

Financing Concentration and Credit Risks: Empirical Study on the Islamic Banks in Malaysia

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ABSTRACT

Sectoral financing concentration in a few sectors of the economy by Islamic banks in Malaysia has become a recurring issue. The objective of this study was to examine the relationship between financing concentration and Islamic banking credit risks in Malaysia. The study employed the Hirschman-Herfindahl-Index (HHI) to investigate the sectoral concentration of the financing portfolio. Dynamic OLS Approach of Cointegration was estimated to determine the long-run relationship between financing concentration and credit risks in the Islamic banking system. The HHI indicated that Islamic banks in Malaysia held a highly concentrated financing portfolio during the period 2007-2018. The result of the Dynamic OLS Approach of Cointegration indicated the existence of the long-term relationship between the banks' financing concentration and credit risks. Findings from the study present practical implications for policy formulation and monitoring functions of the regulatory authorities, and managers of Islamic banks in particular, to protect the interests of depositors and the financial system against the consequences of an unanticipated macroeconomic shock. The study provides new insights into financing concentration as a determinant of credit risk in Islamic banking in Malaysia using static and dynamic statistical methods.

Keywords - *Credit risk, financing concentration, Hirschman-Herfindahl Index, Dynamic OLS.*

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INTRODUCTION

Financial crises have become inevitable periodic shocks in modern economic history. There have been a series of such crises since the end of the Great Depression (1929-1939). The 2007-2008 Global Financial Crisis (GFC) in particular, shook the foundations of the global financial system, with devastating economic and social consequences (Angeloni, 2015). Angeloni (2015) further argued that even though many reasons have been advanced in the literature as the possible causes of the crisis, certainly all those reasons can be aggregated into “a single cause: this was, and still, primarily a crisis of trust” (p. 1). The GFC, according to Akhtar Aziz¹ (2015) can also be traced to corporate misbehaviour and ethical lapses in the financial services profession. Gavin and Hausmann (1998) have long stated that many bank failures are due to bad decisions made by bankers. Similarly, imprudent lending is one of the key determinants of non-performing loans in banks (Akhter, 2023).

The quality of risk assets of the banking institutions has for a very long time been of great concern to sovereign financial regulatory authorities and international financial institutions. It still occupies the dominant space in the academic and professional discussion among many people with a stake in the global financial industry. Basel Committee on Banking Supervision (BCBS) in its Basel III issued a global regulatory framework to ensure more resilience in the global banking system. BCBS, to ensure greater discipline among the banking system operators, through the framework, raised the level and quality of banks' capital base. The framework aims to capture all material risks both on- and off-balance sheet exposure.

Banks' credit portfolios have always been the fertile soil upon which most of the banking crises germinate and are nurtured. For the Islamic banking system, evidence has shown that despite all legal and political support for Islamic banking in many of the countries in the GCC and other countries like Malaysia and Indonesia in East-South Asia, non-performing credit is becoming a critical issue of concern. Islamic banks in many of these countries are facing tremendous pressures resulting from non-performing financing. Emerging evidence for the existence of and a higher level of non-performing financing in Islamic banking compared to their conventional

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counterparts calls for the need to examine the performance of Islamic banks beyond the traditional approach of profitability and capital adequacy. Even though Islamic banking continues to report improved stability, non-performing financing of global Islamic banking is still much higher (5.2%) than the non-performing loans in EU banks (4.5%) (Table 1).

Table 1: “Global Islamic Financial Stability Indicators as of 2017

	Tier-1 Capital (%)	NPF/NPL (%)	ROA (%)	ROE (%)	Cost-to-Income Ratio (%)
Islamic Banks ^a	9.82	5.2	1.71	14.72	51.5
World Top 200 Banks	12.0	n.a.	n.a	11.0	56.0
World Top 1000 Banks ^c	6.50	n.a.	0.85	13.04*	n.a
EU Banks	15.7	4.5	0.45	7.0	61.5

Note:

a: Based on a sample of 18 countries representing over 95% of the global Islamic banking assets as of 1H2017. See footnote 146.

b: Based on results reported in EY: Global Banking Outlook 2018.

c: Based on results reported in The Banker: “Top 1000 World Banks 2017”.

d: Based on results reported in EBA: Risk Dashboard – data as of Q22017

* This ROE is calculated as a percentage of Tier 1 capital, as opposed to shareholders' capital.

Source: Islamic Financial Services Industry Stability Report, 2018^d

An emerging feature of Islamic banks’ financing portfolio, particularly, in Malaysia is financing concentration in the household sub-sector of the economy. For example, the Islamic Financial Services Board, in its Islamic Financial Services Industry Stability Report 2019, highlighted the continuing financing concentration of Islamic banking financing. Out of the thirteen (13) countries presented with their sectoral financing distributions, three of them, namely the UK, Malaysia and Pakistan show a high level of financing concentration. According to the report, while the UK and Pakistan concentrated their financing on the real estate and manufacturing sectors, respectively, Islamic banks in Malaysia recorded a high concentration in household financing. The concentration of financing in households and personal financing in Malaysia, for example, was as high as 58% of the total Islamic banking financing in 2018 (IFSB, 2019). These facts, therefore, signal the imperative to examine the impact of financing concentration on the risk assets of Islamic banks.

Trend analysis by comparing the sectoral distribution of financing by Islamic banks in Malaysia at the beginning of the study period (2007) and the end period (2018) showed a persistent financing concentration over the period (Table 2). The statistics presented by Bank Negara Malaysia (The

Central Bank of Malaysia) monthly showing the financing distributions by purpose and sectors of the Malaysian Islamic banking system for the period were consistent with the reports on the Islamic financial services industry.

Table 2: Comparison of Islamic Banking Sectoral Financing in Malaysia as of 2007Q1 and 2018Q4

Sector	2007Q1		2018Q4	
	RM (MILLION)	%	RM (MILLION)	%
Primary agriculture	1,327.60	3.15%	14,816.90	2.79%
Mining and quarrying	15.4	0.04%	5,303.70	1.00%
Manufacturing (including agro-based)	3,508.40	8.32%	24,880.40	4.68%
Electricity, gas and water supply	229.2	0.54%	2,646.90	0.50%
Wholesale & retail trade, and hotels & restaurants	1,704.10	4.04%	25,026.30	4.71%
Construction	2276.1	5.40%	29,594.10	5.56%
Real estate	503.90	1.20%	27,497.70	5.17%
Transport, storage and communication	728.8	1.73%	16,194.20	3.04%
Finance, insurance and business activities	1,288.90	3.06%	30,798.70	5.79%
Education, health and others	575.7	1.37%	21,421.70	4.03%
Household sector	28,641.50	67.93%	319,551.70	60.08%
Other sectors	1363.5	3.23%	14,101.30	2.65%
Total financing	42,163.10		531,833.50	

Source: Islamic Banking System: Financing by Purpose and Sectors in Bank Negara Malaysia's Monthly Highlights & Statistics (Figures for 2007Q1 and 2018Q4)

The Islamic banking system in Malaysia from the starting point of this study to the end period in 2018 consistently showed skewed financing preference for the household sector. For example, as of the end of 2007Q1, the percentage share of the household sector of total financing was 68%. Similarly, the trend in the financing distribution continued to be skewed towards the household sector in 2018. The share of the household sector of the total financing by December 2018 remained dominant (60%) in the financing portfolio of the Islamic banks in Malaysia (see Table 2). These reports from the Islamic Financial Services Board (IFSB) and Bank Negara Malaysia (BNM) point to the fact that the Islamic banking system in Malaysia has been heavily concentrated for several years.

Ironically, despite several past studies on Islamic banking performance, the impacts of concentration of financing in one particular sector or a few sectors have not been rigorously examined. The need to investigate the impact of the concentration of financing in one particular sector by Islamic banks cannot be overemphasized as sectoral concentration of Islamic financing has become a recurring feature in the analysis of Islamic banking sectoral financing in Malaysia. This is more important because no consensus has been reached among researchers on the real impact of financing concentration on the credit risk of banks and the stability of the banking system. For example, some studies Diamond (1984) and Rossi et al. (2009) have argued that loan (financing) concentration endangers a bank's stability while other studies, such as Hayden et al. (2007); Ali, et al. (2015) and Chen et al. (2013) concluded that loan concentration by banks could create a competitive advantage for the banks and therefore, remain stable. Similarly, more recent studies Polemis & Stengos (2017); Chen, et al. (2018) and Kusi et al. (2020) established the non-linearity of the relationship between loans (financing) concentration and the financial stability of banks. This lack of consensus among scholars has triggered the need to further investigate the effect of financing concentration on the credit risk of Islamic banking.

The focus of the study on Malaysia was because it is considered to be of strategic importance to the health of Islamic banking globally. Malaysia has long been a hub for Islamic banking and its strategic position as the global hub of Islamic finance and banking practices will continue to make it a subject to constant scrutiny and investigation. In the words of Abdul Manap (2015), "The successful experience of Islamic banking in Malaysia has important implications for other countries keen to develop Islamic finance in their respective jurisdictions" (p. 87). The existence of supporting infrastructure, both regulatory and institutional, in Malaysia, will continue to make Islamic banking a significant reference point to other countries.

The findings of this study will help Bank Negara Malaysia (BNM) design necessary macroprudential guidelines for the banks' credit risk management. It is expected that Islamic banks, both in Malaysia and in other countries, will learn a great deal from the unanticipated shock brought to bear, by the COVID-19 pandemic, not only on their operations as financial services providers but also all aspects of people's social and economic

lives with dire consequences for credit risk of the banks. Such shock has been shown in the impact of COVID-19 on the non-performing loans of Chinese banks (Kryzanowski et al., 2023). This study has contributed to the literature on, the significance of the impact of financing concentration on Islamic banks' credit risk. Therefore, the management of the individual banks and regulatory authorities should continue to ensure a high-quality and ideal financing portfolio mix to ensure the banks' financial health and the stability of the overall financial system. Finally, the result of this study will have significant implications for the financing portfolio managers of Islamic banks. There are also serious policy ramifications for the regulatory authorities not only in Malaysia but throughout the Islamic banking world.

LITERATURE REVIEW

Banking is a business built on public trust and confidence. The level of confidence people have in a bank determines the extent to which it can succeed (Jaseviciene, 2012). According to Jaseviciene (2012), ethical judgments create confidence in the public concerning banking services and thereby develop a better reputation. People's confidence can be earned by a bank by how honest and fair it is in performing its duties and whether the bank (represented by its management and employees) is believed to be reliable, principled and transparent in its dealings. Similarly, Abeng (1997) affirms that the role of a business leader is important in the development of the culture of a business enterprise.

The ethical value of a bank requires banks to maintain a reasonable balance between depositors' and borrowers' interests by striking a harmony between their assets and liabilities. Iqbal and Mirakhor (2011), stated that Islam greatly emphasizes that Muslims must not compromise their trust and honesty both in private affairs and in business or other forms of financial transactions. According to Al-Aidros et al. (2013), the concept of ethics in Islam is based on divine guidance from the Quran and the Sunnah of the Prophet (saw). Musa (2011) investigated the consistency or otherwise between the Islamic ethical norms and the practices of Islamic banking in Malaysia and concluded that the emphasis on Sharia compliance of products and services has sidelined the ethical dimension. Mollah et al. (2017) examined the role of governance structure in taking a risk by Islamic banks

when compared with conventional banks and concluded that for Islamic banks, governance structure creates an incentive to take a higher risk which enhances performance. It is, therefore, neither in consonance with the ethics of banking nor in conformity with the Islamic ethics for Islamic banks to expose their depositors to credit risk arising from financing concentration, when pursuing profitability.

Loan portfolio concentration in the conventional banking system and its effect on credit risk has been widely investigated, but the findings have been wide-ranging. Findings of several studies concerning loan diversification or concentration on the performance of conventional banks have not been conclusive (Diamond, 1984; Herring & Watcher, 1999; Fazio & Cajueiro, 2011; Behr et al., 2007; Brahmana et al., 2018). The Theory according to (Diamond, 1984) states that “if banks diversify their loan portfolio, the probability of default would diminish”. Herring and Watcher (1999) affirmed that increasing the concentration of banks’ credit portfolios particularly in real estate has proved disastrous for banks in many countries.

Similarly, Buyuran and Eksi (2020) found that revenue concentration had a negative impact on bank performance. This finding was also supported by Brahmana, Kontesa and Gilbert (2018) who discovered that diversification enhances bank performance and reduces risk. The need to diversify the bank financing portfolio has further become imperative given the impact of macroeconomic shock occasioned by COVID-19 or economic policy uncertainties (Kryzanowski, et al., 2023; Louri & Karadima. 2020; Park & Shin, 2021).

However, contrary to the Portfolio Theory, Tabak et al. (2011) found in their study the effects of loan portfolio concentration on Brazilian banks’ return and the risk that loan concentration appears to ensure these banks perform better in terms of their return and risk profile. Similarly, Adzobu et al. (2017), also concluded that loan portfolio concentration increased the profitability of Ghanaian banks and that diversification did increase their risk. Adzobu et al. (2017) concluded that “banks in emerging markets may consider the alternative strategy of concentrating their lending in a few sectors as results show that increased diversification reduces bank profitability and increases credit risk” (p, 1285). Berger et al. (2017) contended that theoretical predictions suggest portfolio concentration

indicated a bank's relative expertise in and knowledge of a particular industry or type of borrowers. In the same vein, Shim (2019) asserted that a bank's financial stability depends largely on the diversity of its product mix. The study, therefore, concluded that banks that diversify in more concentrated markets are likely able to achieve financial stability compared to banks in less concentrated markets.

Chen et al. (2013) found that sectoral diversification results in reduced risk as well as reduced return by Chinese listed commercial banks. This presents a divergent outcome from what most the conclusion of most previous studies. So they, posited that their finding may be explained by the effect of high monitoring costs which reduce the overall profitability while at the same time, the effect of monitoring helps to offset specific risks thereby producing overall lower risk. Similarly, Behr et al. (2007) in their analysis of diversification and banks' risk-return characteristics of German banks found that more specialized banks (i.e. banks with high loan concentrations) tend to have slightly higher returns. However, the study asserted that a higher return comes with higher risk. They concluded that banks with high loan concentrations do better, but their non-performing loans are slightly more volatile. Effects of the volatility in the macroeconomic environment on bank crises and the financial system stability have led national and multinational financial institutions to prescribe various macroprudential policies with which banking institutions must comply. To further underscore the impact of macroprudential policies on financial stability, Belkhir et al. (2020) found that the application of prudential policies led to less incidence of systemic banking crises. Nevertheless, Božović (2007) affirmed that banks as part of their observance of banking ethics should avoid excessive risk-taking which may be manifested in financing concentration in risky assets or a few sectors.

Rapid credit expansion has been considered a precursor to the growth of credit risk. Kashif et al. (2016) examined the effect of loan growth and risk-taking behaviour of banks in Pakistan during expansionary lending periods. They concluded that "loan growth in the previous year raises non-performing loans and decreased bank solvency with a time lag of many years". Kashif, et al. (2016) wrote that abnormal loan expansion during an economic boom increased the ratio of non-performing loans, diminished capital ratio and decreased banks' financial stability. Similarly, Dang (2019) investigated the effect of rapid loan expansion on the riskiness of Vietnamese

banks between 2006 and 2017. The study provided evidence that lending rapid growth increases loan loss provision from two to three subsequent years. Peric and Konjusak (2017) also, investigated the influence of rapid credit growth on the non-performing loans of banks in the Central and Eastern European (CEE) countries. They found that credit growth with a two-year lag had a positive relationship with the non-performing loans in CEE countries. The study further surmised that the impact of rapid credit growth on the credit risk of banks in CEE countries was faster than in developed countries.

Several studies have been published on various aspects of Islamic banking and finance particularly in the area of credit risks (Ahmad & Ariff, 2007; Haron & Hin Hock, 2007; Siddiqui, 2008; Adebola et al., 2011; Al-Wesabi & Ahmad, 2013; Said et al., 2017; Hussien, et al., 2019; Oladapo et al., 2022). However, the financing portfolio structure and its effects on the credit risk of Islamic banking have not been critically examined in particular detail, nor have the effects of a skewed financing structure on the credit risk of Islamic banking. For example, El-Hawary et al. (2004) examined the risks and regulations for Islamic banking within the context of the prevailing practices in contrast to the core principles.

However, they did not consider the ethical perspective of the deviation from the Islamic principles of finance. Financing concentration either on a geographical or sectoral basis has been viewed with different outcomes. However, when it creates risks of endangering or undermining the quality of banks' risk assets, it will no doubt, result in poor investment. This scenario is capable of creating credit risk and eventual financial instability. This becomes more compelling as Islamic banks have a fiduciary responsibility to safeguard the investments of their shareholders and depositors in a manner that conforms with the principles of Sharia both in form and in substance (Archer et al., 1998). Safiullah and Shamsuddin (2018) concluded that Islamic banks operating in predominantly Muslim countries, because of their favourable operating environments, have less insolvency risk than conventional banks, but are nevertheless, equally exposed to other risks such as liquidity, operational and credit risks. Examining the financing structure and its impact on the risk profile of the risk assets of Islamic banks in Malaysia has, therefore, become imperative.

In addition to the issue of financing concentration, the effect of the macroeconomic environment on the credit risk of the banks is important. Macroeconomic factors, such as GDP, monetary policy management of the regulatory authority (Bank Negara Malaysia (BNM) through the instruments of money supply, inflation and foreign exchange management do wield an impact on the credit risk of banks. Several studies have established the effects of macroeconomic variables on the credit risks of banks. For example, Salem et al. (2020) and Tanasković and Jandrić (2015) established a negative relationship between non-performing loans and economic growth. Tanasković and Jandrić (2015) in their study of the effect of macroeconomic and institutional determinants of non-performing loans in Central, Eastern, and South-Eastern Europe (CESEE) economies, concluded that there was a negative relationship between GDP growth and non-performing loan ratio. The study further, states that “foreign currency loan ratio and exchange rate were positively related with the increase in non-performing loan ratio”. Similarly, Kjosevski and Petkovski (2017) in their research on the Baltic states concluded that GDP growth rate, inflation and domestic credit were among the key determinants factors of non-performing loans in these countries.

METHODOLOGY

The study investigated the relationship between financing concentration and the credit risks of the Islamic banking system using the Hirschman-Herfindahl-Index (HHI) and Dynamic OLS (DOLS) approach to cointegration. The data for the financing portfolio of the Islamic banks and their allocation to the various economic sectors were obtained from Bank Negara’s Monthly Statistical Bulletin showing the Islamic banking system financing according to purpose and sectors. The data used were as at the end of each quarter from 2007-2018. This study ended in the year 2018 because COVID-19 which began in late 2019 resulted in a total lockdown of socio-economic activities in Malaysia as was the case globally. The proportional share of each sector from the total financing was obtained to determine the level of concentration in these sectors by the Islamic banks. As a measure of financing concentration, the Herfindahl-Hirschman Index (HHI) was estimated by summing the squares of the percentage of the banks’ financing in each sector to the total sum of the financing of the bank.

The study adopts the Herfindahl-Hirschman Index (HHI) by calculating as follows:

$$HHI = \sum r_i^2 \tag{1}$$

This measures the financing of bank b at time t to different sectors as represented by:

$$r_i = \text{each sector financing} / \text{total financing}$$

The HHI index indicates a value ranging from near zero to 10,000 if the relative share of each sector is considered in percentage terms. However, if each sector’s share of the total financing is considered in decimal terms, HHI will range from 0 to 1. “Therefore, the nearer HHI is to the maximum of 1 (or 10,000), the more concentrated the loan portfolio. If, however, the index gives figures tending towards zero then, it shows a more diversified portfolio. As a rule, an HHI of less than 0.100 (1,000) is considered to indicate a diversified portfolio; if the HHI is between 0.1000 – 0.1800 (1,000-1,800) it is then considered to indicate a moderately concentrated portfolio. However, if HHI is above 0.1800 (1,800), it strongly suggests a highly concentrated portfolio” (Johan & Vania, 2021).

Once the HHI had been determined this study conducted a regression analysis using the Dynamic OLS (DOLS) approach to cointegration to estimate the long-run relationship between credit risks and financing concentration. The Dynamic OLS was developed by Saikkonen (1991) and generalized by Stock and Watson (1993).

The general DOLS model is given as:

$$C_t = BX_t + \sum_{j=-k}^k \partial_t \Delta X_{t-j}^I + \varepsilon_t \tag{2}$$

Where X = [FC, LGDP, LMR, LFIN, INF, EXC], X^I is the subset of I (1) variables and B is the vector of long-run coefficients.

The analytical model is given as:

$$CR_t = \beta_0 + \beta_1 FC_t + \beta_2 LGDP_t + \beta_3 LRM_t + \beta_4 LFIN_t + \beta_5 INF_t + \beta_6 EXC_t + \varepsilon_t \dots\dots\dots(3)$$

Where CR represents the credit risk of Islamic banks, FC stands for HHI (financing concentration), LGDP is a natural logarithmic form of GDP representing the macroeconomic environment and income, LRM is a natural logarithmic form of money supply (M2), LFIN is a natural logarithmic form of financing growth of the banks (credit expansion), INF stands for inflation rate and EXC denotes exchange rate. The ratio of non-performing loans (non-performing financing) to total loans (total financing) or the possibility of default by counterparty among other factors has been used to define credit risk in financial institutions (Joint Forum, 2015; Ahmad & Ahmad, 2004; Louis et al., 2012).

RESULTS AND DISCUSSION

The result shows the quarterly HHI of the financing portfolios of the Islamic banks in Malaysia for the period 2007-2018 (Table 3). The result as presented in Table 3 showed a high HHI throughout the period 2007Q1-2018Q4. The average HHI for the period 2007Q1-2018Q4 was 0.3958. Moreover, all of the individual values were also above the upper threshold of 0.1800 which indicated a moderate concentration. Further, it meant that the financing portfolios of Islamic banks in Malaysia were highly concentrated, particularly in the household sector.

Table 3: Hirschman-Herfindahl Index (HHI) for Financing Concentration

PERIOD	HHI	PERIOD	HHI	PERIOD	HHI
2007 Q1	0.4766	2011 Q1	0.3998	2015 Q1	0.3970
, Q2	0.4604	, Q2	0.3994	„Q2	0.3922
„ Q3	0.4437	„ Q3	0.4058	„ Q3	0.3990
„ Q4	0.3967	„ Q4	0.4004	„ Q4	0.3970
2008 Q1	0.3768	2012 Q1	0.3931	2016 Q1	0.3948
„Q2	0.3650	„Q2	0.3904	„Q2	03940
„ Q3	0.3550	„ Q3	0.4058	„ Q3	0.3932
„ Q4	0.3663	„ Q4	0.3951	„ Q4	0.3882

2009 Q1	0.3775	2013 Q1	0.4148	2017 Q1	0.3880
„Q2	0.3666	„Q2	0.4178	„Q2	0.3882
„Q3	0.3860	„Q3	0.4116	„Q3	0.3878
„Q4	0.3728	„Q4	0.4054	„Q4	0.3785
2010Q1	0.3873	2014Q1	0.4048	2018Q1	0.3754
„Q2	0.3767	„Q2	0.4040	„Q2	0.3762
„Q3	0.4028	„Q3	0.4032	„Q3	0.3728
„Q4	0.3987	„Q4	0.3882	„Q4	0.3767

Source: computation by the Authors (2023)

Having established that the financing portfolio of Islamic banking in Malaysia was concentrated, the impact of concentrating financing in one particular sector on the banks' credit risk was examined by estimating the Dynamic OLS model in Equation 3. The result of the estimation established the long-term relationship between credit risk (CR) and financing concentration (FC), GDP, money supply (LRM), credit expansion (LFIN), inflation (INF) and currency exchange rate (EXC) (Table 4).

The outcome of the estimation showed financing concentration (FC) was an important variable that explained the credit risk of Islamic banks in Malaysia. Its coefficient was positive and significant at the 1% level. This meant that credit risk (CR) was positively related to financing concentration (FC).

Table 4: DOLS Estimation of Financing Concentration (FC) on Credit Risk (CR)

	FC	LGDP	LRM	LFIN	INF	EXC	C
Coefficient	9.2740***	-1.6006**	-5.3998***	1.1746***	0.0792**	-1.0480***	82.1980***
Std error	(1.5769)	(0.6690)	(0.5245)	(0.2429)	(0.0229)	(0.2868)	(6.555833)
t-Statistic	[5.8812]	[-2.3926]	[-10.2962]	[4.8365]	[3.4582]	[-3.6537]	[12.53815]

*** represent statistical significance at the 1% level.

Note: Standard errors and t-statistics are reported in parentheses () and brackets [] respectively.

The implication is that the credit risks of the banks grew in the direction of the trend of the financing portfolio concentration. It means two things: firstly, as concentration increases, the credit risk also increases, secondly, credit risks of Islamic banks in Malaysia as represented by the ratio of their non-performing financing to the total financing can be explained to a great extent by financing concentration in the household sector of the economy.

This can precipitate banking crises should there be any unanticipated major shock to the economic system that can threaten household income such as in the case of the COVID-19 pandemic.

Credit risks have also been identified with the direction of the activities within the economy. The result of the DOLS estimation (Table 4) showed a GDP with a negative coefficient, i.e. credit risk had an inverse relationship with economic activities (GDP). This supports the findings in previous studies such as Zhang and Daly (2014); Kjosevski and Petkovski (2017) and Akhter (2023).

Typically, it has been established that during the economic upturn (positive GDP growth), credit risks go down, reflecting a positive economic environment in which economic activities expand, unemployment falls and household income grows.

During an economic upturn, businesses experience favourable conditions and banks' credit customers always find it easier to pay back their loans as at when due; but when there is a downturn in aggregate economic activities (economic contraction), firms and households are faced with cash flow problems and therefore, unable to meet their repayment obligations. In severe economic contractionary situations, the first casualty is employment. Businesses cut their losses by cutting jobs. Job losses affect household incomes and thereby reduce their ability to meet their debt obligations. Banks with high household financing exposure suffer deterioration in the quality of their risk assets during the economic downturn. However, during a prolonged economic boom, competition among banks is usually intense and to capture new or maintain an existing share of the market, banks can be forced into an excessive credit expansion by pursuing a relaxed credit policy that creates future poor quality financing portfolios.

Another variable that had a significant long-run relationship with the credit risks of Islamic banks in Malaysia was money supply (LRM). The result as in Table 4 showed money supply also had an inverse relationship with credit risks. This is in line with the theory of Monetary Policy which holds money supply as an instrument of monetary policy. Monetary authority's policies of liquidity expansion or contraction can significantly impact the banks' ability to meet their financing obligations to their borrowing customers. A tight or contractionary monetary policy

reduces the loanable funds available to the banks. The inability of banks to continue to meet their financing obligations to their customers can endanger the ability of these customers to run or even expand their businesses, and thereby pay off financial obligations such as loans. The consequence of this is the increasing credit risks faced by banks. The monetary expansionary policy, on the other hand, enables banks to expand their lending capacity to various sectors. The availability of loanable funds can ease the business environment and capacity of investors to meet their financial obligations and thus reduce credit risk. Furthermore, rapid credit expansion (LFIN), creates a positive long-run relationship with credit risks. These results are supported by Asemota et al. (2023).

Similarly, rising inflation (INF) often pushes up interest rates. The effect of a high real interest rate is to push up the cost of borrowing and lead to borrowers' difficulty in repaying their loans. The result of the estimation also showed the exchange rate (EXC) as significant with an inverse relationship with the credit risk of Islamic banks. To understand the actual effect of the fall or rise of the exchange rate on the banks' borrowing customers, one needs to understand which on which end of the foreign exchange rate the borrowing businesses are. Are they net exporting businesses or net importing businesses? For example, a fall in the exchange rate (domestic currency appreciation) will benefit import-dependent raw material users but disadvantage the revenue of export-oriented borrowers. This is because a fall in the exchange rate will enable net import businesses to spend less domestic currency to acquire foreign currencies to pay for their imports.

However, a fall in the exchange rate (domestic currency appreciation) would have the opposite effect of making export products more expensive in the international market, and subsequently reducing their sales. Similarly, a rise in the exchange rate (domestic currency depreciation) has the opposite effect on both export-oriented and import-oriented businesses. A country that is, in the aggregate, a net export nation will benefit more from domestic currency depreciation as this will improve its balance of payment. Export-oriented businesses will be able to sell more of their products since their products become relatively cheaper in the international markets. The businesses can earn more revenue and thus have a greater capacity to meet their financial obligations. A net-importing country, on the other hand, will

likely suffer an adverse balance of payment. The effect on bank borrowers is to increase their debt obligations. A bank customer who has foreign exposure will require more domestic currency to pay for the same amount of foreign currency he was exposed to before the exchange rate increased. This often creates credit risk for the financing banks.

The result of the estimation established the long-run relationship between the credit risk (CR) and financing concentration (FC), GDP, money supply (LRM), credit expansion (LFIN), inflation (INF), and currency exchange rate (EXC). It showed financing concentration (FC) as an important variable that explains the credit risk of Islamic banks in Malaysia. The ramification of this is that the credit risks of the banks grew as the financing portfolio became more concentrated. So the higher the level of concentration, the higher the credit risk. This finding corroborates the findings of some other previous studies (Berger et al., 2017; Shim, 2019; Kusi et al., 2020). These studies similarly, provide evidence that the concentration of financing in a few sectors could weaken the stability of banks and the entire financial system.

Similarly, economic growth (GDP) was another variable that was found to be a significant factor that determined the credit risk of Islamic banks. It emerged that credit risk had an inverse relationship with economic activities (GDP). Typically, it has been established that during the economic upturn (positive GDP growth), credit risks go down, reflecting the positive economic environment in which economic activities expand, unemployment declines and household income grows. However, when there is a downturn in aggregate economic activities (economic contraction), firms and households are faced with serious cash flow problems and therefore, unable to meet repayment obligations to their creditors. This result supports what other studies have discovered Zhang and Daly (2014); Kjosevski and Petkovski (2017); Wood and Skinner (2018) and Abdurraheem et al., (2018).

Money supply (LRM), is another factor that could explain the credit risks of Islamic banks in Malaysia in addition to economic activities. Money supply as an instrument of the government's monetary policy was found to have an inverse relationship with credit risk. A tight or contractionary monetary policy reduces the loanable funds available to banks. The inability of banks to continue to meet their financing obligations to their customers

can in turn undermine the ability of the latter to run their businesses or service their financial obligations, thus increasing the banks' credit risk. This finding agrees with the conclusions reached in other research (Akomolafe et al., 2015; Nasserinia et al., 2014). Other factors that determine the credit risk of Islamic banks are credit expansion (LFIN), and inflation (INF). Credit expansion, although it may have boosted the incomes of banks in the short run, does nevertheless create a positive long-run relationship with credit risk. The finding is supported by Peric and Konjusak (2017). Similarly, rising inflation (INF) often pushed up interest rates. The effect of a high real interest rate is to push up the cost of borrowing and lead to borrowers' difficulty in repaying their loans. This result corroborates the findings reported by Perry (1992) and Helhel (2014).

Exchange rate fluctuation was also found to affect the credit risk of Islamic banks in Malaysia. This outcome strongly hinted at an inverse relationship with banks' credit risk. The direction of the effect of changes in the exchange rate depended on whether the country was a net importer or net exporter. The implication of this relationship found in the study meant that the country was a net exporter of goods and services. A rise in the exchange rate (depreciation) vis-à-vis other international currencies tended to boost exports which led to an increase in export earnings, which then positively affects the ability of the banks' customers to honour their debts and consequently curtail the banks' risk exposure. Similarly, the impact of exchange rate fluctuation would also depend on the extent of foreign exchange financing granted to unhedged investors. The findings in this study support the findings of Ahmad and Ahmad (2004), Ahmad and Ariff (2007), Das and Ghosh (2007), Adebola et al. (2011), Akinlo and Emmanuel (2014) and Abdurraheem et al. (2018).

CONCLUSION

Financing concentration by Islamic banks has been a major issue of concern to the Islamic Financial Services Board as a global regulator of financial services. From its various reports, Malaysia has consistently been one of the countries that show a high level of financing concentration. This study, therefore, undertook an empirical study to investigate whether financing concentration is linked to the credit risk of Islamic banks in Malaysia.

The study employed the Hirschman-Herfindahl-Index to determine if there was evidence of concentration and also the Dynamic OLS approach to cointegration, to investigate the effect of concentration on the credit risk of Islamic banks. The study established the existence of financing concentration, particularly in the household sector in the financing portfolio of Islamic banks, and concluded that it is a significant factor explaining the credit risks of the Islamic banks in Malaysia. Financing concentration, though, could yield a higher return in the short-term, particularly during a favourable economic environment phase or boom period, but can precipitate a banking crisis when a major macroeconomic shock occurs. The study also found the long-run relationship between the credit risk (CR) of the banks and low economic growth (GDP), money supply contraction (LRM), credit expansion (LFIN), rising inflation (INF) and currency exchange rate (EXC) volatility.

The findings of the study have practical implications for policy formulation and monitoring of the regulatory authority to safeguard the stability of the Islamic banking system and the entire financial system in Malaysia. Managers of Islamic banks are required to pay particular attention to the best optimal sectoral mix and concentration that will guarantee the quality of their risk assets. A well-managed credit risk exposure will ensure banking system resilience from any potential macroeconomic shocks such as the type brought upon the global economy by the COVID-19 pandemic. This limitation is that the study did not fully capture the effects of COVID-19 as its full effects are just being manifested in the general performance of the banking system.

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