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Stability of Islamic versus Conventional Banks: A Malaysian Case

(Kestabilan Bank Islam berbanding Bank Konvensional: Kajian Kes Malaysia)

Muhamad Azhari Wahid
Markfield Institute of Higher Education

Humayon Dar
Edbiz Corporation Limited

ABSTRACT

The purpose of this paper is to raise certain questions within the Malaysian banking sector and find the appropriate answers. The research questions of this paper are: a) whether Islamic banks are more stable relative to conventional banks; and b) what are the determinants of stability for both types of banks? In measuring and comparing the stability of Islamic and conventional banks, this study employs the financial soundness indicators (FSI) of the International Monetary Funds (IMF) and the z-score index. These are then followed by a series of parametric and non-parametric tests. Thereafter, a pooled ordinary least squares (OLS) robust regression is applied to examine the determinants of stability for Islamic and conventional banks. The results reveal that Islamic banks are significantly less stable than conventional banks. However, when the analysis is conducted based on a sample of small and large banks, the results suggest that only large Islamic banks are less stable than large conventional banks. In contrast, small Islamic banks are found to be more stable than small conventional banks. Furthermore, the results reveal that bank size, the level of capitalisation and income diversification are important determinants for the stability of Malaysian Islamic and conventional banks.

Keywords: Banks; crisis; financial stability

ABSTRAK

Tujuan kajian ini adalah untuk membangkitkan soalan-soalan tertentu dalam sektor perbankan di Malaysia dan mencari jawapan yang sesuai untuknya. Persoalan kajian yang akan dijawab ialah: a) sama ada bank-bank Islam lebih stabil berbanding bank-bank konvensional dan b) apakah faktor-faktor penentu kestabilan bagi kedua-dua jenis bank ini? Dalam mengukur dan membandingkan kestabilan bank-bank Islam dan bank-bank konvensional, kajian ini menggunakan indikator keteguhan kewangan daripada International Monetary Fund (IMF) dan indeks z-score, kemudian, diikuti dengan siri ujian parametrik dan bukan parametrik. Selepas itu, kaedah regrasi kuasa dua terkecil secara pooled (OLS) yang tekal digunakan untuk mengenal pasti faktor-faktor penentu kestabilan bagi bank-bank Islam dan bank-bank konvensional. Keputusan menunjukkan bahawa bank-bank Islam adalah kurang stabil berbanding bank-bank konvensional. Walau bagaimanapun, apabila analisis dijalankan berdasarkan sampel daripada bank-bank yang bersaiz kecil dan besar, keputusan kajian ini menunjukkan bahawa bank-bank Islam yang bersaiz besar sahaja yang kurang stabil berbanding bank-bank konvensional yang besar. Sebaliknya, bank-bank Islam bersaiz kecil didapati lebih stabil daripada bank-bank konvensional bersaiz kecil. Tambahan pula, keputusan menunjukkan bahawa saiz bank, tahap pemodalan dan kepelbagaian pendapatan adalah faktor-faktor penentu yang penting bagi kestabilan bank-bank Islam dan bank-bank konvensional di Malaysia.

Kata kunci: Bank; krisis; kestabilan kewangan

INTRODUCTION

The recent 2007 to 2009 global financial crisis had exhibited the failure of major conventional banks in the West. There are several causes to the global crisis, among others are risk transfers and imprudent credit growth, failure of risk management, lax of regulation and supervision, and low level of transparency and disclosure (Aziz 2008; Bernanke 2009; Mirakhor 2009). In response to the crisis, the European Union's (EU's) competition commissioner stressed on the need to replace unsustainable and overleveraged banking structures with simpler, less leveraged, more prudent and more transparent form of banking (Newman 2009). Interestingly, these characteristics are actually embedded within the Islamic financial system.

In addition, the recent global financial crisis has led to an increase of global interest in using the Islamic banking system as an alternative to the conventional banking system. This is why, nowadays, the Islamic banking system has not only flourished in the Muslims populated region of the world, but also welcomed in the non-Muslim

region. Britain for example, has pledged to rival Dubai and Malaysia as the centre of *Shariah*-compliant finance (Wilson 2013). In showing its commitment, in June 2014, Britain has become the first country outside the Muslims populated world to issue sovereign sukuk (Islamic bond) (HM Treasury 2014).

As the Islamic banking system has managed to attract interest around the globe and continuously gaining market share, the system is expected to have important roles towards the stability of banking system. Perhaps, the increase in global attention towards Islamic banks could be due to the literature, which reveals the superiority in performance of Islamic banks over its conventional counterparts. The superiority in performance of Islamic banks have contributed to the financial and economic stability of these institutions (Hasan & Dridi 2010; Parashar & Venkatesh 2010).

Despite the increased attention towards Islamic banks, Usmani (2010) and Chapra (2009) argued that Islamic banks are operating in a conventional-dominant financial system, and thus are forced to participate in the existing market risks. Hence, this might affect the stability of Islamic banks. This is further supported by newer studies that produced inconclusive results on the issue of stability of Islamic banks over the conventional counterparts (Rokhim & Gamaginta 2009; Kassim & Abd. Majid 2010; Belouafi, Bourakba and Saci 2013; Bourkhis & Nabi 2013).

Studies that examine the stability of Islamic banks over conventional banks are relatively scarce. The current literature (e.g., Čihák & Hesse 2010; Pappas, Ongena, Izzeldin and Fuertes 2016; Bourkhis & Nabi 2013) have considered cross-country sample with evidence obtained being general and does not necessary apply at country level. Hence, no clear conclusion can be made for Islamic banks in Malaysia. Analysing the stability of Malaysian Islamic banks is important as Malaysia is one of the pioneers in Islamic banking industry and is one of the centres of focus of global attention towards the Islamic banking business.

A number of literature focusing on the state of stability of Malaysian Islamic banks can be found (e.g., Kassim & Abd. Majid 2010; Mat Rahim & Zakaria 2013; Abdul Rahman & Masngut 2014; Verbeet 2014). Nonetheless, those studies covered a limited time period. In spite of these early studies, the recent status of stability of Islamic banks over the conventional banks post 2007 to 2009 global financial crisis has remained unclear, especially within the context of Malaysia. Hence, it is pertinent to carry out a comparative study on the stability of Malaysian Islamic and conventional banks by utilising newly available data, which included the post crisis period.

With this in mind, our study aims to compare the stability of Islamic and conventional banks in Malaysia for the period of 2004 – 2013 using financial soundness indicator and *z*-score index as indicators of bank stability. In addition, this paper examines the determinants of bank stability. Using a series of parametric and non-parametric tests, the results from financial soundness indicator and *z*-score index reveal that Islamic banks are found to be significantly less stable than conventional banks. This is further confirmed by the regression analysis that controls the Islamic banks' dummy variables. Furthermore, the results of regression analysis suggest that the Malaysian Islamic and conventional banks have similar determinants of stability. On one hand, the bank size indicates a negative effect on bank stability. On the other hand, equity to total asset and income diversification indicate a positive effect on bank stability.

This study contributes to a small but growing literature on the stability of Islamic banks, specifically with reference to the Malaysian banking sector. The study generalises previous comparative studies on the stability of Malaysian Islamic and conventional banks based on the following points. Firstly, the study compares the stability of Islamic and conventional banks in Malaysia by employing sets of financial soundness indicators and *z*-score index over the period of 2004 – 2013. This covers the period of pre, during and post 2007 – 2009 GFC. Secondly, this study examines the determinants of stability for the Islamic and conventional banks which include the impact of GFC on bank stability.

The rest of the paper is structured as follows. Section 2 summarises relevant literature while Section 3 outlines the methodology and data used in this study. Section 4 presents the preliminary results and discusses the empirical findings. This is followed by a conclusion incorporated in the final section of this paper.

LITERATURE REVIEW

THE CONCEPT OF BANK STABILITY

Banks and financial institutions act as intermediaries that pool funds from the surplus unit (depositors). The available funds are then channelled to those with productive investment opportunities (Schinasi 2005). As an intermediary of funds, banks have the capacity, expertise and access to important information compared to the surplus unit (Bessis 2010). Through banks and financial institutions, the surplus units are able to avoid a potential issue of asymmetric information which may lead to adverse selection and moral hazard (Heffernan 2001).

Nevertheless, should a bank fail to perform its function as an intermediary of funds effectively, the bank has the potential of becoming insolvent or too illiquid. When this occurs, the bank will fail to meet its obligations to its depositors or other creditors. In order to avoid this problem, an insolvent bank either will have to borrow from other banks or will be forced to sell its assets at a lower price compared to its market value in order to generate liquidity. However, in the event where

the solvent banks are unable to lend liquid money to the insolvent bank, a situation called *bank panic* will occur among the depositors in which most of them will take out their cash money from the bank. Due to these simultaneous actions, the bank will be incapable of realising the demands of all of its depositors on time.

When this takes place, the banking system would not be able to channel sufficient amount of money to finance economic activities. This is the reason why a bank's failure is widely perceived to have a great adverse effect on the economy as a single bank's failure may potentially contribute towards a domino effect on one system (Caprio & Klingebiel 1997). As a result, this may dampen the economic growth of one country (Kaufman 2009) as what we have witnessed in the crisis involving the United States financial system in 2007 – 2008.

Caprio & Klingebiel (1996) suggested that banking failures are more depressing for developing countries. This is due to the possible combination of effects with reductions in domestic lending, reductions in export earnings, and reductions in financial flows. Such adverse developments may result in a reduction in private sector investment and household consumption, an increase in unemployment, and disturb the flow of credit to individuals and firms, thus, causing an overall economic slowdown (Naudé 2009).

In the case of Malaysia, more than 20 percent of its banking market share is contributed by the share of Islamic banking system. For that reason, an unstable Islamic banking system has the potential of harming the whole banking system in Malaysia. Furthermore, an unstable Islamic banking system may attract negative perception across the globe as Malaysia is one of the pioneers of Islamic banking industry. Therefore, it is important for the bank's management and the banking supervisor in Malaysia to observe the level of stability of the Islamic banking institutions and the overall banking system.

MEASURING BANK STABILITY

Literature has employed several techniques in measuring bank stability. These include the qualitative and quantitative approaches. A qualitative approach was used by earlier research on bank stability mainly due to poor or non-availability of sufficient information and indicators that allow for quantitative analysis (Caprio & Klingebiel 1996). Due to the advancement in technology that enhances data collection and availability of data, several quantitative methods have been employed to measure bank stability. Among these methods are the analyses of the financial soundness indicators, *z*-score index and market-based indicators. Quantitative methods gain their popularity in measuring bank stability that can be observed in research which analyses financial stability and stability reports prepared by bank regulators (Oosterloo, de Haan and Jong-A-Pin 2007)

Despite different indicators of bank stability, there is no clear consensus or such widely accepted indicators that best measure bank stability (Segoviano & Goodhart 2009; Čihák & Hesse 2010). Each indicator has its own advantages and disadvantages in measuring bank stability. For example, the main advantage of financial soundness indicator lies in the availability of data which can be obtained from a bank's financial statement. Therefore, analysis of bank stability can be done for most of the banks, in contrast to market-based indicators in which data are not available for banks that are not publicly listed. Despite its capability in identifying the banking market's turmoil, Čihák & Schaeck (2010) suggested that financial ratios analysis should be supported with other available quantitative methods.

With regard to market-based indicators, several advantages of these indicators are worth mentioning here; those are the availability of data on higher frequency, forward-looking nature and smaller lags in comparison to supervisory-based data, and data which can be easily obtained as they are available publicly (Cihák 2006). Despite these advantages, market-based indicators do have their flaws. Market-based indicators are influenced by general trends in the financial markets. Therefore, market-based indicators may be less useful in the case of invalid assumptions (e.g. the underlying market is illiquid) or if when there are major general trends in the financial market. In addition, the levels of some market-based indicators (e.g. the distance to default) are difficult to interpret. Therefore, it is suggested that those who employ these indicators should focus on the trends of these variables, rather than their absolute levels.

STABILITY OF ISLAMIC BANKS

Islamic banking system is developed based on the main sources of Islam i.e. the *al-Quran* and *al-Hadith*. These main sources have underlined basic principles in conducting Islamic banking transaction. These basic principles help to protect Islamic banks from the crisis, thus, ensuring their stability. Among these basic principles are the prohibition of interest-based activities and speculative transactions, avoidance of leverage and debt refinancing due to the prohibition of the sale of debt, matching of assets and liabilities, and the elimination of the multiplier effect (Iqbal & Mirakhor 2011; Iqbal, Askari and Krichenne 2011).

Despite the above theoretical idea, empirical studies that examine the stability of Islamic banks over conventional banks are relatively scarce. This is proven by the study of Belouafi et al. (2013) which discovered that the effort to empirically examine the stability of Islamic banks began after the 2007 – 2009 GFC. It begins with Rokhim & Gamaginta (2009) who examined the stability of Indonesian banking sector, then followed by Čihák & Hesse (2010) who investigated the role of Islamic banks in financial stability using data for

the period of 1993 – 2004 using sample of banks from cross-countries.

More recently, literature can be found comparing the stability of Islamic and conventional banks (Hasan & Dridi 2010; Rajhi 2013; Beck, De Jonghe and Schepens 2013; Bourkhis & Nabi 2013; Pappas et al. 2016). However, those researchers incline to focus on a sample of banks from cross-countries. Only few studies are found to focus specifically on the stability of Malaysian banking sector. For example, Kassim & Abd. Majid (2010) investigated whether Islamic banks in Malaysia are more resilient to the financial shocks compared to the conventional banks. The study which considered two (2) cycles of financial crisis, namely the 1997 Asian financial crisis and the 2007 financial crisis, revealed that both types of banks are vulnerable to financial shocks.

Mat Rahim & Zakaria (2013) examined the stability between Islamic and conventional banks in Malaysia using *z*-score and non-performing loans as proxies for bank stability. Using a sample of Malaysian banks over the period of 2005 – 2010, the study revealed that Islamic banks are more stable than the conventional banks. In addition, Abdul Rahman & Masngut (2014) also employed CAMELS (capital adequacy, asset quality, management quality, earnings efficiency, liquidity and *Shariah* compliance ratio) ratings system to detect financial distress of Malaysian Islamic banks. The results indicate that the Islamic banks will be less likely to face financial distress. This is due to the good performance of Islamic banks as evidenced in the CAMELS rating system.

Verbeet (2014) compared the stability of two (2) Islamic banks and three (3) conventional banks in Malaysia by using accounting ratios. The findings show that conventional banks tend to be more stable than the Islamic banks as they have better liquidity ratio, higher performance ratio and more stable capital adequacy ratio. Nevertheless, the study used a limited sample of banks to compare the stability of Islamic and conventional banks in Malaysia.

Results from the above-mentioned literature reveal unclear evidence whether Islamic banks are more stable than the conventional banks. Mainly, the literature is divided into two (2) groups, with the first group subscribes to the popular view that the Islamic financial system is more stable than the conventional financial system; among others are Hasan & Dridi (2010), Pappas et al. (2012), Beck et al. (2013), Rajhi (2013) and Mat Rahim & Zakaria (2013). In contrast to the first group, Rokhim & Gamaginta (2009), Kassim & Abd. Majid (2010) and Bourkhis & Nabi (2013) have demonstrated mixed results or no difference at all in terms of the stability of Islamic and conventional banks. This contradicts the popular belief and theoretical literature which proposes that the Islamic banks are more stable compared to the conventional banks.

With regard to literature involving Malaysian Islamic and conventional banks, several important points are relevant to be highlighted. Firstly, the analyses in those studies (Kassim & Abd. Majid 2010; Mat Rahim & Zakaria 2013; Abdul Rahman & Masngut 2014) covered a limited time period, i.e. from 1995 to 2010. Although all of these studies have taken into account the 2007 crisis period, they did not analyse the impact of the crisis in the post-crisis period. While it is useful to examine the degree of bank stability during the crisis period, it is also important to analyse the post-crisis impact as the crisis is still unfolding, thus, may hamper bank stability (Hasan & Dridi 2010). Secondly, with regard to Abdul Rahman & Masngut (2014), the study did not make any comparison between Islamic and conventional banks. Hence, there is no conclusion can be made whether Islamic banks are more stable than their conventional counterparts.

METHODOLOGY AND DATA

INDICATOR OF BANK STABILITY

Bank stability is measured using the financial soundness indicator, following Bourkhis & Nabi (2013); and the *z*-score indicator following Čihák & Hesse (2010); Mat Rahim & Zakaria (2013); Rajhi (2013); Bourkhis & Nabi (2013). A set of financial soundness indicator used in this study includes the equity to total assets (ETA) as a measure of capital adequacy, non-performing loans (NPL) and loan loss reserve (LLRGL) as a measure of asset quality, cost to income ratio (CIR) as a measure of management efficiency, return on assets (ROA) as a measure of bank earnings and profitability, and liquid assets to deposits and short-term funding (LADSTF) as a measure of bank liquidity.

Following Čihák & Schaeck (2010), this study utilised another indicator, namely the *z*-score, as an alternative measure of bank stability. The *z*-score measures the probability that the value of one bank's assets becomes lower than the value of the debt (Čihák & Hesse 2010). This indicator gains popularity because it is inversely related to the probability of a bank's insolvency. It can be summarised as

$$z \equiv (k + \mu)/\sigma \quad (1)$$

where k is an equity capital and reserves as percentage of assets, μ is an average return as percentage of assets, while σ is a standard deviation of return on assets as a proxy for return volatility. A higher *z*-score resembles a lower upper bound of insolvency risk, therefore, implies lower probability of insolvency risk.

These indicators were chosen due to their popularity and effectiveness in measuring bank stability as evidenced in previous studies. With regard to *z*-score, this indicator has been used in most studies on the stability of the banking institutions due to several

reasons. Firstly, the *z*-score has the ability to measure an individual bank's risk. Therefore, it helps to compare the risk of default in different groups (Cihak 2007; Cihák & Hesse 2007). This feature suits the aim of this study in comparing the stability level between the Islamic and conventional banks. Secondly, Demirgüç-Kunt & Detragiache (2009) suggested that the *z*-score index is the improvement of the measures used by previous studies which employed accounting ratios such as NPL, loan spread, interest margin, and capital adequacy to measure bank stability. Thirdly, this indicator can be used for institutions in which more sophisticated market data are not available. For all these reasons, the *z*-score is expected to be an appropriate indicator for this study, especially in comparing the stability of Malaysian Islamic and conventional banks in addition to the financial soundness indicator analysis.

DATA AND METHOD

Data for the empirical analysis were extracted from financial statements of Malaysian Islamic and conventional banks over the period of 2004 – 2013. These financial statements were obtained from the website of each individual bank. We choose a sample of banks that have at least six (6) years of their latest financial statements. This is preferred so that bank stability can be observed during crisis and post-crisis periods. This leaves us with 17 Islamic banks and 21 conventional banks, which is equivalent to 80.85 percent of all Malaysian Islamic and conventional banks. Table 1 describes the sample of banks by their type.

Parametric (t-test) and non-parametric tests (Mann-Whitney (MW) and Kolmogorov Smirnov (KS)) had been carried out in order to compare the mean of financial soundness indicators and *z*-score for Malaysian Islamic and conventional banks for all periods and each sub-period. Subsequently, we performed pooled OLS regression analysis to examine the type of bank that is more stable and to investigate the determinants of stability for Islamic and conventional banks for all the sub-periods. In light of the regression analysis, the *z*-score for each bank *i* and time *t* were constructed. Based on the panel data analysis, a modified version of Mat Rahim & Zakaria (2013) was estimated in order to test for the effect of the financial crisis while controlling the bank's specific variables and macroeconomic variables:

TABLE 1. Number of banks vs. sample of banks

By type	Islamic bank	Conventional bank	Total
Number of banks	20	27	47
Sample of banks	17	21	38
Percentage of sample (%)	85%	77.78%	80.85%

$$Z_{it} = \alpha + \beta_1 IBDUMMY + \beta_2 LN(TA)_{it} + \beta_3 ETA_{it} + \beta_4 NPL_{it} + \beta_5 CIR_{it} + \beta_6 ROA_{it} + \beta_7 INCDIV_{it} + \beta_8 NLTA_{it} + \beta_9 HSTAT_t + \beta_{10} GDP_t + \beta_{11} INF_t + \beta_{12} PERIOD + \varepsilon_{it} \quad (2)$$

where the dependent variable is the *z*-score for bank *i* at time *t*; while controlling elements for bank specific factors, market structure and macroeconomic variables. Our main variable of interest is the IBDUMMY, represented by 1 if the type of bank is Islamic, while 0 if the type is conventional bank.

The control elements is then followed by set of bank specific factors; namely the natural log of total assets (LN(TA)) to control for effects of size, the equity to total assets (ETA) to assess the impact of capital adequacy, the non-performing loans (NPL) to control the bank credit risk (non-performing loans), the cost to income ratio (CIR) to control the efficiency of bank's management, the return on assets (ROA) to assess the effect of profitability, the income diversification (INCDIV) to control the extent of banks that diversifies from traditional lending/financing activities, the net loans to total assets (NLTA) to assess the impact of loan (financing) growth.

In addition, the market structure is controlled by using Panzar-Rosse H-statistic (HSTAT) and is estimated based on total revenue equation as stated below:

$$\ln TREV_{it} = \alpha_0 + \alpha_1 \ln PL_{it} + \alpha_2 \ln PK_{it} + \alpha_3 \ln PF_{it} + \sum \zeta_j \ln BSF_{it} + \varepsilon_{it} \quad (3)$$

for $t = 1,\ldots,T$, where T is the number of periods observed and $i = 1,\ldots,I$, where I is the total number of banks in the sample. Subscripts i and t refer to bank i and at time t. The total revenue is used as a dependent variable. Bandt & Davis (2000); Nathan & Neave (1989), among others, suggest that banks have been actively generating income from non-interest sources, namely on fee based and other off-balance sheet activities. Therefore, it is appropriate to consider the total revenue as the dependent variable PL_{it} is the price of labour of bank i at time t, PK_{it} is the price of capital of bank i at time t and PP_{it} is the price of funds of bank i at time t. The ratio of personnel expenses to total assets is used as a proxy for price of labour, followed by the ratio of other operating and administrative expenses to total assets is used as a proxy for price of capital, and finally the ratio of interest expenses to total deposits is used as a proxy for price of funds.

Furthermore, macroeconomic condition is controlled using GDP growth and inflation. Also, the PERIOD dummy variables which represent different sub-periods are also included, namely pre-crisis (2004 – 2007), crisis (2008 – 2009) and post-crisis periods (2010 – 2013). In order to determine the specific year of crisis, the macroeconomic indicator namely the GDP growth is used. The trend of GDP growth has the ability to provide indication between normal time and the crisis period (Kaminsky & Reinhart, 1996; Hardy & Pazarbasioglu, 1998). Based on the World Development Indicator of the World Bank, it has been observed that the GDP growth in Malaysia

deteriorated between the period of 2008 and 2009 from the rating between 4.83 and -1.51, respectively. This indicates the year in which the impact of the 2007 to 2009 global financial crisis reached Malaysia. Finally, ε_{it} is the residual.

Table 2 presents the definition of variables used in this study, as well as the expected results.

In order to examine the determinants of bank stability for Islamic and conventional banks, estimation is carried out with the following equation.

$$Z_{it} = \alpha + \beta_1 LN(TA)_{it} + \beta_2 ETA_{it} + \beta_3 NPL_{it} + \beta_4 CIR_{it} + \beta_5 ROA_{it} + \beta_6 INCDIV_{it} + \beta_7 NLTA_{it} + \beta_8 HSTAT_t + \beta_9 GDP_t + \beta_{10} INF_t + \beta_{11} PERIOD + \varepsilon_{it} \quad (4)$$

Details of the variables used in equation (4) are defined in Table 2.

RESULTS AND DISCUSSION

DESCRIPTIVE STATISTICS

TABLE 3 presents descriptive statistics of variables used in this study. Total assets variable is in natural logarithm form, while other bank specific variables are in the form of financial ratios. In total, the number of observations for Islamic banks for each variable varies from 120 to 132. This is due to the fact that some Islamic banks were newly established during the early period of observation and did not report some data required for this study. In contrast, the numbers of observations for conventional banks are 210.

Based on the statistics, on one hand, we found that the mean score of conventional banks is better than Islamic banks in terms of *z*-score, LN(TA), NPL, CIR and ROA. On the other hand, we found that Islamic banks are better than conventional banks in terms of ETA and INCDIV.

In addition, we conducted correlation analysis on independent variables used in this study. Table 4 presents the result of correlation analysis. Based on this analysis, the result indicates no serious multicollinearity issue involving variables used in the regression analysis.

BASIC COMPARISON

A series of parametric (t-test) and non-parametric tests (MW and KS) were carried out in order to compare the mean of stability indicators for Islamic and conventional banks over the entire period (2004-2013), pre-crisis (2004-2007), crisis (2008-2009), and post-crisis (2010-2013) periods. The results are presented in Table 5.

First, the *z*-score results of the Malaysian Islamic banks are presented. In addition, the trend of *z*-score for Islamic and conventional banks from 2004 to 2013 is presented in Figure 1. Over the entire period of observation, the *z*-score of Malaysian Islamic banks

TABLE 2. Description of the variables used in the regression models

Variable	Description	Expected sign
Dependent		
Z-score	*Z*-score is measured by (ROA+ETA)/Standard Deviation of ROA	NA
Independent	*Bank characteristics*	
LN(TA)	Natural log of total assets	+/-
ETA	Total book value of shareholders equity over total assets	+/-
NPL	Non-performing loans over gross loans	-
NLTA	Net loans to total assets	+/-
CIR	Cost to income ratio	-
ROA	Return on assets	+
INCDIV	Income diversification measured by (net interest income – other operating income)/ total operating income	+/-
	Economic and financial market conditions	
GDP	Gross domestic products (growth)	+
INF	Inflation	-
HSTAT	Panzar-Rosse H-statistics	+/-
Pre-Crisis Dummy	Dummy variable that takes a value of 1 for pre-crisis period, 0 otherwise	+
Crisis Dummy	Dummy variable that takes a value of 1 for during crisis period, 0 otherwise	-
Post-Crisis Dummy	Dummy variable that takes a value of 1 for post-crisis period, 0 otherwise	+
Islamic Banks Dummy	Dummy variable that takes a value of 1 for Islamic banks, 0 for conventional banks.	+/-

TABLE 3. Descriptive statistics

	Bank Type	Obs.	Mean	Std.Dev.	Min.	Max.
Bank-specific variables						
z-score	Islamic	131	29.006	34.519	-3.207	271.149
	Conventional	210	35.798	21.640	5.114	113.065
LN(TA)	Islamic	132	15.864	1.397	10.154	18.644
	Conventional	210	16.901	1.586	13.661	19.801
ETA	Islamic	132	12.893	17.101	-1.902	100.000
	Conventional	210	11.311	6.844	3.570	37.239
NPL	Islamic	120	4.004	4.920	0.070	23.230
	Conventional	210	3.776	3.792	0.010	26.400
NLTA	Islamic	128	52.399	17.144	0.830	77.740
	Conventional	210	47.943	21.886	0.420	89.730
CIR	Islamic	120	58.509	67.240	21.200	760.780
	Conventional	210	43.031	13.328	18.540	109.910
ROA	Islamic	131	0.218	2.671	-25.780	2.080
	Conventional	210	1.160	0.520	-0.980	3.050
INCDIV	Islamic	131	0.827	0.131	0.230	1.000
	Conventional	210	0.538	0.240	-0.801	0.988
Market competition and macroeconomic variables						
HSTAT		380	0.453	0.246	0.148	0.902
GDP		380	5.02	2.325	-1.5	7.4
INF		380	2.48	1.292	0.6	5.4

Notes: LN(TA) is natural log of total assets. ETA is equity to total assets. NPL is non-performing loans. NLTA is net loans to total assets. CIR is cost to income ratio. ROA is return on assets. INCDIV is income diversification. HSTAT is Panzar-Rosse H-statistic. GDP is gross domestic products. INF is inflation.

TABLE 4. Correlation analysis

	Islamic dummy	LN(TA)	ETA	NPL	CIR	ROA	INCDIV	NLTA	HSTAT	GDP	INF
Islamic dummy	1.000										
LN(TA)	-0.215	1.000									
ETA	-0.216	-0.674	1.000								
NPL	0.041	0.037	-0.079	1.000							
CIR	0.266	-0.194	-0.018	0.239	1.000						
ROA	-0.335	0.159	0.099	-0.413	-0.599	1.000					
INCDIV	0.560	0.003	-0.231	0.002	-0.003	-0.219	1.000				
NLTA	0.188	0.458	-0.352	-0.030	-0.228	0.013	0.431	1.000			
HSTAT	-0.053	-0.066	-0.023	0.066	-0.120	0.005	0.020	-0.080	1.000		
GDP	-0.078	0.015	0.001	0.110	-0.006	0.038	-0.039	-0.007	-0.175	1.000	
INF	-0.016	-0.014	-0.055	0.005	-0.064	-0.011	0.048	-0.028	0.554	0.305	1.000

Notes: LN(TA) is natural log of total assets. ETA is equity to total assets. NPL is non-performing loans. NLTA is net loans to total assets. CIR is cost to income ratio. ROA is return on assets. INCDIV is income diversification. GDP is gross domestic products. INF is inflation.

TABLE 5. Means comparison of the stability indicators

Stability indicator	Periods	Type of banks	Obs	Mean	Std.Dev	P value (t-test)	P value (MW)	P value (KS)
z-score	Overall period	Islamic	131	29.01	34.5219	0.0131**	0.000***	0.000***
		Conv.	210	35.80	21.64			
	Pre-crisis	Islamic	29	34.54	43.517	0.4005	0.040**	0.014**
		Conv.	84	36.19	24.084			
	Crisis	Islamic	34	32.59	47.035	0.3349	0.034**	0.030**
		Conv.	42	36.08	21.772			
	Post-crisis	Islamic	68	24.85	19.839	0.0006***	0.000***	0.001***
		Conv.	84	35.27	19.092			
ETA	Overall period	Islamic	132	12.89	17.101	0.1159	0.018**	0.029**
		Conv.	210	11.31	6.844			
	Pre-crisis	Islamic	30	23.57	31.389	0.0010***	0.408	0.34
		Conv.	84	11.73	8.567			
	Crisis	Islamic	34	11.10	11.021	0.4736	0.135	0.132
		Conv.	42	11.24	6.459			
	Post-crisis	Islamic	68	9.08	4.249	0.0074***	0.001***	0.005***
		Conv.	84	10.93	4.86			
NPL	Overall period	Islamic	120	4.00	4.92	0.3193	0.182	0.010***
		Conv.	210	3.78	3.792			
	Pre-crisis	Islamic	24	7.19	7.008	0.1512	0.973	0.326
		Conv.	84	5.92	4.702			
	Crisis	Islamic	31	3.57	4.279	0.174	0.635	0.219
		Conv.	42	2.85	2.178			
	Post-crisis	Islamic	65	3.03	3.731	0.0244**	0.241	0.122
		Conv.	84	2.09	1.948			
LLRGL	Overall period	Islamic	123	3.44	2.96	0.4475	0.044*	0.004***
		Conv.	210	3.47	2.48			
	Pre-crisis	Islamic	24	4.71	3.804	0.4556	0.281	0.081*
		Conv.	84	4.63	2.803			
	Crisis	Islamic	32	3.46	2.478	0.4364	0.321	0.282
		Conv.	42	3.37	1.887			
	Post-crisis	Islamic	66	2.93	2.698	0.0592*	0.231	0.529
		Conv.	84	2.35	1.788			
CIR	Overall period	Islamic	120	58.51	67.24	0.0007***	0.000***	0.000***
		Conv.	210	43.03	13.328			
	Pre-crisis	Islamic	21	88.44	155.06	0.0028***	0.000***	0.004***
		Conv.	84	40.67	11.616			
	Crisis	Islamic	31	50.32	22.356	0.0095***	0.032**	0.075*
		Conv.	42	41.13	9.352			
	Post-crisis	Islamic	68	53.00	16.928	0.0067***	0.010***	0.003***
		Conv.	84	46.34	15.831			
ROA	Overall period	Islamic	131	0.22	2.671	0.0000***	0.000***	0.000***
		Conv.	210	1.16	0.52			
	Pre-crisis	Islamic	29	-1.20	5.275	0.0000***	0.000***	0.000***
		Conv.	84	1.18	0.622			
	Crisis	Islamic	34	0.57	0.707	0.0000***	0.000***	0.000***
		Conv.	42	1.16	0.468			
	Post-crisis	Islamic	68	0.65	0.919	0.0000***	0.000***	0.000***
		Conv.	84	1.14	0.43			

LADSTF	Overall period	Islamic	128	42.35	56.26	0.2169	0.116	0.106
		Conv.	210	46.20	33.9			
	Pre-crisis	Islamic	26	81.18	108.907	0.0072***	0.027**	0.050**
		Conv.	84	47.91	32.429			
	Crisis	Islamic	34	42.75	33.058	0.3929	0.397	0.183
		Conv.	42	44.92	35.714			
	Post-crisis	Islamic	68	27.31	14.874	0.0001***	0.007***	0.021**
		Conv.	84	45.12	34.735			

Notes: MW = Mann-Whitney. KS = Kolmogorov-Smirnov. ETA = equity to total assets. NPL = non-performing loans. LLRGL = loan loss reserve to gross loans. CIR = cost to income ratio. ROA = return on assets. LADSTF = liquid assets to total assets

stands at 29.01. Interestingly, when the *z*-score of Malaysian Islamic banks were examined based on different sub-periods, we found that the *z*-score for Malaysian Islamic banks indicates a declining trend. For the pre-crisis period, the *z*-score of Malaysian Islamic banks is 34.54, while during crisis period; the *z*-score for Malaysian Islamic banks reduces to 32.59. The *z*-score of Malaysian Islamic banks further reduces to 24.85 during the post-crisis period.

Next, the *z*-score results of the Malaysian conventional banks are presented. Over the entire period of observation, the *z*-score of the Malaysian conventional banks stands at 35.80. For the case of pre-crisis period, the *z*-score of the Malaysian conventional banks is 36.19. The *z*-score of the Malaysian conventional banks is 36.08 during the crisis period. Whereas, during the post-crisis period; the *z*-score of the Malaysian conventional banks stands at 35.27. Similarly, like the *z*-score results of the Malaysian Islamic banks, the *z*-score results of the Malaysian conventional banks also indicate a declining trend from one sub-period to another. Nevertheless, the *z*-score of the Malaysian conventional banks demonstrates a more stable trend compared to the trend of *z*-score of the Malaysian Islamic banks.

When the *z*-score results of the Malaysian Islamic and conventional banks were compared, we found that the *z*-score of the Malaysian Islamic banks is generally lower than the *z*-score of the Malaysian conventional banks. This can be observed from the *z*-score results of the entire periods as well as in all sub-periods. Results of both parametric and non-parametric tests are highly significant over the entire periods as well as during the post-crisis period. In addition, for pre-crisis and during crisis periods, the MW and KS tests reveal a significant result. Therefore, it is clear that the Islamic banks are less stable than the conventional banks.

In addition to the *z*-score, this study also compares the stability of Malaysian Islamic and conventional banks using the financial soundness indicators. The capital adequacy which is measured using equity to total assets suggests that Islamic banks are well-capitalised in comparison to conventional banks over all the periods as well as during the pre-crisis period. The equity to total assets for Islamic banks over the entire period is 12.89 percent compared to conventional banks of 11.31 percent. Likewise, the Islamic banks' equity to total assets during the pre-crisis period is 23.57 percent, which is higher than the equity to total assets of conventional banks at 11.31 percent. The non-parametric test indicates that results for over the entire period are significant while the t-test for pre-crisis period is highly significant at 1 percent level. However, the equity to total assets for

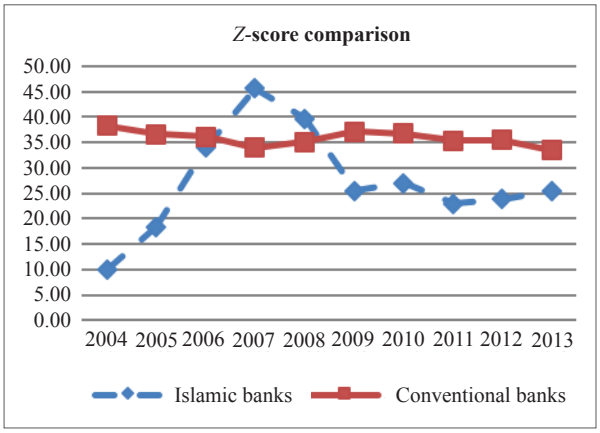

FIGURE 1. *Z*-score comparison of Islamic and conventional banks (2004 - 2013)

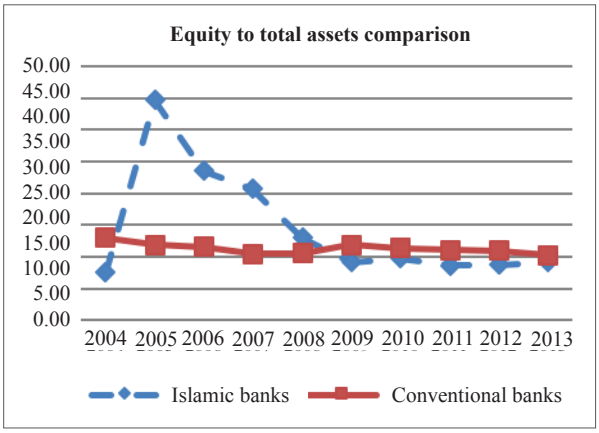

FIGURE 2. Equity to total assets comparison of Islamic and conventional banks (2004 - 2013)

Islamic banks has reduced tremendously to 11.10 percent during the crisis period, which is similar to the equity to total assets of conventional banks which reduced to 11.24 percent. For post-crisis period, the equity to total assets for Islamic banks is 9.08 percent, which is lower than the conventional banks of 10.93 percent. Both parametric and non-parametric tests for post-crisis period are highly significant at 1 percent level. This recommends that although the equity to total assets for Islamic banks is higher over the entire period compared to the conventional banks, the level of capitalisation of Islamic banks has reduced from one sub-period to another. This would trigger a potential problem in the stability of Malaysian Islamic banks in the near future.

Figure 2 presents the trend of equity to total assets for Malaysian Islamic banks and conventional banks over the period from 2004 to 2013. From 2004 to 2008, the equity to total assets for Islamic banks remained higher than the conventional banks. However, the post-crisis period exhibits that the equity to total assets for conventional banks is higher than of the equity to total assets for Islamic banks.

Subsequently, the non-performing loans and the loan loss reserve to gross loans are used to measure the asset quality of Malaysian Islamic and conventional banks. Over the entire period and sub-periods of observations, it is found that the asset quality of conventional banks is better than the Islamic banks. The trend of non-performing loans for both Malaysian Islamic and conventional banks is presented in Figure 3, which confirms the observation. Nevertheless, all the t-test results are not significant across the sub-periods of observations, except for the t-test of non-performing loans during the post-crisis period, which is significant at 5 percent level. Similarly, it has been observed that the loan loss reserve to gross loans ratios for both the Malaysian Islamic and conventional banks indicates a similar trend. However, in most cases as presented in Figure 4, Malaysian Islamic banks have more reserves compared to the conventional counterparts.

Furthermore, the management efficiency of Islamic and conventional banks was compared by using the cost to income ratio. This ratio shows the bank's costs with respect to its income. Banks with lower cost to income ratio indicate better efficiency. When the overall period was considered, the cost to income ratio for Islamic banks is 58.51 percent compared to 43.03 percent for conventional banks. During the pre-crisis period, the cost to income ratio of Islamic banks is 88.44 percent compared to the cost to income ratio of conventional banks at 40.67 percent. For the crisis period, the cost to income ratio of Islamic banks improved to 50.32 percent compared to the cost to income ratio of conventional banks at 41.13 percent. In the post-crisis period, the cost to income ratio of Islamic banks is 53 percent compared to 46.34 percent of conventional banks. The t-test results of cost to income ratio for both Malaysian Islamic and conventional banks are significant at 1 percent level. Observation on the trend of cost to income ratio in Figure 5 over the entire period indicates that the cost to income ratio for conventional banks is better than Islamic banks.

This study also took into account the earnings and profitability by using return on assets, in which conventional banks exhibit higher return on assets than Islamic banks over the entire period of observations and for all the sub-periods. Over the entire period, the return on assets for Islamic banks is at 0.22 percent in comparison to 1.16 percent for conventional banks. Similarly, during the pre-crisis period, the return on assets for Islamic banks is at -1.20 percent compared to 1.18 percent for conventional banks. This is in contrast to the crisis period in which the return on assets for Islamic banks is at 0.57 percent in comparison to conventional banks of 1.16 percent. Lastly, during the post-crisis period, the return on assets for Islamic banks is 0.65 percent, which is lower than the conventional banks of 1.14 percent. The t-test, MW and KS tests are highly significant at 1 percent level. These observations reveal that conventional banks are more profitable, thus,

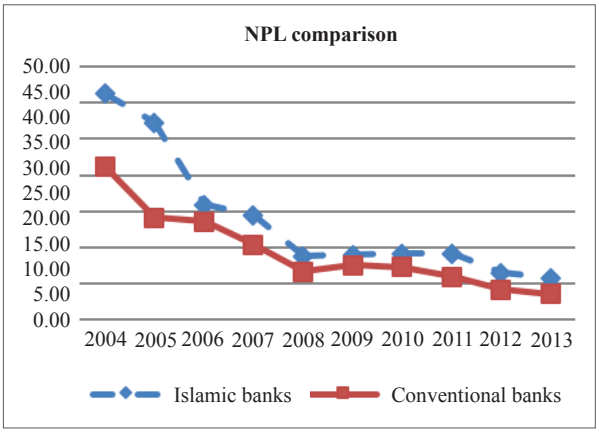

FIGURE 3. Non-performing loans comparison of Islamic and conventional banks (2004 - 2013)

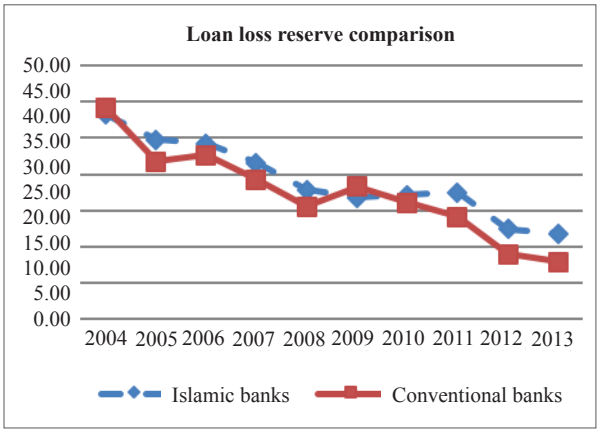

FIGURE 4. Loan loss reserve comparison of Islamic and conventional banks (2004 - 2013)

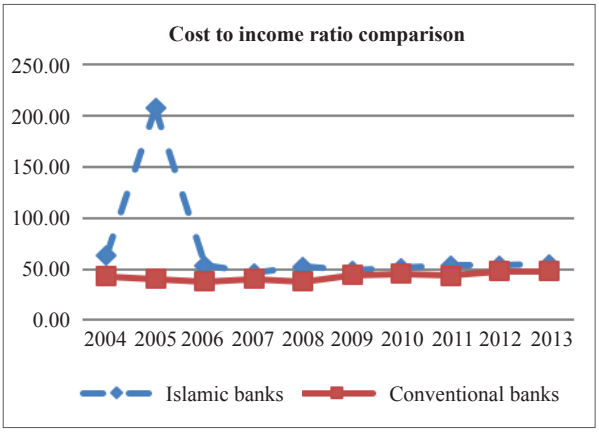

FIGURE 5. Cost to income ratio comparison of Islamic and conventional banks (2004 - 2013)

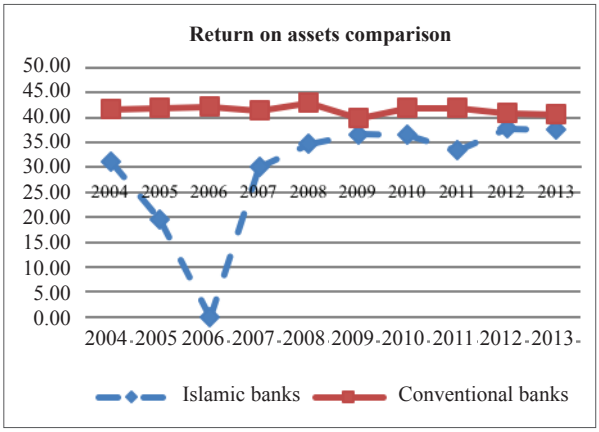

FIGURE 6. Return on assets comparison of Islamic banks and conventional banks (2004 - 2013)

more stable than Islamic banks. Figure 6 presents the trend of return on assets for both Malaysian Islamic and conventional banks over the period of observation.

Lastly, a comparison was carried out on the liquidity ratio of Islamic and conventional banks by using liquid assets to deposits and short-term funding. Over the entire period, t-test, MW and KS tests could not reject the hypothesis that liquidity ratio for both Islamic and conventional banks over the entire period and during crisis period is at the same level. However, for the pre-crisis period, it is observed that the liquidity of Islamic banks is at 81.18 percent, which possesses more liquidity than conventional banks of 47.91 percent. This result might be due to the availability of liquidity instrument for Islamic banks during the pre-crisis period, which is limited. Furthermore, the results are significant at 1 percent and 5 percent levels when the t-test and both non-parametric tests were used. In contrast, during crisis and post-crisis periods, the observations evidence a reduction in liquidity ratio for Islamic banks. Specifically, in the post-crisis period, the liquidity ratio for Islamic banks result is 27.31 percent, which is lower than conventional banks of 45.12 percent. The results for both parametric and non-parametric tests for post-crisis period are highly significant. Moreover, the results also indicate that Islamic banks are more vulnerable to crisis and, therefore, less stable than the conventional counterparts. It is also important to note that the liquidity of Islamic banks has reduced over the period of observation. An illiquid asset may be vulnerable for Islamic banks as they may drag the institution towards liquidity crisis. This potential problem should be emphasised by the Islamic banks in the near future. The trend of liquid assets of both Malaysian Islamic and conventional banks from 2004 to 2013 is presented in Figure 7.

In summary, the comparison of the mean of stability indicators suggests that in most cases, the Malaysian conventional banks are more stable than the Malaysian Islamic banks. The results only find that Islamic banks are more stable for the three following observations, which are the equity to total assets over the entire period, pre-crisis period and liquid assets for the pre-crisis period. Furthermore, in most cases, the results of parametric and non-parametric tests are significant, suggesting that the

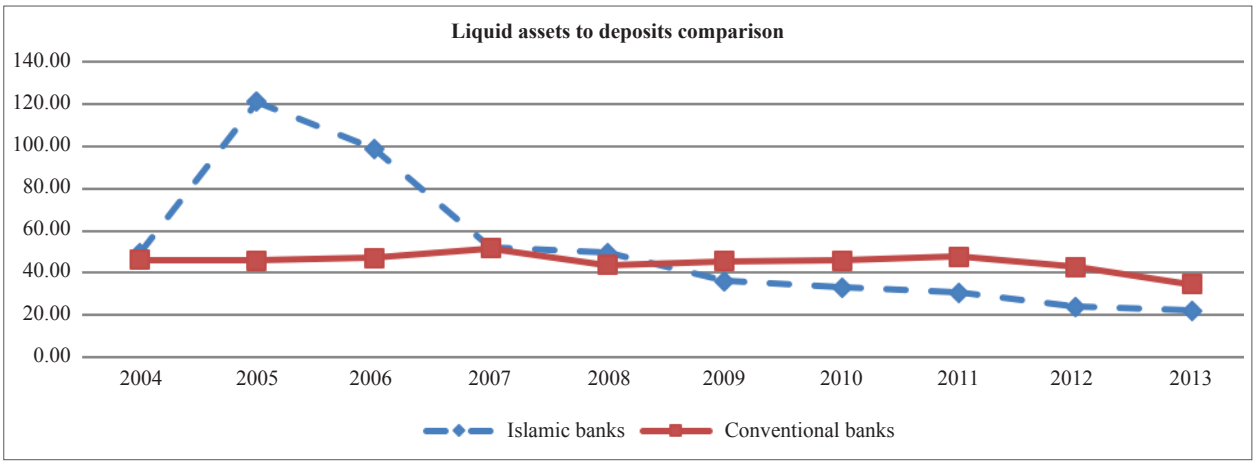

FIGURE 7. Liquid assets to deposits comparison of Islamic banks and conventional banks (2004 - 2013)

differences between stability indicators of Malaysian Islamic and conventional banks are different.

REGRESSION ANALYSIS

Stability of Islamic Versus Conventional Banks To examine the robustness of results in section 4.2, this study conducted an estimation of the pooled OLS regression analysis using equation 2. The analyses control the Islamic banks dummy variable, bank-specific factors, market competition and macroeconomic factors. The results of the pooled OLS regression analysis are presented in Table 6.

Six (6) regression models are estimated. Model 1 includes Islamic banks dummy and bank-specific variables. Model 2 includes all variables used in Model

TABLE 6. Regression analysis with Islamic bank's dummy variables[a]

Estimator	OLS					
Model	1	2	3	4	5	6
Islamic dummy	-13.90***	-13.98***	-14.03***	-14.09***	-14.04***	-14.08***
	(2.969)	(2.977)	(3.012)	(3.139)	(3.028)	(3.135)
LN(TA)	-3.337***	-3.383***	-3.392***	-3.413***	-3.392***	-3.415***
	(1.098)	(1.106)	(1.122)	(1.176)	(1.125)	(1.199)
ETA	0.931***	0.921***	0.917***	0.914***	0.917***	0.914***
	(0.294)	(0.299)	(0.303)	(0.313)	(0.304)	(0.314)
NPL	-0.230	-0.225	-0.225	-0.214	-0.225	-0.213
	(0.232)	(0.233)	(0.243)	(0.280)	(0.243)	(0.292)
CIR	-0.137**	-0.140**	-0.140**	-0.142**	-0.140**	-0.141**
	(0.0668)	(0.0673)	(0.0675)	(0.0694)	(0.0680)	(0.0690)
ROA	2.484*	2.468*	2.467*	2.472*	2.464*	2.479*
	(1.293)	(1.288)	(1.315)	(1.324)	(1.322)	(1.338)
INCDIV	8.811**	8.903**	8.979**	8.986**	8.984**	8.978**
	(4.255)	(4.274)	(4.290)	(4.285)	(4.302)	(4.291)
NLTA	0.174***	0.173***	0.173***	0.172***	0.173***	0.173***
	(0.0602)	(0.0607)	(0.0610)	(0.0608)	(0.0611)	(0.0609)
HSTAT		-1.152	-0.323	-0.140	-0.414	0.0433
		(4.302)	(5.826)	(6.139)	(6.560)	(7.331)
GDP			-0.0407	-0.0206	-0.0205	-0.0544
			(0.524)	(0.570)	(0.835)	(0.559)
INF			-0.301	-0.329	-0.313	-0.311
			(1.076)	(1.124)	(1.145)	(1.083)
Pre-crisis				-0.256		
				(3.075)		
During crisis					0.160	
					(5.182)	
Post-crisis						0.287
						(3.687)
Constant	72.43***	74.02***	74.76***	75.15***	74.70***	75.00***
	(20.47)	(21.18)	(21.89)	(22.99)	(21.97)	(22.58)
Observations	324	324	324	324	324	324
R-squared	0.297	0.297	0.298	0.298	0.298	0.298

Notes: LN(TA) is a natural log of total assets. ETA is an equity to total assets. NPL is non-performing loans. NLTA is net loans to total assets. CIR is a cost to income ratio. ROA is a return on assets. INCDIV is an income diversification. HSTAT is H-statistic based on total revenue derived from Panzar-Rosse method. GDP is gross a domestic products growth. INF is an inflation. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

[a] The equation: $Z_{it} = \alpha + \beta_1 IBDUMMY + \beta_2 LN(TA)_{it} + \beta_3 ETA_{it} + \beta_4 NPL_{it} + \beta_5 CIR_{it} + \beta_6 ROA_{it} + \beta_7 INCDIV_{it} + \beta_8 NLTA_{it} + \beta_9 HSTAT_t + \beta_{10} GDP_t + \beta_{11} INF_t + \beta_{12} PERIOD + \varepsilon_{it}$

1 and market competition. Model 3 includes all variables used in Model 2 and macroeconomic variables. Models 4, 5 and 6 include all variables used in Model 3 and the sub-period dummy variables, namely the pre-crisis, during crisis and post-crisis, respectively. Overall, the coefficient of most variables used in the regression models depicts similar outcome compared to previous studies. In addition, these coefficients' outcomes remain the same across all regression models that are estimated. Therefore, it demonstrates the precise fitting of the proposed regression models.

From the results of regression analysis in Table 6, it can be observed that the coefficient of the primary variable of interest, namely the Islamic banks' dummy variable indicates a negative sign and highly significant at 1 percent level across all models (1 to 6). This reveals that Islamic banks in Malaysia are less stable than conventional banks. The results remain the same when the control element is applied for different sub-periods, including pre-crisis, during crisis and post-crisis periods. This confirmed the earlier comparison result that compared the mean of *z*-score in Section 4.2. The finding is in line with the findings of Rokhim & Gamaginta (2009) and Shafik (2014), which also reveal that Islamic banks within their samples tend to have significantly lower level of stability compared to conventional banks.

Subsequently, a similar regression model is estimated based on different bank sizes. For this purpose, banks in the sample are categorised into small and large banks based on the total assets. Banks with total assets from RM 25.7 million to RM 10.0 billion are considered as small banks, whilst banks with total assets of RM 10.0 billion and above are considered as large banks. Table 7 presents the pooled OLS regression results for large banks, while Table 8 presents the pooled OLS regression results for small banks.

On one hand, the coefficient results of Islamic banks' dummy variable in Models 1 to 6 of Table 7 indicate a negative sign and highly significant at 1 percent level. This reveals that the large Islamic banks are significantly less stable than the large conventional banks. This result concurs with the findings of Čihák & Hesse (2010) and Abedifar et al. (2013), in which these authors investigated a cross-countries sample and found that large conventional banks tend to be stronger than large Islamic banks.

On the other hand, the coefficient results of Islamic banks' dummy variable in Models 1 to 6 of Table 8 indicate a positive sign. This result reveals that the small Islamic banks are more stable than the small conventional banks. This result is in consensus with the findings of Čihák & Hesse (2010) and Abedifar et al. (2013). However, the result is in contrast to the finding of Rajhi (2013), in which a cross-countries study found that small Islamic banks tend to be less stable than small conventional banks. Nevertheless, the coefficient results for small Islamic banks dummy variables are insignificant.

Determinants of Stability To examine the determinants of stability for Islamic and conventional banks, six (6) models were estimated based on pooled OLS regression by using Equation 4. The regression analysis was carried out separately for Islamic and conventional banks. Model 1 includes bank-specific variables. Model 2 includes bank-specific variables and market competition. Model 3 includes all variables used in Model 2 and macroeconomic variables. Models 4, 5 and 6 include all variables used in Model 3 and sub-period dummy variables of pre-crisis, during crisis and post-crisis periods, respectively.

Table 9 presents the regression results for Islamic banks while Table 10 presents the regression results for conventional banks. In general, most of the variables used in the regression models indicate the expected sign and are similar to previous literature. In addition, the sign of coefficient remains the same across all models, therefore, resulted in a good fitness to the proposed regression models.

Determinants of Stability for Islamic Banks Firstly, the results of regression analysis for Islamic banks are reported in Table 9. The coefficient signs for natural log of total assets, which is a proxy for bank size, indicate a negative sign throughout the regression models. The results are significant at a minimum level of 5 percent and suggest that an increase in the size of Islamic banks tends to decrease its level of stability. The findings of this proposed research are in line with previous studies by Bourkhis & Nabi (2013), De Jonghe (2010), Čihák & Hesse (2010), and Rajhi (2013). The outcome can be justified simply because larger banks will normally be exposed to a major amount of risks. In contrast, the smaller banks with limited capacity would not be exposed to businesses with a larger amount of risks. Therefore, larger banks are more vulnerable to a critical situation, especially during adverse economic conditions (De Jonghe, 2010).

In addition, the sign of coefficient for equity to total assets, which is the proxy for the level of bank's capital adequacy, is positive and significant at the minimum level of 10 percent throughout the regression models. The results indicate that an increase in the level of capitalisations of Islamic banks would consequently increase the level of stability. This is expected and in consonance with the previous literature, among others are Degryse et al. (2013), Beck et al. (2013), Beck et al. (2010), and Tagkalakis (2014). As a result, a strong capital adequacy portrays the ability of a bank to remain stable, especially during the turbulence period. In addition, the bank that has a good level of capital will gain consumer's confidence, hence, the customers will continue using the banking facilities and services (Hussein, 2010).

As expected, the sign of coefficient for non-performing loans, which is the proxy for asset quality, is

TABLE 7. Regression analysis with Islamic bank's dummy variables based on large banks[a]

Estimator	OLS					
Model	1	2	3	4	5	6
Islamic dummy	-25.91***	-26.92***	-27.26***	-30.39***	-27.23***	-30.96***
	(4.226)	(4.175)	(4.211)	(4.493)	(4.218)	(4.522)
LN(TA)	-11.48***	-11.72***	-11.87***	-12.79***	-11.87***	-13.20***
	(1.692)	(1.701)	(1.717)	(1.751)	(1.721)	(1.750)
ETA	-0.206	-0.375	-0.407	-0.950**	-0.400	-1.029**
	(0.420)	(0.416)	(0.420)	(0.470)	(0.429)	(0.459)
NPL	-0.464	-0.342	-0.262	0.244	-0.262	0.448
	(0.281)	(0.291)	(0.295)	(0.330)	(0.296)	(0.334)
CIR	0.0950	0.0514	0.0483	-0.0253	0.0483	-0.0545
	(0.147)	(0.152)	(0.151)	(0.151)	(0.152)	(0.149)
ROA	4.401***	4.300***	4.468***	4.476***	4.488***	4.923***
	(1.543)	(1.456)	(1.451)	(1.392)	(1.466)	(1.463)
INCDIV	5.771	6.635	6.226	5.152	6.231	4.824
	(7.976)	(8.204)	(8.340)	(8.341)	(8.342)	(7.537)
NLTA	0.449***	0.425***	0.427***	0.414***	0.427***	0.405***
	(0.107)	(0.109)	(0.109)	(0.110)	(0.110)	(0.107)
HSTAT		-8.168	-12.53	-7.832	-12.19	1.933
		(5.608)	(7.600)	(7.882)	(8.590)	(9.128)
GDP			-0.592	0.0664	-0.665	-1.330**
			(0.643)	(0.720)	(1.067)	(0.667)
INF			0.995	-0.0503	1.039	0.521
			(1.341)	(1.458)	(1.462)	(1.362)
Pre-crisis				-9.438**		
				(4.120)		
During crisis					-0.586	
					(6.734)	
Post-crisis						13.41***
						(4.609)
Constant	204.6***	216.3***	221.4***	245.2***	221.6***	245.8***
	(30.13)	(31.21)	(31.97)	(32.93)	(32.03)	(32.16)
Observations	199	199	199	199	199	199
R-squared	0.271	0.279	0.283	0.302	0.283	0.311

Notes: LN(TA) is a natural log of total assets. ETA is an equity to total assets. NPL is non-performing loans. NLTA is net loans to total assets. CIR is a cost to income ratio. ROA is a return on assets. INCDIV is an income diversification. HSTAT is H-statistic based on total revenue derived from Panzar-Rosse method. GDP is a gross domestic products growth. INF is an inflation. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

[a] The equation: $Z_{it} = \alpha + \beta_1 IBDUMMY + \beta_2 LN(TA)_{it} + \beta_3 ETA_{it} + \beta_4 NPL_{it} + \beta_5 CIR_{it} + \beta_6 ROA_{it} + \beta_7 INCDIV_{it} + \beta_8 NLTA_{it} + \beta_9 HSTAT_t + \beta_{10} GDP_t + \beta_{11} INF_t + \beta_{12} PERIOD + \varepsilon_{it}$

negative throughout the regression models. The results are highly significant at 1 percent level, thus, revealing that an increase in non-performing loans of Islamic banks tends to reduce its level of stability. These results are in line with the findings of Rajhi (2013), Čihák & Hesse (2010), Tagkalakis (2014), and Godlewski (2006). The negative relationship between non-performing loan and bank stability is possible as an increase in non-performing loans could cause cash flow problems and affects a bank's liquidity. Such scenario will expose the bank to the vulnerable situation.

TABLE 8. Regression analysis with Islamic bank's dummy variables based on small banks[a]

Estimator	OLS					
Model	1	2	3	4	5	6
Islamic dummy	7.692	7.729	7.617	7.636	7.524	7.585
	(4.704)	(4.784)	(4.911)	(4.882)	(4.965)	(4.989)
LN(TA)	-5.480	-5.501	-5.137	-5.230	-4.958	-5.028
	(5.271)	(5.387)	(5.631)	(5.658)	(5.831)	(5.949)
ETA	1.746***	1.744***	1.758***	1.761***	1.776***	1.759***
	(0.411)	(0.421)	(0.425)	(0.425)	(0.439)	(0.429)
NPL	-1.140***	-1.145***	-1.175***	-1.136***	-1.151***	-1.203***
	(0.320)	(0.317)	(0.326)	(0.388)	(0.315)	(0.405)
CIR	-0.358***	-0.360***	-0.360***	-0.365***	-0.362***	-0.356***
	(0.0874)	(0.0910)	(0.0922)	(0.0946)	(0.0913)	(0.0961)
ROA	-1.181	-1.191	-1.388	-1.278	-1.261	-1.460
	(1.552)	(1.562)	(1.600)	(1.674)	(1.578)	(1.671)
INCDIV	12.79	12.77	12.80	13.10	13.52	12.67
	(8.780)	(8.813)	(9.131)	(9.009)	(9.229)	(9.078)
NLTA	-0.161*	-0.162*	-0.160*	-0.165*	-0.168**	-0.157*
	(0.0815)	(0.0825)	(0.0826)	(0.0837)	(0.0824)	(0.0826)
HSTAT		-0.380	4.380	5.203	1.210	3.141
		(5.584)	(7.602)	(8.113)	(8.205)	(9.369)
GDP			0.310	0.397	1.015	0.356
			(0.725)	(0.783)	(1.088)	(0.778)
INF			-1.300	-1.414	-1.723	-1.275
			(1.515)	(1.546)	(1.590)	(1.519)
Pre-crisis				-1.136		
				(4.393)		
During crisis					5.642	
					(6.814)	
Post-crisis						-0.964
						(5.060)
Constant	109.5	110.1	104.2	105.5	98.85	103.2
	(87.91)	(91.45)	(95.43)	(95.71)	(99.80)	(99.01)
Observations	125	125	125	125	125	125
R-squared	0.595	0.595	0.598	0.598	0.601	0.598

Notes: LN(TA) is a natural log of total assets. ETA is an equity to total assets. NPL is non-performing loans. NLTA is net loans to total assets. CIR is a cost to income ratio. ROA is a return on assets. INCDIV is an income diversification. HSTAT is H-statistic based on total revenue derived from Panzar-Rosse method. GDP is a gross domestic products growth. INF is an inflation. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

[a] The equation: $Z_{it} = \alpha + \beta_1 IBDUMMY + \beta_2 LN(TA)_{it} + \beta_3 ETA_{it} + \beta_4 NPL_{it} + \beta_5 CIR_{it} + \beta_6 ROA_{it} + \beta_7 INCDIV_{it} + \beta_8 NLTA_{it} + \beta_9 HSTAT_t + \beta_{10} GDP_t + \beta_{11} INF_t + \beta_{12} PERIOD + \varepsilon_{it}$

Similarly, the sign of coefficient for the cost to income ratio, which is the proxy for management efficiency, is negative and highly significant at 1 percent level of the regression models that are estimated. An increase in cost to income ratio is tantamount to a lower degree of management efficiency. Therefore, a negative coefficient suggests that an increase in cost to income ratio would lead to a decrease in bank stability. The findings of this proposed work support the previous literature such as Rajhi (2013), Beck et al. (2009), Bourkhis & Nabi (2013) and Čihák & Hesse (2010).

In addition, the regression results reveal a positive coefficient sign of INCDIV, which is the proxy for income diversification. The results are significant at 5 percent level throughout the regression models. It is clear from the results that an increase in income diversification

would contribute positively towards the stability of Islamic banks. Furthermore, the results remain positive when the control element was applied to during crisis and post-crisis dummy variables. The findings of the proposed research are in line with previous literature, among others, Vallascas & Keasey (2012), Beck et al. (2009), Mat Rahim & Zakaria (2013), and Rajhi (2013). This observation is possible as non-interest based activities are normally exposed to a lesser amount of risk compared to the interest-based activities. Therefore, banks which generate higher income from non-interest activities will be less exposed to potential risks. Such move helps a bank to remain stable, especially during and post-crisis periods.

TABLE 9. Regression analysis on determinants of stability for Malaysian Islamic banks[a]

Estimator	OLS					
Model	1	2	3	4	5	6
LN(TA)	-7.099***	-7.348***	-7.255**	-6.607**	-6.723**	-7.075**
	(2.574)	(2.727)	(2.786)	(3.002)	(2.748)	(3.003)
ETA	0.886*	0.844*	0.871*	1.040**	1.052**	0.913*
	(0.469)	(0.473)	(0.477)	(0.513)	(0.497)	(0.498)
NPL	-0.918***	-0.896***	-0.932***	-1.088***	-1.037***	-0.978**
	(0.269)	(0.293)	(0.306)	(0.388)	(0.311)	(0.376)
CIR	-0.439***	-0.444***	-0.444***	-0.424***	-0.420***	-0.439***
	(0.107)	(0.111)	(0.113)	(0.120)	(0.115)	(0.118)
ROA	-1.305	-1.307	-1.375	-1.367	-1.093	-1.408
	(1.067)	(1.066)	(1.075)	(1.087)	(1.093)	(1.078)
INCDIV	32.24**	31.78**	32.73**	38.79**	41.60**	33.91**
	(13.21)	(13.39)	(13.75)	(17.02)	(15.99)	(15.60)
NLTA	-0.176	-0.178	-0.184	-0.190	-0.202	-0.184
	(0.141)	(0.141)	(0.143)	(0.143)	(0.145)	(0.144)
HSTAT		-2.625	-0.595	-2.727	14.27	-3.321
		(7.054)	(9.347)	(9.333)	(13.00)	(12.42)
GDP			0.367	0.141	-1.330	0.499
			(0.756)	(0.785)	(1.315)	(0.965)
INF			-0.361	-0.0256	0.427	-0.334
			(1.554)	(1.567)	(1.625)	(1.550)
Pre-crisis				5.046		
				(6.220)		
During crisis					-15.01	
					(9.743)	
Post-crisis						-1.929
						(7.893)
Constant	140.7***	146.9***	143.2***	126.4**	129.2**	140.5**
	(44.99)	(49.80)	(51.34)	(59.38)	(52.10)	(55.32)
Observations	114	114	114	114	114	114
R-squared	0.336	0.337	0.339	0.344	0.352	0.339

Notes: LN(TA) is a natural log of total assets. ETA is an equity to total assets. NPL is non-performing loans. NLTA is net loans to total assets. CIR is a cost to income ratio. ROA is a return on assets. INCDIV is an income diversification. HSTAT is H-statistic based on total revenue derived from Panzar-Rosse method. GDP is gross domestic products growth. INF is inflation.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

[a] The equation: $Z_{it} = \alpha + \beta_1 LN(TA)_{it} + \beta_2 EQASS_{it} + \beta_3 NPL_{it} + \beta_4 CIR_{it} + \beta_5 ROA_{it} + \beta_6 INCDIV_{it} + \beta_7 NLTA_{it} + \beta_8 HSTAT_t + \beta_9 GDP_t + \beta_{10} INF_t + \beta_{11} PERIOD + \varepsilon_{it}$

Furthermore, the coefficient of return on assets indicates a negative sign throughout Models 1 to 6. However, the result is insignificant. Similarly, the coefficient of net loans to total assets also indicates a negative sign across the models. This suggests that financing growth tends to affect the stability of Islamic banks. Nevertheless, this result is also insignificant. In addition, the impact of market competition on the stability of Islamic banks is controlled. The coefficient of HSTAT indicates a negative sign in Models 2 to 4, and 6. As a result, there is a negative impact of market competition on the stability of Islamic banks. However, this finding is also insignificant.

TABLE 10. Regression analysis on determinants of stability for Malaysian conventional banks[a]

Estimator	OLS					
Model	1	2	3	4	5	6
LN(TA)	-2.882**	-2.869**	-2.970**	-3.032**	-2.968**	-3.035**
	(1.173)	(1.175)	(1.209)	(1.266)	(1.213)	(1.273)
ETA	1.267***	1.271***	1.251***	1.244***	1.250***	1.244***
	(0.341)	(0.346)	(0.355)	(0.368)	(0.357)	(0.368)
NPL	0.152	0.150	0.186	0.249	0.187	0.247
	(0.272)	(0.271)	(0.282)	(0.319)	(0.283)	(0.339)
CIR	0.305***	0.308***	0.313***	0.304***	0.312***	0.305***
	(0.0940)	(0.0978)	(0.0981)	(0.102)	(0.0981)	(0.104)
ROA	12.25***	12.26***	12.74***	12.75***	12.72***	12.77***
	(2.714)	(2.710)	(2.803)	(2.794)	(2.810)	(2.798)
INCDIV	8.451*	8.397*	8.886**	9.070**	8.960**	8.970**
	(4.309)	(4.339)	(4.342)	(4.317)	(4.422)	(4.276)
NLTA	0.320***	0.321***	0.321***	0.318***	0.320***	0.319***
	(0.0649)	(0.0656)	(0.0658)	(0.0653)	(0.0659)	(0.0654)
HSTAT		0.517	1.022	1.934	0.678	2.372
		(5.432)	(7.201)	(7.890)	(7.666)	(9.133)
GDP			-0.317	-0.211	-0.205	-0.359
			(0.673)	(0.768)	(1.057)	(0.689)
INF			-0.389	-0.543	-0.461	-0.447
			(1.354)	(1.481)	(1.472)	(1.389)
Pre-crisis				-1.146		
				(3.676)		
During crisis					0.862	
					(6.142)	
Post-crisis						1.129
						(4.364)
Constant	22.35	21.72	24.82	26.02	24.41	25.40
	(22.38)	(23.03)	(24.31)	(25.54)	(24.41)	(25.00)
Observations	210	210	210	210	210	210
R-squared	0.296	0.296	0.298	0.298	0.298	0.298

Notes: LN(TA) is a natural log of total assets. ETA is an equity to total assets. NPL is non-performing loans. NLTA is net loans to total assets. CIR is a cost to income ratio. ROA is a return on assets. INCDIV is an income diversification. HSTAT is H-statistic based on total revenue derived from Panzar-Rosse method. GDP is a gross domestic products growth. INF is an inflation.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

[a] The equation: $Z_{it} = \alpha + \beta_1 LN(TA)_{it} + \beta_2 EQASS_{it} + \beta_3 NPL_{it} + \beta_4 CIR_{it} + \beta_5 ROA_{it} + \beta_6 INCDIV_{it} + \beta_7 NLTA_{it} + \beta_8 HSTAT_t + \beta_9 GDP_t + \beta_{10} INF_t + \beta_{11} PERIOD + \varepsilon_{it}$

Furthermore, during crisis and post-crisis, dummy variables were controlled to examine the impact of the recent 2007 to 2009 global financial crisis on the stability of Islamic banks. The signs of the coefficient for both sub-periods dummy variables are negative, whereby indicating that stability of Islamic banks is lower during crisis and post-crisis periods. Therefore, a negative impact can be observed on the stability of Islamic banks. Nevertheless, both results are found to be insignificant.

Determinants of Stability for Conventional Banks

Next, the results of the analysis which examine the determinants of conventional banks are reported in Table 10. Firstly, it is important to highlight that the resulting outcome of the proposed research suggests that there are several determinants for the stability of conventional banks, which are similar to Islamic banks. The determinants are total assets, which indicate a negative relationship, equity to total assets and income diversification, which indicate a positive relationship.

In addition, it is observed that there are several other significant determinants of stability for conventional banks. The sign of coefficient for the cost to income ratio is positive and highly significant at 1 percent level throughout the regression models. These findings are in contrast to the results of Islamic banks. Therefore, an increase in cost to income ratio inclines to increase the level of stability for conventional banks.

Furthermore, it is observed that the sign of coefficient for return on assets, which is the proxy for earnings and profitability, is positive and highly significant at 1 percent level throughout the regression models. These suggest a positive relationship between earnings and profitability of conventional banks and its level of stability. The resulting outcome of this variable supports previous literature, among others, Greuning & Iqbal (2008), Ismail (2010), Acharya (2009), Patro et al. (2013), and Tagkalakis (2014). Bank's earnings and profitability help to increase the level of bank stability at least through two (2) channels. Firstly, an increase in earnings and profitability helps to increase shareholder and customer's confidence. Secondly, an increase in earnings and profitability assists bank stability to increase its capital through retained earnings.

Moreover, the sign of coefficient for net loans to total assets, which is the proxy for credit exposure, is positive and highly significant at 1 percent level of the regression models. Our findings suggest that an increase in a credit exposure of conventional banks inclines to increase the level of stability. Such scenario is possible only when the bank has an effective mechanism for monitoring and controlling of its credit exposure. The results concur the findings of Degryse et al. (2013), Rajhi (2013) and Gavin & Hausmann (1998).

In addition, the coefficients of non-performing loans and HSTAT also indicate positive signs for conventional banks across Models 1 to 6. Nevertheless, both of these findings are not significant. Lastly, it is observed that the signs of coefficients for during crisis and post-crisis periods dummy variables are positive. Thus, this suggests that the recent 2007 to 2009 global financial crisis did not contribute any negative impact to the stability of conventional banks. However, these results are found to be insignificant. Hence, need to be treated cautiously.

CONCLUSION

In this paper, firstly, an analysis is presented using the *z*-score and financial soundness indicators to examine and compare the efficiency of 17 Islamic banks and 21 conventional banks in Malaysia over the period of 2004 to 2013. Based on the results of regression analysis, we find that the large Islamic banks are less stable than the large conventional banks. In contrast, the results reveal that the small Islamic banks are found to be more stable than the small conventional banks.

Secondly, this paper examines the factors that determine the stability of the Malaysian Islamic and conventional banks. The regression results reveal that both the Malaysian Islamic and conventional banks shared similar determinants of stability. The first determinant is the total assets which indicate a negative effect on bank stability. The second and third determinants of stability of Islamic and conventional banks are the equity to total assets and income diversification which indicate a positive effect. In addition, there are two (2) other determinants which are specific to each type of bank. On one hand, for the Islamic banks, the results indicate that the cost to income ratio and non-performing loans have a negative effect on the stability of this type of bank. On the other hand, for the conventional banks, the results reveal that the cost to income ratio, return on assets and net loans to total assets have a positive effect on the stability of Malaysian conventional banks.

Based on these results, several recommendations can be made for bank manager and bank regulator. Firstly, the results suggest that being large does not necessarily contribute to the stability of a bank. The significant negative result of coefficient of total assets has proven this claim to be accurate in the case of Malaysian Islamic and conventional banks. Therefore, bank manager and bank regulator should take extra precaution when planning to increase bank size.

Secondly, it is recommended that both the Islamic and conventional banks increase their level of capitalisation. This is because the result of coefficient of the equity to total assets indicates a positive relationship with bank stability. Furthermore, it is also recommended that both types of banks to increase the amount of their non-interest income. This is because the particular variable tends to indicate a positive effect on the stability of these banks. Therefore, it is recommended that bank manager focuses on diversifying the source of income in the future.

Our findings are important for several reasons. Firstly, although numerous studies are found to compare the stability of Islamic and conventional banks, to the best of our knowledge, these studies have not given specific concern to the stability of the Malaysian banking sector. The study of Mat Rahim & Zakaria (2013) used *z*-score and non-performing loans as an indicator of stability, whereas Verbeet (2014) used a limited sample of banks to compare the stability of Islamic and conventional banks in Malaysia. Therefore, our study is important as we enriched the literature by including new indicators of stability while considering a bigger sample size.

Furthermore, Malaysia is one of the pioneer countries that has successfully implemented Islamic banking system in a dual banking system. This encourages other countries to follow the model of Malaysian Islamic banking sector. As Malaysian Islamic banking model is being referred to by many countries, understanding the current state of stability of the Malaysian Islamic banks in comparison to the stability of its conventional counterparts is vital as it is essential to the policy maker of those countries. Thus, our study investigates this issue which at the same time being our second contribution to the literature.

Lastly, our study is important as we examine the factors that determine the stability of Malaysian Islamic and conventional banks surrounding the global financial crisis. In addition, we include the pre, during and post crisis dummy variables in order to examine the impact of the global financial crisis on the stability of the Malaysian Islamic and conventional banks. Existing literature that examines the level of stability in the Malaysian Islamic banking sector does not lay any emphasis on the impact of the recent 2007 to 2009 global financial crisis especially during the post-crisis period. Hence, our study is important as we also add to the literature by examining the impact of the recent 2007 GFC on the stability of the Malaysian Islamic and conventional banks.

This research has one (1) major limitation which involves employing a market-based indicator to measure bank stability. This limitation is due to the data requirement of a market-based indicator which requires a bank to be publicly listed, whereby, in this case, the majority of the Islamic banks in Malaysia are not publicly listed. Thus, the market-based indicator could not be employed to measure bank stability in this study due to the availability of market-based data for Islamic banks. Therefore, it is proposed that future research on the stability of Islamic banks to explore the applicability of other available methods to measure the stability of Islamic banks. The application of various indicators could explain how these indicators are related to one another.

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Muhamad Azhari Wahid*
Markfield Institute of Higher Education
LE67 9SY Leicestershire
United Kingdom
muhamadazhari.wahid@gmail.com

Humayon Dar
Edbiz Corporation Limited
305 Crown House
North Circular Road
Park Royal London NW10 7 PN
United Kingdom
humayon@humayondar.com

*Corresponding author