

## CHAPTER THREE :LITERATURE REVIEW

### 3.1 Introduction

This section is divided into three parts to review the existing literature that gives the motivation for this study. First, the bank's profitability and insolvency risks measures were discussed to give a clear direction of the variables under study. This is followed by the discussions on the relationship of the model I specifications, which is a direct relationship (i.e., X on Y). Various bank specific factors and macroeconomic factors that determine bank's profitability, and insolvency risks were explored by relating the previous studies with current research and identified the research gap. The second part reviews the existing literature for model II specifications (i.e., X on M). In this section, bank specific factors and macroeconomic factors of liquidity are reviewed based on the existing studies and the literature gap is identified. The next part, review the literature on model III specifications. Here the relationship of the bank's liquidity and profitability and insolvency risks was explored and also the research gap was identified. Lastly, the chapter closed with a summary of the existing literature and the study gap which the whole study sought to close.

### 3.2 Measure of Banks Profitability and Insolvency Risk (Z Score)

The term profitability is a relative concept. In this perspective, the value itself is not definable, but it depends on the profit amount benefitted from the transaction with other businesses such as total investment, sales, or equity capital. There is a cut-off mark that over many years a specific portion must be achieved for profitability to cover the full costs. If not, the company may experience losses that will be borne by the capital.

If this continues to occur for an elongated period, the total capital in the company can be lost and lead to dismissal or insolvency of the firm.

In short term, covering long-term costs is not attainable. If it continues, fund providers will be afraid to deal without prepayment, and incoming lenders will make any efforts to make sure their investments are secured. Moreover, equity holders will have other investment alternatives that will ensure a sound return. This type of firm may be unattractive to both customers and stakeholders. Thus, a policy that will maximize a positive return (profitability) must be followed by the management which will make it more competitive to the public. In order to achieve this target, all sections (departments) should strive to improve in order to earn more profits and reduce cost which will maximize the efficiency, profitability and solvency. The Chief Financial Controller (CFO) must also be included in these requirements. His contribution mainly concentrates on two parts: i) make optimal funding structure and secure the liquidity, and ii) reduce costs. Vormbaum, (1995) described all this requirement as elasticity or flexibility. For the finance section, the optimal level is between liquidity and indebtedness. Even though the optimal level was indicated at a corporate level, financial institutions can essentially apply it. The capital base is eroded by losses up to the level that tempers capital adequacy ratio requirements, which subsequently lead to the loss of license. Many lenders, investors, and customers may already lose their confidence and withdrew their engagement with the bank even before such stage is reached.

This study uses three dependent variables to estimate the factors that determine profitability of Islamic and conventional banks in Malaysia. These are; Return On Assets (ROA), Return On Equity (ROE) and Net Interest Margin (NIM). The study also consider a variable that indicate the bank's insolvency risks (i.e., Z Score) as another dependent variable.

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

Return on Assets is net earnings per unit of a given asset. Generally, the return on assets equals profit after tax over total assets. In this study, ROA is measured by the net income over the total assets of the bank. ROA is the result of efficient management in profit generation on each dollar of investment (Hassoune, 2002). A particular concern is given to the bank's ROA as it precisely measures the performance of the assets. A higher ratio indicates the higher ability and better performance. ROA is selected as the dependent variable in this study because it helps to identify the effectiveness of the assets of the bank.

### **3.2.2 Return on Equity (ROE)**

Return on equity is net earnings per dollar of total equity capital. Return on equity equals profit after tax/equity capital. ROE indicates the amount of profits generated by the bank on shareholders' investment. Net income over shareholders' equity is used to measure the bank's ROE. ROE also determine the degree of the bank's management efficiency in using the shareholders' fund. A higher ratio indicates higher managerial performance (Hassan & Bashir, 2003)).

### **3.2.3 Net Interest Margin**

Net interest margin (NIM) can be explained as a ratio of interest income divided by the total earning assets. The average net interest margin for banks in Malaysia during the fourth quarter of 2006 was 1.52%. This was the lowest average net interest margin over the last 20 years, at the same time for the Malaysian banks during the fourth quarter of 2011, when the net interest margin was 4.93%. In the fourth quarter of 2016, the

average rate was achieved at 1.93%. This shows that a healthy net interest margin for banks in Malaysia is between 2 and 4% in the 21st century (World Bank).

Based on the above, the net interest margins remain relatively constant between small to medium-sized banks. However, the value may sometimes shrink vividly among the large banks. Based on this, the net interest margin is taken into consideration among the factors that affect banks' profitability. Thus, this study uses this variable as one of its dependent variables.

#### **3.2.4 Bank Insolvency Risk Measure (Z Score)**

The risk level in a bank, which is often termed as bank risk-taking, can be measured through insolvency risk (Barry et al., 2011). The problem of insolvency in banks reveals the number of losses or failure in the exposure amount that will cause a reduction in the bank's capital reserves which is used as a buffer at the time of shocks to offset any adverse effects. Insolvency risk in banks shows how the banks' distanced itself from bankruptcy at the time of the failure. It is measured through z-score. If z-score is lower or negative, it means the bank is in a riskier environment. However, if the z-score is higher or positive, it indicates that the banks are more safe and solvent. Bank risk is measured in this study through z-score. Z-Score becomes a popular bank's insolvency risks measure as it seeks to measure both capital and bank's profits that acts as a buffer to the banks with the standard deviation of returns based on the grounded concept. In other words, z-score estimates how many standard deviations a bank is distanced from exhausting its capital base. When the z- score is higher the probability for banks to become insolvent is lower. Thus, it provides a more direct bank's insolvency risks measure than simple leverage measures. Z-score can be calculated using the following formula:

$$Z = \frac{ROA + (Equity / Assets)}{\sigma ROA}$$

$\sigma ROA$

Based on the above formula, ROA is the bank's return on assets; E/A is the ratio of equity to total assets (i.e., capital adequacy ratio), while  $\sigma ROA$  is the standard deviation of return on assets. This study measures the standard deviation using a three-year rolling time window in order to allow for sufficient variation in the denominator of the z-score. In this way, the study avoids a situation that z-score is only driven by a yearly change in the levels of capital and profitability. Many studies frequently measure the bank's insolvency risks through z-score (e.g. Beck et al. 2013, Cubillas & González, 2014; Fu et al., 2014; William, 2014, and Ghosh, 2014). However, mostly concentrate on conventional banks.

There are many reasons for the popularity of z-score as a tools to measure the insolvency risks of the banks. (i) Financial institution's insolvency is inversely related to the s-score, for instance, the probability that the value of banks debt exceeded the value of their assets. Put it in another way, if the ROA is distributed normally, the z-score estimates the extent which standard deviations of the bank's return (measured through ROA) if it falls, the equity will be depleted. Even if returns are not distributed normally, z-score is the lower bound on the bank's defaults probability. (ii) z-score has a practical advantage since it can easily be computed transparently for all banks sample because it only requires accounting information. (unlike, market-based measures i.e., distance to default calculations that needs markets that do not exist or illiquid for numbers of banks in the sample). (iii) Many studies confirmed that the z-score is a useful tools to measure the bank's insolvency risks. For instance, Čihák and Hesse (2010), used a sample of 29 countries, out of which 12 of them has systemic banking crises. The finding shows that significantly low s-score characterize these banks during the

crisis compared to other banks. (iv), Despite the facts that the z-score measure, did not explicitly includes the bank's exposure to Credit Default Swaps (CDs), Collateralized Debt Obligations (CDOs) or subprime mortgage products individually, it eventually indicates that these exposures at the final calculation shows a lower z-score due to low ROA, low capital adequacy ratio or high standard deviation of ROA.

### **3.3 Factors Affecting the Bank Profitability (Model 1)**

#### **3.3.1 Capital Adequacy Ratio (CAR) and Bank Profitability**

Basically, the researchers used Structure Conduct Performance (SCP) concept, Relative Market Power (RMP) concept and Efficiency Structure (ES) concept to study the relationships between CAR and bank's profitability (Muda, et al, 2013)). This study measures capital adequacy ratio variable using 2 items (i.e., equity over total assets and equity over net loans). The performance of banks through their internal factors can be determined based on the adequacy of capital that they holds. Athanasoglou, (2005) explained capital in the banking sector as the available amount of funds or money, which will support the banks financing activities and act as a buffer during hostile situations. Diamond & Rajan (2000) opined that banks with higher capital would have a lower level of distress. Though there are certain drawbacks of holding unnecessary high capital, as it leads to the low demands of liability, nevertheless the capital is by far the cheaper source of funds for the banks. Capital adequacy indicates a certain level of capital that is required by any bank to hold in any jurisdiction which will enable it to withstand risks, such as market, liquidity, operational and credit. In a study by Dang (2011), capital adequacy ratio (CAR) is used to evaluate the capital adequacy of a bank. The ratio is also used to gauges the strength of a bank to withstand a shock during the financial crisis. The findings showed that it has a direct proportion to the resilience of a

bank at a time of distress and it also directly affects profitability by determining the expansion to riskier investment that will generate more profit.

The relationship between capital adequacy and the bank's profitability is expected to be positive, in which higher capital adequacy improve the bank's profitability. There are various studies on the relationship between CAR and bank profitability. However, evidence from these studies are contradictory. Some studies shows a positive and significant relationship between CAR and banks' profitability (Ahmad & Mohamad, 2011;, Dietrich & Wanzenried 2010, Fadzlan & Muzafar, 2010, Sastroswito & Suzuki 2011, Ramadan et al. 2011, Ayadi & Boujelbene, 2012, El Biesi, 2010, Rami, 2012, Shams et al. 2012, and Hasanov, et al. 2018). Others indicate negative and insignificant relationships e.g. Ali et al. (2011), Saira (2011), and Wasiuzzaman & Tarmizi (2010). Other studies found neutrality between CAR and bank profitability (Muda, et al, 2013;), Idris (2011), and Said & Tumin, 2011). These differences in findings might be due to the time factor and methodology used. Hence, the study on capital adequacy and the bank's profitability must be conducted continuously in order to provide appropriate advises to all stakeholders.

In a study by Athanasoglou, (2006), the Generalized Method of Moment (GMM) technique was used for panel data in Greek banks for the period between 1985-2005. They found a positive and significant relationship between capital adequacy and bank profitability. Abdel-Hameed (2000) used cross-country panel data to analyses the factors that determine profitability in Middle-east countries. Unlike the previous studies, this study focused solely on Islamic banks and showed that an increase in the capital generate higher profitability.

On the other hand, Wasiuzzaman & Tarmizi, (2010) conducted their studies on the profitability of Islamic Banks in Malaysia, using the Ordinary Least Square (OLS)

method, contrary to previous findings, the study found that capital has an inverse relationship with profitability and indicates a negative relationship. Even though the study was conducted in 2009, the researchers suggested the time frame of the study to be expanded further because profitability can change due to liberalization, new regulations, demand and future trends in the sector.

Overall, previous studies with regards to banks' capital adequacy and profitability provide mixed findings for both conventional and Islamic banks. Thus, there is a need for further studies on the issue.

### **3.3.2 Asset Quality and Bank Profitability**

This study used Balanced Portfolio concept to study the relationship between assets quality and bank's profitability. Three measurements define assets quality in this research; 1) Growth of gross loans, 2) Reserves for impaired loans over impaired loans and 3) the ratio of risk-weighted assets and off-balance-sheet activities divided by assets. Bank's profitability can be influenced by the quality of the assets held. Bank's assets include current assets, fixed assets, total financing granted to customers, as well as other short- and long-term investments such as investments in money market instruments and Sukuk. The substantial amounts of banks' income that came from financing/loans granted to customers. Thus, a positive relationship is expected to exist between banks' assets and profitability if most assets held are qualitative enough to contribute to their profitability. The more qualitative loan/financing provide more profits for the banks. The highest risk banks may undertake is the losses through delinquent facilities as a result of the low asset quality (Dang, 2011). One of the major concerns for all commercial banks is to keep the non-performing loans ratio as low as possible and increase the growth of its assets because high non-performing loans

undermine the quality of the assets held by the banks indicating a negative relationship between assets quality and profitability. The ratio of assets quality is expected to be high in order to burst the bank's profitability. (Sangmi & Tabassum, 2010, Alper & Anbar, 2011, and Hasanov, et al. 2018). Some studies found an asset quality to be negatively related to bank's profitability (Iqbal, 2012).

### **3.3.3 Management Efficiency and Bank Profitability**

The management's ability to use its resources efficiently, maximize income, and reduce operating costs is measured through financial ratios. The efficiency of management determine its profitability. Researchers often uses efficiency structure (ES) and Expense Preference concepts to study this relationships. Many ratios measure the management efficiency of the banks and the most frequent measures include; operating expenses to gross income, interest expenses to interest income, interest expenses to average interest-bearing liabilities and operating expense to average total assets. These ratios are expected to have a negative relationship with the bank's profitability. Other ratios that measure the management efficiency, as suggested by Sangmi and Tabassum (2010), include operating expenses to income ratio and overhead expenses over average total assets (in %). Lower ratios indicates better efficiency.

The efficiency can be explained as the ability of a bank to minimize its input factors and still achieves a given target output. In other words, it can also be defined as maximizing output and still maintains the same input. In terms of efficiency, there is no difference between banking and other industries – a company must keep its cost as minimum as possible and at the same time, achieve a higher output in order to survive. In other words, the efficiency ratio provides a measure of whether a bank is operating effectively or not. There are many studies on the efficiency of banks (e.g. Sufian, 2007,

Tahir 2011, and Shah et al. 2012). The findings of these studies confirmed that efficiency is among the critical factors that explain the differences in profitability between banks. Furthermore, these studies produce mixed results for both the conventional and Islamic banks. This might be due to time factors, different data analysis methods, political changes, and different ratios used.

Ahmad & Mohamad, (2011), Said and Tumin (2011), Wasiuzzaman & Tarmizi (2010) and Čihák & Hesse (2010) found a positive relationship between efficiency and bank's profitability. Fadzlan and Muzafar (2010), Sastrosuwito & Suzuki (2011), Davydenko (2011), and Rami (2012) documented a negative relationship between efficiency and profitability. On the otherhand, Idris (2011) and Ramadan et al. (2011) found an insignificant relationship . Thus, there is need to do further study on the variables and issues at hand.

#### **3.3.4 Earnings Quality and Bank Profitability**

As per the previous researches, this research used Signaling concept to investigate the relationship between earnings quality and bank's profitability. Earning quality positively impacts on bank's profitability (Nguyen et al. 2012) This is because as the banks' earnings increased through interest income, non-interest income, and other income, the overall profitability measured through ROA, ROE and NIM increased. However, a study by Said et, al. (2008), investigates the impact of bank's earning measured through interest-earning ratio on Malaysian banks profitability. The findings shows a negative relationship between banks interest income and ROE. The negative earnings coefficient shows that, when there is an increase in the bank's net interest income that expand through their intermediation activities, the profitability (measured through ROEs), tend to decrease. The overall fall in the bank's returns could be a result

of either a decline in net income or an increase in the bank's capital adequacy ratio. Although the banks are actively increasing their intermediation activities and generating a high-interest income, the overall activities can harm their total net income if they conservatively maintain their assets portfolios. This may be due to their response to conservative policy on loan loss. Thus, a vast provision for the bank's loan loss reserves is to be made, which has the negative effect of decreasing the banks' profitability (i.e., ROE).

Based on the above conflicting results, this research measured the earning quality through, Interest-Earning Ratio, Operating income over average assets and Non-Interest Income over Gross Revenues and try to find the effects of earnings quality on banks profitability.

### **3.3.5 Inflation Rate (INF) and Bank Profitability**

Inflation is defined as a persistent increase in the general prices of goods and services in an economy. This research used uncertainty hypothesis to study the relationship between inflation and bank's profitability. When inflation is high, the cost of goods and services is high while the income remains constant. In his study, Perry (1992) suggests that the degree in which inflation affects bank profitability rests on whether inflation is anticipated or unanticipated. If it is anticipated, the bank managers can prepared to take the necessary adjustments in their interest rates in order to increase their revenues over costs. This will lead to higher profits (positive). However, if banks do not adjust their interest rate on time, their costs may exceed their revenues which will lead to a reduction in profits (negative). Furthermore; inflation will benefit banks in a situation of zero interest deposits with the condition that the depositors do not change the deposits to the interest-bearing account (Abdel-Hameed, 2000). If we look

at the fact that banks are able anticipate inflation better than a customer, inflation will surely improve banks' profitability (Musso, et al 2007). Inflation is usually expected to negatively impact the bank's profitability because banks have the capability to shift any rise in the interest rates due to inflation to their customers. Abdel-Hameed (2000), Fotios & Kosmidou (2007), Fadzlan & Muzafar (2010), Musso, et al. (2007), Vong & Chan (2008), Wasiuzzaman & Tarmizi, (2010), Al-Jarrah, (2010), Davydenko (2011), and Hasanov, et al. (2018) found a positive relation between inflation and banks' profitability. On the other hand, Fadzlan & Royfaizal (2008), Ali et al. (2011), Khrawish, et al. (2011), Muhammad & Sana (2012) and Rami (2012) found a negative relationship between inflation and banks' profitability. Meanwhile, Jasmine et al. (2011), Sastroswito & Suzuki (2011), Ramadan et al. (2011), Ayadi & Boujelbene (2012) documented an insignifnact relationship. This study assumed that banks did not anticipate any inflation in the future.

### **3.3.6 Gross Domestic Product (GDP) and Banks Profitability**

The total national outcome of an economy is measured through the Gross Domestic Product. Goods and services produced during a given year are measured through GDP. In order to measure the real GDP, the impact of rising prices is excluded from the actual increase in goods and services. The GDP is one of the factors customarily used as a macroeconomic indicator to evaluate the overall economy's total economic activity. GDP influences the demand for deposits and financing in banks. During the recession, particularly, GDP growth slows down and affects credit quality. In turn, nonperforming loans increase and further reduce banks profitability. The coefficient of this variable is expected to be positive. However, findings from the previous researches documented a mixed results, Wasiuzzaman & Tarmizi (2010), Ali

et al. (2011), Yu & Gan (2010), and Rami (2012) found a positive relationship between GDP and bank's profitability, while, Khrawish, et al. (2011) results shows a negative relationship. A studies by Yap (2012), Jasmine et al. (2011), Ramadan et al. (2011), Ayadi & Boujelbene (2012) and Muda, et al (2013) found an insignificant relationship of GDP and bank's profitability . Two items were employed to measure GDP in this research, i) the GDP growth rate which is measured by the real annual growth rate and ii) GDP per capita which is measured by GDP over the total population.

### **3.3.7 Concentration Risk and Bank Profitability**

Many studies existed in the literature examining the effects of concentration risk on the bank's profitability. These studies mostly used the Herfindal Index as an indicator of market structure. The Structure–Conduct–Performance (SCP) hypothesis argued that through paying a low rate for deposit and charging a high rate for loans, institutions would have the ability to have a monopoly in a concentrated market. In simpler words, this hypothesis means a low competition that results from a high market concentration leads to market power while high market power allows the banks to earn monopolistic power and high profit through exploiting the market. There are many pieces of studies that provide support for the SCP hypothesis. These include the studies by Rose & Fraser (1976), Heggstad (1977), Short (1979), Berger & Hannan (1989), Lloyd-Williams et al. (1994), Samad (2008), Fadzlan & Muzafar (2010), and Sastroswito & Suzuki (2011), and others.

Gilbert (1984) conduct a study that provided a summary of 44 studies on the relationship between market concentration and profitability in banks. The overall findings indicate that out of the 44 studies, 32 of them found a significant and positive relationship between bank concentration (market power) and profitability. In other

words, it is argued that the significant positive effects of concentration on the bank's profitability are not as a result of the rise in market power but rather a result of the high efficiency of the banks that has a large market share (i.e. concentration). This is based on the ES hypothesis, developed by Demsetz (1973), who finds that the institutions with high efficiency have the ability to increase their market shares. This high efficiency gives the firms high concentration and results in a low competition which will burst the overall profitability (Lloyd-Williams et al., 1994). In the same study, the finding shows that the banks with high efficiency can maximize their profits through two ways: (i) The banks maintained the current market size and policies on pricing; (2) Size expansion and the strategies for a price reduction. Berger (1995) found that a more efficient bank that has efficient management and uses new technology can increase both its market share and profitability. The efficiency-structure hypothesis is further supported by Brozen (1982), Seelanatha (2010) and Ramadan et al. (2011).

Both two hypotheses hold the viewpoint that more massive market power results in high concentration, and it eventually leads to a increased in the overall profitability, postulating a positive relationship between concentration and profitability. Notwithstanding, some studies found an insignificant relationship between market concentration and bank's profitability (Fotios & Kosmidou, 2007, and Ayadi & Boujelbene, 2012).

It should be understood that there are various ratios considered in calculating the concentrations/competitions ratios. These includes the following:

**1. Lerner index:** The Lerner Index is a measure of market power in an industry.

The Lerner index measures the **price-cost margin** - it is measured by the difference between the output price of a firm and the marginal cost divided by the output price. Under conditions of perfect competition, output prices equal

marginal costs (leading to an electively efficient equilibrium output) while prices move increasingly above marginal cost as market power increases, and head towards an oligopoly, duopoly or monopoly. The Lerner index lies between zero (perfect competition) and one (strong market power)

2. The **Panzar–Rosse** model builds a competition indicator (**H statistic**) that provides a quantitative assessment of the competitive nature of a market. The **H statistic** is the sum of equilibrium gross revenue elasticities with respect to each input price.
3. The Herfindahl-Hirschman Index (HHI): This is a commonly accepted measure of market concentration. It is calculated by squaring the market share of each firm competing in a market and then summing the resulting numbers. It can range from close to zero to 10,000.

Based on the above 3 measures and the interpretation of each one, this research observed that the Lerner index and Panzar-Rosse is more suitable for a companies other than the financial institutions, while HHI is the most commonly used concentration ratio by both banks and companies. This study decided to use HHI index due to its simplicity and in order to capture the degree of concentration of market share in the banking sector of Malaysia.

### **3.4 Factors Affecting the Bank Insolvency Risk**

#### **3.4.1 Capital Adequacy and Bank Insolvency Risk**

The literature that investigates the effects of capital on commercial bank's insolvency risks is largely divided. Some studies find that higher capital lead banks to take more risk. Koehn, & Santomero, (1980), in their seminal works, show that a capital ratio controls the banks that are uncertainty-avert. They adjust their portfolio of assets

by increasing risky financings, thereby increasing the bank's probability of default. Likewise, Kim, & Santomero, (1988) found a risk-based capital requirement to influence the banks to finance the riskier assets. Altunbas et al. (2000) study for 15 banks in European countries', found a positive relationship between bank capital changes and risk-taking.

A second category of the studies indicates that high regulatory capital results in low risk-taking by banks. For instance, Keeley & Furlong, (1990) suggest that higher requirements for regulatory capital, by reducing the problem of moral hazard produced by deposit insurance, decrease the banks' incentives to take on higher risk. Similarly, studies such as Jacques and Nigro, (1997) for U.S. banks, Ediz et al. (1998) for U.K. banks, Konishi & Yasuda (2004) for Japanese banks, and Maji & Dey (2012) for Indian banks, suggests a negative relationship between capital and insolvency risks for banks.

In Asian context, there is limited study for bank capital and risk. Only recent researchers started to study the association between bank capital and risk in this region. Lee & Hsieh (2013) used a sample of 42 banks in Asian countries. The finding shows a strong negative relationship between bank capital and risk-taking for banks. In particular, the findings showed that capital ratios are inversely related to banks risk-taking. Contrary, Haq et. al. (2014) studied listed commercial bank samples in 15 Asia-Pacific countries, which showed a mixed result. Notably, they find a negative relationship between bank capital and bank idiosyncratic and credit risks, while a positive relationship between bank capital and bank total and systemic risks. Both above studies on Asian banks include all commercial banks but have reported primarily mixed results. These mixed findings motivate further investigation.

### 3.4.2 Asset Quality and Bank Insolvency Risk

The existing literature consistently finds that a high loan growth rate (assets quality) leads to increased risk-taking by banks (Foos et al., 2010, and Jimenez & Saurina, 2006). As the growth will provide more profits to the banks and distanced them from the insolvency risks, there is a disagreement between academics about the effect of a business mix of a bank on bank risk. While some are of the view that non-interest activities such as investment banking provides an additional source of income to the banks and therefore can provide an overall income diversification which will increase their solvency, others are of the view that banks may experience insolvency risks if non-lending activities increased as this will lead to the higher non-interest income volatility. The recent financial crisis of 2008 shows evidence to support the latter hypothesis.

The study by Altunbas et al. (2011) finds that larger banks and the banks with excessive growth of loans are less stable. They opine that high fees and trading income through increased in the non-interest income leads to high risk, also heavily reliant on wholesale funding by banks leads to high risk as well. Demirgüç-Kunt & Huizinga (2010) did not see any evidence to support that high rates of growth in assets result in higher risk-taking. However, both studies find that the effect of a business model of the banks on risk-taking is analyzed using a sample of listed banks that are usually large and have high non-lending activities than non-listed banks such as savings and cooperative. This study measure assets quality by three items, i) growth of gross loans, ii) reserves for impaired loans over impaired loans and iii) the ratio of risk-weighted assets and off-balance-sheet activities over total assets. It also measures the bank's insolvency risk using z-score.

### 3.4.3 Management Efficiency and Bank Insolvency Risk

Two main hypotheses are associated with the impact of efficiency on the banking industry's risk of insolvency; (i) Bad management hypothesis and (ii) Moral hazard hypothesis. Bad management hypothesis (Berger & DeYoung 1997 and Williams 2004) suggests that an efficiency level that is low leads to high costs due to the bank's failure to monitor credit and excessive expenses in their operation. The efficiency declines will result in bank's increase insolvency risk because of reputational, credit, operational and market risks. The moral hazard hypothesis on the other hand (Jeitschko & Jeung 2005), argues that a low level of bank efficiency leads them to take higher risks. The problem of moral hazard is mainly a result of informational friction and the agency problem which will make managers of the banks take on higher risk.

The first study to examine the relationship between bank risk and efficiency is done by Kwan & Eisenbeis (1997). The study used a sample of bank holding companies for the period between 1986–1995 and test the interrelationship of interest rate risk, credit risk, capitalization, and operational efficiency. The findings show a positive impact between inefficiency and the bank's risk-taking. Altunbas et al. (2007) use a sample of European banks between 1992-2000 to investigate the relationships between capital, risk, and efficiency. The study measured the inefficiency through stochastic cost frontier. The finding indicates that inefficient banks have high levels of capital and low risk. Fiordelisi et al. (2011) studied a sample of commercial banks in the European Union for the period 1995 to 2007. They test the relationship between efficiency, capital, and bank risk. Efficiency is measured through a stochastic frontier approach that includes cost, revenue and profit efficiency, while three indicators measure the risk, (i.e., (i) non-performing loans divided by total loans, (ii) expected default frequency of 1-year ahead and (iii) expected default frequency of 5-year ahead). The findings show

that high cost and revenue efficiencies increase the bank's insolvency risk. Hsiao et al. (2010) use a sample of 40 commercial banks in Taiwan to examine the effect of financial restructuring (due to bank's insolvency) on the operating efficiency between 2000–2005. The results indicate low operating efficiency for banks during the reform 2002–2003 (i.e. at the insolvency) compared to the period before the insolvency (i.e., 2000–2001) while operating efficiency improved after the reforms period 2004–2005 (i.e. after the insolvency period). The improvement in efficiency after the insolvency period is due to the improvement in compliance with financial restructuring and bank risk management practices.

Overall, the impact of efficiency on bank insolvency risks produced an inconclusive result. This study used three items to measure bank efficiency, a higher ratio of these items indicates the bank's inefficiency (i.e. the percentage of overhead expenses over average total assets, total expense over total revenue and personnel expenses over net income) and to investigate the relationship of management efficiency to bank insolvency risks.

#### **3.4.4 Earnings Quality and Bank Insolvency Risk**

The interest rates and bank risk-taking relationship rises a concern between the academics. Some studies find that interest rates have impact on the bank's risk through profit-seeking mechanisms (Rajan, 2005). Accordingly, the banks' earnings from loan-related business declined when the interest rate is low. However, banks increase their risk-taking in order to seek higher profits. This means a positive relationship between the bank's earning and insolvency risks. Moreover, banks expect a high valuation of their assets and cash flow when the interest rate is low. This will then enable them to take more risks. On the other hand, low-interest rates mean loose on the part of monetary

policy, and it shows that the government is creating policies that will improve economic development, while the economic environment strengthens banks to invest in more risky projects and earns more profits.

### **3.4.5 Inflation and Bank Insolvency Risk**

When inflation is high, the cost of goods and services is also high while the income remains constant. This research measure inflation by the percentage change in the consumer price index. Generally, the interim high Real Interest Rate has a negative effect on the balance sheets of the banks (postulating a negative relationship between inflation and bank's solvency). This is if the banks failed to increase the lending rate to be in line with the rates of deposit (Demirgüç-Kunt & Detragiache, 1998). Furthermore, a high rate of inflation may also have a detrimental effect on the bank's solvency, because due to the high inflation rate, the banks may find it difficult to predict real deposits return and loans precisely. This may cause poor lending quality and poor decisions to borrow, thus, increase the insolvency risk for banks (Ivpcisc, et, al 2008). On the contrary, Rahim & Zakaria (2013) examined the solvency of Malaysian Islamic and conventional banks for the period between 2005-2010. The finding shows that inflation has a significant relationship with the Islamic bank's solvency. Rashid, & Khalid, (2017) studied the Pakistani banks and examined the impacts of inflation on the bank's performance and solvency. The finding shows that neither inflation nor interest rate uncertainty has any significant impacts on the solvency for conventional banks. A different result was found for the Islamic bank's study as the solvency of Islamic banks is found to have a significant impact on both types of uncertainties (i.e., inflation and interest rate). Particularly, the study found inflation to have a negative effect on the

bank's insolvency, while the interest rate has a positive and significant effect on the Islamic bank's insolvency.

### **3.4.6 GDP and Bank Insolvency Risk**

The GDP is one of the factors generally used as a macroeconomic indicator to evaluate the overall economy's total economic activity. GDP influences the demand for deposits and financing in banks, thus, these factors are expected to influence the direction of GDP in an economy. During the recession, particularly, GDP growth slows down and affects credit quality. Various studies examined the relationship between GDP and insolvency risks. However, different measured of insolvency risks were employed in these studies.

Männasoo & Mayes (2009) found a positive relationship between GDP growth and risk during a favorable macroeconomic condition. Louzis et al. (2012) found insolvency risks (measured through NPLs) in the Greek banking sector to be mainly as a result of the growth in GDP. Jimenez and Saurina (2005) investigate the banks in Spain for the period between 1984-2003. The finding showed insolvency risks measured through NPLs to have a significant impact on GDP growth. On the other hand, Rajan & Sarat (2003) found the growth GDP rate to negatively effects the credit risk which means negatively related to insolvency risks. In addition, Quagliariello (2007) find the economic growth to have a negative relationship with insolvency risks. Overall, the studies on GDP effects on insolvency risks produced an inconclusive results. By contrast, this study used z score to measured the insolvency risks in banks and investigates its relationship with GDP.

### 3.4.7 Concentration Risk and Bank Insolvency Risk

The empirical literature in this section discusses the relationship between bank concentration and risk-taking behavior. The previous researches use different methods to measure the concentration risk in banks (e.g., some use deposit market concentration, HHI etc). Bank solvency ratio, defined as the return on assets (ROA) plus capital adequacy ratio divided by the standard deviation of ROA, is expected to be positively related to bank concentration which means the higher bank concentration is correlated with higher solvency.

A study by Keeley & Furlong, (1990) estimated the extent of concentration risk in banks by using Tobin's Q. He defined concentration as the ratio of the bank's equity market valuation over the book value. He found that the bank's risk correlate with concentration. Brewer & Marc, (1996) and Rahman, (2010) found the banks with higher concentrations have a greater solvency ratio. On the other hand, Caminal & Matutes (2002) find that the relationship between the bank's concentration and their insolvency to be ambiguous. Hellmann et al. (2000) studied the Japanese financial-market in the 1990s, the finding shows that higher competition reduced the profitability for domestic banks, and this subsequently leads to the East Asian banks' insolvency that weakened the overall Japan financial system. Jayaratne & Philip (1998) used the bank performance measures such as ROA, ROE, and other credit quality indicators. The finding shows that after restrictions on banks' geographic expansion were lifted in the U.S., the profitability was improved significantly. Thus, an increase in the bank's concentration seems to have a positive relationship with the bank's insolvency. Furthermore, the literature on new bank entrants finds that reduction market competition (i.e., increase in concentration) may decrease the bank's insolvency (Shaffer, 1998).

Generally, many works of literature support the franchise value paradigm. However, in contrary, Boyd et al. (2006) uses a cross-country empirical study that supports the risk-shifting model using bank's insolvency measures of Z-Score and concentration measured through Herfindahl-Hirschmann Index (HHI). The study found a significant negative relationship between Z-Score and concentration risk. This means a more concentrated banking market is associated with a high risk of insolvency. Levy-Levy & Micco (2007) using the H-statistics measure also found an increase in the bank's insolvency as a result of the increase in concentration in 8 Latin American countries. Berger, et al. (2016) used H-statistics for 38 countries between 1980 to 2003 and found that the higher banking system concentration the fewer banks are prone to insolvency. Overall, the previous literature on the bank's concentration and insolvency risk suggests inconclusive findings.

### **3.5 Factors Affecting the Bank Liquidity (Model II)**

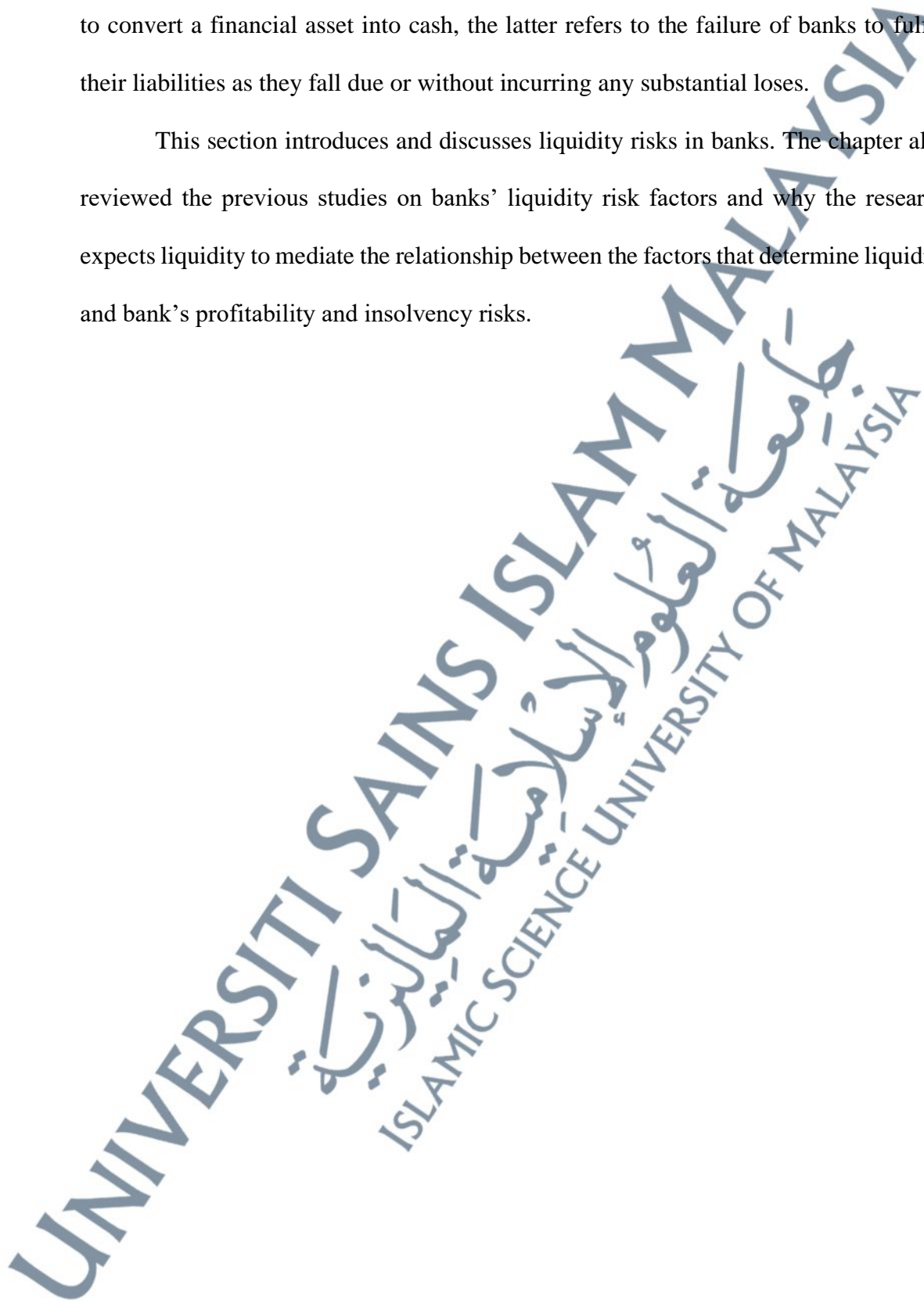
#### **3.5.1 Introduction**

Liquidity risk in bank can be explained as a risk of inability of the bank to meet the depositors' obligations or to finance the assets at the time of maturity at no or fewer costs or losses. Iqbal (2012) stated that the banks would suffer from insufficient cash or any other alternative when the depositors decide to withdraw their money, this is known as a liquidity problem. Banks' deposits usually are short term in nature while banks financing activities are mostly medium to long-term. Hence, mismatches arise most of the time between the bank's assets and liabilities in the balance sheets which unless handled properly, the banks may face the danger of liquidity risks.

The liquidity risk can be classified into two types, namely, the market liquidity risk and funding liquidity risk (Drehmann & Nikolaou, 2013; Mujtaba, 2014, and Ruozi

& Ferrari, 2013). While the former refers to the risk of inability or difficulty of banks to convert a financial asset into cash, the latter refers to the failure of banks to fulfill their liabilities as they fall due or without incurring any substantial losses.

This section introduces and discusses liquidity risks in banks. The chapter also reviewed the previous studies on banks' liquidity risk factors and why the research expects liquidity to mediate the relationship between the factors that determine liquidity and bank's profitability and insolvency risks.



**Table 3. 1:** Impact of Selected Factors on Profitability and Insolvency Risks

Factors	Positive	Negative	Insignificant	Expected Relationship to Profitability	Expected Relationship to Insolvency Risk
Capital Adequacy Ratio	Structure Conduct Performance (SCP) Concept, Relative Marker Power (RMP), ,Nicolo, (2015), Akhtar et al. (2011), Ahmad & Mohamad, (2011), Houcem & Ines (2011), Dietrich & Wanzenried (2010), Fadzlal & Muzafar (2010), Sastroswito & Suzuki (2011), Ramadan et al. (2011) Ayadi & Boujelbene (2012) El Biesi (2010) Rami (2012) Shams et al. (2012) Hasanov, et al. (2018)	Structure Conduct Performance (SCP) Concept, Relative Marker Power (RMP), Concept, Financial Fragility-Crowding out Effect, (Athanasoglou, 2006), Wasiuzzaman & Tarmizi, (2010), Ali et al. (2011) Saira (2011) Wasiuzzaman & Tarmizi (2010) Mollah & Zaman, (2015);	Structure Conduct Performance (SCP) Concept, Relative Marker Power (RMP), Concept, Muda, et al (2013) Idris (2011) Said & Tumin (2011)	Positive	Positive
Asset Quality	Balanced Portfolion Concept, Alper & Anbar (2011) Hasanov, et al. (2018)	Balanced Portfolio Concept, Iqbal (2012)	Balanced Portfolio Concept, Saira (2011)	Positive	Positive
Management Efficiency	Expense Preference concept, Efficient-Structure (ES) Concept, Ahmad & Mohamad, (2011), Said & Tumin (2011) Wasiuzzaman & Tarmizi (2010) Ćihák & Hesse (2010)	Expense Preference Concept, Efficient-Structure (ES) Concept, Akhtar, et al. (2011), Fadzlal & Muzafar (2010) Sastroswito & Suzuki (2011), Davydenko (2011), Ramadan et al. (2011) Rami (2012)	Efficient-Structure (ES) Concept, Idris (2011) Ramadan et al. (2011)	Negative	Negative

Factors	Positive	Negative	Insignificant	Expected Relationship to Profitability	Expected Relationship to Insolvency Risk
Earnings Quality	Structure Conduct Performance (SCP) Concept, Relative Marker Power (RMP), Nguyen et al. (2012)	Structure Conduct Performance (SCP) Concept, Relative Marker Power (RMP), Said et al. (2008)	Structure Conduct Performance (SCP) Concept, Relative Marker Power (RMP),	Positive	Positive
Inflation	Uncertainty Hypothesis, Wasiuzzaman & Tarmizi, (2010), Davydenko (2011) Fadzlan & Muzafar (2010), Al-Jarrah, (2010) Hasanov, et al. (2018) Wasiuzzaman and Tarmizi (2010)	Uncertainty Hypothesis, Khrawish, et al. (2011), Ali et al. (2011) Rami (2012), Muhammad & Sana	Uncertainty Hypothesis, Jasmine et al. (2011), Sastroswito & Suzuki (2011), Ramadan et al. (2011) Ayadi & Boujelbene (2012)	Negative	Negative
GDP	Fadzlan & Muzafar (2010), Ali et al. (2011), Yu & Gan (2010) Rami (2012) Smaoui & Salah (2011) Wasiuzzaman & Tarmizi (2010)	Khrawish, et al. (2011)	Muda, et al (2013), Yap (2012), Jasmine et al. (2011), Ramadan et al. (2011), Ayadi & Boujelbene (2012)	Positive	Positive
Concentration Risk	Structure Conduct Performance (SCP) Concept, Relative Marker Power (RMP), and Efficiency Structure (ES) Concept. Short (1979), Sastroswito & Suzuki (2011), Fadzlan & Muzafar (2010) Apergis (2014)	Structure Conduct Performance (SCP) Concept, Relative Marker Power (RMP), Efficiency Structure (ES) Concept, Ramadan et al. (2011).	Ayadi & Boujelbene (2012), Fotios & Kosmidou (2007).	Positive	Positive

Factors	Positive	Negative	Insignificant	Expected Relationship to Profitability	Expected Relationship to Insolvency Risk
Liquidity	Balanced Portfolio Concept, Risk Return Trade off concept, (Dang, 2011), Wasiuzzaman & Tarmizi, (2010), Vodová (2013) Berger & Bouwman (2008, 2009), Bologna, (2011), Vazquez & Federico (2012), Bordeleau & Graham (2010), Yan et al. (2011), Mohammad (2013), Ahmad & Mohamad, (2011)El Biesi (2010) Sham et al. (2012)	Risk Return Trade off Concept, Izhar & Asutay (2007), Rauch et al. (2010), Demirgüç-Kunt & Huizinga, 2009; Raddatz, (2010), Härle et al., (2010), King, (2013) Macroeconomic Assessment Group, (2010), Angelini et al. (2011) Gambacorta, (2011), Khrawish, et al. (2011), Fadzlani and Muzafar (2010), Saira (2011) Hasanov et al. (2018)	Said and Tumin. (2011), Muda, et al (2013), Idris (2011), Houcem & Ines (2011), Said & Tumin (2011), Davydenko (2011).	Positive	Positive

### 3.5.2 Liquidity Measures

In assessing the adoption of measure for liquidity risk, previous studies used different simple accounting measures such as ratio of total deposit to total asset (Ahmad & Mohamad., 2013), cash to total asset (Akhtar, et al., 2011; Iqbal, 2012; Sayedul, 2012, Mohammad, 2013; Muhammad & Muhammad, 2014), and the ratio of current asset to total liabilities (Ahmed et al., 2011) to investigate the impact of bank specific factors and macroeconomic factors on liquidity risk. From the regulatory monitoring perspective, there are few empirical studies by Cucinelli (2013), Horváth et al. (2012) and Brůna & Blahová (2016) and Dietrich, (2014), that considered the latest liquidity risk measures. They construct a more complex formula proposed by Basel III, namely; LCR and NSFR. These studies are considered inadequate, especially at this time of the trial period for LCR and NSFR, as most of them are done either using conventional banks or using inappropriate measures.

#### 3.5.2.1 Liquidity Coverage Ratio (LCR)

The LCR calls for banks to keep enough level of unencumbered, high-quality liquid assets that can be converted to cash to meet needs for a 30-calendar day time horizon under severe liquidity stress conditions specified by supervisors (Basel Committee on Banking Supervision, 2013.). The standard necessitates that this ratio should not be lower than 100% as the projected net cash outflow should at least equal to the stock of high-quality liquid assets. Few researchers employed LCR as a liquidity measures includes; Cucinelli (2013), Giannotti et al. (2011), Muhammad & Muhammad (2014), and Brůna & Blahová (2016). The implementation of LCR is said to lead to more capital- and liquidity-efficient business models and products (Härle et al., 2010), but concurrently will have negative impacts on banks profitability.

### **3.5.2.2 Net Stable Funding Ratio (NSFR)**

The NSFR is aimed to promote longer-term funding of the assets and activities of banking institution by establishing a minimum acceptable amount of stable funding based on the liquidity of an institution's assets and liabilities over a one-year horizon (Basel Committee on Banking Supervision, 2010). The NSFR is explained as a ratio of banks' Available Stable Funding (ASF) over Required Stable Funding (RSF). This ratio is required to be at least 100 percent. The NSFR is expected to have a significant effect on banks. its implementation is forecasted to lead to more efficient capital and liquidity business models and products (Härle et al., 2010). Explicitly, NSFR rules will set a limit on banks' ability in terms of maturity transformation, which is among the core banks functions. Consequently, observing NSFR standard by financial institutions will also have an impact on the bank's performance, including low profitability and crash on lending margins (Macroeconomic Assessment Group, 2010).

### **3.5.3 Factors that Determine Liquidity**

This section explores previous literature on the bank specific factors and macroeconomic factors of liquidity and links them with the liquidity. The section explains the items employed to measure each latent variable.

#### **3.5.3.1 Capital Adequacy Ratio and Bank Liquidity**

This research used Risk Absorption concept and Fragility crowdingout effect concept to investigate the relationship between CAR and bank's liquidity. Two items are used to measure the CAR in this research. (i) Equity over total assets (in %) and (ii) Equity over net loans (in %). CAR makes a liquidity position of a bank more attractive. In order to measure the bank's financial strength, its capital strength needs to be

examined. This will ascertain the bank's capability to absorb any substantial losses arising from operational, credit, market and liquidity risks. Due to the importance of CAR to banks, its concern is much prevalent that both supervisory and regulatory bodies in various jurisdictions recommend the ideal CAR to be maintained by every bank and the sanctions were enforced for any bank that breaches such threshold (Basel Committee on Banking Supervision, 2004). Each regulatory jurisdiction enforces a minimum CAR requirement for banks to be maintained which indicates the banks' ability to further its business. The capital size of any bank or financial institution provides flexibility in its financial statement. A higher CAR increases the liquidity position all things being equal. Excess capital will be utilized to cater for any short term and long-term liquidity needs and provide more financing/loan (Ayele, 2012).

During the financial crisis, the CAR held by a bank indicates the strength of such a bank to remain in the business and absorb the losses that may arise. Thus, a strong CAR is considered to have a directly proportional relationship to the resiliency of the bank at the time of crisis. Based on the above, various studies were conducted on the relationship between CAR and liquidity. Mahdi & Abbas (2017), Berger et al. (2016), Yaacob, et al. (2016) and Mohd Amin, & Abdul-Rahman, (2020), found a positive relationship between CAR and bank's liquidity while, Wasiuzzaman & Tarmizi, (2010), Shamas, et al. (2018) and Isik & Belke (2017) indicated a negative relationship. On the otherhand, Sayedul, (2012) and Sheefeni, & Peyavali, (2016) found an insignificant relationship between CAR and bank's liquidity.

### **3.5.3.2 Asset Quality and Bank Liquidity**

Three measurements define assets quality in this research; (i) growth of gross loans, (ii) reserves for impaired loans over impaired loans and (iii) ratio of risk-weighted

assets and off-balance-sheet activities divided by assets. The study used Commercial Loan Concept to examine the relationship between asset quality and bank's liquidity. The quality of assets held by a bank positively affects its liquidity (Vodova 2011, and Yaakub, et. al, (2017). On the otherhand, Iqbal (2012), Ghanim, et al. (2018), Isik & Belke (2017), and Abdul-Rahman, et, al. (2019) shows a negative relationship, while Sheefeni, & Peyavali, (2016) found an insignificant relationship between asset quality and bank's liquidity. The high asset quality held by bank in its books can be used to settle its liquidity issues when the need arises. The banks create assets through financing, whereby higher qualitative financing improves stability in a time of liquidity stress. Thus, a bank needs to be more curious in its financing activities so that the assets it creates will be qualitative enough to generate a positive impact on its liquidity. Based on the above, it is recommended that banks shall make more loans/financing which will uplift the quality of their assets. Such proxy signifies higher profit enjoyed by banks that are translated to higher liquidity as all its financing can be converted to liquid at any time without incurring expenses.

### **3.5.3.3 Management Efficiency and Bank Liquidity**

In order to investigate the effects of bank's efficiency on liquidity, this research used Efficiency Structure (ES) concept. The study employed three measures (i.e. the percentage of overhead expenses over average total assets, total expense over total revenue and personnel expenses over net income) to investigate the relationship of management efficiency over liquidity. The existing studies documented that management inefficiency affects the bank's liquidity but not the opposite causal relationship. Altunbas et al. (2007) employed the SUR approach in examining the bidirectional relationship between capital-risk-efficiency of banks from 15 European

countries from 1992 to 2000. The study used both credit and liquidity risks to proxy for bank risk and employed SFA to estimate cost inefficiency. The study discovered that the bank's efficiency score is related to the decrease in risk (liquidity risk and credit risk). This finding is also in line with the study by Wasiuzzaman & Tarmizi, (2010). Khalib et al. (2016) examined the cost efficiency and liquidity risk of Islamic banks and commercial banks. They estimated Basel III liquidity risk measures using LCR and NSFR. The results indicated that cost inefficiency poses no significant effect in the short-term liquidity (LCR) but a negative effect in long term liquidity, suggesting that cost inefficiency implies that it takes time to reduce liquidity risk in banking. Mohd Amin et al., (2017) used the panel dynamic system GMM to investigate cost efficiency-liquidity risk relationship on Islamic banks in OIC countries. The results show that the effect of cost efficiency on liquidity risk is diverse, depending on the combination of input-output specifications. Based on the intermediation approach, cost efficiency has a positive impact on liquidity risk, but the effect is negative when the value-added approach is used to measure cost efficiency. They suggest that efficiency has a significant influence on liquidity risk.

#### **3.5.3.4 Earnings Quality and Bank Liquidity**

This study defined earning quality by three measurement ratios as follows: Interest-Earning Ratio, Operating income over average assets and Non-Interest Income over Gross Revenues. In recent years, the measurement of earnings quality became increasingly attractive, particularly after large banks collapse in the U.S. Earnings are an essential item in the bank's financial statements, and it is one of the indicators of added quality for the banks. It is also an indicator that helps banks for the resource allocation in both money and capital markets. Essentially, the theoretical value of the

bank's shares is the present value of future earnings. Therefore, earning increase represents a reflection of the increased in the bank's value, while the earning decline shows the decline in the bank's value.

The liquidity risk, on the other hand, is the inability of the bank to fund the increases in the assets or to face the shortage of liabilities. When there is a liquidity shortage in the bank, it cannot get enough earnings either by an increase in its obligations or it carries an excessive cost to transform the assets into liquid assets quickly. Either way, this process negatively impacts the banks' earning quality. However, if the bank has enough liquidity, it will have a positive impact on their earnings. The studies between bank's earning and liquidity produced a mixed findings. Shamas, et al. (2018) and Rauch et al. (2010) found a positive relationship, Akhtar, et al. (2011), Isik & Belke (2017) documented a negative relationship. On the otherhand, Sayedul, (2012) and Sheefeni, & Peyavali, (2016); found an insignifianct relationship between earnings and bank's liquidity.

### **3.5.3.5 Inflation and Bank Liquidity**

This study used uncertainty concept to investigate the inflation and bank's liquidity. The Consumer Price Index measures inflation. Inflation is the percentage change in the value of the price index on a yearly basis. Inflation measures the price change of goods and services in a year. Both the bank's cost and production can be affected by inflation. Commonly, high inflation negatively affects the bank's liquidity ratio.

Inflation is well-defined as a persistent increase in the general prices of goods and services in an economy. High inflation prompts a high cost of goods and services, while the income remains constant. The previous studies on inflation and bank's

liquidity provided an inconclusive findings, Yaacob et, al. (2016) documented a positive relationship between inflation and bank's liquidity. Wojcik-Mazur & Szajt, (2015) and Zaghoudi, & Hakimi, (2017) found an insignificant relationship between inflation and bank's liquidity. A study for Malaysian Islamic banks by Ahmad & Mohamad., (2013) examined the factors that determine liquidity risk measured through total deposit over total assets. The findings is inline with the studies by Wasiuzzaman & Tarmizi, (2010), Sheefeni, & Peyavali, (2016),, and Isik & Belke (2017) which shows a negative relationship of inflation with the bank's liquidity.

#### **3.5.3.6 GDP and Bank Liquidity**

The economic health of a country is usually measured through GDP. GDP can be used by the banks as an indicator to measure the banking services demand through which the banks receive deposits and extend loans to clients. Sheefeni, & Peyavali, (2016), Zaghoudi, & Hakimi, (2017) and Isik & Belke (2017) documented a positive relationship between GDP and liquidity. Yap (2012) and Wojcik-Mazur & Szajt, (2015) found an insignificant relationship. The study by Ahmad & Mohamad., (2013) examined the factors that determine liquidity risk for Malaysian Islamic banks by considering the economic cycles. The final results show an inverse relationship between GDP and liquidity risk. The study argued that economic expansion provides the banks with the opportunity to increase their income and reduces the liquidity risk exposure. The negative relationship between GDP growth and liquidity risk is in parallel to Cucinelli (2013) and Yaacob, et, al. (2016) who measured liquidity risk via LCR and NSFR.

### 3.5.3.7 Concentration Risk and Bank Liquidity

The impact of the bank's concentration on liquidity creation is related to two opposing hypotheses. (i) increased competition causes an increase in the bank's fragility, which reduces the profit of banks that increase the capital which acts as a “buffer” to the banks against adverse shocks (liquidity risk). Consequently, banks found the incentive to reduce liquidity creation by reducing the amount of the loan granted and the deposit's volume accepted to reduce the bank's run threat. (ii) the increased concentration impacts banking policy on prices—which leads to loan rates diminishes and deposit rates increase. Consequently, there is a rise in both demands for loans and deposits.

Several researches provide support for the relationship between competition and liquidity. An increase in bank concentration facilitates financing demand and loans obstacles and leads to a shortage of liquidity creation. Beck et al. (2004) argued that an increase in concentration increases loan obstacles which reduces liquidity creation. Contrary to the above study, Hainz et al. (2013) find an increase in bank concentration leads to the demand for higher collateral. This view suggests a positive relationship between competition and liquidity creation. Meanwhile, Abdul-Rahman, et al (2018) results for conventional banks are inconclusive.

**Table 3. 2:** Impact of the Selected Factor on Banks' Liquidity

Factors	Positive	Negative	Insignificant	Relationship to Liquidity
Capital Adequacy Ratio	Risk Absorption Concept, Mahdi & Abbas (2017), Vodova (2011), Berger et al. 2016, Yaacob, et al, (2016) and Mohd Amin, & Abdul-Rahman, (2020),	Financial Fragility- out Crowding Effect, Wasiuzzaman & Tarmizi, (2010) Shamas, et al. (2018) Isik & Belke (2017)	Sayedul, (2012), Sheefeni, & Peyavali, (2016).	Positive
Asset Quality	Commercial Loan concept, Vodova 2011 and Yaakub, et al (2017).	Commercial loan concept, Iqbal (2012), Wasiuzzaman & Tarmizi, (2010); Shamas, et al. (2018) Isik & Belke (2017). Rauch, et al (2010), Abdul-Rahman, et, al, (2019).	Sheefeni, & Peyavali, (2016)	Positive
Management Efficiency	Efficiency Structure (ES) concept. Mohd Amin, et al, (2017).	Efficiency Structure (ES) concept, Wasiuzzaman & Tarmizi, (2010), Khalib, et al. (2016)	Efficiency Structure (ES) concept.	Negative
Earning Quality	Shamas, et al. (2018) Rauch, et al, (2010)	Akhtar et al. (2011), Isik & Belke (2017).	Sayedul, (2012) Sheefeni, & Peyavali, (2016)	Negative
Inflation	Uncertainty Hypothesis, Horvath et al. 2014, Yaacob, et al, (2016)	Uncertainty Hypothesis, Ahmad & Mohamad (2013), Wasiuzzaman & Tarmizi, (2010); Sheefeni, & Peyavali, (2016); Isik & Belke (2017). Vodova 2011	Uncertainty Hypothesis, Wojcik-Mazur & Szajt, (2015); Zaghoudi, & Hakimi, (2017)	Negative

Factors	Positive	Negative	Insignificant	Relationship to Liquidity
GDP	Ali et al. (2011), Sheefeni, & Peyavali, (2016), Zaghoudi, & Hakimi, (2017) Isik & Belke (2017).	Ahmad & Mohamad (2013), Cucinelli (2013), Wasiuzzaman & Tarmizi, (2010), Yaacob, et al, (2016)	Yap (2012) Wojcik-Mazur & Szajt, (2015);	Negative
Concentration Risk	Carbo-Valverde et al., (2009); Love & Martinez (2012)	Fragility Channel concept, Petersen & Rajan (1995), Horvath, R. et al. (2016).	Berger & Bouwman, (2009), Abdul-Rahman, et al (2018).	Negative

### 3.6 Relationship Between Bank Liquidity, Profitability and Insolvency Risk (Model III)

#### 3.6.1 Liquidity and Bank Profitability

Balanced Portfolio Concept, and Risk Return Trade off concept are mainly concepts used to study the relationships between liquidity and bank's profitability. This research used two items to measure the liquidity risk (i) LCR and (ii) NSFR. Many studies investigated liquidity and bank's profitability (Eljelly, 2004; Owolabi & Obida, 2012). As one of the factors that determine the banks' profitability, liquidity can be explained as the ability of a bank to honor its obligations without incurring substantial losses. Many studies found contradictions on the relationships between bank liquidity and profitability. Sudin (2004) and Wasiuzzaman & Tarmizi, (2010) in their studies, found a positive and significant relationship between liquidity and bank profitability. In addition Vodová (2013) shows a positive relationship between profitability as a measure of performance and liquidity, contrary to the standard economic concept. Ojong et al. (2014) also conducted a study on the relationship and effect between credit and liquidity on bank's default risk among deposit money banks in Nigeria. The findings concluded

a positive relationship between liquidity and bank performances in Nigerian banks. A positive relationship is also found in a studies by, Mohammad (2013), Ahmad & Mohamad (2011), El Biesi (2010) and Berger & Bouwman (2008, 2009).

On the other hand, Izhar & Asutay (2007), in their study on Indonesian banks, found a negative relationship between liquidity and profitability. Rauch et al. (2010), Demirgüç-Kunt & Huizinga, (2009), King, (2013), Fadzlan & Muzafar (2010), Saira (2011) and Hasanov, et al. (2018) also found a negative relationship between liquidity and bank profitability. However, a study by Said & Tumin (2011), Davydenko (2011) and Muda, et al (2013) is contradicted to the above study. They have presented a findings that shows no relationship between liquidity and bank profitability. Also, Idris (2011) in their studies on Malaysian Islamic banks, found that liquidity cannot be one of the factors to determine bank's profitability because it does not meet the requirements of significance. Ferrouhi (2014) conducted a study on the relationship between liquidity and financial performances of Moroccan banks. The findings indicated that the relationships between liquidity and bank performance depend on the employed model.

Overall, the studies of liquidity and bank's profitability based on the simple accounting measures are inconclusive. This may be due to the use of different methods and liquidity ratios at different times. As such, these findings always tend to be contradicting due to varying methodology, time factor, ratios used, and different jurisdictions. Thus, there is a need for further study to confirm the concept, especially in the Malaysian context. With the new liquidity measures introduced by Basel III Accord in 2010 (LCR and NSFR) and the scarce studies that employed these measures on the bank's profitability, this study is deemed timely.

### 3.6.2 Banks' Liquidity and Insolvency Risk

Banking risk is the risk of bank activities or the risk of their assets which is confronted during bank operating. There are many different ways to measure bank risk in the literature. The most common ways to measure riskiness of financial institutions are VaR, ES and Z-score. VaR is a standard risk measure for bank risk management which is recommended by Basel II. ES is a better risk measure than VaR, and it is recommended in Basel III. However, both VaR and ES focus on the risk of an individual institution and cannot adequately capture systemic risk (Li & Malone, 2016). This study focuses on the overall riskiness of banks; thus z-score is a suitable approach. Z-score has now become a standard indicator of bank risk-taking and has been used widely by academics (Laeven & Levine, 2009; Houston et al., 2010; and Delis et al., 2014). By measuring the distance to default as well as the size of capital buffers and standard deviation of its return, z-score is simple in computation and it can be computed by using available accounting data only.

The risk of funding liquidity has long seen as a cause of financial institutions crisis and financial system instability. In order to manage liquidity risk and shocks due to illiquidity, banks are advised to maintain a buffer of liquidity (Khan et al., 2017). Hong et al. (2014) found that liquidity risk contributes in no small way to bank crisis through systematic and idiosyncratic channels. According to Acharya & Naqvi (2012), funding liquidity can potentially affect bank risk-taking and stability. Consistently, Vazquez & Federico (2015) found that the stability of capital (according to Basel III) can reduce the probability of the bank's failure and increase funding liquidity. However, to maintain a higher of funding's stability, banks have to pay a higher long-term cost of capital to borrowers (King, 2013), leading to a reduction in the bank's profitability. Therefore, liquidity and profitability of the bank may have an antagonistic relationship.

It implies that once banks follow high profitability, it may increase its risk-taking by financing more assets.

The level of funding liquidity has significantly influenced the bank during the operating period while maintaining a higher level of funding liquidity can lead to bank crises (Adrian & Shin, 2010 and Khan et al., 2017). Under the stress of using surplus funds, Adrian & Shin (2010) show that banks would look for potential borrowers, even they do not have enough liquidity capacity. The result is that there is a potential hazard that comes from reducing lending standards to push the use of surplus funds. Wagner's (2007) theoretical model describes the relationship between bank liquidity and stability. It is found that an increase in the bank's liquid assets may reduce the bank's stability during the financial crisis, but it will not affect the normal period. Besides that, changes in bank liquidity may be caused by interest rates movement through changes in monetary policy. Lucchetta (2008) argues that banks will face more risk when they have over-investments in risk-free bonds due to increasing of risk-free interest. It will increase liquidity supply and lending in the interbank market. In turn, the increase in liquidity also pushes banks investing in riskier assets. According to Acharya & Naqvi (2012), 73% of the failed banks had caused by over lending. Authors implied that bank managers often tend to engage in "overly aggressive risk-taking behavior," as a problem of principal-agent concept.

Because investors prefer insured deposits than a risky direct investment at the time of financial crisis, Khan et al. (2017) indicated that banks could obtain funds through insured deposits and grants riskier loans which are more profitable. Though there could be a moral hazard for investing in riskier assets (Keeley & Furlong, 1990). However, since the banks have excess deposits, they can take more risks and protect their depositors through the deposit insurance scheme (Khan et al., 2017). Concepts and

empirical studies suggested that there is a correlation between liquidity and risk-taking behavior of the bank.

### **3.7 Indirect/Mediation Effects**

This study examines the effects of the bank specific factors and macroeconomic factors on Malaysian bank's profitability and insolvency risk mediated by liquidity. The study assumes that a bank's liquidity influences how the bank specific factors and macroeconomic factors affect profitability as well as insolvency risk. For example, concerning the capital adequacy ratio, banks with higher capital buffer have short as well as long term fund to act as a buffer for higher liquidity levels. This is in line with the "liquid assets as a buffer concept," which suggests that there is a positive relationship between the bank's liquidity and profitability. The banks that hold excess liquid assets benefit from the funding markets superior perceptions, which will reduce their cost of funds and increase their overall profitability. Higher liquid assets can indicate a higher bank's reputation in accessing funds and can be used to finance profitable projects leading to higher returns and distanced from insolvency risk. Therefore, it is hypothesized that liquidity acts as an indirect or mediator variable between the exogenous variables i.e., the bank specific factors and macroeconomic factors and endogenous variables (i.e., bank profitability and insolvency risks)<sup>3</sup>.

### **3.8 Comparison of Islamic and Conventional Banks Profitability and Insolvency Risk**

In past literature, studies examined the profitability of Islamic banks as well as conventional banks in a separate manner. However, only a few research has analyzed

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<sup>3</sup> For details explanation on Exogenous and Endogenous variables refer to section 5.2.5 (Structural Sub-Model)

the factors that determine profitability and insolvency risks (z score) of Islamic and conventional banks. Accordingly, the following are the prominent studies found literature in this area:

Hassoune (2002) examined the profitability of Islamic banks in an interest rate cycle during the period 1994-2001. The study indicated that conventional banks to be less profitable than their Islamic bank's counterparts despite their similar balance sheet structures. This may be due to the fact that Islamic banks had a large pool of non-remunerated deposits, which reduced their funding costs in their stocks and let them enjoy the benefits of market imperfection. Faisal (2005), in turn, investigated the conventional and Islamic bank's profitability in GCC countries for the 1997 to 2004 period. Substantial revenue from oil trade in GCC was among the reasons why the researcher chooses the topic for the study. The findings of the research showed that Islamic banks had lesser good assets quality than their conventional bank counterparts while showcasing better performance in terms of capitalizations.

Mousa (2007) examine the factors that determine profitability for Islamic and conventional banks. He used the sample of 69 conventional banks and 21 Islamic banks between 1996-2003 for four middle eastern countries (i.e., Egypt, Bahrain, Saudi Arabia and Jordan). The general finding shows a negative effect of liquidity on profitability for both Islamic and conventional banks. On the other hand, both Islamic and conventional bank studies found that the concentration ratio have a negative but insignificant effect on bank's profitability (measured by banks' Return on Assets and Return on Equity). The capital adequacy ratio has a statistically significant positive relationship on the bank's profitability (measured by return on assets only). Furthermore, the efficiency ratio is found to have a statistically significant negative impact on the bank's profitability (measured by Return on Equity only). For the fixed effects model, the

efficiency have a positive but insignificant effects using return on assets as a measurement of profitability for Islamic and conventional banks. A positive and significant effect is found between GDP per capita and banks' profitability. The GDP growth rate also positively impact on the banks' profitability for Islamic and conventional banks fixed-effects model. At the same time, the positive and significant relationship of inflation and profitability is found.

Rami (2012), examines the factors that determine profitability of Islamic and conventional banks in GCC countries for the period between 2002-2009. The findings showed that capital adequacy is the most critical factor that explains the profitability of conventional banks. On the other hand, the efficiency ratio has a significant negative effect on both Islamic and conventional banks' profitability. The results also indicate a positive relationship between GDP and banks' profitability, while inflation was negatively correlated to banks' profitability for both Islamic and conventional banks. Shams et al. (2012) analyzed the bank specific factors that determine profitability of conventional and Islamic banks in Pakistan between 2006 and 2010. The results found that only capital and deposits are positively related to Islamic and conventional banks' profitability. Mohanty et al. (2016) investigate the cost and profit efficiencies of banks operating in six GCC countries. The findings show that both cost and profit efficiencies of Islamic and conventional banks are similar. The findings also suggest that inflation and GDP have significant effects on cost and profit efficiencies for both Islamic and conventional banks.

Mollah, et al. (2016) investigates and compare the difference in governance structures on the risk-taking and performance of Islamic and conventional banks. A sample of 52 Islamic banks and 104 conventional banks in 14 countries was used between 2005 to 2013. Islamic banks are found to have higher capitalization than

conventional banks. Rashid, et al. (2016), investigates the bank specific factors and macroeconomic factors of profitability of Islamic and conventional Pakistani banks. The findings suggest operating efficiency, reserves, and overheads are the only significant factors that determine profitability of conventional banks', while deposits and market concentration are significant factors that determine profitability for Islamic banks. GDP is found to have a negative impact on profitability for both Islamic and conventional banks. Doumpos, et al. (2017) made a performance comparison between the Islamic and conventional banks. The research finds that conventional banks outperform the Islamic banks in Asia and the GCC; however, Islamic banks perform better in the MENA and Senegal region.

On the other hand, Beck et al. (2013) argue that non-loan earnings assets increase the insolvency risks measured by z score in 510 Islamic and conventional banks across 22 countries for the period 1995-2009. The results suggest that Islamic banks are less likely to disintermediate during crises due to higher z-score. Overall, small banks were found to be scoring the highest z-score and increasing in fixed assets leading to raising the z-score, which makes banks in the sample more stabilized. In conclusion, the selected banks can reduce the probability of bankruptcy by focusing on non-loan earnings assets and fixed assets. Accordingly, smaller banks are found to be more capitalized than larger banks. In contrast, banks with greater amount of fixed assets had less capital. Srairi (2013) compared the determinants of risk using 10 countries over the period 2005-2009. By adopting OLS regression as a statistical approach to examine the determinants of z-score, the study yielded three main results: (i) Family banks tend to be more solvent than company and state-owned banks. (ii) concentration, loan growth, capital adequacy and banking sector development were found to have a higher z-score which leads to making the banks less risky. (iii) inefficiency ratio was found to be

decreasing the z-score which raises the insolvency risk. Overall, during the period, the mean z score of conventional banks is more (21.7) than Islamic banks (20.8) which makes the conventional banks more solvent and resistant against crises in MENA countries.

A study by Bourkhis & Nabi (2013) focused on Islamic and conventional banks covering 16 countries using z-score as a bank solvency indicator. This study used 68 (34 Islamic and 34 Conventional) banks for the period 1998-2009 using random effects to find the factors that affect the stability. The results obtained argued that the global financial crisis (GFC) does not impact the banks solvency. Overall, solvency was affected significantly and negatively by loan intensity (more loans lead to lower z-score). However, a significant and positive relationship was found between z-score and inflation rates which made the banks more solvent with low amount of failure risk. In particular, the findings suggest that efficiency ratio influenced the z-score negatively in large banks only. Large banks were found to be unstable compared to small banks. In conclusion, Islamic banks could reduce the risk of bankruptcy more than conventional banks over the period.

Mirzaei et al. (2013) conducted a comparison between Middle Eastern banks and Eastern Europe banks over the period of 1999-2008 examining 1929 banks. The empirical results explain that for banks in the Middle East, concentration, interest rate, capital ratio and efficiency ratio have a significant but negative relationship with z-score. Inflation and bank size were found to be decreasing the z-score. Regarding the Eastern Europe banks, the findings indicate that z-score was influenced significantly and positively by concentration, interest rate spread, capital ratio, off-balance sheet to total assets, inflation and GDP. In contrast, efficiency ratio is negative and significant with z-score. According to the GCC banking market, Ghosh (2014) tested the relation

between risk and capital for 57 conventional and 46 Islamic banks in the GCC region for the period 1996-2011. The main finding shows that banks generally increase capital in response to an increase in risk. However, the determinants of risk identified such as liquidity risks explain the z-score. In contrast, income diversification was found to have a significant and negative relationship with z-score which made banks riskier through the period. Profitability ratios were improving the capital significantly over the period. In general, GFC does not impact the solvency of banks in GCC.

Kohler (2015) examined the insolvency factors on 15 EU countries investigating 3362 banks through the period 2002-2011. The factors that strengthen the banks stability were found to be non-interest income share, capital ratio, loan intensity, net interest margin, GDP growth and GDP per capita. On the other side, size, inflation, bank assets, GDP and long-term interest rate reduce the stability.

In summary, the literature above discussed the effects of bank specific factors and macroeconomic factors that determine banks' profitability and insolvency risks measured through z score for Islamic and conventional banks. Findings from these studies produced different results for both Islamic and conventional banks. However, some common factors were found to influence profitability and insolvency risks for Islamic and conventional banks. The results of El Biesi (2010) show that higher capital has a positive relationship with the bank's high profitability. Mousa (2007) revealed that high capital, greater GDP per capita, greater GDP growth rate and high inflation have a significant positive relationship with the bank's profitability. On the other hand, an increase in deposits, loans, high overhead and greater concentration are found to have a negative relationship with the bank's profitability. Rami (2012) also found that a high capital adequacy ratio and GDP growth have a positive relationship with profitability, but the efficiency ratio and inflation negatively influence the bank's profitability. Shams

et al. (2012) suggest that higher deposits and higher capital lead to a higher bank's profitability.

The literature review on solvency risk allows the researcher to empirically analyse the relationship between, liquidity, profitability and z score as an independent variables. The bank-specific latent variables can be, capital ratio, assets quality, management efficiency, earnings, and liquidity. On the other side, GDP and inflation can be examined as macroeconomic variables.

### **3.9 Factors that Determines Liquidity, Profitability & Insolvency Risk (Islamic and Conventional Banks Before and After the 2008 Crisis)**

#### **3.9.1 Introduction**

There are a few research that examines the effects of the financial crisis on the bank's liquidity. The main question which is still not answered is how the bank's liquidity and profitability and insolvency risk are related to the 2008 financial crisis, especially for Islamic and conventional banks. Empirical investigations routinely include the bank specialization (i.e., Islamic, conventional, foreign or domestics) as a dummy variable or else they randomly select the specialized banks in the study sample. However, previous literature does not examine liquidity (using the new Basel III liquidity measures) and profitability and insolvency risks variations across different banking sector (i.e., Islamic and conventional banks) in different periods (i.e. before and after 2008 financial crisis) in Malaysia. Within the knowledge of the researcher, no study has investigated if there is any significant difference among Islamic and conventional banks before and after crisis period, if there is, how these banks are different in Malaysia?

The banks are classified into two sectors: Islamic and conventional banks. Thus, there is absence if not few liquidity studies that tested the simultaneous interrelationships between these banks period and differentiated it before and after 2008 financial crisis using new Basel III liquidity measures (LCR and NSFR) and profitability measures by employing PLS-SEM approach that will combine all the latent variables and regress them simultaneously. This study is the first that discusses such interrelationships comprehensively in three ways. First, it takes into account latent variables as explained in previous chapters. Secondly, Islamic banks in South-East Asia are increasingly getting recognition in the South-East Asian economy, practitioners, as well as the researchers, mentioned the significant contribution of banks to GDP and economic prospects. Based on the Bank Negara Malaysia financial sector development reports, governments have encouraged the establishment of Islamic banks and it fully supports the system and makes it among the 'national goals' and a strategy to makes Malaysia a leading Islamic financial hub. The structural transformation of many conventional bank's financial products to innovative sharia-compliant products and services is of the utmost importance to the Malaysian banking industry and financial sectors. Malaysian economy experienced an improvement in both (Islamic and conventional banking sectors and the entire banking system).

Based on the above, the newly transformed role of the banking sector after the crisis has paramount importance to the bank's liquidity study. This will pave the way to understand how banks before and after the crisis period vary with different information technology (ITs) related to each banking sector's effects on liquidity, profitability and solvency. For example, banks during the pre-crisis period might have the same liquidity structure to finance the new loans in order to improve their bank's profitability. This may be due to the assumption that all the banks before the crisis period might employ

the same technology; they might also have the same business risk and asset categories for their operation. An example that illustrates this relationship is from the concept of business risk-bankruptcy cost, which says; different banks will be involved with different categories of assets and liabilities. This implies that banks faced different risk characteristics. Thus, the bank's liquidity tends to vary from one bank to another due to the different risk categories. This study aims to examine how the bank liquidity before and after the crisis period mediate the effect of the factors that determine liquidity on profitability and insolvency risks.

Thirdly, most researchers routinely control the banking sector (i.e., Islamic or conventional banks) or include a particular banking sector as a dummy variable in order to test how a bank's characteristics affect its liquidity. However, the significant difference among banking sectors and, if there is, how the specific banking sector (i.e., Islamic banks) is different from its counterparts' conventional banks before and after the 2008 world financial crisis has not extensively examined. Therefore, from the methodological standpoint, the PLS-SEM procedures and, as an extension, the PLS-MGA approach would make a valuable difference to current knowledge. This study is intended to close the gap left by previous studies and make a relevant contribution to knowledge. The study retained the same motivation to investigate the Malaysian banking system as clarified in the previous chapter. The following sections report the background to the study in terms of the history, structure of the study, before and after the 2008 financial crisis, and nature of the bank's liquidity.

### **3.9.2 Global Financial Crisis and Bank Liquidity**

In order to analyze the impact of the 2008 financial crisis on Malaysian bank's liquidity, the data was divided into two i.e from 2000-2007 representing the pre-crisis

period and from 2009-2016 representing the post-crisis period, 2008 is considered as the crisis period because it is the year in which the crisis reached its peak (Mohd Amin, & Abdul-Rahman, 2020). The crisis of the financial institutions in 2008, which started around August 2007 has significantly affected the financial institutions all over the world. Prior to the crisis, in Basel II Accord, it seems that possible challenges related to liquidity problems in banks were widely neglected and many banks find incentives to borrow short-term from the markets instead of borrowing in more stable long-term and high-quality assets (moral hazards issue). Although this business model has an impact positively on profits during times of economic boom, its negative impacts start to be felt from 2007 when there is abrupt liquidity dry-up for several banks. Banks realized that high liquidity reserves by keeping high quality and more stable liquid assets serve them with better cushion and would make them strong enough to absorb losses and pressure from the liquidity dry up. Funding problems in banks naturally requires them to narrow their balance sheets, which similarly would have had a positive impact on liquidity.

### **3.9.3 Impact of Financial Crisis on Banks' Liquidity**

The banks exist mainly to provide liquidity creation. Banks manage liquidity through granting financing to illiquid assets such as mortgage loans using liquid liabilities such as deposits from the customers (Diamond & Dybvig, 1983). Bank customers use loans provided by the banks to make investments. On the other hand, the public makes purchases through deposits that provide liquidity and payment services. Liquidity can also be created by banks in the balance sheet by committing to grant loans and other claims on the liquid funds (Kashyap et al., 2002). Such commitments mandate the banks to provide the required fund for the customers at the time of need. The

researches confirm that liquidity creation by on- and off-balance sheet activities positively impact the economy (Berger & Sedunov, 2017). Though the liquidity creation by the bank is vital for the economy at a macro level, in some instances it can lead to the financial crisis. Acharya & Naqvi (2012) find that at the time of uncertainty, bank's deposits increased, this will lead the banks to increase their assets financing and as a results, on-balance sheet liquidity creation increased, and subsequently, banks lending increase may cause the prices of the assets to decline in the market which will cause the fragility in the banking sector. In a study by Thakor (2005), the results suggest that during the period of economic boom, there will be an increase in both the bank's financial assets as well as liquidity creation. Due to the reputational issues, banks cannot use the clauses related to a material adverse change in loan commitment contracts. An increase in assets financing by the banks will cause the prices of the assets to crash in the market which eventually will lead to the financial crisis in the economy.

Tran, et al. (2016). examine the interrelationships among liquidity creation, regulatory capital, and bank profitability of US banks. The study finds a positive relationship between these variables. However, the relationship between these variables is largely driven by small banks and primarily during non-crisis periods. Mahdi, et, al. (2017) examined the factors and the joint relationship between capital, risk, and liquidity of conventional and Islamic banks., the finding shows a Global financial crisis has a significant effect on capital, risk and liquidity of conventional and Islamic banks. Berger & Bouwman, (2017), investigates the interplay among bank liquidity creation, monetary policy, and financial crises. Findings show that high liquidity creation has a significant effect on bank crises. Ayadurai & Eskandari., (2018), used PLS-SEM to investigates the factors that determine the bank stability in the G7 countries for the period between 2003 to 2013. The results show that banks have low levels of capital

and liquidity, resembling banks that failed during the Great Depression of the 1930s. The low capital and liquidity by banks indicate the need for policymakers to have a better understanding of sound banking and creating policies that will reduce the banks' vulnerability to financial crises.

From the above studies, it is evident that both Islamic, and conventional banks, have been affected by the 2008 financial crisis through liquidity dry up and excessive liquidity creation. It is also clear that both bank specific factors and macroeconomic factors, were used in these studies. This study uses PLS-SEM capable of taking care of all the items and constructs to produce a result at once and compare the effects of the 2008 financial crisis on Islamic and conventional banks in Malaysia. To the best of the researcher's knowledge, this is the first study for Malaysian Islamic and conventional banks that uses PLS-SEM to investigate the new Basel III liquidity measures (i.e. LCR and NSFR) before and after 2008 crisis. Also, it is the first study that compares the bank specific factors and macroeconomic factors of liquidity, profitability and Z Score.

#### **3.9.4 Global Financial Crisis (GFC) and Bank Profitability**

The performance of banks can be a result of the changes in their environment and the character of their competitors. In a perfectly competitive situation, economic concept reports that profit maximization means minimization of cost. Hence, exogenous factors such as regulation or economic shocks (crisis) can cause low performance (profitability) by banks.

As pointed out by Muhammad (2010), Malaysia was also affected by the global financial crisis of 2008. The downturn in global financial markets and the crash of the commodity prices during the second half of 2008 leads Malaysia's GDP growth to moderate at 0.1% in the last quarter of 2008. In the first quarter of 2009, the domestic

economy witnessed the negative impact of the global recession, and the economy declined by 6.2%. Bank Negara Malaysia undertakes the full efforts and measures. The accelerated fiscal stimulus measures implementation has contributed to the stabilization of the economy in the second quarter and its subsequent recovery in the second half of 2009. However, the studies which sought to relate the impacts of this crisis on the profitability of Islamic and conventional banks in Malaysia are limited. To the best of the researcher's knowledge, this is the first study that investigates the factors that determine liquidity and profitability and compares the profitability with the z score using PLS-SEM and also compare the profitability and risk-taking activities before and after 2008 financial crisis.

Al-Musali & Ismail (2014) find that Saudi banks' profits increased during the period of the 2008 crisis, which means a positive relationship between the 2008 financial crisis and the bank's profitability. However, Haan & Poghosyan (2012) find a negative association between the global financial crisis and the American bank's financial performance. On the other hand, Hasan & Dridi (2010) found that Islamic banks of Bahrain, Jordan, Kuwait, Malaysia, Qatar, Saudi Arabia, Turkey, and the UAE have been affected differently during the global financial crisis of 2008 than conventional banks. Conversely, a study by Ahmad & Mohamad, (2011) indicated that the profitability of 78 Islamic banks in 25 countries for the period of 1992-2009 was not affected during the 2008 global financial crises.

Based on the above, both Islamic banks and conventional were exposed to the impact of the global financial crisis during the period (2008-2009) differently. In this respect, the data was divided into two to examine the effect of the global financial crisis on the profitability of Islamic and conventional banks in Malaysia. First category is for

the period before the crisis (i.e. 2000-2007) and the second category for the periods after the crisis (i.e., 2009-2016). The year 2008 is considered as a crisis period.

### **3.9.5 Global Financial Crisis (GFC) and Bank Insolvency Risk (Z Score)**

There is no study that finds a positive relationship between GFC and the bank's stability. Williams (2014) find that commercial banks in Asia faced a bankruptcy risk as a result of the GFC. In addition, a study by Anginer et al. (2014) also indicates that GFC negatively affected the bank's stability. Furthermore, Ghassan, & Fachin, (2016) studied a sample of Saudi banks using quarterly data over a period centered on the 2008 financial crisis. The study found that Islamic banks contribute positively to the stability of the system than conventional banks. Sorwar, et al. (2016) studied the market risk profiles of Islamic banks with two sets of conventional banks taken from the same geographical locations as Islamic banks and a random global sample respectively for the period 2000–2013. The study divided the sample period into a pre-financial crisis and a post-financial crisis. The univariate analysis finds no discernible differences between Islamic and conventional banks. However, dynamic correlations obtained via a multivariate setting shows Islamic banks to be less risky for both sets of the banks during the 2008 global financial crisis. On the other hand, some studies found no influence of GFC in bank's insolvency risks such as Ghosh (2014), Bourkhis & Nabi (2013) and Nguyen *et al.* (2012).

Against this backdrop, this study aims to investigate the insolvency risks of Islamic and conventional banks before and after the crisis period.

### **3.10 Liquidity, Profitability, Z Score and Mediation (Before & After Crisis Period)**

Tran, et. al. (2016), conducted a survey of interrelationships between the bank's liquidity, profitability and financial crisis. The study examines the interrelationships among liquidity creation, regulatory capital, and bank profitability of US banks. It is found that regulatory capital and liquidity creation affect each other positively after controlling for bank profitability. However, this relationship is largely driven by small banks and primarily during non-crisis periods. Furthermore, the study finds that banks that create more liquidity and exhibit higher illiquidity risk have lower profitability. In addition, a Malaysian study by Mohamed & Salina (2012) documents that the relationship between profitability and bank liquidity was affected by the financial crisis. The relationship between bank liquidity and profitability is expected to differ in crisis time. It is vital to examine how liquidity factors (bank specific factors and macroeconomic factors) affect bank profitability through liquidity during financial crisis time. Therefore, this study expected the bank liquidity to play a mediation effect between the bank specific factors and macroeconomic factors of liquidity and profitability before and after the crisis period.

### **3.11 Summary of the Literature Review and Study Gap**

This section analyzed the previous literature between the bank specific factors and macroeconomic factors of liquidity and profitability and insolvency risks that leads to the conceptual framework of the study, It is generally agreed by the researchers that the lower the banks profitability the higher will be their insolvency risks. This is based on the facts that capital eats the banks profitability and both capital and profitability measures entered the calculations of the banks z score (insolvency risks). Thus, the

literature explored in this chapter includes both before and after the financial crisis in Malaysia and other countries on liquidity, profitability and insolvency risks. The general findings show inconclusive results that pave the way for further research on the issue. The conflicting findings are summarized below:

As for the effect of AR on bank's profitability; Dietrich & Wanzenried (2010), Ayadi & Boujelbene (2012), and Hasanov, (2018), observed a positive relationship. However, Ali et. al. (2011) and Saira (2011) found a negative relationship. On the other hand; Idris (2011), Said & Tumin, (2011) and Muda, et al (2013) found an insignificant relationship. With regard to assets quality to bank's profitability; Alper & Anbar, (2011) and Hasanov et al. (2018), found significant positive relationships. Iqbal, (2012) found this variable to be negatively related to profitability. On the other hand, Saira (2011), documented an insignificant relationship between asset quality and bank profitability. With regard to management efficiency on profitability; Ahmad & Mohamad, (2011), and Said & Hanim, (2011) found a positive significant relationship. Sastroswito & Suzuki, (2011), Davydenko, (2011) and Rami, (2012), observe that efficiency negatively affects banks profitability. On the other hand; Ramadan et al. (2011), found an insignificant relationship. For the relationships of earnings quality and banks profitability, Nguyen et al. (2012) found a positive relationship while Said et al. (2008) documented a negative relationships.

For inflation on profitability; Fazdlan & Muzafar, (2010), Al-jarrah, (2010), and Hasanov, (2018) found a positive and significant relationship. Khrawish, et al. (2011), Ali et al. (2011) and Rami (2012) found a negative relationship. On the other side, jasmine et al. (2011) and Ayadi & Boujelbene (2012) found an insignificant relationships. With regards to GDP growth; Ali et al. (2011), Yu & Gan (2010), and Rami (2012) documented a positive relationship. However, Khrawish, et al. (2011)

observed a negative relationship. Muda, et al (2013) and Jasmin, (2011) found an insignificant relationship. As for the relationship of concentration on profitability; Sastrosuwito & Suzuki (2011) and Fazdlan & Muzafar (2010) documents a positive significant relationship, whereas Ramadan et al. (2011) found a negative relationship. On one side; Ayadi & Boujelbene (2012), observed an insignificant relationship.

With regard to the effect bank's liquidity risk on profitability; Berger & Bouwman (2008, 2009), Bologna (2011); and Shams (2012), found a positive relationship. On the other hand, Fazdlan & Muzafar (2010), Saira (2011) and Hasanov et al. (2018); observed a negative relationship; while Idris (2011), Davydenko, (2011), and Muda, et al (2013) found an insignificant relationship. As for the effect of the 2008 financial crisis on banks profitability; Fazdlan & Muzafar (2010) observe a positive relationship between the 2008 financial crisis and bank's profitability while Muda, et al (2013) found a negative relationship. On the other hand, Ahmad & Mohamad, (2011) observed an insignificant relationship.

Overall, the studies on banks profitability and insolvency risks factors produced inconclusive results, by contrast, this study differs from the previous literature in the sense that newly liquidity measures is used (LCR and NSFR). Furthermore, since some of the previous studies found an indirect relationship between profitability and liquidity risks controlling for other variables, this study used liquidity risk as a mediator to capture the relationship of liquidity risk factors and profitability and insolvency risks. The study PLS-SEM approach that will regress all the variable simultaneously. Finally, the study compare the profitability and insolvency risks measures of both Islamic and conventional banks before and after the 2008 financial crisis period.

To summarize the literature on the factors that determine liquidity, this review found that previous studies on the factors that determine liquidity and the variables used in this research produced inconclusive results;

For the effects of CAR on banks liquidity, Mahdi & Abbas (2017), Vodova, (2011), and Berger et al. (2016) found a positive relationships. On the other hand, Wasiuzzaman & Tarmizi, (2010), Shamas et al. (2018) and Isik & Belke (2017) documented a negative relationship. Sayedul, (2012), and Sheefeni, & Peyavali, (2016) found insignificant relationships. For the relationship between assets quality to bank liquidity, different measures were used to evaluates this relationship, Vodova (2011), found a positive relationship, whereas Shamas et al. (2018), Isik & Belke (2017) and Chan et al. (2015) found a negative relationships An insignificant relationship was noticed in a study by Sheefeni, & Peyavali, (2016). With regard to the efficiency on banks liquidity, most of the studies concentrated on conventional banks, however Mohd Amin et al. (2017), and Rauch et al. (2010) documented a positive relationship, while Wasiuzzaman & Tarmizi, (2010) found a negative relationship. Earning to liquidity, Shamas et al. (2018) and Rauch et., al (2010) found a positive relationship while Akhtar, et al. (2011) and Isik & Belke (2017) documented a negative relationship; on the other hand, Sayedul, (2012) and Sheefeni, & Peyavali, (2016) found insignificant relationship.

For the macroeconomic factors, Ali et al. (2011), Sheefeni, & Peyavali, (2016) and Zaghdoudi, & Hakimi, (2017) found a positive relationship of GDP growth on liquidity. Ahmad et, al. (2013), Cucinelli (2013), and Wasiuzzaman & Tarmizi, (2010) observed a negative relationships. Yap (2012), and Wojcik-Mazur & Szajt (2015); documented an insignificant relationships. With regard to inflation, Horvath et al. (2016), documented a positive relationship, whereas Ahmad et al. (2013), Wasiuzzaman

& Tarmizi, (2010) and Sheefeni, & Peyavali, (2016), found a negative relationship. On the other hand, Wojcik-Mazur & Szajt (2015) and Zaghdoudi, & Hakimi, (2017) found an insignificant relationships. For concentration, Horvath et al. (2016), found a negative relationship while Berger & Bouwman (2017) found an insignificant relationship.

As for the effects on 2008 financial crisis, Mahdi & Abbas (2017) found a positive relationship between liquidity risk and 2008 world financial crisis, while Vodova, (2011) observed a negative relationships. On the other hand, Shamas et al. (2018) documented an insignificant findings reflecting that 2008 financial crisis does not have any impacts on banks liquidity.

Overall, the studies on the factors that determine liquidity produced an inconclusive result. By contrast, this study differs from the previous literature in the sense that newly liquidity is used (LCR and NSFR). Furthermore, the study compares the newly liquidity risk measures of both Islamic and conventional banks.