic banks, which differ from region to region.

1.2 Research Problem

One of the issues pointed out in the Global Islamic Finance Markets Report 2019 is Islamic banking's reliance on the regulation framework designed for conventional banks, with a few adjustments. This brings up a few problems, namely the lack of expertise among regulators regarding the distinct knowledge regarding Islamic law needed to effectively supervise Islamic banks. There are also concerns regarding the lack of a global standard framework for all Islamic banks worldwide to follow. As of the present, there are few globally recognized institutions. AAOIFI and IFSB are two such organizations. However, most countries have no legal obligation to follow the guidelines set out by these organizations unless decreed by their respective countries' regulatory bodies, such as in the case of Bahrain's central bank. (AAOIFI, 2020).

Inconsistent Islamic bank regulation from country to country leads to lack of confidence by consumers, as pointed out by Karbhari, Naser and Shahin (2004). This is why the role of Shariah Supervisory Boards and by extension, the shariah scholars who serve on these boards are so important. The scholars' professional integrity and competency in shariah and economic/finance knowledge are crucial to serve the varying needs and conditions of each country's Islamic banks (Grassa, 2013).

The functions of Shariah Board are involved in development of Islamic product, review and evaluating and approving things relating to Sharia, making sure that IFIs investment with Shariah by participating in shares, equities, sukuk and so on. Different countries have different qualification requirement in selecting the Shariah Board. Some of the member of Shariah Board are not specialists in Shariah knowledge. The final Islamic product may not inspire confidence in consumers since there is no guarantee that the product has been evaluated properly from Shariah viewpoint.

BNM, through the standard procedure on governance of the Committee of Shariah for Islamic Bank and other Islamic Financial Institutions (IFI), specified that a member of the Shariah Committee (as Shariah boards in Malaysia are called) should be a specialist in Usul Fiqh and Fiqh Muamalat. Wright (2006) mentioned that the hard task for Islamic banks are to find scholars that are equally well-versed in finance and banking-related matters, even if not required by regulatory bodies like BNM. Wilson (2009), and Greuning and Iqbal (2008) mentioned that shortage of quality Shariah Board leaders is a barrier for IFIs to accomplish their objectives. To solve this problem, some IFIs appoint Shariah scholars as their Shariah board members. Unfortunately, another problem crops up. The high frequency of the same few Shariah scholars being appointed to many Shariah Boards. Reuters (2010), and Baltaji and Anwar (2010) declared that the top 20 Shariah scholars serve 621 boards worldwide as of year 2010.

The concern is that the scholar would not be able to handle his/her duties to the best of their abilities if they serve on so many Shariah boards, especially since many of the most experienced scholars are of an advanced age and they may struggle to cope since IFIs are still developing their business model at a rapid pace.

This issue causes there is only a few Shariah Board in each Islamic bank. Fakhrunnas and Ramly (2017) mentions that shariah supervisory board affects risk taking of Islamic bank negatively. They also indicate that when the Shariah scholars in the SSB are increasing, the stricter the role of supervision would be. If one of the Islamic banks have only a few Shariah Board, these banks will be going to take more risk than the bank. If the number of SSBs in an Islamic bank is large, the risk to the business will be lower than the Islamic bank that have lower number of Shariah scholars on the shariah board. In addition, bigger Islamic bank, depending on the total asset, will having higher credit risk and lower Z-scores.

According to Grais and Pellegrini (2006), Rammal (2006), Khan (2007), and Farook and Farooq (2013), the shortage of qualified Shariah practitioners, multiple board representation of Shariah Board members, potential conflict of interest, independence of Shariah Board, lack of standardization in Shariah Board rulings and Shariah due diligence are the major issues and challenges confronting growth of Islamic banks. Therefore, BOD and SSB act an important function in managing Islamic banks. At the same time, BOD and SSB as part of corporate governance need to ensure Islamic banks able to follow the Islamic shariah law due to those systems have their own moral dimension in the commercial transactions. This means that the Islamic banks are highly relied on the supervisory and monitoring of BOD and SSB.

According to Fakhrunnas, Faaza and Ramly, Zulkufly (2017), there is relationship among BOD, SSB and risk-taking behavior of Islamic banks which means the decisions made by them will directly affect the risk-taking behaviour of Islamic banks. For example, there is a case showing the corporate governance in Malaysia caused one of the Islamic banks (Bank Islam) take over risk due to provide financing without evaluate the risks and ignorance at lending money to the companies that are not highly committed. As a result, the unexpected provision for non-performing financing caused Bank Islam suffered huge losses. Therefore, proper supervisions and regulations are difficult to reduce the uncertainty involved with IFIs. The supervision of the Islamic banking systems through effective monitoring by an authorized regulatory is very important to ensure that prudential requirements are observed by IFIs.

Bank for International Settlements (2006) state the board should have a sound knowledge of every form of material financial operation that the Bank plans to undertake. For certain instances, though, bank directors may not have extensive knowledge of banking, finance and relevant issues. Although the absence of such knowledge does not preclude an otherwise qualified person from sitting on the board,

in these situations, banks are advised to introduce targeted training programs for board members in order to best allow them to meet their responsibilities.

There are also past cases of Islamic institutions which failed due in part to governance-related factors. One particular case stands out since it faced many of these problems. Ali (2007) wrote that Ihlas Finance House had been affected by the effects of Turkey's own financial banking crisis in 2001 alongside other Turkish commercial and Islamic banks. Several Turkish commercial banks failed during this period. Among the Islamic bank institutions, only Ihlas Finance House could not weather through the crisis and closed down.

A combination of factors led to Ihlas Finance's bank closure. Firstly, there were hints of improper credit control for certain loan approvals. One of the bank's clients turned out to be its parent company, Ihlas Holdings. While the company mainly had operations in stable industries that were not prone to unexpected shocks, these were businesses that use up a lot of the company's cash flows. Turkey's crisis would have weakened the company's ability to pay its loans on time, which would then affect the bank's cash flow as well. The bank also did not have procedures in place to handle panic withdrawals by depositors, which weakened its available cash flow even further in the midst of the banking crisis. The bank also failed to comply with new regulations launched in 1999 even though it was given a 2-year grace period before the new regulations were enforced. The management failed to rectify these problems and instead used information manipulation to disguise the issues. Most, if not all of the above issues can be partially linked back to the poor governance structure in place at Ihlas Finance House, which consisted of inexperienced directors and individual directors with potential conflict-of-interest. On the regulators' side, problems were also exposed on the inadequate regulations in place to deal with the specific issues in the case of Ihlas Finance House after its potential bankruptcy came to attention. Regulators

simply cancelled the banking license for Ihlas Finance House without considering any other alternatives.

Closer to home, we have the case of Tabung Haji. Tabung Haji is an Islamic financial institution created by the Malaysian government for the purpose of funding pilgrimages to Mecca for Malaysian Muslims (Tabung Haji, 2020). Reports began to come out regarding the mismanagement of depositors' funds in 2016 after then BNM governor Tan Sri Zeti warned of bad practices at Tabung Haji. Among these were payouts of dividends to depositors since 2012 even though Tabung Haji had less assets than liabilities (The Edge Markets, 2016), and falsely reporting that their financial statements were cleared by auditors (The Edge Markets, 2018). The Strait Times (2018) reported that the institution needed to be bailed out by the Malaysian government in late 2018 at huge cost to taxpayers. It was also found that three out of four board members on Tabung Haji's BOD were not independent directors (The Star, 2020). The bad decision-making by the top management could not have been done without board approval. This clearly made the case that even Islamic Financial Institutions needed good governance in ensuring that it did not take undue risk or break regulations.

The Agency's problem is quite a bit serious in the instances of Islamic banks, because creditors in normal banks have their own degree of definiteness regarding the dividends, gains as well as potential losses suffered in Islamic banks, and as a consequence the burden is balanced between banks and their creditors (Siddiqui, 2001). Therefore, the division of ownership and power were not to be confined with the instance in Islamic banks, and yet applies to the distribution of cash flow and power, rendering the agency dilemma in Islamic banks more complicating than normal banks (Safieddine, 2009). In addition, increased the likelihood of CEO duality (Dalton et al., 2007), so, with a high degree of board independence, autonomy of the chairman position may not make further benefit in governance. Furthermore, Sah and Stiglitz (1991), and Lipton and Lorsch (1992) argued that smaller board may have higher efficiency because of

simplicities in solving agency problems among members of the board. Likewise, Dalton et al. (1998) proposed that the boards of directors consented to share more professionally trained representation and offered additional scope for the likelihood of correspondence with various external links. In fact, bigger companies require further oversight (Nenova, 2003), which therefore results in increased expenses for businesses and thus contributes to a greater probability of solving the Agency's issues. Last but not least, the reduction in service issues at the most basic stage leads to an improvement in the share interest and the effect of this good results.

Following by the agency issues, it came to asymmetric information problem. This theory argues that the impossibilities of distinguish good borrowers from bad borrowers (Auronen, 2003), which may result in detrimental selection and moral hazard problems. For instance, the regulatory problems highlighted that related to PSIAs (Profit Sharing Investment Accounts) but there are still no any solution in the form of changes to the openness and transparency of Islamic banks to lower the asymmetric information occurs. In addition, due to capital provider (Rabbul-mal) does not have the authority to intervene in the investment management which is exercised by entrepreneur (Mudarib), and thus, this would create asymmetric information in the profit-sharing contract. If these participants do not engage in the usage and operation of the resources, they pose a high degree of information uncertainty, Shari'ah compliance risk and market risk.

1.3 Research Questions

Our research questions are:

1. Whether the governance factors will affect the risk-taking behaviour of Islamic banks?
2. Whether the bank-specific factors will affect the risk-taking behaviour of Islamic banks?
3. What are the relationships between governance factors and the risk-taking behaviour of Islamic banks?
4. What are the relationships between bank-specific factors and the risk-taking behaviour of Islamic banks?

1.4 Research Objectives

1. To observe the significance of governance factors on risk-taking behaviour of Islamic banks.
2. To observe the significance of bank-specific factors on risk-taking behaviour of Islamic banks.
3. To investigate the relationship between governance factors and risk-taking behaviour of Islamic banks.
4. To investigate the relationship between bank-specific factors and risk-taking behaviour of Islamic banks.

1.5 Research Significance

This study contributes to the literature on the risk-taking of Islamic banking industry. It also provides additional valuable insights into the nature and role of corporate governance of Islamic bank risk-taking behaviour for the benefit of stakeholders such as regulators, investors, clients etc. We seek to fill the gap in current research literature as well. The effect of PhD-holding shariah scholars on bank governance is still largely unknown due to a lack of literature that focuses on the issue. Moreover, most research has focused their data on a very small and usually regional subset of Islamic bank samples. We already know that Islamic governance standards and frameworks can differ by regions. By providing a slightly larger picture with a mix of bank samples from different regions, we hope that regulators can get an alternate picture different from current literature as a reference for setting future policies regarding standards for Islamic bank governance. These could include setting an optimal number for shariah board size, setting a minimal of academic qualifications for shariah board members among others.

In addition, we hope the study will also give regulators more insight so that future cases of financial scandals could be avoided. Moreover, other bank stakeholders (depositor, borrower and investor) can gain more understanding about the quality of Islamic bank governance on risk-taking behaviour, enabling them to make sensible decisions.

1.6 Conclusion

The background of research illustrate the future potential of the Islamic banking industry, while the research problem lays out the pressing issues the industry faces,

which lead to the formation of our research questions and objectives. Finally, we hope that our research will be useful for future reference when it comes to governance of Islamic banks.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this chapter, we will discuss the literature that we have gone over, which includes relevant theoretical models, proposed frameworks (both theoretical or conceptual) and conclusion as well. The review of literature will cover Risk-taking behavior (Z-Score), Shariah Board Size (SSB), PHD Degree Holder in Shariah Board (PHD), Others' Shariah Board (OSSB), Board Size (BOARD), CEO duality (CEOD), Cost to Income Ratio (CI), Bank Size (BS), Interbank Ratio (IB), Overhead Ratio (OH) and Net interest Margin (NIM). Instead of only focusing on Malaysia's Islamic bank, this study extended to different countries including Asia and Western countries.

2.1 Review of Literature

2.1.1 Dependent Variable

Risk-taking Behaviour (ZSCORE)

In its earliest form, Z-Score was developed in an attempt to test overcome the inconsistent prediction results of single ratio analysis. Altman (1968) came up with the

idea to test the efficacy of multiple analysis ratios when used together. The original Z-Score was designed to predict the likelihood of bankruptcy for manufacturing firms.

For banks, the formula $Z \equiv \frac{\mu+k}{\sigma}$ is modified to account for bank equity, k and return on assets, μ against volatility of return on asset, represented by standard deviation, σ. This design originally came from Boyd and Graham (1986). The greater the Z-Score value, the greater the buffer before bank exhausts its equity reserve. This is interpreted as higher bank stability (Maechler, Mitra, & Worrell, 2010). Čihák and Hesse (2010) reason that Z-Score for bank is consistent for financial institutions since it measures financial indicators of equity and reserve. All financial institutions disclose these two indicators.

The Z-score has been used and tested extensively for commercial banking industry. Some of the advantages associated with using Z-score for banks over other methods include its reliability in accurately predicting bank stability and its relative ease of use when it comes to sourcing for the data needed.

Since Islamic banks worldwide have different standards for disclosure based on the regulations of their respective regions and also whether the bank is listed or not, Z-score holds a definite advantage. This is because the data needed to construct bank Z-score can be extracted solely from accounting data. Thus, it is suitable for consistent testing for Islamic banks around the world regardless of regulatory disclosure. (Altman, Iwanicz-Drozdowska, Laitinen, & Suvas, 2014)

Boyd and Runkle (1992) also ran a study on US commercial banks from the period 1971-1990 to determine if bank size is related to bank stability. They presented their prediction that larger banks would be less likely to fail as the U.S. government would intervene if there really is risk of failure. Their final conclusion was that bank size did

not significantly impact the likelihood of bank insolvency. They backed their results by checking actual failure rates of banks from the years 1971-1990. The accuracy of the results when compared to the real failure rate of banks support the reliability of the Z-score.

Chiaramonte, Croci, & Poli (2015) found that Z-score performed similarly to the more data-comprehensive CAMELS method when use to predict banks in distress in the short term. The authors define banks in distress for banks that are bankrupt or in the process of going bankrupt. Banks undergoing merger and acquisition processes are only considered as being under distress if they reported a negative capital ratio (having bad debt that exceeded its capital reserves) or had required financial bail-outs from governments in the 12 months before it was merged or acquired by another bank.

A study was also carried out to test the viability of the bank Z-score against more sophisticated methods using Z-score together with additional macro variables to predict bank failures (Boyd and Graham, 1986). The study by Chiaramonte, Liu, Poli, & Zhou (2016) provided evidence based on data from more than 8,000 U.S banks that showed the bank Z-score performing similarly well against more data-intensive methods in predicting bank failures accurately. Also, the prediction is accurate up to 3 years before bank failure on average. The takeaway from their conclusion was that Z-score can be an even more reliable predictor of bank stability if accounting practices are held to a high standard.

2.1.2 Independent Variables

Shariah Board Size (SSB)

Shariah board size refers to the number of shariah scholars on a bank's Shariah supervisory board. This Shariah board is unique to Islamic banks. Shariah board has a crucial role to serve in making sure the Islamic bank complies with Shariah principles, such as implementing risk-sharing concept and avoiding the three prohibited elements in Islamic finance when carrying out its day-to-day operations. (Nomran, Haron, & Hassan, 2018)

The effect of Shariah board size had generated mixed results across previous studies. Results from Alman's (2012) study support the significant inverse relationship between Shariah board size and Islamic bank risk-taking behaviour. A larger Shariah board results in lower bank risk-taking behaviour. However, his study only applies to loan portfolio risk-taking. This form of risk applies when the bank is unable to meet the required returns on investments in its portfolio.

Safiullah and Shamsuddin (2017) also found that bank risk is significantly reduced with a corresponding increase in Shariah board size in terms of operations and insolvency risks, but not significant for liquidity or credit risks. Their findings propose the possibility that Shariah governance may only significantly impact certain types of bank risks. Their study also compared the inclusion of Shariah boards in Islamic banks against its absence in conventional bank counterparts.

Zeineb and Mensi (2018) zoned in on the impact of Shariah board size on both efficiency and the tendency for Islamic banks to lean towards risk-taking behaviour (Z-score). Their findings were that increase in Shariah board size had a significant negative influence on both bank risk-taking behaviour and efficiency. Basically, a larger Shariah board reduced risk-taking of the bank, but also hindered the bank efficiency. They attributed the result to agency theory and the occurrence of one Shariah scholar sitting on multiple Shariah boards, which we have included as another variable in our study, OSSB.

On the other hand, Al Abbad, Hassan, & Saba (2019) noted that their result findings for Shariah board size influence on bank risk-taking behaviour (Z-score) had a positive but not significant relationship. That is, a larger Shariah board size would increase risk. They explain the result as consistent with previous literature that attribute larger board size with less effective supervision, as more Shariah board members would mean taking longer to agree on a decision.

To conclude, most prior literature had results that were consistent with the exception of Al Abbad et al. (2019). However, the result observed was not significant.

PhD Degree Holder on Shariah board (PHD)

There are very few studies that directly zone in on the influence that education level of Shariah board members has on bank risk-taking behaviour. Reviewing the formula for bank Z-score, Return on Assets (ROA) is a core component in determining the final value of the Z-score. It appears in both the upper and lower fraction part of the Z-score formula as ROA and standard deviation of ROA respectively. Higher ROA of

individual banks would lead to higher Z-score, while higher standard deviation of ROA represents higher volatility across the whole sample. (Li, Malone, & Tripe, 2016)

Thus, we conclude that previous literature linking education level and bank performance based on ROA could provide us insight into whether PhD degree holders would also have similar impact on bank risk-taking behaviour.

Nomran et al. (2017) ran a study limited to Islamic banks in Malaysia and Indonesia from years 2007-2015 to find the impact of education level on bank performance measured by ROA. They found that an increase in PhD holders on Shariah boards resulted in lower overall ROA performance of Islamic banks.

Safiullah and Shamsuddin (2017) found that an increase in PhD degree holders sitting on Shariah boards had significant negative relationship with bank risk for operations and insolvency risks, but not liquidity or credit risks. A higher proportion of PhD degree holders meant Islamic banks' operation and insolvency risks decreased. It is interesting to note that this effect is nullified if the Shariah board members sit on multiple boards. The study compared Islamic banks against conventional banks.

Others' Shariah Board (OSSB)

According to Abdullah, Percy and Stewart (2013), cross-membership is a condition in which a member of the SSB serves on many SSBs. There are some concerns about conflict of interest due to the fact that some scholars sit on multiple SSBs. SSB would have access to sensitive information during monitoring process and this might have

cause an impact on the Islamic bank if the information are share to the Islamic bank's competitors. Grais and Pellegrini (2006) stated that the Islamic bank will be get highly impact if a SSB reveal sensitive information to the Islamic bank's competitors. Wilson (2009) also pointed out the challenge that faced by banks that possess cross-memberships. The challenge is the individual who sit more than one Shariah board may only able to spend little time to fix problems that faced by the Islamic banks they in charge.

On the other side, Abdullah et al (2013) report the individual who sit more than one shariah board will be benefit by gaining more experience on monitoring and enable them to compare the best practices amongst Islamic banks. According to Dahya, Lonie and Power (1996), they say that cross-membership would help the Islamic banks to get greater transparency of details as it allows for benchmarking purpose amongst Shari'ah disclosure activities. The cross-membership help such participants identify the best practices for corporate reporting. However, placing restrictions on cross-membership of the SSB could cause the issue on shortage of Shari'ah scholars (Van Groening and Iqbal, 2008).

According to Dahya et al (1996), research suggests that cross membership makes information more accessible by analyzing the experience obtained from other organizations. This is because the individual who has cross membership characteristic may consider to use information and criteria that made decision in board A be a part of information for decisions in other boards (Haat, Abdul Rahman & Mahenthiran, 2008; Haniffa and Cooke, 2002). This causes cross membership to serve as a forum for information on market practices (Useem, 1984). Furthermore, cross membership of the SSB is preferred because of their expertise and reputation.

This literature carried many arguments and provided inconclusive evidence on whether there is positive or negative relationship between cross-membership on SSB and Z-score. This is because there is 2 different perspectives that given by the scholars. In general, every Shariah board member has to be eligible on both shariah and financial issues in order to stable the Islamic banks. However, this is not a common pairing of expertise in Islamic finance. As a result, many scholars have to sit on several boards, and this shortage of qualified scholars become the major concern of the Shariah Board (Bassens, Derudder & Witlox, 2011). ÜNal (2011) analyzed the boards of many Islamic organizations around the world and found evidence that the allocation of boards is overwhelmingly biased against a few scholars. According to Alman (2012), there is evidence associating multiple memberships among the top 20 Shariah scholars, this study is measured by the number of SSB positions held by a single scholar, with higher risk rates in Islamic bank lending portfolios. Shariah scholars with several board seats in several organizations are typically overwhelmed and they invest lesser time and energy on each board, adversely impacting their monitoring effectiveness.

Board Size (BOARD)

The size of the board of director act as importance character in effectiveness of the board in monitoring the managers and restricting their behaviors that always be opportunistic (Cheng, 2008; Pathan, 2009). Results of a previous study contend the board with smaller size impacts business risk-taking positively as a mini group should be predicted to supervise the manager of the bank effectively with the interest of shareholders who are motivated for higher uncertainty.

Jensen (1993) believes that while a board has more than 7 or 8 directors, the director become less effectively at work and become easy for the CEO to control. The problems

of communication become straighter. If the board becomes larger, the company considers it more challenging to organize group meetings and allow all the board member to reach a consensus.

Amihud and Lev (1981) claim that strong managers tend have an intention to engage in risk-reduction operations including such diversifying business mergers. In addition, these inefficiencies issue also will concern to agency problem. (Raheja 2005; Harris & Raviv, 2008). Additionally, there are problems of teamwork and the need for consensus (Cheng, 2008). Whereas Harris et al. (2008) conclude that because of endogeneity issues, the empirical correlation between board size and firm-specific measurements could be deceptive, the findings indicate that a larger board could be correlated with larger risk. According to Safiullah and Shamsuddin (2017), Board size determines the board's capacity to succeed in carrying out its task. The size of the BOD can influence the effectiveness of board decisions.

On the other hand, Huang and Wang (2014) said that board size and risk-taking of the bank have negative relationship. They done the research on board size and policy established in the business in various area that overall risk taking of all firm. This study suggested that business with larger board size will experience lower risk. Their findings demonstrate that companies with smaller boards face greater variability in possible future company performance. These companies are often correlated with a greater executive pay-to-performance sensitivity, prefer to undertake riskier investment policies, and participate in earnings management more often.

CEO duality (CEOD)

According to Al-Amarneh (2014), the condition of CEO duality is formed when a person occupy the position of chairman person and CEO in an organization at the same time. The main responsibility of the CEO is to manage the daily business and activities of the bank. Other than this, the chairman is responsible to be a complete and effective role in establishing and shaping the strategy and policies of the company and that the decisions made by the board are in the best interests of the company and reasonably represent the consensus of the board.

Boyd and De Nicolo (2005) have reported that the duality characteristic gives the CEO more control if he occupies position on chairman of the board too in the bank. Based on agency theory, the individual who has CEO duality characteristic has a lot of controlling power. This may cause conflict of interests because the person may misuse his power to gain some private benefits. So, to prevent this outcome, splitting the task of executives and board duties will allow check and balance to take place. In practice, this will mean the CEO and chairman should be different individual. According to Ehikioya (2009), firm may get benefits such as trustworthy and ease of raising fund from the separation of CEO and chairman of board, however, some scholars claimed that CEO duality not necessarily is not good for a company because application CEO duality characteristic has its pros and cons.

According to Zeineb and Mensi (2018), efficiency inversely impact the Z-score in a significance manner. Based on their findings, there is negative relationship between Z-score and banking risk (Z-score). When Z-score increase, risk taken by Islamic bank will reduce, and hence the efficiency of bank reduced. In simple word, more risk is taken by efficient banks to boost their performance in the long term. This result can be explained as risk is positively influence by the level of efficiency of a bank. Banks that

possess high risk-taking behavior will run their business more effective and efficient. The reason why some Islamic banks are inefficient and keep themselves at lower risk is because of limited power on controlling their costs, this caused the banks not willing to take more risk.

Based on the above discussion, we finalized there is existence of negative relationship between CEO duality and efficiency in significance level. This means if the Islamic bank has CEO duality characteristic, the bank will tend to be low efficiency. The main problem that cause the Islamic banks become less efficient is because of they do not have much experience on processing their governance structure. According to Srairi (2009), Islamic banks typically take more chances than conventional banks because they still new and no lack of expects in this field and not familiar with all the financial resources that could help them.

Bank size (BS)

Bank size is measured as the natural logarithm of the value of total assets in US dollars. According to Fakhrunnas and Ramly (2017), they used Generalized Least Square (GLS) random effect to study about the banking governance related to the risk owned by the banks in Tunisian banks context.

Based on their findings, the board size and bank size are negatively significant to the z-score and credit risk respectively. This indicates that the small banks and the duality board are linked to a lower risk of insolvency in the commercial operations of the banks. In fact, global vulnerability decreases if there is an separate board in the BODs .According to Čihák and Hesse (2010), Z-scores continue to increase with the

size of the bank for large banks, but decrease with the size of the small banks With same point of view, Louati and Boujelbene (2015) also reported there is improvement on strength and stability of banking system, when the bank size of an Islamic bank become larger. This is because the Islamic banks have diversified their income.

Greater income diversity helps the banks to increase z-scores in large Islamic banks, this indicating that the business of banks were shifting from lending-based operations to other sources of income may boost the stability of those banks (Čihák & Hesse, 2010). The researchers have revealed the larger Islamic bank have the tendency to be financially weaker than small Islamic banks This is because large Islamic banks faced challenges of credit risk management. The issue that faced by credit risk management of large Islamic bank is charge off rate.

According to Barrell, Davis and Karim (2010), charge off is a declaration by a creditor (usually a credit card account) that an amount of debt is unlikely to be collected. Charge offs may carry directly effect to the possibility of failure, because high value of charge offs lead to insolvency problem, therefore lead to low Z-score. In general, the more capital a bank has, the lower its charge-off rate. However, the more low-quality capital as a proportion of total capital, the higher the charge-off rate. Equity appears to play a role in reducing bank risk taking, as we might expect, but lower grade capital does not have the same effect, and indeed as the share of Tier 2 in the total level l of capital increases charge offs increase. As the scaling of the size variable is different, its coefficient is also different, but it remains significant, and as banks become larger they take on more risk in that they have more charge–offs relative to assets. The scholars have found a strong relationship between bank size and risk as measured by charge-offs even after allowing for the effects of bank size on the standard deviation of the portfolio. Larger banks make larger charge-offs as a proportion of their assets, as the Islamic banks grow rapidly.

As a result, their data set suggests that larger banks hold less total capital and more Tier 2 capital, and both of these will raise charge-offs rates It is perhaps the case that large banks hold poor quality capital to ensure bailouts as Alessandri, Haldane and Kay (2009) suggest. In addition, as bank size increases, as measured by domestic market share, charge offs also increase with growth, suggesting that growing banks are taking on more risk than banks of an equivalent size that do not grow.

For the period 2010-2012, Husein (2014) studied the 102 Islamic banks in Indonesia. The aim was to determine whether the size of the bank had a major impact on the risk by using the z-score as a measurement in term of stability. Based on their findings, there are evidences showed that z-score is taken as the measurement of risk taking and able to capture how the bank size affect the risk taking by the Islamic banks in Indonesia. In this journal, there are few important points need to be be mentioned. Firstly, the scale of banks has a big gap in their stability. Secondly, the stability of Islamic banks is influenced by assets and income diversity in overall. In addition, smaller Islamic banks has the tendency to be financially weaker than larger Islamic banks. Furthermore, small banks lean to be more stable than medium Islamic banks.

Cost to income ratio (CI)

The cost to income ratio, defined by operating expenses divided by operating income, it can be used for benchmarking by the bank when reviewing its operational efficiency. In terms of cost efficiency, the cost to income ratio was used to determine the bank cost efficiency. It is a basic indicator of how well banks handle their direct expenses compared to their profits. The higher the cost to income ratio, the bank tend to be more inefficient.

According to Santoso, Rum and Patria (2016), they stated although the Islamic banks has lower Z-score when comparing with Z-score of conventional. But the interest thing is Islamic banks have, higher loan to asset ratios as compare to conventional banks. This condition occurred can be further explain by the practice of Islamic banks in their investment. The scholars further explain the fact of Islamic banks are not allow to make investments in non-lending operations such as bonds, Forex and derivative. This restriction caused the Islamic banks is less efficient than conventional bank.

On the other side, Rajhi and Hassairi (2012) studied the financial stability of Islamic bank and Conventional banks. They revealed that Islamic banks' z-scores are generally higher than conventional banks. This fact indicated the Islamic banks with higher z-score are generally more stable than conventional banks but the small Islamic banks is excluded. Based on their finding, they come out the result showing income ratio has negatively influence Z-score at 10% significant level on their test with robust estimation. Based on their study, banks with higher cost to income lead them to have lower z-scores. This is because cost to income ratio has a proxy of efficiency shows that the greater cost to income ratio will cause banks will be increasingly inefficient. As a result, inefficient banks need to face the issue of increasing operating costs, this is due to when costs increase, bank need to pay more expenses and this leads to a decrease of profitability. As a result, the z-score decreased. Based on their econometric tests, the researchers demonstrated that a higher cost to income ratio has a negative impact link to the z-scores.

Mat Rahim and Zakaria (2013) stated that their efficiency element is measured by cost income ratio in their study. The ratio provides information on how good the bank duel with their efficiency. The hypotheses made by them is Z-scores is negatively impacted by cost to income ratio. Kwan and Eisenbeis (1997) also find the same hypothesis and claim that when bank with less efficient will take more risk in order to improve their financial performance.

Interbank Ratio (IB)

Tovar-García (2015) found that no evidence of market discipline that agrees with past studies upon that lack of influence on risk-taking behavior of exposure to interbank market on the Mexican case by testing the robustness with a wide range of dependent and explanatory variables.

Lucchetta, M. (2008) mentioned there was a negative relationship among the risk-free interest rate and bank's decision to maintain liquidity and lend the interbank market. The interest rate is associated positively with loan investment. Therefore, the risk-free interest increases risk-taking behavior by banks.

Rochet and Tirole (1996) found that an interbank market will lead to banking regulation and supervision as well as market discipline and lower down the systemic risk by providing peer monitoring incentives from interbank lending banks.

Nier and Baumann (2006) show that banks with a larger ratio of interbank deposits provide larger opportunities to reduce their risk of insolvency by having a larger buffer of capital. Distinguin, Kouassi, and Tarazi (2013) investigated the impacts on bank risk-taking of access to the interbank deposit markets. They revealed that bank with a bigger proportion of interbank deposits presented lesser risk levels.

The banks are great at recognizing other banks' risks and provide motivation to evaluate other banks in interbank borrowing relationship. (Rochet & Tirole, 1996). The level of interbank exposures can help to curb the bank take undue risk and minimize the

possibility of bank failures. Dinger and Von Hagen (2009) said interbank borrowing is related to reduce borrowing banks risk taking.

Overhead ratio (OH)

Non-interest expense is a major element of the overall expenditure of a bank, is called bank overhead and is used for the overhead ratio measurement. The ratio of overhead is determined by the non-interest expense over the average assets. A low overhead ratio is favored as it indicates the bank is incurring reduce in operating expenses.

To manage the bank efficiency, calculated by the ratio of overhead costs, indicates that a lower value in this calculation suggests higher efficiency. The assumption is that a more efficient bank would suffer lower risks (Berger & De Young, 1997).When a highly experienced bank managers are willing to monitor clients at lower cost (Berger et al., 1997), high bank efficiency will reduce banks' probability of insolvency.

Using the traditional hypothesis of competition-efficiency, competition benefit the distribution of resource and shifts profit to more efficient businesses and thereby enhances the efficiency of businesses (Tirole, 1988). With increasing competition, banks are pressured to specialize, offer services at cheaper prices, and reduce costs (Zarutskie, 2013). Competition also pushes banks to strengthen efficiency of lending and lower down the credit risk (Dick & Lehnert, 2010)

Bank regulation impacts the efficiency of the banks. Banking regulation combines supervisory and restrictive policies aimed at both safeguarding the banking sector

against excessive risk-taking and minimizing moral hazard (Barth, Caprio, & Levine, 2004)

Fang, Lau, Lu, Tan and Zhang (2019) identify that the positive effect of cost-effectiveness on profitability is greatest when banks are confronted with higher risk levels and more competition. They also indicate that cost efficiency and bank profitability have positive relationship, while greater impact is shown for the banks with higher risk-taking behavior. This result can be clarified by the assumption that there would be higher levels of risk that incurring higher amount costs and expenses, which substantially decreases the profitability of the banks, if the banks can optimize the asset, the extra expenditures or costs would be partially or completely covered the costs suffered and the bank profitability will be improve.

Net interest Margin (NIM)

Net interest margin (NIM) is a unit of measurement contrasting the margin of net interest created by a financial institution from credit products, with the outgoing interest it charges to savings account holders and deposit certificates.

Hawtrey and Liang (2008) stated that net interest margin related to market strength, operating expenses, risk avoidance, interest rate uncertainty, credit risk and loan volume. Credit risk is the risk to earnings and capital arising from the failure of an obligor to satisfy the provisions of any contract with the bank or the failure of the obligor to act as decided (CBK, 2005). Angbazo (1997) suggests the default risk of US banks strongly linked to the interest margin of bank. Demirgüç et al. and Kunt Huizinga (1999) notes that the risk of credit calculated depends on loans to the total asset ratio

has impact on interest margins positively. Abreu and Mendes (2003) proved that there was a positively linked among loan to total asset ratio with interest margins. Valverde and Fernández (2007) demonstrate that risk of credit was linked to net interest margins positively of 7 European nations.

Existing research shows that banks providing risky loans can be forced to keep a bigger volume of provisions. In effect, this case may cause them to pay more margins to cover the higher default risk, which inevitably contributes to a positive relationship (Drakos, 2002; Maudos & Fernández de Guevara, 2004). Their research indicates that credit risk positively impacts net interest rate margins. The credit risk coefficients are supposed to be positive since a large percentage of bad loans will force banks to raise their interest margins with a risk premium to offset potential default risk.

The effect of several widely used determinants, including with credit risk, liquidity risk and size of operations, differs across banks' ownership structure, but affects costs of operation and aversion of risk absolutely the same. (Fungacova & Poghosyan, 2011)

De Jonghe (2010) mentioned that banks with a higher interest margin or higher loan-to-asset ratio are seen to contribute less to the instability of the banking system, as higher levels of such ratios decrease the tail betas of banks. Measurements of bank specialization for traditional intermediation, for example the net interest margin and the loan-to-asset ratio substantiate the results that traditional banking practices are less risky. So, we will assume that banks that rely profitably on lending contribute more to the stability of the banking system than diversified banks.

2.2 Review of Relevant Theoretical Models

2.2.1 Agency Theory

Himaj (2014) and Jensen (1976) claimed that efficiency of corporate governance is highly associated with Agency theory. According to Eisenhardt (1989) agency theory is a crucial yet debatable theory. This approach is used to address issues that involve the risk management dilemma that occurred because both the principal and the agents had differing viewpoints and attitudes towards the topic of risks. The unequal danger expectations caused them to behave in a dissimilar fashion. Throughout his study, he addressed the principal and the agent being shown to have competing desires, and the governing structures may be effective in controlling the agent's self-serving mindset. In fact, Fama and Jensen (1983) reported that the Board of Directors are successful in overseeing and compensating high-level decision-makers and thereby willing to control the critical judgment of managers. This was also acknowledged by Liang et al. (2013) who claimed that the independent director on board should be successful in minimizing bank interest disputes and handling the agency's issues carefully.

Ahmad and Omar (2016) proposed that a smaller size of board, rather than a bigger size of board, would be liable for overseeing the activities. In reality, larger boards have proven to be less successful in maximizing bank interest. Further agreed by Naji et al. (2018) that many board members must require further attempts if there will be many individual to control the company and the obligation of everyone will ascend. Simultaneously, smaller boards are more effective than larger boards. That is attributed to the reality that bigger boards contain more leaders, any of which can identify as free riders and therefore trigger organization issues. This also agreed by Jensen (1993) that the growing board size may face free-riding challenges and longer durations of decision-making. In addition, the boards of small banks should be made up of three

members, medium-sized companies should be made up of five members and big businesses should be made up of eight members (Linck et al., 2018). While boards which over eight participants for handling and the possibility of sub-groups is rising are challenging. Nevertheless, Sanusi (2012) stated that it is less important the board size than certain considerations, for example, responsibilities and social features.

Generally, Chief Executive Officer (CEO) shall communicate on behalf of the executive team and on behalf of the company to the owners, staff and other stakeholders. The primary duty of CEO is to manage the daily operations of the organization, whilst the president is responsible to make sure that the board as a principle who acts a complete and productive position in establishing and determining the strategy and policies of the group and that the actions made are in the benefits of the company and adequately represent the majority of the board (Al-Amarneh, 2014). According to the theory of agency, as a Chairman of the Board also as a CEO (CEO duality), he would obtain more management power to offer him further private benefits. Therefore, the organization may reduce the clash of desires between owners and management by dividing the command and control functions. On the other hand, Ehikioya (2009) proposed that companies of which chairman of the board and CEO are independent, be expected reliable in the willingness of businesses to attract new funds and, as a consequence, there would be less risk of bankruptcy. However, there is no ideal leadership system since CEO duality and separation have their own costs and benefits.

In order to relieving the particular agency issue faced by Islamic banks, the Shariah governance standards developed by Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) and Islamic Financial Services Board (IFSB) concentrate on the integrity, expertise, secrecy, continuity and transparency of the SSB. As highlights the size of the SSB, AAOIFI allows SSB to involve at any rate of three members, be authorized by the BOD and ratified by the shareholders of the Islamic Bank (El-Hawary et al., 2007). SSB representatives have a supervision function to

perform in maintaining Shariah's compliance. As a consequence, transmission of information to customers as executives deviate from conformity with Shariah and take further risks. The leaders of the SSB are ethically and morally motivated instead of selfish, such that the presumption that truly reported to shareholders. In fact, according to Rammal (2006), and Farook and Farooq (2011), the selection and voting procedure of SSB representatives renders them more reliant on shareholders, particularly when SSB representatives intend to keep on remaining on the board.

Educational qualifications are a vital resource that board representatives add to the organisation so that boards can have the capacity to make professional choices (Kakabadse et al., 2010) and cope with difficult problems (Hambrick and Mason, 1984). In term of the SSBs, Sharia scholars with doctorate degrees (PHD) in Islamic finance are deeply interested with the method and development of Islamic financial products (Rahman and Bukair, 2013). However, the view based on Fama (1980) and Fama & Jensen (1983), managers with superior knowledge and skills about the firm are in a role to pursue self-interest rather than shareholders' interests. This pursuit of self-interest raises the costs to the firm, which can involve the costs of structuring the contracts, the costs of managing and regulating the actions of the agents and the risks suffered as a consequence of the sub-optimal decisions made by the agents. Essentially, managers cannot be trusted and, thus, there is a need for stringent oversight of management by the board in order to safeguard the rights of shareholders. Therefore, in a larger firm with broadly distributed control, small shareholders may not have adequate money to invest time to track the actions of managers or agents.

Lastly, managers are known to be shareholder representatives. Potential conflicts of interest occur between executives, control and shareholders as a consequence of the transfer of decision-making power from shareholders to managers. Shareholders and shareholders cannot track executives accurately and costlessly, but are in a role to

control and gain the knowledge accessible to them by managers otherwise there will be a risk information asymmetry.

2.2.2 Asymmetric information

Ariccia (1998) claimed that in the lending process, binding banks should obtain the necessary details from lenders as they faced confusion regarding the creditworthiness of consumers, and this information collection allowed banks to gain leverage over prospective borrowers. In fact, these knowledge asymmetries became essential to the judgment on the development of the sector and formed a deterrent to the entrance of new banks. In fact, these knowledge asymmetries became essential to the judgment on the development of the sector and formed a deterrent to the entrance of new banks. Therefore, prospective competitors face more serious adverse competition issues than those posed by existing banks. The researcher is studying the role of asymmetric knowledge in evaluating the balance structure of the loan sector in a multi-period model of strong competition. Generally, it established the decision of the banks to join and leave internally. Throughout this end, it is demonstrated that asymmetric knowledge has had an adverse filtering effect, and has served as a barrier to entry, hindering new borrowers from joining the sector. Not to mention that the incumbent gain is being applied to the sector, where asymmetric knowledge is important.

In addition, banks can evaluate small businesses on loans for unpredictable judgments through analysing asymmetric consumer knowledge. Banks are required to develop a strong network with outside organizations to collect details on an overview of the technologies and technological capacities of the company, which would help to reduce the acute problems posed by asymmetric knowledge. As a consequence, insufficient understanding of business sectors and technological implementations produces

asymmetric information challenges and hinders banks from researching danger for limited operations (Deakins & Hussain, 1994).

According to Meza and Webb (1987), asymmetric knowledge has contributed to an adverse selection issue, which has contributed to projects or transactions that are below norm from the perspective of banks contributing to successful projects. It was somehow claimed that, with the presence of asymmetric knowledge, the financial structure of companies and the amount of expenditure depended on the distribution of project returns. When both ventures have comparable projected returns but are limited in difficulty, investors would also support the means of funding and social productivity improvements.

Asymmetric information then exists between the bank and its peers in the contractual arrangement of interbank market. It helps the "feeble" banks to continue and persist in competing for resurrection. Therefore, as in Aghion et al. (1999) and Mitchell (2000) (where the accumulation of loan losses causes the bank to cover them by renewing its bad loans in order to remain afloat), the accrued loan losses have a cascading impact here as well as causing bank gambling for revival.

Throughout the lack of moral hazards, the existence of either an imperfectly dynamic lending system, risk-averse lenders or an asymmetrical comparison between lenders and borrowers will be exploited to render leverage usable for contractual purposes. Asymmetric assessments derived from separate details received by both sides, the lender and the borrower. As a consequence of the evaluations, the lender made a higher deduction in the loan amount than needed by the applicant in return for protection collateral. With asymmetric valuations involved, the rating of lenders is positively related to the collateral sum (Chan & Kanatas, 1985).

2.3 Hypothesis Development

2.3.1 Governance Factors

H_0: All the governance factors have no significant relationship with the bank's risk-taking behavior.

H_1: At least one of the governance factors has significant relationship with the bank's risk-taking behavior.

Alman (2012), Safiullah & Shamsuddin (2017) and Zeineb and Mensi (2018) claimed that there is positive significant relationship in between Shariah board size and Z-score of Islamic bank. In this case, the larger the board size resulted in a correspondingly lower tendency for the bank to engage in risk-taking.

Safiullah et al. (2017) found a negative significant relationship between PhD Degree Holder on Shariah board and Z-score of Islamic bank. For example, the increase in PhD holders on Shariah board lead banks to higher bank risk-taking behavior.

Dahya et al. (1996), Haat et al. (2008), and Haniffa and Cooke (2002) stated there is positive but ultimately insignificant relationship between the members who sit on other SSB and Z-score. The positive relationship between number of members who sit on other SSB and Z-score indicated more members sitting on other SSBs tend to increase the Z-score value and hence the Islamic banks may face take lesser risks.

Pathan (2009) and Cheng (2008) found a significant negative relationship between Z-score and board size. The board with smaller size impacts corporate risk-taking positively as a smaller size of group should be predicted to supervise the manager of bank effectively. Zeineb et al. (2018) found that efficiency has negative effect and significant effect to Z-score.

Therefore, we will reject H_0 since more than one of the governance factors has significant relationship with the bank's risk-taking behavior.

2.3.2 Islamic Banks' Specific Factors

H_0: All the banks specific factors have no significant relationship with the bank's risk-taking behavior.

H_1: At least one of the banks specific factors has significant relationship with the bank's risk-taking behavior.

Fakhrunnas and Ramly (2017) reported the bank size is negatively significant to the Z-score. According to Čihák and Hesse (2010), and Louati and Boujelbene (2015), they suggested Z-scores will increase with larger bank size. This is because they have greater income diversity that enable them to shift from lending-based operation to other sources of income. The bank with growing bank size tends to take more risk than banks that do not grow.

Mat Rahim and Zakaria (2013), Rajhi and Hassairi (2012) and Kwan and Eisenbeis (1997) suggested cost to income ratio was proved to have a negative and insignificant

relationship with the Z-score. The efficient banks may take on additional risk to increase their financial performance. Tovar-García (2015) found that there is an insignificant relationship between interbank ratio with Z-score.

Berger and De Young (1997), and Dick and Lehnert (2010) mentioned that there is negative significant relationship between overhead ratio and Z-score. When a highly experienced bank managers can monitor clients at less expenses, the high bank efficiency will reduce banks' probability of insolvency.

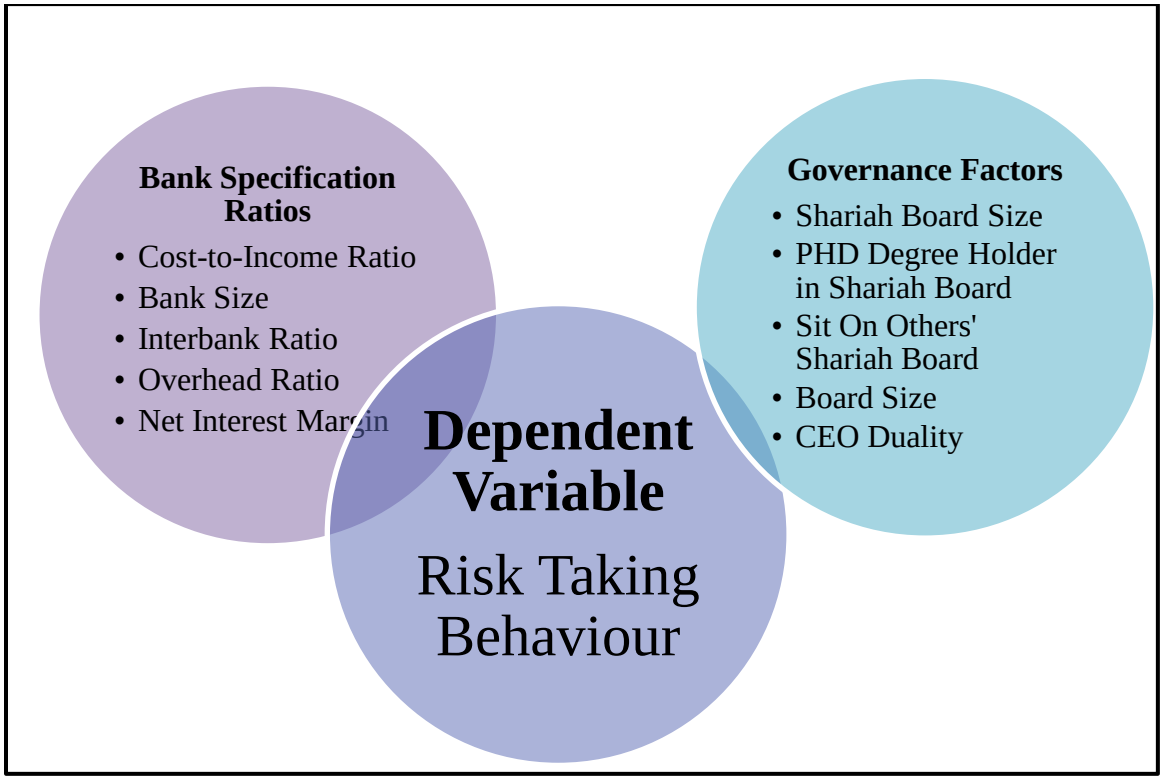
Angbazo (1997), De Jonghe (2010), Valverde and Fernández (2007) suggests that the default risk of US banks have significantly and strongly linked to the margin of interest of the bank. A higher interest margin or higher loan-to-asset ratio are seen to contribute less to the instability of the banking system, as higher levels of such ratios decrease the tail betas of banks.

Therefore, we will reject H_0 since more than one of the banks specific factors has significant relationship with the bank's risk-taking behavior.

2.4 Proposed Theoretical or Conceptual Framework

The framework is structured to study risk taking behaviour of Islamic banks, combined with theories to establish a theoretical model. This is demonstrated as follows:

Figure 2.1: The Impacts of Bank Specification and Governance Variables on Risk Taking Behaviour of 206 Islamic Banks in Different Countries from Year 2009 to 2018



In this research, risk taking behaviour of 206 Islamic banks was adopted as our dependent variable and other factors which acted as independent variables, including Shariah Board Size, PHD Degree Holder in Shariah Board, Others' Shariah Board, Board Size, CEO duality, Cost to Income Ratio, Bank Size, Interbank Ratio, Overhead

Ratio and Net interest Margin. The chosen banks came from different countries and the duration of this analysis ranged from 2009 to 2018. The estimated model as follows:

Model 1

$$\widehat{ZSCORE}_{it} = \widehat{\beta_0} + \widehat{\beta_1}SSB_{it} + \widehat{\beta_2}PHD_{it} + \widehat{\beta_3}OSSB_{it} + \widehat{\beta_4}BOARD_{it} + \widehat{\beta_5}CEOD_{it} + \widehat{\beta_6}BS_{it} + \widehat{\beta_7}CI_{it} + \widehat{\beta_8}IB_{it} + \widehat{\beta_9}OH_{it} + \widehat{\beta_{10}}NIM_{it} + \mu_{it} + \varepsilon_{it}$$

Note: ZSCORE=Risk-Taking behaviour, SSB=Shariah Board Size, PHD=PHD Degree Holder, OSSB=Others' Shariah Board, BOARD=Board Size, CEOD=CEO Duality, CI=Cost-to-Income Ratio BS=Bank Size, IB=Interbank Ratio, OH=Overhead Ratio, NIM=Net Interest Margin, μ=industry fixed effect, ε=error term, β=intercept,

2.5 Conclusion

In brief, this chapter offered a deeper explanation and a clear point between the determining variables which are Shariah Board Size(SSB), PHD Degree Holder in Shariah Board (PHD), Others' Shariah Board (OSSB), Board Size (BOARD), CEO duality (CEOD), Bank Size (BS), Cost to Income Ratio (CI), Interbank Ratio (IB), Overhead Ratio(OH) and Net interest Margin(NIM). With the risk taking behaviour (Z-Score) of 206 Islamic banks within different countries. That of the variables listed was explored and analysed in a detailed and objective way, according to the previous scholars's report. In addition, theoretical models found in the course of this research project have been defined and analysed appropriately, and the theoretical structure for this study has been suggested.

CHAPTER 3: METHODOLOGY

3.0 Introduction

Research methodology means the process used for data collection and statistics. The relationship between independent variables and dependent variables can be calculated and defined using a research methodology. In addition, panel data regression will be applied in this analysis to discover the risk-taking behavior of 206 Islamic banks in different countries. This chapter estimates methods of data collection, designs for the analysis, models for the research, criteria for the sample and forms of diagnostic tests used. Therefore, in this clinical review, we will define and clarify how to use this methodology including econometric approaches and diagnostic tests that are acceptable for research usage.

3.1 Research Design

The research design defines a framework that lays out the procedures for gathering information and evaluating results. This involves data processing and data interpretation throughout the research design process utilizing either qualitative or quantitative research methods.

3.1.1 Quantitative Research

All theoretical techniques have been used to test the theories established in this study. Firstly, the approach utilizes computational coding and mathematical analysis to evaluate the necessary details, and provide the research field with in-depth information. Furthermore, Hassan (2016) claimed that the quantitative analysis approach enables the detection of the features of an observable phenomenon and the finding of associations between the variables. Quantitative data were used in this study to examine the correlation between the exogenous variables such as Shariah Board Size, PHD Degree Holder in Shariah Board, Others' Shariah Board, Board Size, CEO duality, Cost to Income Ratio, Bank Size, Interbank Ratio, Overhead Ratio and Net interest Margin with endogenous variable, Risk Taking Behaviour of 206 Islamic banks in different countries.

In fact, the period of the analysis ranged from 2009 to 2018, and the data was gathered on an annual basis. Panel data was picked as being more reliable and descriptive relative to cross-section data or time series data.

3.2 Data Collection Methods

The processing of data plays a critical role in research, and inaccuracies can contribute to invalid conclusions reported by Graziano and Rawlin (as quoted in Lancaster, 1965). There are chiefly two types of data, primary data and secondary data.

3.2.1. Secondary Data

Hsiao (2007) suggested that panel data was preferable to cross-section and time series data because it offered more reliable explanation for model parameters and explained calculation and statistical inference. In addition, He also said that panel data had been more widely accessible in developed countries and had a higher magnitude than cross-section or time series data to overcome dynamic human behavior. Therefore, it would be easier to collect the secondary data, as mentioned, for this research the annual report and bank scope of 206 Islamic banks are the main focus. The financial data and corporate governance information are collected from the annual reports and bank scope of the respective banks from their official website, Bursa Malaysia and Bank Focus for this study. After collecting data from each bank was then arranged in a single Excel file for the computation. Later the variable was tested using Stata 15.0 version where reliability test, descriptive analysis, and panel data regression were conducted.

Table 3.1: Variables with its Proxies, Explanations, Unit Measurement and Sources

Dependent Variable	**Proxies**	**Explanations**	**Unit Measurement**	**Sources**
Risk	ZSCORE	[ROA+(equity/assets)] divided by standard deviation of ROA	Percentage (%)	Own Calculation
Independent Variables	**Proxies**	**Explanations**	**Unit Measurement**	**Sources**
Shariah Board Size	SSB	Number of Shariah Board members	-	Banks'Annual Reports

PHD Level	PHD	Number of Shariah Board members who have PHD degree	-	Islamic Markets
Others' Shariah Board	OSSB	Number of Shariah Board members who sit on other Islamic bank's Shariah Board	-	Islamic Markets
Board Size	BOARD	Number of directors on board	-	Banks'Annual Reports
CEO duality	CEOD	It is modelled as dummy variable in the situation under which the CEO always retains the role of Chairman of the Board of Directors takes value equal to 1, otherwise 0	Not applicable	Banks'Annual Reports
Cost to Income Ratio	CI	Dividing the operating expenses by the operating income generated	Percentage (%)	Bank Focus
Bank Size	BS	The natural logarithm of the value of total assets in US dollars.	Percentage (%)	Own Calculation
Interbank Ratio	IB	This ratio is a computation of interbank liquidity.	Percentage (%)	Bank Focus
Overhead Ratio	OH	Dividing non-interest expense by the average assets	Percentage (%)	Own Calculation

Net Interest Margin	NIM	(Investment Return-Interest Expense) divided by average earning assets	Percentage (%)	Bank Focus

3.3 Sampling Design

This research includes both financial statement and the governance information of Islamic banks in the world. A total of **206** Islamic banks were selected out. The list of banks is including Islamic banks in different countries such as Malaysia, Indonesia, Bahrain, Sudan, Oman, Jordan, Kuwait, Tunisia, United Arab Emirates, Syrian, Palestinian Territories, Kenya, Iraq, United Kingdom, Saudi Arabia, Qatar, Pakistan, Lebanon, Iran, Egypt, Bangladesh, Turkey and others. A total of ten independent variables that are selected for this study which are the Shariah Board Size, PHD Degree Holder in Shariah Board, Others' Shariah Board, Board Size, CEO duality, Cost to Income Ratio, Bank Size, Interbank Ratio, Overhead Ratio and Net interest Margin, while the dependent variable is the risk-taking behaviour of Islamic banks.

Our research starts covering 10 years period from the year 2009 to 2018. Similar literature was conducted by Mushtaq Younas, Dr Naveed and Umair Ahmed (2018) but they cover for the period of 2014 to 2018. Further, there are many countries' Islamic Banks included and additional variables of corporate governance such as educational level of Shariah Board members and CEO duality were tested in this research compared to the previous study.

3.3.1 Sample Used

Malaysia
1. Affin Islamic Bank Berhad 2. Al Rajhi Banking & Investment Corporation (Malaysia) Bhd 3. ALLIANCE ISLAMIC BANK BERHAD 4. AmBank Islamic Berhad 5. Bank Islam Malaysia Berhad 6. Bank Muamalat Malaysia Berhad 7. CIMB Islamic Bank Berhad 8. Hong Leong Islamic Bank Berhad 9. HSBC Amanah Malaysia Berhad 10. Kuwait Finance House (Malaysia) Berhad 11. Maybank Islamic Berhad 12. MBSB Bank Berhad 13. OCBC Al-Amin Bank Berhad 14. Public Islamic Bank Berhad 15. RHB Islamic Bank Berhad 16. Standard Chartered Saadiq Berhad
Indonesia
17. PT Bank Aceh Syariah 18. PT Bank BCA Syariah 19. PT Bank BNI Syariah 20. PT Bank BRIsyariah Tbk 21. PT Bank Jabar Banten Syariah 22. PT Bank Maybank Syariah Indonesia 23. PT Bank Mega Syariah 24. PT Bank Muamalat Indonesia Tbk 25. Pt Bank Panin Dubai Syariah Tbk 26. PT Bank Syariah Bukopin

27. PT Bank Syariah Mandiri
28. PT Bank Tabungan Pensiunan Nasional Syariah Tbk
29. PT Bank Victoria Syariah
Bahrain
30. ABC Islamic Bank (E.C.)
31. Al Baraka Banking Group B.S.C.
32. Al Baraka Islamic Bank B.S.C. (c)
33. Al Salam BankBahrain B.S.C.
34. Bahrain Islamic Bank B.S.C.
35. Citi Islamic Investment Bank
36. First Energy Bank
37. Global Banking Corporation B.S.C.
38. International Investment Bank B.S.C. (c)
39. Investors Bank B.S.C.
40. Kuwait Finance House B.S.C.
41. Khaleeji Commercial Bank B.S.C.
42. Liquidity Management Center BSC
43. Seera Investment Company B.S.C.(c)
44. Venture Capital Bank BSC (c)
Sudan
45. Al Baraka Bank Sudan Public Limited Company
46. Al Jazeera Sudanese Jordanian Bank
47. Al Salam Bank
48. Al Shamal Islamic Bank
49. AlNile Bank for Commerce & Development
50. Animal Resources Bank
51. Bank of Khartoum
52. Blue Nile Mashreq Bank Ltd
53. Byblos Bank Africa Ltd
54. Faisal Islamic Bank (Sudan)
55. Farmers Commercial Bank

56. Financial Investment Bank 57. Industrial Development Bank 58. Omdurman National Bank Public Limited Company 59. Savings & Social Development Bank 60. Sudanese Egyptian Bank 61. Sudanese French Bank Public Limited Company (The) 62. Tadamon Islamic Bank 63. United Capital Bank
Oman
64. Alizz Islamic Bank S.A.O.G 65. Bank Nizwa SAOG
Jordan
66. Islamic International Arab Bank 67. Jordan Islamic Bank 68. Safwa Islamic Bank
Kuwait
69. A'Ayan Leasing & Investment Company 70. Ahli United Bank KSC 71. Al Ahli Bank of Kuwait 72. ALAFCO Aviation Lease and Finance Company KSCP 73. Almadar Finance And Investment K.S.C. 74. Boubyan Bank KSCP 75. First Investment Company K.S.C.C. 76. Gulf Investment House K.S.C.P. 77. Kuwait Finance House 78. Kuwait International Bank 79. Rasameel Structured Finance Company K.S.C 80. Warba Bank
Tunisia
81. Albaraka Bank Tunisia (Tunisia) 82. Banque Zitouna (Tunisia)

United Arab Emirates
83. Dubai Islamic Bank PJSC 84. Emirates Islamic Bank PJSC 85. Noor Bank 86. Al Hilal Bank PJSC 87. Sharjah Islamic Bank 88. Amlak Finance PJSC 89. Mawarid Finance PJSC 90. Tamweel PJSC 91. Abu Dhabi Islamic Bank 92. Ajman Bank
Syrian
93. Al Baraka Bank Syria SA 94. Syria International Islamic Bank (SYRIAN) 95. Cham Islamic Bank sa
Palestinian Territories
96. Arab Islamic Bank 97. Palestine Islamic Bank
Kenya
98. First Community Bank Limited 99. DIB Bank Kenya
Iraq
100. Al Arabiya Islamic Bank 101. Al-Janoob Islamic Bank 102. Elaf Islamic Bank 103. Iraq Noor Islamic Bank For Investment And Finance 104. Kurdistan International Bank for Investment and Development 105. Ameen Al-Iraq Islamic Bank for investment 106. Cihan Bank for Islamic Investment and Finance P.S.C 107. Zain Iraq Islamic Bank 108. Parsian Bank

109.International Development Bank for Investment
110.National Islamic Bank
111.World Islamic Bank
112.Trust International Islamic Bank Private Shareholding Company
113.Al Qurtas Islamic investment & Finance
114.Al Bilad Islamic investment & finance
115.Iraqi Islamic bank for investment & development
Yemen
116.Saba Islamic Bank
117.Shamil Bank of Yemen & Bahrain
118.Tadhamon International Islamic Bank
United Kingdom
119.DD&Co. Limited
120.Bank of London and The Middle East Plc-BLME
121.Gatehouse Bank Plc
122.QIB (UK) Plc
123.Rasmala UK Limited
124.Al Rayan Bank Plc
125.BLME Holdings PLC
Saudi Arabia
126.Alinma Bank Public joint stock company
127.Bank AlBilad
128.Bank AlJazira JSC
129.Al Rajhi Bank Public Joint Stock Company
130.International Islamic Trade Finance-ITFC
Qatar
131.Masraf Al Rayan (Q.S.C.)
132.Qatar First Bank LLC
133.Qatar International Islamic Bank
134.Qatar Islamic Bank SAQ
Pakistan

135.Meezan Bank
136.Dubai Islamic Bank Pakistan Limited
137.Albaraka Bank (Pakistan) Limited
138.First Habib Modaraba
139.First National Bank Modaraba
140.ORIX Modaraba
141.BankIslami Pakistan Limited
142.MCB Islamic Bank Limited
143.Popular Islamic Modaraba
Lebanon
144.Arab Finance House sal
145.Al Baraka Bank SAL
146.Lebanese Islamic Bank Sal
Iran
147.Bank Sarmayeh
148.Eghtesad Novin Bank PJSC-EN Bank
149.Karafarin Bank
150.Saman Bank
151.Parsian Bank
152.Bank Pasargad
153.Bank Melli Iran
154.Bank Sepah
155.Bank Mellat
156.Bank Tejarat
157.Export Development Bank of Iran
158.Bank of Industry and Mine
159.Bank Saderat Iran
160.Refah Kargaran Bank-Bank Refah
161.Bank Maskan
162.Bank Keshavarzi-Agricultural Bank of Iran
163.Middle East Bank

164.Ansar Bank 165.Day Bank 166.Sina Bank 167.Post Bank of Iran 168.Kosar Central Credit Public Joint Stock Company 169.Melal Credit Public Joint Stock Institution 170.Bank Shahr Public Joint Stock Bank 171.Resalat Qard Al-Hasan Public Joint Stock Bank 172.Bank Hekmat Iranian 173.Ayandeh Bank Public Share Holding Company 174.Iran Zamin Bank 175.Mehr Eghtesad Bank
Egypt
176.Al Baraka Bank Egypt SAE 177.Abu Dhabi Islamic Bank 178.Faisal Islamic Bank of Egypt
Bangladesh
179.Al-Arafah Islami Bank Ltd. 180.Export Import Bank of Bangladesh Limited 181.First Security Islami Bank Limited 182.ICB Islamic Bank Limited 183.Islami Bank Bangladesh Limited 184.Islamic Finance and Investment Limited 185.Shahjalal Islami Bank Ltd 186.Social Islami Bank Ltd 187.Union Bank Limited
Turkey
188.Barwa Bank 189.Albaraka Turk Participation Bank-Albaraka Turk Katilim Bankasi AS 190.Kuveyt Turk Katilim Bankasi A.S.-Kuwait Turkish Participation Bank Inc

191. Turkiye Finans Katilim Bankasi AS 192. Ziraat Katilim Bankasi A.S. 193. Vakif Katilim Bankasi Anonim Sirketi
Others
194. Bank Islam Brunei Darussalam Berhad (BRUNEI) 195. Al-Amanah Islamic Investment Bank of the Philippines (Philippines) 196. Islamic Bank of Thailand (THAILAND) 197. Albaraka Bank Limited (SOUTH AFRICA) 198. Jaiz Bank PLC (NIGERIA) 199. Lolc Finance Plc (SRI LANKA) 200. Maldives Islamic Bank Pvt Ltd (MALDIVES) 201. Banque Islamique du Sénégal (SENEGAL) 202. Al-Salam Bank (AlGERIA) 203. Amana Bank Limited (TAZANIA) 204. Banque islamique de Guinée (GUINEA) 205. KT Bank Ag (GERMANY) 206. Kibris Faisal Islam Bankasi (CYPRUS)

3.3.2 Sampling Approach

STATA was adopted to analyze the findings as well as to build the performance of our research. It is because it has provided valuable methods for the systematic study, control, evaluation and development of research models. In fact, it has incorporated superior conventional computing technologies and are still commonly adopted by all thanks to their easy-to-use GUI and sophisticated data processing. In addition, this software enabled researchers to conduct hundreds of types of statistical instruments, such as norm methods and modern tools.

Furthermore, the econometric and statistical research can be completed with a distinct consistency of graphs and tables in this panel data report. Therefore, it could still be used in time series and cross-sectional data analysis. In fact, there are tests such as the Skewness and Kurtosis test (Normality Test), Hausman test and Breusch-Pagan Lagrange Multiplier Test could be conducted to analyze Pooled OLS, Fixed Effect Model and Random Effect Model. It will require the exploration of the best-fit model for this analysis and, at the same time, the achievement of the research objectives.

3.4 Data Processing

Figure 3.1: Process of Data

A total of 5 phases are taken to process data during the data processing cycle. First and foremost, the review of a great number of journals and articles to look for a suitable title for further investigation. After the declaration of this research topic, variables were determined. These variables were selected on the basis of past supporting theories, research recommendations as well as data accessibility.

As an outcome, data are gathered from each Islamic banks' annual reports (governance data) and the Bank Focus (financial data). All the relevant data will be well organized in Microsoft Excel for ease of review using statistical analysis tool, STATA.

Last but not least, the findings will be defined and clearly expressed. The conclusion would then be taken on the basis of the analysis findings of STATA.

3.5 Data Analysis

3.5.1 Model Alternatives

3.5.1.1 Pooled Ordinary Least Squares (POLS)

Pooled OLS Model is a methodology used to support researchers achieve accurate and improved data for their studies. In their research, Masood, Niazi, and Ahmad (2011) applied Pooled OLS to analyse reasons for the growth of Islamic banks and bank threats. In their analysis, Z-score was used as a measure of bank harm, and POLS was used to test the regression. In comparison, Nwosu et al. (2012) have used Pooled OLS to assess bank risk factors where they used Z-score as their

surrogate for bank risk. Pooled OLS was used to analyze the risk-taking conduct of bank-specific variables in Nigeria. Baselga-Pascual et al. (2015) used Pooled OLS to classify the determinants of bank vulnerability in their alternative models and render the process more stable.

Pooled OLS is a regression used to analyse panel data that involved cross-section and time series details. This would be more efficient because there is no specific influence, which implies that all independent variables would perform the same. Croissant and Millo (2008) claimed that this estimator will be the most effective and productive estimator in the case of a potential loss of a single section.

Several assumptions are used in this POLS model.

a) Linearity of the parameter.
b) Exogeneity: Disturbances are not correlated with regressors.
c) Disturbances are not related (no autocorrelation) and have a constant variance (no heterocedasticity).
d) Variability of X with X values is constant as sampling is replicated.
e) No multicollinearity. (Heterogeneity may affect Assumption(b) and Assumption(c) and then the OLS estimator would not be the best unbiased linear estimator as the effects of individual are negligible,)

Under POLS model, the subscription i stands for individual observation, while the subscription t stands for duration or span for observations. For this research, i represent the Islamic banks that have been chosen while t represents the years. The equation we used can be expressed as follows:

Model 1

$$\widehat{ZSCORE}_{it} = \widehat{\beta_0} + \widehat{\beta_1}SSB_{it} + \widehat{\beta_2}BOARD_{it} + \widehat{\beta_3}PHD_{it} + \widehat{\beta_4}OSSB_{it} + \widehat{\beta_5}CEOD_{it} + \widehat{\beta_6}CI_{it} + \widehat{\beta_7}BS_{it} + \widehat{\beta_8}IB_{it} + \widehat{\beta_9}OH_{it} + \widehat{\beta_{10}}NIM_{it} + \varepsilon_{it}$$

Note: ZSCORE=Risk-Taking behaviour, SSB=Shariah Board Size, BOARD=Board Size, PHD=PHD Degree Holder, OSSB=Others' Shariah Board, CEOD=CEO Duality, CI=Cost-to-Income Ratio, BS=Bank Size, IB=Interbank Ratio, OH=Overhead Ratio, NIM=Net Interest Margin, ε=error term, β=intercept

In order to examine the suitability of the POLS model for the equation of this analysis, there are two experiments could be carried out. Such measurements are the Breusch-Pagan test or the Poolability F-test. Breusch Pagan test is applied to compare with the Pooled OLS model and the REM. While Poolability F-test is used to check whether the POLS model or the FEM had a more remarkable increase in model fitness. Both experiments can be carried out using STATA.

3.5.1.2 Fixed Effect Model (FEM)

Fixed Effect Models (FEMs) can be divided into two separate general groups. Each model would be specifically described if the regressors are categorical. The formula is similar to the product of the study of the variance, which is only valid to the particular case. Characteristics of calculation of the size of the impact. Aside to that, the second type to models would be considered accurate because there is either a hidden or constant regulated variable. For this case, first-class variants are typically referred to as a special category. The Hausman test would be applied to evaluate selection on the Fixed Effect or Random Effect Model (Cooper & Hedges, 1993).

FEM and REM are being considered in our study. A researcher claimed that FEM became simpler to perform and describe during the testing cycle (Naceur, 2003). He felt that FEM was a stronger alternative theory because there was a need to

distinguish the circumstance in each bank chosen and ensure the existence of substantial heterogeneity between banks.

In addition, the Fixed Effect Model is being implemented in Athanasoglou et al. (2008) study. The calculation outcome provided the presence of an entity effect as the F-statistic is important. Nonetheless, the least square estimator of the FE model, along with the inclusion of lagged regression for the independent variables, is both skewed and inconsistent. Evidence indicates that the bias would be significant for T, which consists of a small value, but when the T-value grows, it will be equivalent to zero.

Fixed Effect Model was used to removing omitted variable bias by estimating a number of omitted variables from a sample size of a broad population over time. However, FEM was unlikely to include many dummy variables, because the assumption was not adequate to operate the analysis and thus had an effect on the degree of freedom. In addition, common intercepts had to be removed in the model as further dummy variables were added to avoid dummy variable traps (Gujarati & Porter, 2009).

In this research, it will be contructed as below:

Model 1

$$\widehat{ZSCORE}_{it} = \widehat{\beta_0} + \widehat{\beta_1}SSB_{it} + \widehat{\beta_2}PHD_{it} + \widehat{\beta_3}OSSB_{it} + \widehat{\beta_4}BOARD_{it} + \widehat{\beta_5}CEOD_{it} + \widehat{\beta_6}BS_{it} + \widehat{\beta_7}CI_{it} + \widehat{\beta_8}IB_{it} + \widehat{\beta_9}OH_{it} + \widehat{\beta_{10}}NIM_{it} + \mu_{it} + \varepsilon_{it}$$

Note: ZSCORE=Risk-Taking behaviour, SSB=Shariah Board Size, PHD=PHD Degree Holder, OSSB=Others' Shariah Board, BOARD=Board Size, CEOD=CEO Duality, CI=Cost-to-Income Ratio, BS=Bank Size, IB=Interbank Ratio, OH=Overhead Ratio, NIM=Net Interest Margin, μ=industry fixed effect, ε=error term, β=intercept

Models with so many dummy variables may have had the problem of multicollinearity (Gujarati and Porter, 2009). Time-invariant variables have been excluded from being used in the Least Square Dummy Variable (LSDV) sex and ethnicity cannot be managed over time and can only be managed by using dummy variables. Nevertheless, adding so many dummy variables, the model or analysis may result in much more useless information.

3.5.1.3 Fixed Effect Model Robust Standard Errors Clustered by Islamic Banks (FER)

In a research performed by Altunbas, Binici and Gambacorta (2017), numerous tests were conducted to confirm the robustness of their Z-score bank risk assessment results. They were developed to explore the potential volatility of macro prudential instruments introduced at various stages of economic and financial growth across countries, the global geo-economic and financial impacts and the attainable limits of data coverage. In addition, the robustness of the outcome is tested by presenting a complete range of regional and time-limited outcomes and relinquishing macro-economic control. They noticed strong norm errors clustered at the bank-year level in their study.

A white standard error that is not constant within cluster dependency is recognized as a standard error that is not set within cluster dependency (Petersen, 2009). Petersen (2009) also stated that model errors that are resilient to heteroscedasticity tended to ignore the true standard error. This then suggested that the measurements that are robust to the dependency form in the data would deliver objective standard error along with accurate confidence intervals, whereas those that are not robust to the dependency framework in the data sets would result in very small confidence intervals and biased standard error.

Dkhil (2014) suggested that fixed effects should be regarded and that heteroscedasticity and autocorrelation of the error term should be controlled. They used robust distributed fixed-effect structures on continents, also referred to as robust distributed FEs. As a result, instrumental variables and the Generalized Method of Moments (GMM) were adopted, with defined results immune to heteroscedastic and autocorrelated errors, and managed to build a relationship between policy and broadband implementation in an inverted U-shape development. The robust approach to diagnostic modeling simplified the distinctions regarding homoscedastic and discrete defects. However, robustness has typically come at the expense of precision, when model expectations are being relaxed to the degree that standard anomalies have culminated in severe sky-high declines and inaccurate estimates. There are thumb rules applied where robustness is implemented only when appropriate, particularly along short clustering dimensions and where errors and regressors may be associated (Millo, 2017).

In this research, it will be addressed as below:

Model 1

$$\widehat{ZSCORE}_{it} = \widehat{\beta_0} + \widehat{\beta_1}SSB_{it} + \widehat{\beta_2}PHD_{it} + \widehat{\beta_3}OSSB_{it} + \widehat{\beta_4}BOARD_{it} + \widehat{\beta_5}CEOD_{it} + \widehat{\beta_6}BS_{it} + \widehat{\beta_7}CI_{it} + \widehat{\beta_8}IB_{it} + \widehat{\beta_9}OH_{it} + \widehat{\beta_{10}}NIM_{it} + \mu_{it} + rb\varepsilon_{it}$$

Note: ZSCORE=Risk-Taking behaviour, SSB=Shariah Board Size, PHD=PHD Degree Holder, OSSB=Others' Shariah Board, BOARD=Board Size, CEOD=CEO Duality, CI=Cost-to-Income Ratio, BS=Bank Size, IB=Interbank Ratio, OH=Overhead Ratio, NIM=Net Interest Margin, μ= industry fixed effect, $rb\varepsilon$= Robust standard error term cluster by bank, β=intercept

3.5.1.4 Random Effect Model (REM)

According to Francis (2013), the random effects estimator was supposed to produce more meaningful results in a highly variable data collection. He suggested that the Random Effect Model (REM) be used as an efficient metric for unbalanced panel structures, supported by the Hausman Specification Test to assess the utility between the REM and FEM for the Panel Regression Calculation.

In a research by Safiullah and Shamsuddin (2018) on the disparity in risk between Islamic and commercial banks in 28 countries, they argued that REM was preferred by FEM in their sense as FEM included time variability and cross-sharp vector variance. Nevertheless, the bank-degree variable of bank governance in their analysis did not differ following the time, and the country-degree macroeconomic variables did not vary through banks. More, REM became more tolerant of the existence of dummy variables in their model, as FEM eliminated the dummy variable impact. Similar to Mokni et al. (2016)'s study of risk-taking determinants of Islamic and traditional banks, which included REM through a survey of 15 conventional and 15 Islamic banks from 2002 to 2009.

Even so, the dissimilarity between FEM and REM is that, in REM, the general intercept as the mean value of all cross-sectional intercepts, and the term of error was a significant deviation of the discrete intercept from the average value. Two aspects needed to be taken into account. First, the association meaning between the disruption concepts at two separate periods stayed the same irrespective of how specific the two-time span was for each particular cross-sectional unit, and second, the connection between all cross-sectional units stayed the same. As a consequence, the Generalised Least Squares (GLS) would be the best approach to be followed as OLS would consequence in unreliable estimators (Gujarati & Porter, 2009).In this research, it will be demonstrated as below:

Model 1

$$\widehat{ZSCORE}_{it} = \widehat{\beta_0} + \widehat{\beta_1}SSB_{it} + \widehat{\beta_2}PHD_{it} + \widehat{\beta_3}OSSB_{it} + \widehat{\beta_4}BOARD_{it} + \widehat{\beta_5}CEOD_{it} + \widehat{\beta_6}BS_{it} + \widehat{\beta_7}CI_{it} + \widehat{\beta_8}IB_{it} + \widehat{\beta_9}OH_{it} + \widehat{\beta_{10}}NIM_{it} + w_{it}$$

Note: ZSCORE=Risk-Taking behaviour, SSB=Shariah Board Size, PHD=PHD Degree Holder, OSSB=Others' Shariah Board, BOARD=Board Size, CEOD=CEO Duality, CI=Cost-to-Income Ratio, BS=Bank Size, IB=Interbank Ratio, OH=Overhead Ratio, NIM=Net Interest Margin, w= composite disturbance term, β=intercept

REM also named as Error Component Model (ECM) revealed its shotage of understanding of the specific configuration by error concept when the FEM was concerned with the incorporation of dummy variables together with the resulting loss of the amount of degrees of freedom in the LSDV model (Gujarati and Porter, 2009). In this scenario, dummy variables represented a theoretical deficit of the exact model explained in the FEM.

The composite disturbance term, w_{it} contained two elements, namely ε_i, which is known as cross-section error component and μ_{it} which is the combined time series error element. This is the reason of REM as ECM. As a consequence, the predictions for the model is that individual error components were not auto-correlated in both cross-section and time series units, in spite of related to each other. Besides, there should be no correlation between exogenous variables and w_{it}. Nonetheless, since ε_i is an element of w_{it}, the latter hence tend to interact with independent variables. As a direct result, the REM would provide an incorrect estimate of the regression coefficients. In comparison, the Hausman test will demonstrate that REM is an effective model to be used, provided that wit is related to explanatory variables (Gujarati & Porter, 2009).

3.5.2 Scale Measurements

3.5.2.1 Normality Test

According to D'Agostino (1990), the normality check is a mathematical estimation technique used to test whether the underlying distribution of a random variable is naturally distributed, the Skewness and the Kurtosis Method. Major experiments leveraging the predictive strength of these across a broad variety of alternate sources have been conducted, and a fairly clear image has arisen as to which of these would be suggested for usage. He also claimed that the use of the plot plus statistics should constitute a successful total normality analysis. The usage of these is equivalent to what is commonly offered in normal computer applications. Conscientious investigators will suggest including the information in this report in their data review (D'Agostino, 1990).

Skewness is a test of the probability distribution asymmetric of the average random variables. This is a sum and orientation of the skew. Kurtosis, on the other side, reflects the sharpness and height of the midpoint compared to that of the regular bell curve.

H_0, Null hypothesis: The error term is normally distributed

H_1, Alternative hypothesis: The error term is not normally distributed

Decision: Reject H_0 if less than 5%, otherwise accept H_0 if more than 5%.

3.5.2.2 Multicollinearity

Multicollinearity is an issue at which the two or more independent variables are strongly associated. Even so, one of the findings showed that was no direct association between the independent variables in the Classical Linear Regression Model (CLRM) (Gujarati and Porter, 2009). The regression model can be stated as below:

$$\widehat{Y_{it}} = \widehat{\beta_0} + \widehat{\beta_1}X_{1it} + \widehat{\beta_2}X_{2it} + \widehat{\beta_3}X_{3it} + \widehat{\beta_4}X_{4it} + \widehat{\beta_5}X_{5t} + \widehat{\beta_6}X_{6t} + \widehat{\beta_7}X_{7t} + \widehat{\beta_8}X_{8t} + \widehat{\beta_9}X_{9t} + \widehat{\beta_{10}}X_{10t} + \mu_{it}$$

Where Y = dependent variables; X_{1it}, X_{2it}, X_{3it}, X_{4it}, X_{5it} X_{6it} X_{7it}, X_{8it}, X_{9it} and $X_{10it}$are independent variables, and μ_{it} is the error term. Gujarati and Porter (2009) also suggested that the CLRM believed that the regression model is linear in parameters where the interaction between the regression and the regressor is constant. Multicollinearity may also exist where there has been more than one direct linear association between the variables and, as a result, a normal error would become immeasurable.

There were, however, many reasons causing the issue of multicollinearity. The first is the form used in the processing of results. Restricted or incomplete data in an independent variable can potentially create complications, because data collection may be strongly correlated. Second, the over-determined model can often induce multicollinearity. Once the regressor is greater than the amount of measurements in the regression test, the strength of the process and the interaction between independent variables may increase. Second, a time series data model can often contribute to a issue. It was attributed to the assumption that the predictive variables modified their meanings over time and thus strengthened the interaction between variables.

Multicollinearity can contribute to many implications for the regression model. According to BLUE (Best Linear Impartial Estimators), the OLS estimators are always impartial, even when there is a multicollinearity question where the predicted value is identical to the actual value. Aside from this, the OLS estimators would also have a large estimate of uncertainty and covariance, rendering the precision of the calculation more challenging. In order to diagnose a multicollinearity problem, the variance-inflating factor (VIF) may be used to evaluate the issues. The formula is stated as below:

$$VIF = \frac{1}{1 - R_{aux}^2}$$

VIF indicates that the estimator is skewed by the existence of multicollinearity (Gujarati & Porter, 2009). If the VIF value was greater than 10, it meant that the model had a issue with multicollinearity. Tolerance (TOL), and the opposite of VIF, are another way of detecting multicollinearity. The formula of TOL is stated as below:

$$TOL = \frac{1}{VIF} / (1 - R^2)$$

If R^2 is amount to 1, it points out that the model is in complete collinearity with a severe multicollinearity problem. If the TOL value is equivalent to 1, it means that the layout is safe of multicollinearity problems. In fact, the slope coefficient would be independently small in the t-test and raise the importance of R^2 because the standard error of the model is high in magnitude. However, owing to large standard deviations, the trust interval appears to be broader and to inflict significant multicollinearity.

Last but not least, the researchers are suggested that they could neglect the issue of multicollinearity as the data available for review was small (Gujarati and Porter,

2009). Otherwise, the researcher can collect more data by increasing the size of the sample. Rather than that, the researcher could opt to delete one of the independent variables that was irrelevant or revamped.

3.5.3 Inferential Analysis

3.5.3.1 Reluctant F-Test

The Reluctant F test made it possible to choose the right configuration between the Pooled OLS and the FEM. A panel analysis by Hamdan (2016) on the effect of FDI on 17 Arab countries ' economic development from 1995 to 2013 considered three separate models, namely the Pooled Regression Model, FEM and REM. As a rule, the likelihood of cross-section F was 0.00, lower than the 5 % significance point. As a consequence, FEM is compared to the Pooled model, and this is how the Reluctant F-test is used to differentiate between the two models. There are two model range, either FEM or REM, was decided using the Hausman method.

The purpose of this study was to analyse the presumption of data with various entities or time intervals in constant coefficient (Croissant and Millo, 2008). In order to do this study, the OLS regression needed to be done to the context of a group or time by time. In other terms, according to the analog analysis, it can be called a classical F test and a comparison between the models recovered from complete sampling and the equation found for and person. It can be defined as the testing of the existence of individual effects by using hypotheses below:

H_0, *Null hypothesis: Pooled OLS regression model is appropriate*

H_1, *Alternative hypothesis: Fixed effect model is appropriate*

Decision: Reject H_0 if less than 5%, otherwise accept H_0 if more than 5%.

Besides, the formula below can be applied since it is defined as restricted F test.

$$F_0 = \frac{R^2_{FEM} - R^2_{POLS} \Big/ K_{FEM} - K_{POLS}}{(1 - R^2_{FEM}) \Big/ K_{FEM}}$$

R^2_{FEM}: R-squared of FEM

R^2_{POLS}: R-squared of POLS

K_{FEM}: Number of independent variables in FEM

K_{POLS}: Number of independent variables in POLS

Let the F-value is determined to be greater than the critical value, the null statement will be dismissed. This can be described as unable to collect panel data and should not be pooled together. Therefore, De Jager (2008) concluded that no inference may however be made on the validity of fixed results or unpredictable causes.

3.5.3.2 Breusch-Pagan Lagrange Multiplier (BPLM) Test

Breusch-Pagan test (BP test) is a popular diagnostic method used in a linear panel data layout. The LM measure, which is focused on the progressive essential values of the associated x^2 distribution then was claimed can have a significant size distortion when N/T is high (Pesaran, 2015). According to Waldman (1983), he suggested that Godfrey and Breusch and Pagan had established a separate research model for heteroscedasticity based on the smallest square residues in the years 1978 and 1979. The squared residual is determined by the mean squared residuals

which are regressed to a collection of independent variables chosen, the test result is the stated squared total of this formula.

The Breusch and Pagan method was created by Trevor Breusch and Adrian Pagan in 1979. This study was designed to assess the presence of autocorrelation and heteroscedasticity in the regression model. The validity of the linear regression process would be doubted if the hypothesis expectations have not been reached, stated by Breusch & Pagan (1979). They also proposed that the inefficiency of the ordinary least square (OLS) should give effect to the error variable in the regression to be biased. Homogenous disturbance and defined coefficient were the fundamental criteria of the regression model to be achieved. Homogenous disturbance implied that the term of error in the model did not consist of a question of heteroscedasticity and autocorrelation arising from a human influence and time impact. Croissant and Millo (2008) hypothesized that the LM method may investigate the existence of human and time effects depending on the result of the pooling experiment. The hypotheses of test are as follow:

H_0, *Null hypothesis:* $\alpha_n = 0$, *n=1,2,3… (Homoscedastic disturbance)*

H_1, *Alternative hypothesis: At least one of α is not equal to zero (Heteroscedastic disturbance)*

According to Breusch & Pagan, 1980, the LM statistic was calculated using the residual in the model estimated by the OLS. The BP test can be implemented to check the presence of random effects in the model. Such LM research was used to decide if the Pooled OLS or REM is more relevant to use (Gujarati & Porter, 2009). If let null hypothesis, H_0 is being rejected, it indicated that REM would be preferable compared to Pooled OLS, or vice versa.

The steps to perform LM test can be represented as follow:

Step 1: Use OLS to perform the model.
Step 2: Estimate auxiliary regression.
Step 3: Retain R^2 which had been computed from auxiliary regression
Step 4: Obtain F-statistic or Chi-square statistic

3.5.3.3 Hausman Test

According to Baltagi and Liu (2007), the Hausman study was examined. They were trying to demonstrate the design check in the panel info. The study is focused on the difference between fixed and random results, and it was assumed that the Hausman method was selected to determine which model to use by implementing two-stage least square (2SLS) regressions.

Then, the researchers claimed that the Hausman test is typically used to choose between the fixed effect estimators and the random effect estimators for the panel results. For the random effect estimator, the relationship between the regressors and the unobservable and the individual-specific effects is believed to be null. Therefore, the assumption will be regarded instead of the statute. They claimed that if the test result is in disagreement with the fixed effect estimators and the random effect estimator, the null will be discarded and the study will usually ignore the random impact estimator and draw a decision centered on the fixed effect estimator. They proposed the use of a model focused on the difference between the category and the defined effects which rendered it possible for researchers to measure the similarity of the sets of coefficients and the specific variables that cannot be forwarded to the Hausman Test (Frondel & Vance, 2010).

In addition, an analysis was carried out by the writer, who claimed that they should first carry out the Hausman test before determining the conclusion on the basis of fixed effects or random effects in the panel data model. They also found that if the Hausman test refused the null hypothesis which indicated that the random effect was right, the second stage would tend to use the fixed effect prediction. Alternatively, the random effect estimator would be used instead of the defined effect because there is not adequate proof to dismiss the null hypothesis. This shows that the Hausman method was used to evaluate the estimators would be used for a set and a random effect model (Guggenberger, 2009).

Similar to the study carried out by Kabaila, Mainzer and Farchione (2015), they also researched the time-varying covariate may be used in the panel results, and the Hausman method would usually be used to decide if the impact may be influenced using a fixed effect or a random effect model. In this study, the impact of the test was assumed to be a minimal coverage of the likelihood of the trust interval. In this research, three new sample theorems were discovered that could render the method simpler to use.

The Hausman method was used to decide if FEM or REM is suitable for adoption. This check may show how the composite error term is linked to independent variables or, in other words, if the REM is the right model. Furthermore, the null statement behind the Hausman study was that the estimators of FEM and REM did not have a pronounced contradiction. In fact, the main result included in this study is asymptotic by x^2 distribution. If the null hypothesis was dismissed, the inference drew was that REM is thus unacceptable to be implemented, because random events are associated with at least one independent variable. For other terms, whenever the null statement is denied, FEM is compared to REM, and vice versa. Through this, it has demonstrated that FEM is senior to REM if the null hypothesis is dismissed. In addition, according to Gujarati & Porter (2009), owing

to a high-efficiency explanation, REM will be null hypotheses with FEM as an alternate hypothesis.

3.5.3.4 Sargan-Hansen Test

According to Corbae, Durlauf & Hansen (2006), basically, Sargan-Hansen is a Fixed Effect (FE) vs Random Effect (RE) study related to the analysis of over-identifying constraints. The theory checked is that the instruments as a group are exogenous, thus they are appropriate and have been deemed to be sound. The number of instruments used by GMM does not surpass the sample size (number of banks adopted in this research).

A broad set of chi-square test statistic is tested without any degree of freedom correction. In the case of homoscedasticity, the research result is never identical to the Hausman set or random impact test. At the other side, for a neutral group, artificial regression and Hausman test results would be numerically comparable. Like the Hausman variant, the test outcome can be generalized explicitly to heteroscedastic and cluster-robust models. It means that the outcome would also be a good test figure (Cameron & Trivedi, 2010).

According to Sargan (1958), Sargan-Hansen study, also known as Sargan's J study, is used to assess Fixed Effect (FE) against Random Effect (RE) to define shortcomings in the mathematical model. Tested theory applies to the instruments as a category that is exogenous, hence they are appropriate and recognized as a balanced tool. The amount of instruments used by GMM does not surpass the sample number (the number of banks included in this research). In comparison to the Hausman variant, the test outcome would be maintained explicitly to

heteroscedastic and cluster-robust models. It implies that the result produced would also be a positive test statistic. With this, Chen et al. (2015), Sufian and Habibullah (2010), Lee et al. (2014), Mokni et al. (2016) and Safiullah and Shamsuddin (2018) also exploited and supported this Sargan-Hansen test.

3.5.3.5 T-test

According to Gujarati and Porter (2009), the T-test was an alternative but consistent tool for the confidence-interval process of the predictive test hypothesis. This was also regarded as a test-of-importance strategy. This is a measure of validity under which the findings of the study were utilized to identify the truth or fallacy of null hypothesis. It was used to determine that each explanatory variable had a major impact on the variable described. The decision as to whether to agree or deny H_0 is focused on the test statistical value derived from the results. Furthermore, under normality assumption, test statistic computation will be as follow:

$$t = \frac{\widehat{\beta_2} - \beta_2}{se(\widehat{\beta_2})}$$

This research examined 10 different independent variables relation with dependent variable, risks taking behaviour of banks. With this, independent variables of this study included Shariah Board Size (SSB), PHD Degree Holder in Shariah Board (PHD), Others' Shariah Board (OSSB), Board Size (BOARD), CEO duality (CEOD), Cost to Income Ratio (CI), Bank Size (BS), Interbank Ratio (IB), Overhead Ratio (OH) and Net interest Margin (NIM). The hypotheses of test are as follow:

H_0, Null hypothesis: Relationship between independent variables and dependent variable are not significant (β_i=0, i=1, 2, 3, 4, 5, ...)

H_1 , Alternative hypothesis: Relationship between independent variables and dependent variable are significant ($\beta_i \neq 0$, i=1, 2, 3, 4, 5, ...)

The F-test result represented true slope of coefficients was simultaneously zero. H_0 will be rejected if value of α percentage (1%,5% or 10%) exceeded critical F-value (Gujarati, 2004). By employing p-value method, H_0 will be eliminated as p-value for the test was lower than the significance level, α. Thus, indicates that there might be at any rate of one explanatory variables were significantly affecting dependent variable; or else, do not reject H_0 (Gujarati, 2004).

3.5.3.6 F-test

$$F = \frac{R^2/(k-1)}{(1-R^2)/(n-k)}$$

k = Total number of parameters to be estimated

$R^2 = ESS/TSS$

The F test was used to establish the validity of the model employed in this paper (Gujarati, 2004). The F method was applied by previous researchers to diagnose the mutual impact between the explanatory variables on the described variables. The example of hypothesis testing is shown as below:

H_0 , *Null hypothesis:* $The\ model\ is\ insignificant, where\ the\ \beta_i = 0, i = 1,2,3$ ...

H_1, Alternative hypothesis: Dependent variable will be influenced by at least one of the independent variables.

Hence, decision rule is H_0 will be rejected if significance level, α is found higher than p-value of T-test. This also delivered that the exogenous variable has a major effect on the endogenous variable, because it would not be ignored if otherwise.

3.5.3.7 Autocorrelation

Autocorrelation is an issue where the terms of error are associated in time or space (Gujarati & Porter, 2009). Autocorrelation in time series data is defined as the term of error is proportional to the time series. Furthermore, at the same moment, the error term in cross-section data is associated with various spaces.

According to Gujarati and Porter (2009), there were two forms of autocorrelation, pure autocorrelation and impure serial autocorrelation. Simple association happens where an unrelated result is made in the error word, and this disobeys the traditional premise of the equation. At the other side, the impurity of the serial distinction may arise where there is a bias definition and an inaccurate functional type.

In addition, there are several causes that have triggered autocorrelation. First, the design prejudice can contribute to a question of autocorrelation (Gujarati & Porter, 2009). Failure concept used in the regression analysis assumed to be missing variables. Thus, if the error term is consistently associated with another error term, it can trigger a correlation problem. Third, the divergence of the mathematical model can often trigger autocorrelation issues, because the imprecision of the mathematical type varies from the real nature of the interaction, and so there has been a serial association. Third, data distortion is often known to be one of the causes behind autocorrelation. Miscalculation of independent variables may allow the error of disruption to be reversed.

The first result of the autocorrelation is that the estimators must stay neutral and accurate in order to preserve the impartiality of the estimator. However, the estimators are not effective, and this can lead to underestimation of variance. In

fact, owing to a large statistical error, a more meaningful t-statistic would be obtained, which can lead to variables that are not significant being significant.

Breusch-Godfrey LM Test and Durbin Watson Test are the two common methods to diagnose autocorrelation issues. For the Breusch-Godfrey (BG) method, it is also classified as the LM test and is only measured with a higher autocorrelation value. There is a formula which is $(n-p)R^2 \sim X_p^2$ to determine and test for autocorrelation problem. The hypothesis testing for BG test is as followed:

H_0, Null hypothesis: $There\ is\ no\ higher\ order\ of\ autocorrelation.$

H_1, Alternative hypothesis: There is a higher order of autocorrelation.

The decision rule for BG test: Reject H_0 as the value of BG test is higher than the chi-square value. Otherwise, do not reject H_0.

While Durbin-Watson Study is only checked for autocorrelation in first order (Gurarati & Porter, 2009). The hypothesis testing is stated below:

H_0, Null hypothesis: There is no first-order autocorrelation.

H_1, Alternative hypothesis: There is first-order autocorrelation.

3.5.3.8 Heteroscedasticity

Heteroscedasticity can arise where there is any misspecification due to unknown nonlinear predictor conditions or ignored predictors omitted from the regression model. The parametric model is needed to evaluate the structure of heteroscedasticity, while heteroscedasticity research methods existed (Klein, Gerhard, Büchner, Diestel & Schermelleh-Engel, 2016). Heteroscedasticity can be detected by two ways which are the graphical method or formal test.

H_0, *Null hypothesis:* $Homoscedasticity\ E(u_i^2) = \sigma_i^2 (i = 1,2,3 \dots)$

H_1, *Alternative hypothesis: Heteroscedasticity* $E(u_i^2) \neq \sigma_i^2 (i = 1,2,3 \dots)$

When the result is equivalent to zero, the statement is seen to be persuaded of homoscedasticity. However, if the answer is not negative, it may be concluded that there is a issue of heteroscedasticity. It might mean that the OLS estimators are unbiased and unreliable.

3.6 Conclusion

In this chapter, we developed an econometric model and analyzed data obtained from various sources with STATA 15.0 to examine the significance of the independent variables, the existence of the econometric problem and the appropriate model to be implemented. In brief, this chapter offered detailed guidance on the nature of analysis, the system of data collection and the mechanism of data processing. It also addressed the most critical elements involved in the regression of panel results, which also used secondary data in this analysis. In addition, all experiments performed to evaluate the best-fit model in this analysis have also been listed in this portion. The next segment, Chapter 4, will begin to analyze and explain the findings of STATA 15.0.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

This chapter provides the outcome of the analysis results by using STATA. This chapter is intended to present and explain the empirical findings discussed in Chapter 3. Test analysis through STATA is to verify whether the model faces econometrics problems. According to the statistical results of the study, it is found that the FER model is more proper to use in this study. The data and results are presented in the form of tables.

4.1 Descriptive Analysis

The samples used in this study are Islamic banks in different countries from the year 2009 to 2018. Table 4.1 describes the mean, standard deviation, minimum value, maximum value and the total observations of the respective variables as well as the bank's risk-taking behaviour. The respective explanatory variables namely Shariah Board Size, PHD Degree Holder in Shariah Board, Shariah members who sit on Others' Shariah Board, Board Size, CEO Duality, Bank Size, Net Interest Margin, Overhead Ratio, Cost to Income Ratio and Interbank Ratio.

Table 4.1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
ZSCORE	0.2683117	1.355192	-7.398494	17.64906	1,411
SSB	4.092737	2.064211	1	12	895
PHD	2.756853	1.524814	0	8	839
OSSB	2.495686	1.341242	0	7	815
BOARD	8.884797	3.287995	3	26	1,059
CEOD	0.1146789	0.3188169	0	1	872
BS	14.97563	2.516005	6.940068	22.63887	1326
NIM	3.917667	8.096044	-45.36	144.724	1260
OH	5.64597	7.724074	-9.261	104.504	1,294
CI	76.4063	70.86226	6.2335	948.575	1258
IB	159.2795	180.4078	-63.672	968.342	838

4.1.1 Risk-taking behaviour

The risk-taking has the most observation for the dataset which is 1411. It had obtained an average of 0.2683117, while the standard deviation is 1.355192. Apart from that, a maximum value of 17.64906 and minimum value of -7.398494 had been achieved by risk-taking.

4.1.2 Shariah Board Size

The mean value of shariah board size is 4.092737 according to table 4.1. It also reached the minimum value of 1 and maximum value of 12. Moreover, 2.064211 is the standard deviation of this variable. The total observation of shariah board size has 895.

4.1.3 PHD Degree Holder

From the outcome above, mean value of number of PhD degree has 2.756853. Besides, standard deviation observed is 1.524814. The minimum and maximum value are 0 and 8 respectively. Lastly, the total observation of this variable is 839.

4.1.4 Others' Shariah Board

The average of number of members SSB who sit on other SSBs is 2.495686 while standard deviation is 1.341242. Minimum and maximum value are 0 and 7. This variable has the lowest total observation in the sample which is 815.

4.1.5 Board Size

Based on the table above, the total observation of board size has 1059. Besides, 8.884797 is the mean value of board size. The descriptive data shows that standard

deviation value is 3.287995. The minimum value of board size is 3 meanwhile some country has two-tier board structure thus the maximum value is 26.

4.1.6 CEO Duality

CEO duality is a dummy variable. 0 is indicated as not CEO duality meanwhile 1 indicated as CEO duality. The average of this variable is 0.1146789 and the standard deviation is 0.3188169. The total observation of CEO duality has 872.

4.1.7 Bank Size

Bank Size has 1326 of total observation in the sample. The mean value of bank size is 14.97563 and standard deviation is 2.516005. Furthermore, 6.940068 is the minimum value while maximum value is 22.63887.

4.1.8 Net Interest Margin

3.917667% of average of net interest margin had been detected while standard deviation indicated is 8.096044%. Also, the minimum and maximum value are -45.36% and 144.724% respectively. The total observation of this variable has 1260.

4.1.9 Overhead Ratio

The overhead ratio formula is non-interest expenses divided by average assets. The mean value of this overhead ratio is 5.64597% and standard deviation is 7.724074%. Besides, the minimum value is -9.261% whereas the maximum value is 104.504%. Lastly, 1294 observations are available to use with this variable.

4.1.10 Cost to Income Ratio

For cost to income ratio, it had obtained 76.4063% of mean value while 70.86226% of standard deviation. In comparison, there is a broad variation between the minimum and maximum value of 6. 2335% and 948.575%. A total observation of cost to income ratio has 1258.

4.1.11 Interbank Ratio

The mean value of interbank ratio is 159.2795% meanwhile standard deviation is 180.4078%. There also has a large range between minimum and maximum values for this interbank ratio. Minimum value and maximum value are -63.672% and 968.342% respectively. Interbank ratio had obtained 838 of the total observation.

4.2 Panel Data Analysis

Table 4.2: Result of Bank's Risk-taking Evaluated in Different Models

VARIABLES	(1) POLS Zscore	(2) FEM Zscore	(3) FER Zscore	(4) REM Zscore
SSB	-0.01400	0.10994*	0.10994*	-0.01453
	(0.01615)	(0.06100)	(0.06031)	(0.01911)
PHD	-0.01574	-0.12148***	-0.12148*	-0.02760
	(0.02173)	(0.04644)	(0.07209)	(0.02405)
OSSB	0.00136	0.05751	0.05751	0.01318
	(0.01970)	(0.04350)	(0.04918)	(0.02237)
BOARD	-0.00472	0.02945*	0.02945	-0.00266
	(0.00830)	(0.01511)	(0.02967)	(0.00920)
CEOD	0.19890**	0.33784**	0.33784**	0.21348**
	(0.09251)	(0.13091)	(0.13673)	(0.09935)
BS	0.04531***	-0.13535*	-0.13535**	0.04329***
	(0.01127)	(0.07659)	(0.06045)	(0.01319)
CI	-0.00279***	-0.00168***	-0.00168	-0.00250***
	(0.00050)	(0.00058)	(0.00154)	(0.00052)
IB	0.00028**	0.00014	0.00014	0.00028**
	(0.00012)	(0.00016)	(0.00010)	(0.00013)
OH	-0.10378***	-0.17704***	-0.17704***	-0.10819***
	(0.00841)	(0.01398)	(0.03634)	(0.00869)
NIM	0.07427***	0.10441***	0.10441***	0.07584***
	(0.00819)	(0.01542)	(0.03196)	(0.00891)
Constant	-0.15416	2.05532*	2.05532**	-0.14037
	(0.22023)	(1.18798)	(0.90888)	(0.25174)

Observations	369	369	369	369
R-squared	0.47279	0.42810	0.42810	
Number of idc		69	69	69

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We tried to decide which model would be most suitable to use in our research. To decide the best model to use, the F-test, Hausman test, and Breusch and Pagan Lagrangian Multiplier Test (BPLM Test) are thus adopted.

First and foremost, we used the Reluctant F-test. This is because evaluate the better model between Pooled OLS (POLS) and Fixed Effect Model (FEM) is the function of Reluctant F-test. Based on Appendix 4.1, outcomes showed the bank's risk-taking behaviour proxy is significant at 5% significance level hence rejected the null hypothesis. It was demonstrated that FEM is more applicable than Pooled POLS model. Therefore, based on this Reluctant F-test, we can conclude that FEM for the bank's risk-taking behaviour proxy was the better model at the significance level of 5%.

Furthermore, the second test we used is Hausman test. This test used to investigate the appropriate model to be apply between Random Effect Model (REM) and FEM. The result in Appendix 4.4 indicated null hypothesis will be rejected due to the probability (Prob>chi2 = 0.0000) is less than 5% significant level. Thus, the FEM is preferable option compare with REM for bank's risk-taking behaviour in this test.

Moreover, Breusch and Pagan Lagrangian Multiplier Test (BPLM Test) is the third test we used. The function of this test is to determine which model is most suitable to be chosen between POLS and REM. The output of result (Appendix 4.5) show that the probability (Prob>chibar2 = 0.0000) is less than 5% significant level thus the null hypothesis rejected. There is sufficient evidence that REM is suitable in this test instead of POLS.

According to the Reluctant F-test and Hausman test, FEM is preferable in these two tests. However, the BPLM Test is preferable REM. Therefore, we take a decision on the FEM model to be adopted in testing to measure the relation between the risk-taking

behaviour of the bank with the explanatory variables. Lastly, we proved that FER is the best model to be applied in this study through the Sargan-Hansen test by adding the option "robust". This is because Sargan-Hansen test robust processing of the standard error group. Refer to Appendix 4.2, the significance level of 5% is higher than the p-value which is 0.0000.

4.3 Diagnostic Checking

4.3.1 Normality test

The normality test helps identify the likelihood of the dataset's underlying random variable is normally distributed. There are several normality test but the skewness kurtosis test and the Jarque Bera test are simple and popular among the tests.

Figures 4.1: Skewness and Kurtosis tests for Normality

				------ joint ------	
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
resid	369	0.0000	0.0000	.	0.0000

H_0 = The error terms follow a normal distribution

H_1 = The error terms do not follow a normal distribution

Skewness is a measure of the asymmetry of the probability distribution of a random variable with respect to its mean. It represents the amount and direction of deflection. On the other hand, Kurtosis indicates the height and sharpness of the central peak relative to the standard bell curve. The table above shows the results obtained after test the skewness and kurtosis tests for normality in STATA.

The number of observations is 369. Based on the Figures 4.1, the probability of skewness and the probability of kurtosis is 0.0000 even the value of chi2 is 0.0000. In this case, the null hypothesis should be rejected since the probability value is lower than 0.05 at 5% significance level. Originally, there is consider not normality distribution in the model. However, a symmetrical dataset will have a 0 in value of skewness. Therefore, a normal distribution will have skewness of 0 in value. Skewness essentially measures the relative size of the two tails. Besides, kurtosis is sometimes reported as "excess kurtosis". This makes the normal distribution kurtosis has a 0 value. Finally, we can said that when skewness and kurtosis are both in zero value, the response pattern is considered to be normally distributed.

4.3.2 Multicollinearity

When an explanatory variable in a multiple regression model is highly correlated with one or more other explanatory variables, the problem of multicollinearity occurs. The high correlation between the independent variables will result in a larger standard error. This will make the corresponding regression coefficients unstable and not statistically significant.

A simple way to detect multicollinearity is to calculate the correlation coefficients of all pairs of variables. Therefore, we conducted a pairwise correlation to detect whether

this problem exists. The Pearson correlation coefficient represents the distance between all these data points and the best fit line. If the correlation coefficient r is exactly +1 or -1, it is called perfect multicollinearity. If r is close to -1 or +1, then one variable should be removed from the model as much as possible. The value 0 means that there is no relationship between the two variables.

Assuming that the pairwise correlation coefficient between two variables is very high (> 0.8), there may be a multicollinearity problem. However, even if there is collinearity for the paired correlation coefficient, it does not mean that the issue of multicollinearity is severe. So, in this way, partial correlation coefficients can be used for more than two explanatory variables in order to improve the multicollinearity reliability.

4.3.2.1 Correlation Analysis

Table 4.3: Pairwise Comparisons

	ZSCORE	SSB	PHD	OSSB	BOARD	CEOD	BS	CI	IB	OH	NIM
ZSCORE	1.0000										
SSB	0.0237	1.0000									
PHD	0.0348	0.6336*	1.0000								
OSSB	-0.0175	0.3335*	0.6062*	1.0000							
BOARD	-0.0527	0.5091*	0.1088*	-0.0203	1.0000						
CEOD	-0.0668	-0.1062*	-0.1424*	-0.1920*	-0.0385	1.0000					
BS	-0.1084*	0.0381	0.1637*	0.1462*	-0.0123	0.1832*	1.0000				
CI	-0.3763*	-0.1918*	-0.1523*	-0.0337	-0.1456*	0.1235*	-0.0973*	1.0000			
IB	0.1204*	0.1585*	0.0576	-0.0527	0.1008*	-0.0215	0.0142	-0.1053*	1.0000		
OH	-0.0066	-0.3557*	-0.3803*	-0.2580*	-0.1926*	0.0748	-0.1855*	0.2110*	0.0017	1.0000	
NIM	0.1567*	-0.2572*	-0.3238*	-0.2701*	-0.1003*	-0.0434	-0.2480	-0.0347	0.0024	0.3506*	1.0000

Based on the Table 4.3, the highest positive significant correlation among all is +0.6336 which is the pair of SSB and PHD meanwhile IB and OH has the lowest positive significant correlation in 0.0017 of value. On the other hand, the pair of OH and PHD has the highest negative weak correlation which is -0.3803 and the value of -0.0066 is lowest negative weak correlation of the match of ZSCORE and OH. Finally, the result showed that there is no any value of coefficient of correlation higher than the value 0.8. Therefore, we can concluded that there is no multicollinearity problem occur between the variables.

Figures 4.2: Result of VIF test

Variable	VIF	1/VIF
PHD	2.56	0.390689
OH	2.52	0.396251
NIM	2.42	0.413105
SSB	1.92	0.521359
OSSB	1.74	0.574002
BOARD	1.43	0.699419
CI	1.36	0.734684
BS	1.29	0.777765
CEOD	1.18	0.844656
IB	1.06	0.940639
Mean VIF	1.75	

In addition to informal tests, formal tests such as VIF and TOL were also deployed to further assess whether there is a multicollinearity problem between independent variables. The mean VIF is 1.75, which indicates that the correlation is very low. A VIF value less than 10 indicates that there is no multicollinearity between variables. 1/VIF is the tolerance, which indicates the degree of collinearity. Variables with tolerance values greater than 0.1 mean that other explanatory variables have no linear combination, which has proved to be the case with our explanatory variables. Therefore, the multicollinearity problem does not exist in this model.

4.3.3 Heteroscedasticity Problem

Figures 4.3: Result of Modified Wald test

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (69)  =    2.2e+34

Prob>chi2 =    0.0000
```

In many panel data sets, the variance between cross-sectional units may be different. In the cause of this phenomenon, we can quote the scale difference of the dependent variable between units. Consequently, we perform a modified Wald test to detect whether there is groupwise heteroscedasticity in the residuals of fixed effects regression. Hence, the probability value is 0.000. This result leads to a strong rejection of the null hypothesis of any confidence level. Hence, heteroscedasticity issue occurred.

4.3.4 Autocorrelation Problem

Figures 4.4: Result of Wooldridge test

```
Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

    F(  1,      55) =     12.266

           Prob > F =      0.0009
```

Serial correlation is the reasons for overly optimistic standard errors. Thus, we run a Wooldridge test where the null hypothesis is no first-order autocorrelation in order to detect the problem. Based on the result of Figures 4.4, the probability of risk-taking behaviour model (0.0009) leads us strongly reject the null hypothesis and verify the existence of first-order autocorrelation at significant level of 5%. In short, we can conclude that the model faced the autocorrelation problem.

After run the Modified Wald and Wooldridge tests, we know that there have heteroscedasticity and autocorrelation problems in the model. In this case, we solve these problems by using the robust standard error in the fixed effects (FER).

4.4 Inferential Analyses

4.4.1 R-squared

R-square may also be known as the goodness of fit of a model. R-squared is a statistical measure in the regression model that represents the proportion of variance in the dependent variable which can be explained by the independent variable. Generally, a higher r-squared indicates that the model has a good fitness. However, in some cases, high r-squared not always mean that it is good to the regression model. Sometimes a regression model with a high r-squared can indicate the problems. On the other hand, a model with low r-square numbers are usually bad signals. However, in some cases, a good model may show a low value of r-squared. There is no uniform rule on how to include statistical measures in the regression model and the insights from the metric may be difference in vary situations.

As discussed before, we adopted Fixed Effect regression (FER) in this study. According to the result of Table 4.2, the r-squared value of FER is 0.42810, which can be illustrated as the variation of explanatory variables can explained 42.81% of risk-taking behavior variation.

4.4.2 F-Test

Figures 4.5: F-test result

```
      Source |       SS           df       MS      Number of obs   =       369
-------------+----------------------------------   F(10, 358)      =     32.10
       Model |  54.0861945        10  5.40861945   Prob > F        =    0.0000
    Residual |  60.3110376       358  .168466585   R-squared       =    0.4728
-------------+----------------------------------   Adj R-squared   =    0.4581
       Total |  114.397232       368  .310862044   Root MSE        =    .41045

------------------------------------------------------------------------------
      ZSCORE |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         SSB |  -.0139971   .0161542    -0.87   0.387    -.0457661    .0177719
         PHD |  -.0157371   .0217256    -0.72   0.469    -.0584629    .0269887
        OSSB |   .0013628   .0197016     0.07   0.945    -.0373825    .0401081
       BOARD |  -.0047163   .0083002    -0.57   0.570    -.0210395    .0116069
        CEOD |   .1988956   .0925083     2.15   0.032     .0169676    .3808236
          BS |   .0453114   .0112713     4.02   0.000     .0231451    .0674778
          CI |  -.0027933   .0005022    -5.56   0.000     -.003781   -.0018056
          IB |   .0002788   .0001207     2.31   0.021     .0000414    .0005161
          OH |  -.1037814   .0084073   -12.34   0.000    -.1203152   -.0872476
         NIM |    .074272   .0081879     9.07   0.000     .0581697    .0903744
       _cons |  -.1541648   .2202285    -0.70   0.484     -.587269    .2789393
------------------------------------------------------------------------------
```

H_0 = All independent variables are insignificant to explain the banks' risk-taking behaviour

H_1 = At least one independent variables is significant to explain the banks' risk-taking behaviour

Based on the table above, the null hypothesis will be rejected since 5% significance level is higher than the F-statistic probability in the value of 0.0000. The meaning showed at least has one independent variables significant to explain the banks' risk-taking behaviour for 369 observations of Islamic banks.

4.4.3 Divergent Effects of variables on Risk-taking behaviour

With Table 4.2, the results showed the Fixed Effect Regression (FER) is the best model to measure that the impact of explanatory variables on risk-taking behaviour proxies (ZSCORE) at significance level at 5%.

First of all, there is a positively significant of shariah board size on generated risk-taking behaviour proxy. It means the larger of shariah board size will reduce the bank's risk-taking behaviour. Safiullah & Shamsuddin (2017) found that an increase in Shariah board size significantly reduced bank risk in terms of operations and insolvency risks. Alman's (2012) also supported that larger Shariah board results in lower bank risk-taking behaviour on loan portfolio risk-taking. These two findings indicate that the governance of Shariah may only severely affect certain types of banking risks. Fich and Shivadasani (2006) has discovered that the members of SSB have several members, thereby minimizing the discipline of taking risks in Islamic banks.

Secondly, the variable of PHD degree holder generated a result of negatively significant relationship. Based on this result, we can interpret that the less of number member of shariah board who has PhD degree level will helps the Islamic banks drop the risk-taking. Our result proved by Safiullah and Shamsuddin (2017). However, the interesting thing is that this influence will be eliminated if members of the Shariah board sit on multiple boards.

Number of members sit on other shariah board is another determinant of that showed positive relationship with banks' risk-taking behaviour. The more member in shariah board sit on other shariah board, the less of bank's risk-taking behaviour. This is because cross membership in other Islamic banks will provide more experience for SSB members and allow them to compare best practices in Islamic banks (Abdullah et al. 2013). This can indirectly affect to reduce the risk-taking and Dahya et al. (1996) can support on this statement. Despite of this, this variable is not significant to bank's risk-taking.

Moreover, the size of the board is a major function and plays an important role in monitoring the effectiveness of the board and restricting the opportunistic behavior. There is a positive relationship illustrated between board size and bank's risk-taking in our result. However, it is insignificance on risk-taking. Huang and Wang (2014) studied the size of the board of directors and the policies that all firms in various fields, assuming the overall risk-taking. This research shows that companies with larger boards will face lower risks.

For CEO duality, the result showed there is significant and positive relationship with risk-taking behaviour (ZSCORE). That means the risk-taking of Islamic bank will be lesser when the CEO serves as chairman of the board in Islamic bank. This can be supported by Boyd and De Nicolo (2005). If a CEO duality structure occurs, the bank can reduce the interest dispute between shareholders and management by separating

management and control activities. Other supporting journal was Zeineb & Mensi (2018) which justified proved that the duality of CEOs adversely affects banking performance or efficiency. The more of the system of unified leadership, the less efficiency. Inefficient IBs remain at lower riskr due to cost constraints, which restrict inefficient IBs' ability to take on more risks. The bank also has a poor degree of productivity while CEO serves as chairman of the board. Lastly, it proved that efficiency and banking risk positively correlate.

Furthermore, bank size demonstrates an impact on risk-taking behaviour. It indicated a negative relationship with risk-taking behaviour proxy. The meaning saying that the larger bank size lead to high risk-taking behaviour of Islamic banks and vice versa. (Fakhrunnas & Ramly, 2017) demonstrated that the bank with some size linked to a lower risk of insolvency in the commercial operations of the banks.

Besides, there are a negative and insignificant relationship with the proxy of risk-taking behaviour for the cost to income. The meaning to say that Islamic banks with higher cost to income tend to lower the z-scores which is higher risk-taking behaviour. Rajhi & Hassairi (2012) found that inefficiency will lead to increased operating costs while increased costs will lead to reduced profitability. As a result, the z-score dropped. This was in line with findings of Mat Rahim & Zakaria (2013) and Kwan and Eisenbeis (1997).

The insignificant result also found on interbank ratio. However, it has positive relationship with risk-taking behaviour proxy. The higher the interbank ratio, the lower risk-taking behaviour on Islamic bank. This can be explained by the finding of Rochet and Tirole (1996), it said the level of interbank risk can help restrain banks from taking excessive risks and minimize the possibility of bank failure. Other supporting journals include Rochet and Tirole (1996), Nier and Baumann (2006), Lucchetta, M. (2008),

Dinger and Von Hagen (2009), and Distinguin, Kouassi, and Tarazi (2013) are same line with the finding.

Next, overhead ratio given an evidence of negatively significant relationship with z-score. Overhead ratio determines the indirect expense ratio by dividing the non-interest expense by the average asset. The lower overhead ratio will lead to a lower bank risk-taking behaviour. This is because a lower overhead ratio is beneficial because it shows that the bank's operating expenses are decreasing. Competition-efficiency effect also will affect the risk-taking behaviour of bank because competition pushes banks to increase lending efficiency and reduce credit risk (Dick and Lehnert 2010). This statement is supported by few journals which are Tirole (1988) and Zarutskie (2013).

Lastly, the net interest margin showed the positively significant relationship to z-score. The increase of net interest margin, the lower of risk-taking behaviour. Banks with higher interest rates or higher loan-to-asset ratios have less impact on the instability of the banking system because higher ratios reduce the bank's risk-taking behaviour. Therefore, banks that rely on loans for profit make a greater contribution to the stability of the banking system than diversified banks. Meanwhile, credit risk strong linked to net interest margin of bank. Angbazo (1997), Demirgüç et Kunt Huizinga (1999), Abreu and Mendes (2003), and Carbo and Rodriguez (2007) are supported to the result above.

4.5 Conclusion

The samples used in this study are Islamic banks in different countries from the year 2009 to 2018. We used Stata to do all the testing in this study. Several tests were adopted in this chapter in order to detect the finest model to be used in this study. The several tests are Reluctant F-test, Hausman test and Breusch and Pagan Lagrangian Multiplier Test (BPLM Test). At last, the preferable model is Fixed Effect Model (FEM) after running the tests. However, the Sargan-Hansen test revealed that Fixed Effect Regression (FER) is the most suitable model after being robust to standard errors. Other than that, we did the diagnostics checking to investigate the problem of our regression. We have did normality test, VIF test and pairwise comparisons for multicollinearity, Modified Wald test for heteroscedasticity and Wooldridge test for autocorrelation. The result of FER indicated that there are 4 variables are insignificant to bank's risk-taking behaviour which is other shariah board, board size, cost to income ratio and interbank ratio. The other 6 variables showed positive and negative significant to risk-taking behaviour. Based on the result, the bank's risk-taking behaviour will proceed lower risk-taking with large shariah board size, less PhD degree holder in shariah board, CEO duality system in Islamic bank, small bank size, low overhead ratio and higher net interest margin.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

We will comment on and sum up the overall findings of this study in this chapter. This chapter also will include a summarized statistical analysis, discussing the main findings, the implications that arise from our study, the limitations of study, and potential avenues of research for future consideration. This is the final chapter of our research paper. We have also provided some recommendations that may be of use to concerned parties.

5.1 Summary of Statistical Analysis

Table 5.1: Result of Summary of the Diagnostic Checking

Diagnostic Checking	Value	Result
Skewness kurtosis test	P = 0.0000	The error term follow a normal distribution.
Variance Inflating Factor (VIF)	Highest value = 2.56	Multicollinearity issue not severe
Tolerance Factor (TOL)	Lowest value = 0.390689	Multicollinearity issue not severe
Modified Wald test	P = 0.0000	Has heteroscedasticity problem

Wooldridge test	P = 0.0009	Has autocorrelation problem
R-square	0.42810	The variation of independent variables could explained 42.81% of variation of risk-taking behaviour.
F-test	P = 0.0000	At least one independent variables significant to explain banks' risk-taking behaviour at 5% significant level.

Table 5.1 above summarizes the results of the diagnostic checking that completed in the chapter 4. The result stated that our model considered as normal distributed and no multicollinearity problem. However, the model also has occurred the heteroscedasticity and autocorrelation issue. Besides, r-square value showed the variation of independent variables could explained 42.81% of the variation of risk-taking behaviour. The result of F-test showed that at least one independent variables is significant to explain the banks' risk-taking behaviour at 5% significant level.

5.2 Discussion of Major findings

5.2.1 Risk-taking Behaviour (ZSCORE)

The bank Z-score formula has been tested in many previous studies regarding its usefulness. Chiaramonte et al. (2015) and Chiaramonte et al. (2016) had compared the

Z-score against other alternative predictors of bank risk-taking behaviour that required more data. In theory, more data input should ensure a more accurate prediction. In practice however, the basic bank Z-score did just as well as alternatives that required more data like CAMELS. This made Z-score a better choice when banks do not disclose additional data or researchers are unable to obtain other data. Another argument for Z-score is the accuracy of its predictions of bank failure when matched with real bank failure data (Boyd and Runkle, 1992; Chiaramonte et al, 2016).

5.2.2 Shariah Board Size (SSB)

Our results showed that increase in the size of Shariah boards had a positive significant effect on Z-score. A larger the board size resulted in a correspondingly lower tendency for the bank to engage in risk-taking. Alman (2012), Safiullah and Shamsuddin (2017), and Zeineb and Mensi (2018) produced similar significant results in their studies of the influence Shariah board size has on Islamic bank risk-taking behaviour.

The one exception so far is Al Abbad et al. (2019) who observed the opposite result, that is, a larger Shariah board negatively impacted the Z-score. However, it is noted that this result was statistically insignificant.

5.2.3 PhD Degree Holder on Shariah board (PHD)

All in all, PhD degree holders had a significant negative impact on bank Z-score, which meant increase in PhD holders on Shariah board lead banks to higher bank risk-taking behaviour. A study done by Safiullah and Shamsuddin (2017) found significant

evidence to support our results, with increase in PhD holders lowering bank operations and insolvency risk. However, it must be noted that there is a lack of literature that directly relates education level to bank risk-taking.

Other evidence we found was indirectly related to bank risk, specifically to the Z-score. Looking through the literature linking education level to bank performance based on ROA, we found that Nomran et al. (2017) discovered a negative relationship between higher proportions of PhD holders to bank performance; they surmise that this may be due to a higher proportion of these scholars having PhDs in Shariah rather than finance-related PhDs. This is supported by another study that noted the positive impact of finance-educated Shariah board members on Islamic banks' ROA performance in Bahrain. (Hakimi et al., 2018)

5.2.4 Others' Shariah Board

Our result uncovered the existence of a positive but ultimately insignificant relationship between the members who sit on other SSB and Z-score. The positive relationship between number of members who sit on other SSB and Z-score indicated more members sitting on other SSBs tend to increase the Z-score value and hence the Islamic banks may face take lesser risks. Therefore, Abdullah et al. (2013) are of the opinion that getting cross-membership in another Islamic bank might provide more experience for Shariah board members and enable them to compare best practices amongst Islamic banks. In addition, Dahya et al. (1996), Haat et al. (2008), and Haniffa and Cooke (2002) also agree on the positive relationship between the variables, they claimed that cross-membership help Islamic banks serve as forum for information and makes information more accessible. Anyhow, the result revealed that the number of members who sit on other SSB has an insignificant relationship with the Z-score.

On the other hand, Z-score was affected in a significant and negative manner by the number of members who sit on other SSB (Grais & Pellegrini, 2006). This relationship indicated more members sit on other SSB tend to decrease the Z-score as a result increase the risk. The results were also in line with findings of Wilson (2009) which stated there are confidentiality and conflict of interest on factor of number of members who sit on other SSB. This is because SSB is able to access sensitive information of Islamic banks hence there is a threat of SSB reveal sensitive information to the Islamic bank's competitors.

5.2.5 Board Size

The size of the board of director is a major feature that act importantly in effectiveness of board the supervising the managers and restricting their opportunistic behaviors (Cheng, 2008; Pathan, 2009). Results of some previous studies contend the board with smaller size impacts corporate risk-taking positively as a smaller size of group should be predicted to supervise the manager of bank effectively with the interest of shareholders who have motivated for higher uncertainty.

Jensen (1993) believes that while a board has more than 7 or 8 directors, the director become less effectively at work and become easy for the CEO to control. The problems of communication become straighter. If the board becomes larger, the company considers it more challenging to organize group meetings and allow all the board member to reach a consensus.

Amihud and Lev (1981) claim that strong managers have an intention to engage in risk-reduction operations including such diversifying business mergers. In addition, these inefficiencies issue also will concerning to agency problem. (Raheja, 2005; Harris &

Raviv, 2008). Additionally, there are problems of teamwork and make an agreement among all board member (Cheng, 2008). Whereas Harris et al. (2008) conclude that because of endogeneity issues, the empirical correlation between board size and firm-specific measurements could be deceptive, the findings in the literature indicate that a larger size of board could be correlated with more risk. According to Safiullah and Shamsuddin (2017), Board size determines the board's capacity to succeed in carrying out its task. The size of the BOD can influence the effectiveness of board decisions.

On the other hand, Huang and Wang (2014) said that board size and risk taking of the bank have negative relationship. They done the research on board size and policy established in the business in various area that overall risk taking of all firm. This study suggested that business with larger board size will experience lower risk. Their findings demonstrate that companies with smaller boards face greater variability in possible future company performance. These companies are often correlated with a greater executive pay-to-performance sensitivity, prefer to undertake riskier investment policies, and participate in earnings management more often.

5.2.6 CEO duality

According to the result of this paper, Z-score is directly and significantly affected by CEO duality this indicated if there is CEO duality in the Islamic bank, the Islamic bank will tend to have lower risk because of higher Z-score. According to research done by Zeineb & Mensi (2018), they found that efficiency has negative effect and significant effect to Z-score. Other than this, their findings revealed banking risk and Z-score affected each other negatively. In a short summary, we can say that an increase in Z-score is equivalent to a decrease in risk, thereby decreases banking efficiency. In simple words, banks with high efficiency risk tend to be bolder when taking risk in order to

boost their profitability. The researchers concluded higher risk banks tend to be more effective. The reasons why the Inefficient IBs remain at lower risk are due the banks are limited power on controlling their costs, this reduce inefficient Islamic bank's willingness to take on more risks.

According to Srairi (2009), the researcher demonstrated efficiency and banking risk positively correlate. Other than this, the researcher revealed efficiency is negatively impact by CEO duality in significant manner and CEO duality inversely relate to banking efficiency. This is due to the Islamic banks suffered from inexperience and weakness in their governance. Islamic banks typically take more chances than normal banks as there is a shortage of expertise as well as lack of familiarity to the financial resources which could help them. In consequence, a low degree of uncertainty is positively associated with efficiency.

5.2.7 Bank size

Based on the result, Bank size had a significant and negative effect on z-score. This statement indicated that when bank size is larger, the z-score will be smaller (Low Z-score indicated high risk and low stability of banks). Therefore, Fakhrunnas and Ramly (2017) reported the bank size is negatively significant to the Z-score. According to Čihák and Hesse (2010), and Louati and Boujelbene (2015), they suggested Z-scores will increase with larger bank size. This is due to they have greater income diversity that enable them to shift from lending-based operation to other sources of income.

However, this condition is valid only if the Islamic banks does not face charge off rate issue. High charge off rate lead to high insolvency risk, thereby lead to low Z-score. When Islamic bank grows rapidly, the bank size will be larger, this lead the banks make

larger charge offs as a proportion of their assets. High charge off rate existed if the Islamic banks have lower grade capital. As a result, the bank with growing bank size tend to take more risk than banks that do not grow.

5.2.8 Cost to income ratio

Cost to income ratio was proved to have a negative and insignificant relationship with the Z-score. This result is supported by Mat Rahim and Zakaria (2013), and Kwan and Eisenbeis (1997) as their result show a higher cost to income ratio will has negatively related with Z-scores. They provided evidences by explaining that the efficient banks may take on additional risk to increase their financial performance. However, this research possessed an insignificant relationship between cost to income ratio and Z-score.

Furthermore, Rajhi and Hassairi (2012) also find out the same result with their tests. The scholars claimed cost to income ratio is play as a proxy of efficiency, thereby greater cost to income ratio caused banks will be increasingly inefficient. The consequences of inefficiency will lead to increased operating costs and indirectly decrease the profitability.

5.2.9 Interbank Ratio

Tovar-García (2015) found that no evidence of market discipline that agrees with past studies upon that lack of influence on risk-taking behavior of exposure to interbank

market by testing the robustness with a wide range of dependent and explanatory variables.

Lucchetta, M. (2008) mentioned there was a negative relationship among the risk-free interest rate and bank's decision to maintain liquidity and lend the interbank market. The interest rate is associated positively with loan investment. Therefore, the risk-free interest increases risk-taking behavior by banks.

Rochet and Tirole (1996) found that an interbank market will lead to banking regulation and supervision as well as market discipline and lower down the systemic risk by providing peer monitoring incentives from interbank lending banks.

Nier and Baumann (2006) show that banks with a larger ratio of interbank deposits provide larger opportunities to reduce their risk of insolvency by having a larger buffer of capital. Distinguin, Kouassi, and Tarazi (2013) investigated the impacts on bank risk-taking of access to the interbank deposit markets. They revealed that bank with a bigger proportion of interbank deposits presented lower risk levels.

The banks are great at recognizing other banks' risks and provide motivation to evaluate other banks in interbank borrowing relationship. (Rochet et al., 1996). The level of interbank exposures can help to curb the bank take undue risk and minimize the possibility of bank failures. Dinger and Von Hagen (2009) said interbank borrowing is related to reduce borrowing banks risk taking.

5.2.10 Overhead ratio

Non-interest expense is a crucial element of the overall expenditure of a bank, is called bank overhead and is used for the overhead ratio measurement. The overhead ratio is determined by the non-interest expense over the average assets. A low overhead ratio is favored as it indicates the bank is incurring reduce in operating expenses.

To manage the bank efficiency, calculated by the ratio of overhead costs, indicates that a lower value in this calculation suggests higher efficiency. The assumption is that a more efficient bank would suffer lesser risks. (Berger & De Young, 1997). When a highly experienced bank managers are able to monitor clients at less expenses (Berger et al., 1997), high bank efficiency will reduce banks' probability of insolvency.

Using the traditional hypothesis of competition-efficiency, competition benefit the distribution of resource and shifts profit to more efficient businesses and thereby enhances the efficiency of businesses (Tirole, 1988). With increasing competition, banks are pressured to specialize, offer services at cheaper prices, and reduce costs (Zarutskie, 2013). Competition also pushes banks to strengthen efficiency of lending and lower down the credit risk (Dick & Lehnert, 2010).

Bank regulation impacts the efficiency of the banks. Banking regulation combines supervisory and restrictive policies aimed at both safeguarding the banking sector against excessive risk-taking and minimizing moral hazard (Barth, Caprio, & Levine 2004).

Fang, Lau, Lu, Tan and Zhang (2019) identify that the positive effect of cost-effectiveness on profitability is greatest when banks are confronted with higher risk

levels and more competition. They also indicate that cost efficiency and bank profitability have positive relationship, while greater impact is shown for the banks with higher risk-taking behavior. This result can be clarified by the assumption that there would be higher levels of risk that incurring higher amount costs and expenses, which substantially decreases the profitability of the banks, if the banks can optimize the asset, the extra expenditures or costs would be partially or completely covered the costs suffered and the bank profitability will be improve.

5.2.11 Net interest Margin

Net interest margin (NIM) is a unit of measurement contrasting the margins of net interest created by a financial institution from credit products, with the outgoing interest it charges to savings account holders and deposit certificates.

Hawtrey and Liang (2008) stated that net interest margin related to market strength, operating expenses, risk avoidance, interest rate uncertainty, credit risk and loan volume. Credit risk is the risk to earnings and capital arising from the failure of an obligor to satisfy the provisions of any contract with the bank or the failure of the obligor to act as decided (CBK, 2005). Angbazo (1997) suggests that the default risk of US banks is strongly linked to the margin of interest of the bank. Demirgüç et al. and Kunt Huizinga (1999) notes that the risk of credit calculated depends on loans to the total asset ratio has an impact on margins of interest positively. There was a positively linked among loan to total asset ratio with margins of interest (Abreu & Mendes, 2003). Valverde and Fernández (2007) demonstrate that risk of credit and net interest margins of 7 European nations have positive relationship.

Existing research shows that banks providing risky loans can be forced to keep a bigger volume of provisions. In effect, this case could cause them to pay higher margins to cover the bigger default risk, which inevitably contributes to a positive effect. (Drakos, 2002; Maudos & Fernández de Guevara, 2004). Net interest rate margins will be positively impacted by credit risk, as indicated by empirical data. The credit risk coefficients are supposed to be positive since a large percentage of bad loans will force banks to raise their interest margins with a risk premium to offset potential default risk.

The effect of several widely used determinants, including the structure of market, credit risk, liquidity risk and size of operations, differs across banks' ownership structure, but affects operational costs and risk aversion absolutely the same. (Fungacova & Poghosyan, 2011)

De Jonghe (2010) mentioned that banks with a higher interest margin or higher loan-to-asset ratio are seen to contribute less to the instability of the banking system, as higher levels of such ratios decrease the tail betas of banks. Measurements of bank specialization for traditional intermediation, for example the net interest margin and the loan-to-asset ratio substantiate the results that traditional banking practices are less risky. So, we will assume that banks that rely profitably on lending contribute more to the stability of the banking system than diversified banks.

5.3 Implication of Study

First of all, the finding stated the individual who has CEO duality characteristic in the Islamic bank will has more control power and the other executives is limited on their controlling power. Suppose splitting the task of executives and board duties will enable

bank for more efficiency. Therefore, the main reason why Islamic banks become inefficient is because the individual who has CEO duality characteristic has more control power than other executives and this lead the banks tend to be less efficient. Inefficient bank will take less risk. In short, the Islamic banks should improve governance procedures that can lead to higher efficiency.

Moreover, shariah supervisory board showed positively significant to z-score. It means the larger of shariah board size able to reduce the bank's risk-taking behaviour. Shariah board member helps implementing risk-sharing concept and avoiding the three prohibited elements in Islamic finance when carrying out its day-to-day operations.

Next, the finding suggest bank with large bank size will has lower z-score, this means large banks will take more risk than small bank. In general, larger bank indicate more stable and low risk. This is because they have done great job on income diversity. However, we find that large Islamic banks will have higher risk. This is because large Islamic banks faced challenges of credit risk management. The main issue is change off rate. Charge off rate is a proxy of bad debt for bank perspective. High charge offs lead to insolvency problem. In general, the more capital a bank has, the lower its charge off rate. However, if the Islamic bank has more low quality as a proportion of total capital, the charge off rate. Based on findings, when the Islamic banks grow and become larger, the charge off rate will tend to become higher. Thus, Islamic bank should control their capital quality and avoid finance money to unsecured assets.

On the other hand, the finding mentioned there is negative and significant relationship between PhD degree holder on Shariah board and Z-score. This implicate the field in PhD degree of the scholar play an important role but not the education level. For example, the scholar who master in investment field and complete his study of PhD degree, the scholar tend to focus on investment, this imply the scholar emphasize on return this will lead the scholar have high risk taking behavior, meanwhile the scholar

who master in risk management field and complete his study of PhD degree such as Financial Risk Management (FRM). The scholar will focus on controlling risk, this lead the scholar will become more conservative and tend to become low risk taker. On the other hand, if the scholar who master his PhD degree in agriculture field, this field of study may not function well in risk management. Therefore, Islamic banks should select the scholar who has PhD Degree that related to banking sector.

Furthermore, the finding stated positive but not significant relationship between board size and Z-score. This indicate the number of board member is not important on risk taking decision on certain conditions. We found that when a Islamic bank has plenty of investment opportunities, a larger board does not result in lower risk taking. In contrast, the effect of a larger board caused significant reduction in the proportion of risky projects. Thus, the Islamic banks should just pick few high-quality investment from the plenty of investments to avoid over high risks.

Shariah member who sit on other SSB has a positive relationship with z-score. It means that the more member in shariah board sit on other shariah board, the less of bank's risk-taking behaviour. This is because cross membership in other Islamic banks will provide more experience for SSB members and allow them to compare best practices in Islamic banks. Cross-membership help Islamic banks serve as a forum for information and makes information more accessible. However, it showed insignificant in result. We assumed that it is because most of the same member of shariah board sit on other shariah board. Some well-established or authoritative shariah scholar members sit on many shariah board in different Islamic banks. This made the shariah board most likely follow or adopted their decision-making.

5.4 Limitations of Study

5.4.1 Bank's lack of complete records

One of the limitations we faced in the course of data collection is the incomplete information disclosed by some banks. In certain cases, we faced technical difficulties like bank annual reports that are without English translations. Some banks were also missing certain years' annual reports when checked from online sources such as the bank official website or third-party sites. Requests made for these banks to send us a copy of their missing annual reports or to provide additional disclosure on governance data went unheeded. We included examples of banks that persistently have these problems below, sorted by country.

5.4.2 Lack of disclosure transparency standards across regions

Banks from different regions have different regulations governing their disclosure of governance data. We found it hard to find certain information on governance-related aspects of Islamic banks' operations such as board of directors' meeting attendance and frequency, the expertise qualifications of Shariah board members or independence of directors. This was especially noticeable for banks in countries belonging to the MENA region. Thus, we had to limit ourselves to only testing for governance variables that were of sufficient sample size.

5.5 Future Recommendations

Based on our research, we recommend that regulatory bodies for Islamic banks globally set a standard for disclosure of corporate governance data and accounting data. We believe this will be beneficial to the global Islamic banking industry in the long term. Some of those benefits will come in the form of global benchmarks for Islamic banks. Another benefit is the problem of information asymmetry will probably be reduced.

Due to insufficient information, we did not test for the effects of Shariah board scholars' expertise in shariah and finance field. We found difficulty in verifying the various Shariah board scholars' education field qualifications. Several previous studies have used the previously mentioned scholar field of expertise as a variable. However, the scope of their study used a smaller sample size or focused on a more specific geographic region. We feel that scholars' field of expertise could provide more in-depth information about the overall effect of Shariah governance on Islamic banks for future researchers. This is especially true for how Shariah boards affect bank risk-taking behaviour aside from board size, multiple board membership and PhD qualifications.

5.6 Conclusion

Our study, while limited in scope, has covered the crucial elements of Islamic bank governance and produced significant results that can be added upon by future researchers. While there are currently many competent research frameworks on innovative ways to investigate the challenges currently faced by Islamic banking industry, the current research that bears empirical results is not keeping up with the growth of the Islamic banking industry.

We have included several suggestions for Islamic banking regulators and future researchers that could benefit both the industry and the academic community. We have also thoroughly discussed the results of our findings which can be added to the current limited literature on Islamic bank governance.

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APPENDICES

Appendix 4.1: Result of FEM

```
Fixed-effects (within) regression               Number of obs      =       369
Group variable: idc                             Number of groups   =        69

R-sq:                                           Obs per group:
     within  = 0.4281                                         min =         1
     between = 0.2435                                         avg =       5.3
     overall = 0.1812                                         max =         8

                                                F(10,290)          =     21.71
corr(u_i, Xb)  = -0.7641                        Prob > F           =    0.0000

------------------------------------------------------------------------------
      ZSCORE |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         SSB |   .1099423    .061001     1.80   0.073    -.0101184    .2300031
```

```
             PHD |  -.1214849   .0464415    -2.62   0.009    -.2128901   -.0300797
            OSSB |   .0575085   .0435012     1.32   0.187    -.0281095    .1431266
           BOARD |   .0294452   .0151091     1.95   0.052    -.0002921    .0591825
            CEOD |   .3378415   .1309093     2.58   0.010     .0801886    .5954944
              BS |  -.1353478   .0765897    -1.77   0.078      -.28609    .0153943
              CI |  -.0016797   .0005834    -2.88   0.004     -.002828   -.0005314
              IB |   .0001358   .0001587     0.86   0.393    -.0001766    .0004482
              OH |  -.1770352   .0139775   -12.67   0.000    -.2045455    -.149525
             NIM |   .1044145   .0154186     6.77   0.000     .0740679    .1347611
           _cons |   2.055322   1.187981     1.73   0.085    -.2828356    4.393479
-----------------+------------------------------------------------------------------
         sigma_u |  .75982895
         sigma_e |  .35311981
             rho |   .8223823   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(68, 290) = 2.85                     Prob > F = 0.0000
```

Appendix 4.2: Result of FER

```
Fixed-effects (within) regression               Number of obs      =       369
Group variable: idc                             Number of groups   =        69

R-sq:                                           Obs per group:
     within  = 0.4281                                         min =         1
     between = 0.2435                                         avg =       5.3
     overall = 0.1812                                         max =         8

                                                F(10,68)           =      6.83
corr(u_i, Xb)  = -0.7641                        Prob > F           =    0.0000

                                    (Std. Err. adjusted for 69 clusters in idc)
------------------------------------------------------------------------------
             |               Robust
      ZSCORE |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         SSB |   .1099423   .0603121     1.82   0.073    -.0104086    .2302932
         PHD |  -.1214849   .0720889    -1.69   0.097     -.265336    .0223662
```

OSSB	.0575085	.0491794	1.17	0.246	-.0406275	.1556446
BOARD	.0294452	.0296746	0.99	0.325	-.0297696	.08866
CEOD	.3378415	.1367341	2.47	0.016	.0649928	.6106902
BS	-.1353478	.0604524	-2.24	0.028	-.2559787	-.014717
CI	-.0016797	.0015431	-1.09	0.280	-.0047589	.0013994
IB	.0001358	.0000994	1.37	0.177	-.0000626	.0003343
OH	-.1770352	.0363427	-4.87	0.000	-.2495559	-.1045146
NIM	.1044145	.0319606	3.27	0.002	.0406382	.1681908
_cons	2.055322	.9088778	2.26	0.027	.2416842	3.868959
sigma_u	.75982895					
sigma_e	.35311981					
rho	.8223823	(fraction of variance due to u_i)				

Appendix 4.3: Result of REM

```
Random-effects GLS regression                   Number of obs     =       369
Group variable: idc                             Number of groups  =        69

R-sq:                                           Obs per group:
     within  = 0.3576                                         min =         1
     between = 0.6039                                         avg =       5.3
     overall = 0.4708                                         max =         8

                                                Wald chi2(10)     =    272.26
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0000

------------------------------------------------------------------------------
      ZSCORE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         SSB |  -.0145271   .0191073    -0.76   0.447    -.0519767    .0229224
         PHD |  -.0276023   .0240523    -1.15   0.251     -.074744    .0195394
        OSSB |   .0131773   .0223723     0.59   0.556    -.0306716    .0570261
       BOARD |  -.0026622   .0091958    -0.29   0.772    -.0206856    .0153613
```

```
            CEOD |   .2134776    .099346     2.15   0.032     .0187629    .4081922
              BS |   .0432929   .0131851     3.28   0.001     .0174506    .0691352
              CI |  -.0024979   .0005155    -4.85   0.000    -.0035083   -.0014875
              IB |   .0002762   .0001265     2.18   0.029     .0000283    .0005241
              OH |  -.1081866   .0086862   -12.46   0.000    -.1252112    -.091162
             NIM|   .0758368   .0089123     8.51   0.000      .058369    .0933045
           _cons |  -.1403669    .251735    -0.56   0.577    -.6337585    .3530247
-----------------+------------------------------------------------------------------
         sigma_u |  .12366715
         sigma_e |  .35311981
             rho |  .10924976   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Appendix 4.4: Result of Hausman Test

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	FEM	REM	Difference	S.E.
SSB	.1099423	-.0145271	.1244695	.0636594
PHD	-.1214849	-.0276023	-.0938826	.0445197
OSSB	.0575085	.0131773	.0443313	.0417856
BOARD	.0294452	-.0026622	.0321074	.0136547
CEOD	.3378415	.2134776	.124364	.1023487
BS	-.1353478	.0432929	-.1786407	.082402
CI	-.0016797	-.0024979	.0008181	.0003719
IB	.0001358	.0002762	-.0001404	.000118
OH	-.1770352	-.1081866	-.0688486	.0125096
NIM	.1044145	.0758368	.0285777	.0142409
_cons	2.055322	-.1403669	2.195688	1.269679

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

```
Test:  Ho:  difference in coefficients not systematic

             chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =       53.62
            Prob>chi2 =      0.0000
```

(V_b-V_B is not positive definite)

Appendix 4.5: Result of Breusch and Pagan Lagrangian Multiplier Test (BPLM Test)

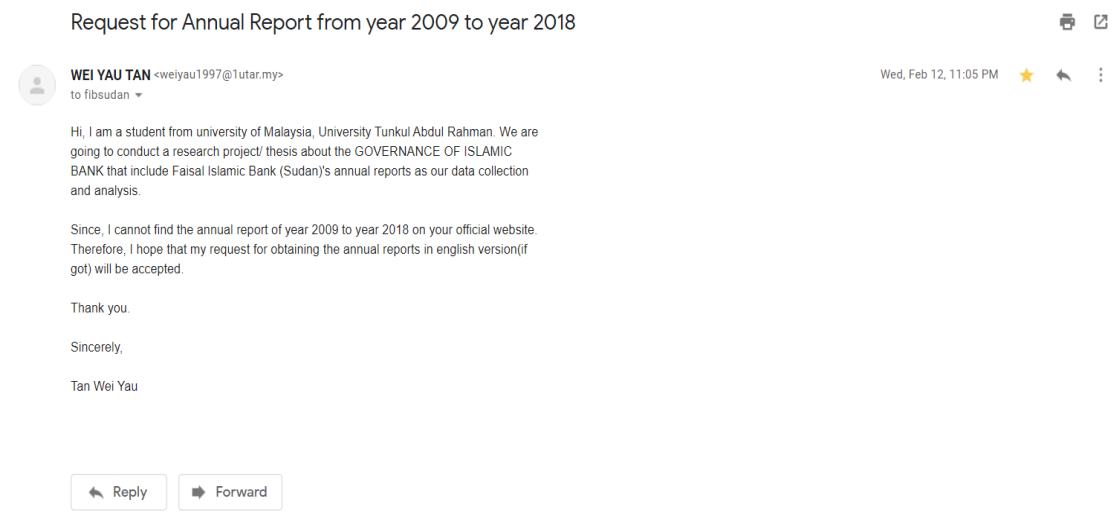
```
Breusch and Pagan Lagrangian multiplier test for random effects

        ZSCORE[idc,t] = Xb + u[bank] + e[idc,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                  ZSCORE |    .310862          .55755
                       e |   .1246936        .3531198
                       u |   .0152936        .1236672

        Test:   Var(u) = 0
                             chibar2(01) =    18.51
                          Prob > chibar2 =   0.0000
```

Appendix 4.6: Request for Faisal Islamic Bank (Sudan)'s annual reports



Request for Annual Report from year 2009 to year 2018

WEI YAU TAN <weiyau1997@1utar.my>
to fibsudan

Wed, Feb 12, 11:05 PM

Hi, I am a student from university of Malaysia, University Tunkul Abdul Rahman. We are going to conduct a research project/ thesis about the GOVERNANCE OF ISLAMIC BANK that include Faisal Islamic Bank (Sudan)'s annual reports as our data collection and analysis.

Since, I cannot find the annual report of year 2009 to year 2018 on your official website. Therefore, I hope that my request for obtaining the annual reports in english version(if got) will be accepted.

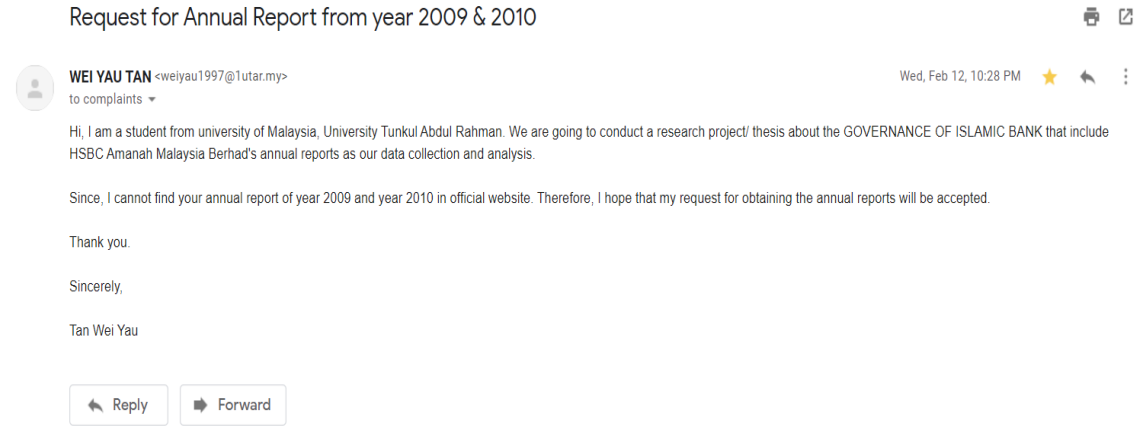
Thank you.

Sincerely,

Tan Wei Yau

Reply Forward

Appendix 4.7: Request for HSBC Amanah Malaysia Berhad's annual reports



Request for Annual Report from year 2009 & 2010

WEI YAU TAN <weiyau1997@1utar.my>
to complaints

Wed, Feb 12, 10:28 PM

Hi, I am a student from university of Malaysia, University Tunkul Abdul Rahman. We are going to conduct a research project/ thesis about the GOVERNANCE OF ISLAMIC BANK that include HSBC Amanah Malaysia Berhad's annual reports as our data collection and analysis.

Since, I cannot find your annual report of year 2009 and year 2010 in official website. Therefore, I hope that my request for obtaining the annual reports will be accepted.

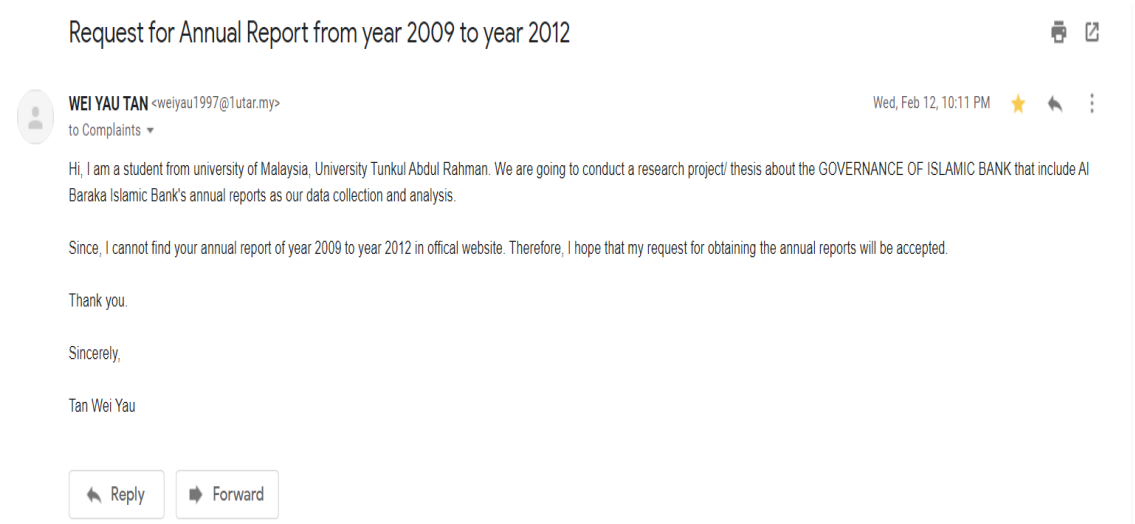
Thank you.

Sincerely,

Tan Wei Yau

Reply Forward

Appendix 4.8: Request for Al Baraka Islamic Bank's annual reports



Request for Annual Report from year 2009 to year 2012

WEI YAU TAN <weiyau1997@1utar.my> Wed, Feb 12, 10:11 PM

to Complaints

Hi, I am a student from university of Malaysia, University Tunkul Abdul Rahman. We are going to conduct a research project/ thesis about the GOVERNANCE OF ISLAMIC BANK that include Al Baraka Islamic Bank's annual reports as our data collection and analysis.

Since, I cannot find your annual report of year 2009 to year 2012 in offical website. Therefore, I hope that my request for obtaining the annual reports will be accepted.

Thank you.

Sincerely,

Tan Wei Yau

Reply Forward