Efficiency, Asset Quality and Stability of the Banking Sector in Malaysia

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Abstract: Malaysia practices a dual banking system, where conventional banks co-exist with Islamic banks. While conventional banks are well established, Islamic banks are growing rapidly. Since Islamic banks consist of two types, namely stand-alone or wholesome Islamic banks and Islamic subsidiaries of conventional banks, it would be revealing to examine if Islamic subsidiaries of conventional banks differ from stand-alone Islamic banks in terms of efficiency, stability and assets quality. A few studies in the literature that examine the issue have focused on comparisons between Islamic banks and conventional banks, with no consideration given to the differentiation between the two categories of Islamic banks. In this paper, we attempt to examine the differences among the players in the banking sector in Malaysia. This paper extends the traditional analysis of conventional versus Islamic banks to comparisons between stand-alone Islamic banks and Islamic subsidiaries of conventional banks. Using dynamic panel data "generalized methods of moments" (GMM), the study reports that there are differences among different types of banks, viz. conventional banks, Islamic subsidiaries of conventional parents, and stand-alone Islamic banks. It shows that Islamic subsidiaries of conventional banks perform better than stand-alone Islamic banks as well as their own conventional parents. Furthermore, the results show that Islamic subsidiaries are more stable in term of their financing income compared to the rest of the banks, while the stand-alone banks have lower asset quality in comparison with both Islamic subsidiaries and their parents.

Keywords: Asset quality, efficiency, GMM, Islamic subsidiaries of conventional banks, stability, stand-alone Islamic banks
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1. Introduction

Malaysia practices a dual banking system, where conventional banks co-exist with Islamic banks. While conventional banks are well established, Islamic banks are growing rapidly due to market acceptance and the recognition that this system is consistent with

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the religious beliefs of the majority of Malaysian population (Mirza, Rahat, & Reddy, 2015). Besides, Islamic banks are argued to be less vulnerable to financial crisis and economic turbulence, as the structure of the balance sheet is "assets-based" compared to the debt-based structure of conventional banks. It is also noteworthy to indicate that Islamic banks have exhibited remarkable progress over the last two decades. The entry of conventional banking players into the field of Islamic finance has created more challenges, stimulating an increasingly intense competition among the players in the Islamic banking industry. The "stand-alone" or "wholesome" Islamic banks are faced with huge competition with "subsidiary" Islamic banks whose parents are conventional banks. Islamic subsidiaries of conventional banks apparently have superior performance indicators than stand-alone Islamic banks. This has implications for the long-run stability, as competition becomes the major driver for the growth and stability of the banks (Dima, Dincă, & Spulbăr, 2014).

In the dual banking system, stand-alone Islamic banks face both indirect competition from conventional banks and direct competition from Islamic subsidiaries with much larger assets and financial support from their conventional parents, notwithstanding the fact that most of these subsidiaries are new and have a shorter history vis-à-vis stand-alone Islamic banks. As scale economies could play a vital role in financing, stand-alone banks are considerably disadvantaged against Islamic subsidiaries which benefit from their privileged access to their parents' logistic support facilities, for the latter would also translate into lower operating costs.

Table 1 shows the recent growth of the banking industry in Malaysia as a whole and by category, i.e. conventional versus Islamic. In aggregate terms, Islamic banks' share has been growing rapidly over the time, where the total assets of the whole banking industry have witnessed a growth ranging from 6.4 to 9.3 percent during the period of 2012-2015. However, looking at the banking models individually, the Islamic banks display an asset growth of 12.2 percent, way above the conventional banks' 4.7 percent growth in 2015, thanks partly to the smaller base. Over the years 2012-2015, the expansion of Islamic banks surpassed the conventional banks at almost double pace, indicating the rising popularity of Islamic banking business in Malaysia. Looking at finance/loans to customers, Islamic banks' financing grew 16.3 percent in 2015 in comparison with 5.2 percent for conventional banks' loans, thanks again partly to the smaller base.

The decline seen in loans/financing provided to customers in 2014-2015 was consistent for both banking models (i.e. conventional and Islamic), which can be explained by the tough economic situation in 2014 and 2015 attributed to the sharp decline in oil prices affecting all segments of the economy. What is more, the decline in the growth of deposits in year 2014 for both conventional and Islamic banks was in tandem with the decline in the growth of loans/financing. Regardless of the let-up in the growth of total deposits in 2015, Islamic banks could still attract deposits throughout. The deposits of Islamic banks have exhibited 14-15 percent growth in 2012-2014 compared to conventional banks' 6-7 percent. Overall, these indicators show that Islamic banks have experienced a growth of deposits exceeding the industry average (Table 1). In all the above-mentioned basic performance indicators, Islamic banks have reported an impressive overall performance vis-à-vis their conventional counterparts.

Table 1. Status and growth of the banking sector in Malaysia

	All banks				Conventional banks				Islamic banks			
	Financial year (FY)				Financial year (FY)				Financial year (FY)			
	FY12	FY13	FY14	FY15	FY12	FY13	FY14	FY 15	FY12	FY13	FY14	FY15
Total assets (billions)	1829	1987	2173	2311	1453	1561	1695	1776	376	426	478	535
Growth (%)	**8.6**	**8.8**	**9.3**	**6.4**	**7.1**	**7.4**	**8.6**	**4.7**	**14.4**	**13.5**	**11.8**	**12.2**
Financing (billions)	1101	1217	1332	1438	8653	9339	9967	1048	236	283	336	390
Growth (%)	**10.4**	**10.5**	**9.4**	**8.0**	**8.4**	**7.9**	**6.7**	**5.2**	**18.1**	**20.0**	**18.4**	**16.3**
Deposits (billions)	1408	1525	1641	1670	1102	1176	1240	1267	306	348	400	402
Growth (%)	**8.4**	**8.3**	**7.6**	**1.8**	**6.7**	**6.7**	**5.5**	**2.2**	**15.0**	**13.9**	**14.8**	**0.5**
Equity (billions)	170.2	185.9	213.0	235.5	143.5	154.8	178.9	197.7	26.7	31.1	34.1	37.8
Growth (%)	**1.47**	**9.2**	**14.6**	**10.6**	**14.7**	**7.8**	**15.5**	**10.5**	**14.8**	**16.9**	**9.6**	**12.2**

Table 2. Status and growth of Islamic banks in Malaysia

	All Islamic banks				Stand-alone Islamic banks				Islamic subsidiaries of conventional banks			
	Financial year (FY)				Financial year (FY)				Financial year (FY)			
	FY12	FY13	FY14	FY15	FY12	FY13	FY14	FY 15	FY12	FY13	FY14	FY15
Total assets (billions)	376	426	478	535	85	84	89	96	291	342	388	438
Growth (%)	**14.4**	**13.5**	**11.8**	**12.2**	**7.3**	**2.2**	**5.9**	**8.4**	**25.5**	**17.4**	**13.4**	**12.9**
Financing (billions)	236	283	336	390	39	47	50	61	197	236	286	328
Growth (%)	**18.1**	**20.0**	**18.4**	**16.3**	**23.2**	**19.8**	**16.1**	**22.2**	**33.9**	**20.1**	**21.1**	**14.8**
Deposits (billions)	306	348	400	402	62	64	70	72	243	284,	330,	329
Growth (%)	**15.0**	**13.7**	**14.9**	**00.5**	**18.8**	**3.2**	**9.4**	**2.9**	**14.0**	**16.7**	**16.1**	**-0.3**
Equity (billions)	26.7	31.1	34.1	37.8	7.7	7.1	8.4	8.7	19.0	24.0	25.7	29.1
Growth (%)	**14.8**	**16.9**	**9.6**	**12.2**	**4.5**	**8.4**	**8.9**	**3.6**	**19.1**	**20.0**	**7.1**	**13.2**

Although the statistics in Table 1 portray the tremendous progress of Islamic banks vis-à-vis conventional banks, the numbers need to be interpreted with some caution. It is important to underscore that the contribution of stand-alone Islamic banks to the impressive progress in Islamic banking business was small compared to that of Islamic subsidiaries of conventional banks. This observation raises questions on the appropriateness of the business model, especially with respect to the efficiency of the different modes of Islamic banking operations.

In Table 2, Islamic banks are divided into two sub-categories: the first category relates to all stand-alone Islamic banks, while the second comprises Islamic subsidiaries owned by conventional banks. The significance of this issue lies in the fact that Islamic subsidiaries have overwhelmingly outperformed stand-alone Islamic banks. The asset growth of Islamic subsidiaries stood at 12.9 percent in 2015 (albeit with a drop of 1.5 percent from 2014), way above stand-alone banks' assets growth of 8.4 percent and 5.8 percent in the corresponding years. Financing provided by Islamic subsidiaries also grew at a much faster pace than that of stand-alone Islamic banks in 2012-2014, although the latter's financing growth in 2015 exceeded that of the subsidiaries in 2015. The growth of deposits in 2012-2014 shows that Islamic subsidiaries were able to attract more deposits with a rate of growth ranging from 14 to 16.1 percent in 2014, followed by a negative growth in 2015. Equity indicators also show that stand-alone Islamic banks lag behind their competitors, namely Islamic subsidiaries.

It would be revealing to examine if Islamic subsidiaries differ from stand-alone Islamic banks in terms of efficiency, stability and assets quality. A few studies in the literature that examine the issue have focused on overall Islamic banks and conventional banks, with no consideration given to the differentiation between the two sub-categories of Islamic banks. An attempt is made in this study to fill this void. This separation between stand-alone Islamic banks and Islamic subsidiaries is very critical, as the sources, experiences and arm's-length business models of these Islamic banking entities could be different, although they operate under the same principles of *Shari'ah*. This has an implication for the analysis of the efficiency and other operational aspects of these banks, where we have to be cautious in analysing the results and generalising the findings.

Over the years, several studies have estimated the efficiency of Islamic and conventional banks and their determinants (Banker & Natarajan, 2008; Drake & Hall, 2003; Kumbhakar & Wang, 2007; Wheelock & Wilson, 2009). However, empirical evidence with a specific focus on comparisons: (a) between stand-alone Islamic banks and conventional banks, and (b) between stand-alone Islamic banks and Islamic subsidiaries of conventional banks is extremely scarce. Some recent studies have embarked on discovering the differences in business dynamics and efficiency in a comparative manner between Islamic and conventional banks (for instance, Beck, Demirgüç-Kunt, & Merrouche. 2013, Mirza et al., 2015; Shawtari, 2018; Shawtari, Ariff, Abdul Razak, 2015; Shawtari, Ariff, Abdul Razak, 2019). Beck et al. (2013) reported that the business model for Islamic banks, to a certain extent, is similar to conventional banks, except in their quality of assets and capitalisations which exhibited some differences. Othman and

Mersni (2014) and Shawtari, Saiti, Abdul Razak and Ariff (2015) reported that Islamic banks and conventional banks are similar in using their discretion over loan/finance loss provisions. Mirza et al. (2015) found that Islamic banks are more stable and secure in terms of their asset quality compared to their conventional counterparts. However, their business models tend to have similar characteristics supporting the earlier findings by Beck et al (2013). Čihák and Hesse (2010) substantiated that small Islamic banks are more stable than small conventional banks, while the larger conventional banks tend to be more stable than their Islamic counterparts.

In this study, we try to investigate the differences among the banking sector's players in the Malaysian market, unlike previous studies which did not make the distinction between stand-alone Islamic banks and Islamic subsidiaries of conventional banks. The focus in this paper shifts from conventional versus Islamic banks to a deeper comparison between stand-alone Islamic banks and Islamic subsidiaries of conventional banks.

One might expect Islamic banks, in general, to be more efficient and more stable with better asset quality than conventional banks on the premise that Islamic ethics and *Shari'ah* compliance would compel them to adopt more stringent behaviour standards, other things being equal. The above conclusion however would not hold, if other things are not equal for these groups in a dual banking system. However, the extent to which Islamic ethics would enhance the efficiency, stability and asset quality of Islamic banks can be outweighed by the impact of the huge scale economies and the vast historical track records of their conventional counterparts. In addition, as *Shari'ah* compliance is not costless, Islamic banking products would cost more, giving the conventional banks a distinct advantage.

Be that as it may, such a generalisation may be inappropriate for *all* Islamic banks, as one would expect stand-alone Islamic banks to behave differently from Islamic subsidiaries. For one thing, it is very likely that Islamic subsidiaries are influenced by their conventional parents in terms of business skills and behaviour norms. For another, they can free-ride on their parents' coat-tails, benefiting from their parents' economies of scale and scope, and sharing their common facilities, all of which would translate to lower costs.

We therefore hypothesise that: (a) Islamic banks in general and stand-alone Islamic banks in particular would pale in comparison with conventional banks in terms of efficiency, stability and asset quality, and (b) Islamic subsidiaries of conventional banks would outperform their parents, given the double advantage of *Shari'ah* oversight and parental support.

This paper will first investigate the efficiency among the different banking subsectors, identify the differences that may exist among the banks. Second, this paper will examine the stability and asset quality of these banks, to find out if there are important differences not only between stand-alone Islamic banks and Islamic subsidiaries but also between Islamic banks in general and their conventional counterparts. This paper is structured as follows. The following section will explain the data and methodology, while section 3 presents and discusses the findings of the empirical work, and finally section 4 concludes.

2. Data

This part of the paper presents the sample of the study and data sources. The main sources of data are the annual reports of the banks and World Bank economic indicators.[1] This paper focusses on the Islamic banks and conventional banks operating in Malaysia over the 2005-2015 period. We choose this time frame to allow a fairly reasonable representation of banks in our analysis, as most of the Islamic banks began their presence in Malaysia from 2005 onwards. The final sample of the data included in the analysis covers 423 observations. Table 3 presents the structure of the banking sector in Malaysia and the sample distribution over the years by banking model.

3. Methodology

3.1 Dependent Variables

In this section, we discuss the methodology adopted in this study. As the paper examines three different dimensions of the banking sector in Malaysia namely efficiency, stability and asset quality, several steps are taken to examine the status of different banking models and how they can be differentiated from one another. To be precise, we look at three dependent variables and classify banks under each of them. The description of the estimation and construction of three dependent variables are discussed below.

3.1.1 Efficiency Estimation

In the first stage of this analysis, we evaluate the efficiency of the banking sector since the first objective of this study is to evaluate whether efficiency differs between different types of banking models. Initially, the paper assesses the efficiency of the banking sector and analyses them based on the banking models (e.g. stand-alone Islamic banks and subsidiaries of conventional banks). Thus, we use the data envelopment analysis (DEA) to estimate this variable. Following the footsteps of Charnes, Cooper and Rhodes (1978) (termed as CCR), DEA has been successfully employed for assessment of the relative performance of a set of firms, usually called as decision-making units (DMUs), which uses a variety of identical inputs to produce a variety of identical outputs. DEA is argued to be a superior method for estimating efficiency due to the following reasons. First, it allows the evaluation of relative efficiency for a set of organisations based on theoretical optimal performance for every organisation (Campisi & Costa, 2008). Second, it relaxes the assumption of distributional forms for errors or functional forms assumption, reinforced by its ability to use multi-inputs and multi-output variables (Ahmad Mokhtar, Abdullah, & Alhabshi, 2008). Third, DEA is more appropriate in cases where the sample is small and where the parametric tests are not suitable (Avkiran, 2004). Fourth, in comparison to the parametric test, Seiford and Thrall (1990) put forward their argument that this approach is directed to frontier and not central tendencies, and instead of trying to fit a regression plan through the centre

[1] World Bank data is used for macro economic variables.

Table 3. Distribution of the sample by years and according to banking model

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total observations
Stand-alone IBs	3	5	5	5	5	5	5	5	5	5	5	53
Islamic subsidiaries of CBs	2	3	5	11	11	11	11	11	11	11	11	93
CBs	19	22	22	23	23	25	27	29	29	29	29	278
Total number of banks	24	29	32	39	39	41	43	44	44	44	44	423

Note: IBs = Islamic banks; CBs = Conventional banks.

of the data, one "floats" a piecewise linear surface to rest on top of the observations. Thus, DEA is very unique as it estimates the efficiency of a DMU relative to all other DMUs with the simple restriction that all DMUs lie on or "below" the efficient frontier. Overall, the basic tenet of such a programming method is to compare the units that are assumed to work homogenously, in which they receive inputs and produce outputs with different volumes. As a rule of thumb, the efficiency of each DMU is calculated as a proportion of the weighted outputs to weighted inputs. The less inputs consumed in the production of a given output, the better the efficiency of DMUs.

In utilising the DEA technique, there are two ways to test the efficiency of DMU, namely the constant return to scale (CRS) and variable return to scale (VRS). Originally, the DEA model developed by Charnes et al. (1978) was based on CRS. In this model, the efficiency for DMU is measured as the optimal ratio of weighted outputs to weighted inputs. According to this model, the efficiency of each DMU is a combination of inputs and outputs. The assumption is that the outputs change proportionally with inputs regardless of the size of DMU. However, this model would not be appropriate in cases where we have DMU with large-scale operations and would be applicable only when all DMUs are operating at optimal scale. Therefore, the VRS model was introduced to overcome this problem (Banker, Charnes, & Cooper, 1984) termed as BCC. The main assumption of VRS is that a change in inputs does not lead to a change in outputs proportionally. In other words, the costs of DMU could increase or decrease if the size of DMU becomes larger. In this study, the VRS is used to allow for the variation in the size of banks.

Based on the intermediation approach, we use the following three outputs (namely interest/finance or investment income, loans/financing to customers and loan loss provisions) and three input factors (namely deposits, labour costs and physical assets). As the aim of the paper is to measure efficiency, we focus on overall efficiency scores.

3.1.2 Bank Margins

Bank margin is used to reflect the stability of the banks. Unlike some other papers which have utilised ROA and ROE (Beck et al., 2013; Mirza et al., 2015) to measure the stability of the bank, this research explores the stability of the banks by using net profit/net interest margins of the banks. This measure is used for stability as we believe that net financing/interest margins provides a better reflection of the nature of banks' operations, especially for Islamic banks. The main functions of the banks are: (a) to provide loans or financing and hence generating their financing income or interest income, and (b) to accept deposits from customers with a compensation of either interest or income distributed to depositors in Islamic banks, which is the main indicator of their stability and resistance in future. Therefore, we believe that banks that are more stable are the ones that are able to attract customers and depositors rather than relying on other sources of income. It would be argued that diversification of income is a good sign, but it is important to underscore that Islamic banks' main operation is premised on investment and providing financing and accepting deposits of customers. Moreover, Saksonova (2014) contended that banks' margins concisely summarise the effectiveness of banks' interest-bearing assets. The larger the net interest margin,

the more successfully does the bank manage its interest-bearing assets. He further substantiated that the banks' margins declined prior to any difficult times facing the banking industry, while ROA remained more stable during the difficulties times. This suggests that bank margins are a more powerful indicator of growing vulnerabilities in the banking sector. In line with the argument of Saksonova (2014), we also opine that the ROA and ROE are more traditional measures of performance, which have recently been criticised on the grounds that these measures are subject to the influence of bank managers who are able to use their discretion over the accruals items such as depreciations and allowances, which results in high or low income being reported, depending on the incentives, and hence influencing the ROA or ROE reported ratios.

This paper measures the bank margin by the differential or spread between the financing/interest income and distribution to the customers/interest expenses. As the structure of the banking models differs among the banks, the margin in the case of Islamic banks is measured by the difference between financing income and the distribution of profit made to the depositors. On the reverse side, the margin in the case of conventional banking is well established and proxied by using the difference between interest income and interest expenses. All the data related to this variable is obtained manually from the annual report of the banks.

3.1.3 Asset Quality

There are several proxies used to measure asset quality, where impaired loans/financing is used as a dependent variable. This measure is adopted to test how the different types of banking models can exhibit variations in their financing and loan quality as major indicators of the asset quality of banks. The data for the variable is extracted from the annual report and measured in terms of the non-impaired financing/loans. Specifically, non-impaired loan is extracted from the annual reports of conventional banks and non-impaired financing is obtained from the annual report of Islamic banks.

3.2 Independent Variables

In order to examine the differentiation possibility in the efficiency, asset quality and bank stability among different banking models, a set of variables is utilised to account for their effects along with the main variables. Beck et al. (2013) argued that these variables might confound the relationship between bank type on the one hand and efficiency, stability and asset quality on the other. Table 4 summarises all variables of interest included in equations 1, 2 and 3 and these are explained as follows.

Firstly, dummy banking model represents the banking model, where it can be the Islamic stand-alone banks and Islamic subsidiaries of conventional banks. This has been created to look at the difference in comparison with the reference banks (conventional banks).

Secondly, the total assets included in the model are the natural logarithm of total assets to account for the firm size. Empirically, bank size is related to efficiency. Beck et al. (2013) and Miller and Noulas (1996) reported that larger banks were more efficient than smaller banks. A plausible reason for this is the advantage of economies of scale

Table 4. Operationalisation of the variables used in the equations

Variables	Acronym	Definition	Source of data
Dependent variables			
Efficiency	lnTE	Technical efficiency estimation using DEA as discussed in section 3.1.1	Estimated by the authors
Stability	lnSTA	Banks margin, which is the difference between financing incomes and distribution to depositors for Islamic banks and the difference between interest income and interest expenses (Section 3.1.2 provides the detail of the construction of this variable)	Annual reports
Assets quality	LnAQ	Non-performing loans/finance as fraction to total loans/finance (Section 3.1.3 summarises the proxy of this variable)	Annual reports
Bank-specific and macro variables			
Dummy stand-alone Islamic banks	DummySA	To differentiate stand-alone Islamic from conventional banks	Compiled by the authors
Dummy subsidiaries of conventional banks	DummyIS	To differentiate Islamic subsidiaries from conventional banks	Compiled by the authors
Size	LnTA	Logarithm of total assets	Annual report of the banks
Physical assets	LnPA	Logarithm of physical assets	Annual report of the banks
Concentration	lnC(3)	It is calculated as the ratio of three large banks in terms of total assets to the total assets of the banking industry	Author calculation based on the extracted data from annual reports
Liquidity risk	Ln(TLFD)	Total loans/finance to total deposits	Annual report of the banks
Capitalisation	Ln(CAP)	Total equity to total assets	Annual report of the banks
GDP growth	GDP	Annual GDP growth rate	World bank data
Crisis	Crisis	CRISIS is a dummy variable that takes a value of one for the crisis, and 0 otherwise	Compiled by the authors

(Sufian & Habibullah, 2010). Similarly, larger banks are expected to produce a higher bank margin as it indicates the degree of monopoly in the market, where the larger size bank is able to dominate the market, and thus it is expected to charge a higher margin (Naceur & Kandil, 2009). In addition to that, larger banks are also expected

to have better assets quality as indicated empirically by Biekpe (2011) and Alhassan, Kyereboah-Coleman and Andoh (2014). This is in line with the argument that larger banks are expected to have better risk management techniques, which results in lower rates of non-performing loans and finance. Mirza et al. (2015) have argued that larger banks may have advantages in terms of market share, diversity of earnings and easy access to deposits, which all lie in the economies of scale that would impact positively on efficiency, stability and asset quality.

Thirdly, in line with Beck et al. (2013) and Mirza et al. (2015), we utilise the physical assets as a percentage of total assets to account for the opportunity costs that arise from having non-earning assets on the balance sheet as argued by Beck et al. (2013), which will be reflected in the efficiency of the banks, and their margins as well.

Fourthly, concentration of the industry is included in the model as measured by the share of total assets of the three largest banks in the total assets of the whole industry. It is the market structure hypothesis which suggests that banks in a highly concentrated market tend to collude and earn monopoly profits, thus be more efficient. Moreover, the competition–stability and competition–fragility hypotheses suggest that competition-driven efficiency results in banks' stability and improves the soundness of the banking industry (Ariss, 2010; Beck, Demirgüç-Kunt, & Levine, 2006; Boyd & De Nicoló, 2005). However, the competition-fragility hypothesis posits that banks with market power (in a concentrated industry) earn higher profits to improve industry stability (Keeley, 1990). Mirza et al. (2015) opined that the more concentrated the market, the higher the monopoly power, which may ruin asset quality and financial stability, as a result of which asset quality of the banks is likely to be inflated.

Fifthly, liquidity of the banks is also used as a control variable. It has been established in the literature that liquidity is the main driver of efficiency, stability and asset quality. Liquidity risk refers to situations where the banks have insufficient cash to meet the expectation for depositors in case of withdrawals or supporting new financing. This leaves the bank with the options of borrowing to meet their emergency, which imposes additional costs on banks (Drakos, 2002). As a result, we would expect that efficiency of the banks to be affected negatively as there will be an additional cost. Margins of the banks would also be affected to the extent the margin is adjusted to cover the costs of borrowing by the banks in the face of an increased risk of liquidity. With respect to the asset quality and liquidity risks, we would expect that increased risk of liquidity (loans to deposits ratio) suggests a high risk appetite and preference, which is expected to lead to high non-performing loans/finance (Dimitrios, Helen, & Mike, 2016).

Sixthly, capitalisation of the banks is another striking determinant of banks' efficiency, stability and asset quality. To be more specific, well capitalised banks are expected to perform better than thin capitalised banks. Bank capitalisation is expected to influence the margins positively. A higher ratio indicates a greater risk aversion and is expected to be reflected in higher margins. Claeys and Vennet (2008) argued that maintaining 'adequate' capital more than what is needed or required may signal solvency and inspire depositor trust. Holding extra capital would enhance the ability of banks to make more loans which can generate more income for the banks. Furthermore, since equity capital is much more expensive compared to other liabilities in terms of expected returns, holding excess capital is an indicator of creditworthiness

on the part of the banks. This would encourage depositors to save and invest their money with banks, which in turn would enable the banks to increase their margins by lowering their deposit rates. Finally, capital is reported to be negatively linked to non-performing loans/finance, based on the moral hazard hypothesis (Berger & Humphrey, 1997). It is contended by Keeton and Morris (1987) and Salas and Saurina (2002) that thinly capitalised banks are more susceptible to risk taking, which might lead to higher non-performing loans.

Seventhly, we control for GDP as the macro variable that accounts for economic cycles (Beck at al., 2013; Mirza et al., 2015). As GDP numbers reflect the economic growth of the country, GDP is expected to positively affect the efficiency of banksas GDP changes would influence the demand for financial services. The greater the expansion in the economy and the wealthier the country, the greater the demand for financial services (Sufian & Habibullah, 2010). GDP is an important factor which affects the demand for and supply of funds. Any increase in economic growth would result in improved business performance and lower default risks. As risk is reduced, banks tend to reduce their margins (Tarus, Chekol, & Mutwol, 2012). As such GDP growth would lead to greater efficiency, reduced defaults, improved asset quality and lower risks, in which case the banks are likely to reduce their margins.

Eighthly, dummy crisis refers to the dummy crisis for the 2008-2009 financial crisis. It is reported that efficiency of the banks tends to be different during crisis times. Islamic banks were revealed to have higher deposit growth rates than conventional banks. Beck et al. (2013) reported that Islamic banks have higher capitalisation during crises, and asset quality is less likely to disintermediate during crises. It is more likely that differences in the behaviour pattern would be manifest among different types of banks in crisis situations. Thus, we use a dummy variable (DummyCrisis) to control for the crisis as banks may exhibit different behaviour during crisis times in terms of their operational efficiency, stability and their asset quality (Beck et al., 2013; Belanes, Ftiti, & Regaïeg, 2015).

3.3 Empirical Models and GMM Estimation

We introduce three empirical models for the analysis. These models include time fixed effects through the inclusion of time dummies in order to account for any cross-sectional dependence in the data. Controlling for this allows us to examine the robustness of our results to the inclusion of time fixed effects. Within this context, in line with Beck et al.'s (2013), we also check the robustness of our main results by interacting the Islamic bank dummies with a crisis dummy (*crisis*).

And finally, v_i is an unobservable bank-specific effect assumed to be constant over time; the bank-specific time variant effect is e_{it} and μ_t is the time-specific fixed effect. Based on the above, the following three dynamic equations are constructed:

$$\ln EFF_{it} = \alpha_0 + \beta_1 \ln EFF_{t-1} + \beta_2 DummySA_{it} + \beta_3 DummyIS_{it} + \beta_4 \ln TA_{it} + \beta_5 \ln PA_{it} + \beta_6 \ln C3_{it} + \beta_7 \ln LIQ_{it} + \beta_8 \ln CAP_{it} + \beta_9 \ln GDP_{it} + \beta_{10} crisis + v_i + \mu_t + e_{it} \quad (1)$$

$$\ln STA_{it} = \alpha_0 + \beta_1 \ln STA_{t-1} + \beta_2 DummySA_{it} + \beta_3 DummyIS_{it} + \beta_4 \ln TA_{it} + \beta_5 \ln PA_{it} + \beta_6 \ln C3_{it} + \beta_7 \ln LIQ_{it} + \beta_8 \ln CAP_{it} + \beta_9 \ln GDP_{it} + \beta_{10} crisis + v_i + \mu_t + e_{it} \quad (2)$$

$$\ln AQ_{it} = \alpha_0 + \beta_1 \ln AQ_{t-1} + \beta_2 DummySA_{it} + \beta_3 DummyIS_{it} + \beta_4 \ln TA_{it} + \beta_5 \ln PA_{it} + \beta_6 \ln C3_{it} + \beta_7 \ln LIQ_{it} + \beta_8 \ln CAP_{it} + \beta_9 \ln GDP_{it} + \beta_{10} crisis + v_i + \mu_t + e_{it} \quad (3)$$

In order to test the above three models, this study adopts the dynamic panel model which is more appropriate, where the time span (T) is small and the number of observations (N) is large (Wintoki, 2012). Theoretically, dynamic panel data regressions are characterised by two sources of persistence over time, namely, autocorrelation due to the presence of a lagged dependent variable among the regressors and individual effects characterising the endogeneity among the individuals (Baltagi, 2008). This problem has triggered the concern of researchers in recent times (Ammann, Oesch, & Schmid, 2011; Nguyen, Locke, & Reddy, 2014). Past studies suggest that in the presence of simultaneity and unobservable features across companies, this problem becomes apparent. It can be emphasised that efficiency, stability and asset quality in their relationship to the predictors are of a dynamic nature, in which the current trends might have a link to the past years leading to issues of endogeneity and unobservable effects. This problem of endogeneity is corrected using the difference generalized method of moments (GMM) of Arellano and Bond (1991) which uses the first difference of the explanatory variables to deal with the fixed effects and their lagged values as instruments.

The difference GMM is an alternative option within GMM models, but it has a weakness with regard to instrument and autocorrelation between lag dependent variables and the error term. Accordingly, there is a need to solve the weakness found, using the two-step difference GMM estimator of Arellano and Bond (1991). Arellano and Bover (1995) and Blundell and Bond (1998) argued that more restriction is needed to overcome those weaknesses related to the autoregressive parameter and the variance of the parameter, and therefore they introduced the system GMM as an alternative and more robust estimator. The two-step system GMM is adopted in this study, as the difference GMM is not suitable for unbalanced data and magnifying gaps (Roodman, 2009). The two-step system has a power to produce more asymptotic efficient estimates than the one-step system. However, the two-step model has two main problems, one of which is the possibility of standard errors biased downward, which can be solved by over correction using Windmeijer's (2005) technique, while the second problem is related to the possible existence of multiple instruments, where it requires that the number of instruments should be less than the number of groups in the sample. As the results of this study show in the following section, this problem does not exist. Therefore, we believe that the two-step system GMM with standard errors correction is most appropriate.

4. Empirical Findings

This section presents the results of the study. First, the descriptive analysis provides a comparison between Islamic and conventional banks. Second, we present the results

that differentiate efficiency, stability and asset quality for Islamic and conventional banks on the one hand and between stand-alone Islamic banks and Islamic subsidiaries of conventional banks on the other.

4.1 Descriptive Analysis of the Dependent Variables

Table 5 provides the descriptive statistics based on mean, minimum and maximum with comparison between banking models among the three variables under investigation, namely bank efficiency, stability and asset quality. Overall, the average of technical efficiency for all banks, as shown in Table 5, Panel A, records an efficiency estimation score of 74.7 percent, which underscores the non-optimisation of their resources to generate their output with a waste in resources of 25.4 percent. The banking sector would have to save more inputs to produce the same output. Similarly, Panel A indicates that overall bank margin, as a measure of stability for the whole industry, is approximately 2.1 percent, and finally, the overall asset quality as reflected by non-performing loans/finances shows an average of 3.1 percent.

Panel B, Table 5 categorises the banks into Islamic and conventional banks and then shows a comparison between the models of banking across the three measures (efficiency, stability and asset quality) with a test of difference to indicate the statistical significance of these differences. As indicated in Panel B, the technical efficiency of conventional banks (0.710) is lower than Islamic banks (0.780), and the difference is statistically significant at 1 percent level, indicating that Islamic banks have outperformed conventional banks in terms of overall efficiency. In Panel C, a breakdown of Islamic banks into stand-alone and Islamic subsidiaries of conventional banks is given to see whether the superiority of performance of Islamic banks is related to all Islamic banks or certain type of Islamic banks. As indicated in Panel C, efficiency of Islamic banks is mostly linked to the subsidiaries of conventional banks (average efficiency 84.7 percent), while the stand-alone Islamic banks' efficiency is shown to be an average of 67 percent and most importantly, the difference is statistically significant at 1 percent level. Finally, the efficiency scores are compared by conventional banks and their Islamic subsidiaries, and Panel D in Table 5 shows that Islamic subsidiaries (average efficiency of 84.7 percent) outperformed their conventional parents with an average of 71 percent and that difference is statistically significant at 1 percent level. The overall findings might indicate that more and more Malaysians are migrating to Islamic banks, particularly to those banks with conventional parent banks at arm's length and hence boosting the efficiency of Islamic subsidiaries of conventional banks. This can be implied from the divergence in the growth of loans/finance and deposits in Islamic banks from that of conventional banks (Table 1).

With regard to the second variable tested in this study, namely banks' margin as a proxy for banks' stability, it is shown in Table 5 that the margin (measured by the differential between loans/financing rate and deposit rate lagged by total assets), for conventional banks is lower (1.9 percent) than that of Islamic banks (2.61 percent) as reported in Table 5 (Panel B) and the difference is statistically significant at 5 percent level. This is expected, given that conventional banks' size of operation is much larger than that of Islamic banks, which drives their spread to be smaller than Islamic banks.

Table 5. Descriptive statistics of dependent variables across banking models

Variables	Technical efficiency			Banks' margin (stability)			Non-performing loans/ finance (assets quality)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Panel A: Indicators of the whole banking industry in Malaysia									
All banks	0.747	0.28	1.00	0.021	-0.012	0.066	0.031	0.000	0.140
Panel B: A comparison of the industry categorised into Islamic banks and conventional banks with their corresponding t-test of difference									
CBs	0.710	0.250	1.000	0.019	0.000	0.066	0.031	0.000	0.223
All Ibs	0.780	0.298	1.000	0.0261	-0.012	0.063	0.044	0.000	0.254
t-test of difference	2.902 (0.003)*			2.102 (0.023)**			4.626 (0.002)*		
Panel C: Comparison of the Islamic banks categorised into stand-alone and subsidiaries of conventional banks with their corresponding t-test of difference									
Stand-alone IBs	0.670	0.547	1.000	0.0268	0.023	0.033	0.070	0.064	0.232
IBs sub. of CBs	0.847	0.432	1.000	0.0258	-0.012	0.063	0.026	0.000	0.115
t-test of difference	4.739 (0.000)*			4.501 (0.000)*			2.906 (0.001)*		
Panel D: Test of difference of the dependent variables between conventional banks and Islamic subsidiaries of conventional banks									
CBs	0.710	0.250	1.000	0.019	0.000	0.066	0.031	0.000	0.223
IBs sub. of CBs	0.847	0.432	1.000	0.0258	-0.012	0.063	0.026	0.000	0.115
t-test of difference	3.903 (0.000)*			2.682 (0.002)*			3.371 (0.002)*		

Notes: CBs = conventional banks; IBs = Islamic banks; Stand-alone IBs = Stand-alone Islamic banks; IBs sub. of CBs = Islamic subsidiaries of conventional banks.
p-value in brackets. ***, **, * indicate significant levels of 10%, 5%, and 1% respectively.

It can be inferred from all this that Islamic banks' greater stability is closely associated with their wider margin. Mirza et al. (2015) reported a better profitability for Islamic banks compared to conventional banks. However, the results are not consistent with Lee and Isa (2017) who observed that margins overall for conventional banks is better than Islamic banks, although their results might have been distorted as they had excluded a large portion of conventional banks from their study. However, among Islamic banks (Islamic subsidiaries vs. stand-alone) the results in Table 5 (Panel C) show that the margins for stand-alone Islamic banks are slightly higher (2.68 percent) than that of the Islamic subsidiaries of conventional banks (2.58 percent).[2]

Turning to asset quality, it is shown in Table 5 (Panel B) that Islamic banks have, on average, more non-performing finance (4.4 percent) compared to conventional banks

[2] This initial result provides us with elementary evidence on the importance of testing banking industry categorised into their various models, thus providing robust results.

(3.1 percent) and that difference is statistically significant at 1 percent level. In addition, Islamic subsidiaries of conventional parents (Panel C) have less non-performing finance (2.9 percent) closer to that of their parents, in sharp contrast to stand-alone Islamic banks' 7.0 percent, and it is statistically significant at 1 percent level of significance, which might be due to the fact that Islamic subsidiaries emulate their conventional parents' risk management. Overall, the conventional banks and their subsidiaries appear to have a better risk management techniques starting from loans screening approval to the stage of following up the loans/finances collections.

4.2 Results of Empirical Models

In this section, we discuss the results of the empirical models in relation to the efficiency, stability and assets quality. Before we proceed with the discussion of the results, model assessments are conducted in order to ensure that valid conclusions are inferred. In the first assessment, we have run the Pearson correlation matrix to assess multicollinearity among the variables. The results reported in Table 6 show that all variables are less likely to suffer from the problem of multicollinearity, where all values of correlation fall below the rule of thumb of 0.70 and -0.70 (Cooper & Schindler, 2006). In the second assessment, we have run the Arellano and Bond (1991) test for serial correlation, and the results are shown at the bottom of Tables 7-9 and it is indicated in the test that there is an autocorrelation in the first order in most models, while it is not correlated in the second order. All the values of the second order autocorrelation in all models are not significant (p-values are greater than 0.10), indicating the validity of the models. The third assessment test is the Hansen J test of over-identifying conditions, and the results affirm the validity of the instruments, where the Hansen J test (Tables 7-9) indicates that the null hypothesis of over identification is rejected and thus accepting the alternative hypothesis of the appropriateness of the used instruments.

With regard to the empirical evidence, Tables 7-9 present the results of different models that have been constructed for this purpose. While Models 1-2 (in Panel A) in each table (7-9) reflects a comparison between the conventional banks (reference banks), Islamic subsidiaries of conventional banks and stand-alone Islamic banks, Model 3 (in Panel A) in each table (7-9) specifically examine, narrowly based on subset data, a

Table 6: Pearson Correlation Matrix

	LTA	LnPA	lnC(3)	Ln(LIQ)	Ln(CAP)	GDP	Crisis
LnTA	1.000						
LnPA	0.514*	1.000					
lnC(3)	0.028	0.016	1.000				
Ln(LIQ)	0.303**	0.271**	0.033	1.000			
Ln(CAP)	-0.194**	-0.156	-0.016	-0.409	1.000		
Ln(GDP)	0.030	0.024	0.081	0.012	0.026	1.000	
Crisis	-0.194**	-0.156	-0.016	-0.187	0.026	-0.409*	1.000

Note: Variables definitions are in Table 4. *, ** indicate significance at the 10% and 5% levels, respectively.

comparison between Islamic subsidiaries of conventional banks (reference banks) and stand-alone Islamic banks. Moreover, the results of Models 4-7 (in Panel B) in Tables 7-9 reflects the possible variation between banking models conditional on the behaviour of the independent variables. After we factored in the macro- and micro-economic variables that may have simultaneous effects, it is noticed that the coefficient of lag efficiency (Table 7, Models 1-3) or the past year efficiency is significant in determining the efficiency of the current period at 1 percent level of significance in the three models. In particular, the past efficiency scores of both conventional banks and Islamic banks play a vital role in determining the current efficiency, where the better efficiency in the past will be reflected positively on the current efficiency. Overall, the results stand in line with the results of Ajisafe and Akinlo (2014) and Dietrich and Wanzenried (2011). This also is an indicator of the degree of persistence of the efficiency measures and the persistence is highly significant, demonstrating the appropriateness of the dynamic panel model (Dietrich & Wanzenried, 2011).

With regard to the main variable of concern (i.e. banking model) in this study that might be used to differentiate the behaviour of banks, the results present an evidence that efficiency of conventional banks (reference category) lags behind the Islamic subsidiaries of conventional banks with a coefficient (t-value) of 0.121 (2.377). However, when it comes to the stand-alone Islamic banks, the coefficient (t-value) is reported to be 0.049 (-3.110) and is significantly and negatively related to efficiency indicating that the stand-alone banks lag behind conventional banks (reference category) in terms of efficiency and more so against Islamic bank subsidiaries (coefficient -0.163 and t-value 1.913). Overall, our results confirm the previous findings reported in Table 5 and also the findings of Azad, Munisamy, Masum, Saona and Wanke (2017) that shows Islamic banks outperformed the conventional banks, although their study did not segregate Islamic banks into their subsets.

With respect to the stability as measured by bank margins (Table 8, Models 1-3), it is noticed that the margins of the past years are positively related to the current margins, which underscores the significance of the spillover from the past margins on the current margins. This result is also consistent with the findings reported in Sun, Mohamad and Ariff (2017) and Lee and Isa (2017). In fact, the positive relationships for the lag efficiency and margins are an indication of the continuous efforts of management to strive for better performance to enhance their competitiveness in the market (Sun et al., 2017). In addition, margins of the banks as a measure of stability, in Table 8 (Models 1-2), show that Islamic subsidiaries of conventional banks and stand-alone Islamic banks dummy variables (Model 1, Table 8) have a positive and significant relationship with the banks' margins, reflecting the superiority of their margins over the conventional banks with a coefficient (t-value) of 0.021 (2.057) and 0.048 (2.671), respectively. These results hold also in Model 2 (Table 8) for both categories of Islamic banks, albeit with a stronger coefficient. Nonetheless, a comparison between the stand-alone Islamic banks and Islamic subsidiaries of conventional banks (Model 3, Table 8), in their subset data, shows insignificant differences (coefficient 0.081 and t-value 1.186) in their margins, suggesting that both types of Islamic banks are not far from each other in their margins strategies. However, this convergence disappears during the crisis period, as the margins of stand-alone banks during the crisis period deteriorated more relative

Table 7. GMM results on efficiency differentiation among banking models

Variables	Efficiency							
	Panel A			Panel B				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Lag dependent variable	0.069 (4.330)*	0.101 (9.310)*	0.125 (8.080)*	0.0418 (2.177)**	0.082 (4.902)*	0.079 (6.109)*	0.117 (5.871)*	0.119 (5.640)*
IBs subsidiary dummy	0.121 (2.377)**	0.142 (4.160)*	–	0.104 (3.107)*	0.093 (3.871)*	0.025 (1.791)***	0.081 (2.981)*	0.047 (3.619)*
Stand-alone dummy	-0.049 (3.110)*	-0.071 (2.571)*	0.163 - (1.913)***	-0.035 (2.110)**	-0.081 (1.922)***	-0.120 (2.300)**	-0.101 (2.336)**	-0.139 (2.270)**
LnTA	0.197 (2.048)**	0.072 (5.100)*	0.126 (2.841)*	0.135 (2.920)*	0.059 (3.801)*	0.107 (2.114)**	0.081 (3.092)*	0.119 (1.978)***
LnPA	-0.103 (-2.346)**	0.058 (-2.610)*	0.030 (-2.760)*	-0.063 (-1.897)***	0.071 (-1.851)***	0.051 (-1.953)***	0.062 (-2.083)**	0.059 (-2.081)*
LnLIQ	0.131 (-3.137)*	-0.144 (-2.330)**	-0.129 (-2.910)*	0.081 (-2.017)**	-0.049 (-3.039)*	-0.091 (-3.083)*	-0.089 (-2.192)*	-0.042 (-2.630)**
Ln(CAP)	0.191 (5.310)*	0.143 (4.160)*	0.172 (3.251)*	0.096 (3.851)*	0.131 (2.983)*	0.097 (2.790)*	0.107 (4.047)*	0.068 (3.625)*
LnC3	0.091 (1.610)	0.069 (1.710)***	0.021 (1.830)***	0.031 (1.119)	0.001 (1.859)***	0.040 (2.016)**	0.060 (2.379)**	0.001 (2.105)**
LnGDP	0.029 (5.080)*	0.181 (6.710)*	-0.185 (-6.910)*	0.070 (3.094)*	0.136 (4.516)*	-0.100 (-3.293)*	-0.131 (-4.017)*	-0.081 (-3.703)*
Crisis dummy	0.029 (-3.080)*	0.035 (-1.883)***	0.001 (-1.807)	0.043 (-2.328)**	0.008 (-1.786)	0.005 (-1.901)***	0.002 (-1.776)***	0.002 (-2.008)**
Crisis dummy* IBs	–	0.061 (1.881)***	–	0.031 (2.105)**	0.035 (2.005)**	0.031 (1.788)***	0.061 (1.881)***	0.071 (2.106)**
Crisis dummy* stand-alone IBs dummy	–	0.016 (1.786)***	0.033 (-1.601)	0.000 (1.902)***	0.002 (1.858)***	0.002 (1.972)***	0.016 (1.781)***	0.081 (2.151)**
LnTA* IBs subsidiaries				0.031 (1.169)				0.061 (1.111)

Table 7. Continued

	Efficiency							
	Panel A			Panel B				
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
LnTA* stand-alone dummy				0.005 (3.510)*				0.045 (1.908)***
LnCAP* IBs dummy					0.052 (1.180)			-0.067 (1.681)
LnCAP* stand-alone dummy					0.009 (1.331)			0.001 (-1.080)
LnPA* IBs						0.006 (.601)		0.009 (0.956)
LnPA* stand-alone dummy						0.001 (1.001)		-0.001 (-0.609)
LnLIQ* IBs							0.028 (2.167)**	0.091 (4.194)*
LnLIQ* stand-alone dummy							0. 071 (3.201)*	0.078 (3.162)*
AR(1) P-value	0.043	0.010	0.013	0.043	0.010	0.013	0.048	0.092
AR(2) P-value	0.267	0.184	0.196	0.512	0.840	0.196	0.267	0.267
Hansen J P-value	0.571	0.467	0.374	0.271	0.108	0.429	0.138	0.163
No. of observations	408	408	179	408	408	408	408	408

Note: The dependent variable is efficiency. IBS is a dummy representing the Islamic subsidiaries of conventional parents. Stand-alone dummy indicates the stand-alone Islamic banks, which represents a subset of all Islamic banks. LnTA is the logarithm of the total assets to represent the size of the banks. LnPA represents the physical assets, which indicates the non-earnings assets. LnLIQ is a measure of liquidity as measured by total loans or finance to total deposits. LnCAP represents the total equity to total assets. LnC3 indicates the concentration in the banking industry as measured by the three largest banks. LnGDP is the annual growth of the real gross domestic product. Crisis dummy* stand-alone dummy is a proxy to control for the crisis and their effect on stand-alone banks. Crisis dummy* IBs represents the effects of the crisis of IB subsidiaries. The time fixed effect is introduced in the model, and we notice that the results are mostly one of indifference with respect to time with the exception of 2008-2009 crisis. Thus, we have run the test by including the dummy crisis with both Islamic banking models dummies. The rest of the variables are interactions among the banking models and the banks specific variables. *, **, *** indicate significance level of 1%, 5% and 10% respectively.

Table 8. GMM results on banking models differentiation based on stability dimension

Variables	Stability							
	Panel A			Panel B				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Lag dependent variable	0.034 (2.502)*	0.223 (3.190)*	0.200 (8.940)*	0.039 (1.799)***	0.071 (2.002)**	0.131 (3.781)*	0.161 (2.791)*	0.148 (3.195)*
IBs subsidiary dummy	0.021 (2.057)**	0.142 (4.160)*	–	0.118 (2.879)*	0.141 (2.982)*	0.091 (2.217)**	0.104 (1.896)***	0.113 (4.104)*
Stand-alone IBs dummy	0.048 (2.671)*	0.162 (2.517)*	0.081 (1.186)	0.007 (1.959)***	0.067 (2.401)**	0.101 (2.791)*	0.081 (1.937)**	0.139 (2.709)*
LnTA	0.072 (5.100)*	0.137 (4.801)*	0.156 (4.671)*	0.091 (3.491)*	0.131 (2.192)**	0.173 (2.482)**	0.072 (2.876)*	0.105 (3.601)*
LnPA	0.087 (-1.165)	0.094 (-1.480)	0.046 (-1.799)***	0.111 (-2.506)**	0.118 (-2.096)**	0.087 (-2.304)**	0.120 (-2.401)*	0.108 (-1.892)***
LnLIQ	-0.054 (-2.670)*	-0.010 (-0.410)	0.060 (-3.110)*	0.001 (-3.738)*	0.071 (-5.104)*	-0.112 (-2.580)*	-0.049 (-3.055)*	-0.062 (-2.891)*
Ln(CAP)	0.051 (7.090)*	0.112 (3.049)*	0.101 (7.270)*	0.050 (2.118)**	0.0871 (2.108)**	0.127 (3.100)*	0.099 (3.291)*	0.081 (2.968)*
LnC3	0.004 (0.450)	0.048 (0.830)	0.001 (0.190)	0.001 (1.484)	0.000 (0.907)	0.004 (1.761)	0.002 (1.109)	0.003 (1.516)
LnGDP	0.075 (3.380)*	0.056 (1.900)***	0.081 (2.240)**	0.071 (2.194)**	0.083 (3.709)*	-0.111 (-2.096)**	-0.091 (-2.626)*	-0.121 (-2.008)**
Crisis dummy	0.001 (-1.780)***	0.003 (-1.987)**	0.006 (-1.387)	0.000 (-3.106)*	0.001 (-2.106)*	0.005 (-2.318)**	0.000 (-2.116)**	0.000 (-1.982)**
Crisis dummy* IBs subsidiaries	–	0.001 (-1.170)		0.000 (-2.361)**	0.001 (-2.231)**	0.002 (-1.946)***	0.003 (-2.006)**	0.004 (3.194)*
Crisis dummy* stand-alone IBs dummy	–	0.006 (-1.450)	0.084 (-1.730)***	0.003 (-2.210)**	0.003 (-2.187)**	0.000 (-2.461)**	0.003 (-1.986)***	0.081 (2.151)**
LnTA* IBs subsidiaries				0.005 (1.005)				0.011 (1.459)

Table 8. Continued

Variables	Stability							
	Panel A			Panel B				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
LnTA* stand-alone IBs dummy				0.001 (1.909)***				0.004 (2.196)**
LnCAP* IBs subsidiaries					0.009 (0.591)			0.000 (0.109)
LnCAP* stand-alone IBs dummy					0.041 (1.291)			0.014 (0.756)
LnPA* IBs subsidiaries						0.008 (0.121)		0.000 (0.717)
LnPA* stand-alone IBs dummy						0.000 (0.291)		0.041 (0.495)
LnLIQ* IBs subsidiaries							0. 121 (1.603)	0.201 (1.436)
LnLIQ* stand-alone IBs dummy							0. 091 (1.201)	0.051 (0.917)
AR(1) P-value	0.089	0.110	0.083	0.001	0.092	0.041	0.051	0.039
AR(2) P-value	0.6311	0.667	0.623	0.156	0.680	0.231	0.278	0.189
Hansen P-value	0.290	0.356	0.163	0.581	0.189	0.228	0.263	0.321
No. of observations	408	408	179	408	408	408	408	408

Note: The dependent variable is bank stability as measured by bank margins. IBS is a dummy representing the Islamic subsidiaries of conventional banks. Stand-alone dummy indicates the stand-alone Islamic banks, which represent a subset of all Islamic banks. LnTA is the logarithm of the total assets to represent the size of the banks. LnPA represents the physical assets, which indicates the non-earnings assets. LnLIQ is a measure of liquidity as measured by total loans or finance to total deposits. LnCAP represents the total equity to total assets ratio. LnC3 indicates the concentration in the banking industry as measured by the three largest banks. LnGDP is the annual growth of the real gross domestic product. Crisis dummy* stand-alone dummy is a proxy to control for the crisis and their effect on stand-alone banks. Dummy crisis* IBS represents the effects of the crisis of IB subsidiaries. The time fixed effect is introduced in the model, and we notice that the results are mostly one of indifference with respect to time with the exception of 2008-2009 crisis. Thus, we have run the test by including the dummy crisis with both Islamic banking models dummies. The rest of the variables are interactions among the banking models and the banks specific variables. *, **, *** indicate significance level of 1%, 5% and 10% respectively.

Table 9. GMM results on differentiation among banking models based on assets quality dimension

Variables	Assets quality							
	Panel A			Panel B				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Lag dependent variable	-0.066 (-1.820)***	-0.006 (-3.103)*	-0.088 (-2.943)*	0.1418 (-3.872)*	0.082 (4.902)*	0.079 (6.109)*	0.072 (5.187)*	0.091 (6.127)*
IBs subsidiary dummy	0.248 (-4.352)*	0.217 (-3.716)*	–	0.139 (-2.062)**	0.093 (3.871)*	0.085 (2.076)**	0.082 (2.117)**	0.068 (3.041)*
Stand-alone IBs dummy	0.029 (1.863)***	0.036 (2.136)**	0.076 (2.108)**	0.046 (3.082)*	-0.071 (2.301)**	-0.056 (2.910)*	-0.083 (3.007)*	-0.121 (2.168)**
LnTA	0.071 (-2.511)*	0.056 (-2.289)**	0.075 (-2.680)*	0.101 (-1.996)**	0.089 (-2.490)**	0.071 (-2.341)**	0.076 (-2.404)**	0.106 (-2.215)**
LnPA	0.029 (1.183)	0.071 (1.360)	0.063 (1.390)	-0.085 (1.120)	0.101 (-2.051)**	0.118 (-2.301)**	0.097 (-2.296)**	0.098 (-2.304)**
LnLIQ	0.224 (7.160)*	0.160 (4.690)*	0.091 (5.728)*	0.110 (-3.108)*	-0.079 (-2.191)**	-0.058 (-2.130)**	-0.065 (-2.235)**	-0.071 (-3.150)*
Ln(CAP)	-0.242 (-1.830)***	-0.353 (-1.940)***	-0.362 (-4.420)*	0.212 (-2.197)**	0.189 (1.891)***	0.121 (2.086)**	0.119 (2.307)**	0.099 (2.207)**
LnC3	-0.144 (-1.260)	-0.187 (-1.400)	-0.198 (1.860)***	0.101 (0.698)	0.171 (1.899)***	0.152 (2.321)**	0.128 (2.039)**	0.108 (2.301)**
LnGDP	-0.046 (-1.189)	-0.048 (-1.170)	-0.039 (-0.910)	0.067 (1.305)	0.081 (2.106)**	-0.072 (-2.988)*	-0.096 (-3.285)*	-0.095 (-3.408)*
Crisis dummy	0.029 (3.580)*	0.013 (1.823)***	0.009 (1.312)*	0.002 (1.989)**	0.000 (-2.075)**	0.003 (-2.111)**	0.001 (-2.008)**	0.003 (-2.381)**
Crisis dummy* IBs subsidiaries		-0.081 (2.890)*	–	0.000 (1.501)	0.000 (0.976)	0.001 (1.173)	0.002 (0.992)	0.004 (1.616)
Crisis dummy* stand-alone IBs dummy	–	-0.011 (1.863)***	-0.007 (1.550)	0.002 (1.466)	0.002 (1.305)	0.001 (1.282)	0.002 (1.157)	0.003 (1.350)
LnTA* IBs subsidiaries				0.092 (-1.198)				0.056 (1.304)

Table 9. Continued

Variables	Assets quality							
	Panel A			Panel B				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
LnTA* stand-alone IBs dummy				0.019 (1.510)				0.005 (1.212)
LnCAP* IBs subsidiaries					0.101 (1.180)			-0.067 (1.681)
LnCA* stand-alone IBs dummy					0.105 (2.394)**			0.117 (2.186)**
LnPA* IBs subsidiaries						0.000 (0.329)		0.002 (0.750)
LnPA* stand-alone IBs dummy						0.000 (1.204)		0.002 (0.931)
LnLIQ* IBs subsidiaries							0.015 (1.671)	0.091 (1.194)
LnLIQ* stand-alone IBs dummy							0. 002 (1.201)	0.078 (1.162)
AR(1) P-value	0.043	0.010	0.013	0.067	0.005	0.009	0.071	0.004
AR(2) P-value	0.267	0.184	0.196	0.238	0.435	0.106	0.098	0.204
Hansen P-value	0.101	0.156	0.147	0.201	0.193	0.187	0.285	0.487
No. of observations	408	408	179	408	408	408	408	408

Note: The dependent variable is asset quality as measured by non-performing loans or finance. IBS is a dummy represents the Islamic banks subsidiaries of convention abnks. Stand-alone Dummy indicates the stand-alone Islamic banks, which represents a subset of all Islamic banks,. LnTA is the logarithm of the total assets to represent the size of the banks. LnPA represents the physical assets, which indicates the non-earnings assets. LnLIQ is a measure of liquidity as measured by total loans or finance to total deposits. LnCAP represents the total equity to total assets. LnC3 indicates the concentration in the banking industry as measured by the three largest banks. LnGDP is the annual growth of the real gross domestic product. Crisis Dummy* Stand-alone dummy is a proxy to control for the crisis and their effect on stand-alone banks. Dummy Crisis* IBS represents the effects of the crisis of IB subsidiaries. The time fixed effects is introduced in the model, and we have notice the results are mostly indifference with respect to time with an exception of 2008-2009 crisis. Thus, we have run the test by including the dummy crisis with both Islamic banking models dummies. The rest of the variables are interaction among the banking models and the banks specific variables. *, **, *** indicate significance level of 1%, 5% and 10% respectively.

to the Islamic subsdiaries of conventional banks, which might suggest that Islamic subsidiaries can withstand better in time of crisis as they are still able to channel funds and get better margins, presumably thanks to the parental support.

Conversely, the lag asset quality of the banks as shown in Table 9 (Models 1-3) reports a negative relationship, which suggests that past years' asset quality exerts a negative influence on the asset quality of current years. In other words, the poor quality of assets in the past would lead to a reduction in non-performing assets in the current period. For example, the coefficient of lag in non-performing loans of 6 percent, in Model 1 (Table 9) indicates that a 1 percent increase in non-performing loans/finance of the past year leads to an enhancement of the asset quality or a reduction in the non-performing loans of the current year by 6 percent. Alhassan et al. (2014) argued that the negative relationship may lead to the conclusion that the current level of non-performing loans/finance is considered an important criterion in controlling the future quality of the assets.

Moreover, looking at the asset quality of Models 1-3, it is shown that the Islamic subsidiaries have lower non-performing finance (Model 1), with a coefficient (t-value) of 0.248 (4.352) compared to conventional banks, as the Islamic banking dummy has a significant negative relationship compared to the conventional banks (reference category). This result confirms the findings shown in Table 5, Panel D. It might have been an advantage for Islamic subsidiaries, for their financing profile is moderate, given the religiously motivated low-risk niche, with lower chances of default compared to the conventional banks that adopt a more aggressive policy of lending (Mirza et al., 2015). In comparison, there is a significant positive relationship between the stand-alone dummy variable and asset quality reflecting higher non-performing finance for the stand-alone Islamic banks in comparison with conventional banks. The stand-alone dummy variable is weakly positive and significant with a coefficient (t-value) of 0.029 (1.863) as shown in Model 1, Table 9; however, it has become stronger in Model 2 with a coefficient of 0.036 and t-value of 2.136. This, in fact, reflects the perception that stand-alone Islamic banks lag behind conventional banks and their Islamic subsidiaries in terms of risk management techniques and support. There is also a possibility that, with stiff competition from Islamic subsidiaries which have huge financial support from their conventional parents all the way, the stand-alone Islamic banks relax their standards of financing to attract customers leading to higher non-performing finance.

In addition to the above, we have also tested (Model 2 in Tables 7, 8 and 9) the behaviour of the banking models during crisis times, especially their reaction in terms of efficiency, stability and asset quality. Although Beck et al. (2013) argued that stability and asset quality are more vulnerable to crises than efficiency, we have examined the three indicators to verify if there is a difference in efficiency as well. Model 2 in each table (7-9) shows the results which detect no more than a weak significant difference (10 percent level of significance) in bank efficiency during the crisis as shown in the interaction term between the crisis and both dummy Islamic banks with a coefficient (t-value) for IB subsidiaries of 0.061 (1.881) and 0.016 (1.786) for stand-alone Islamic banks. This suggests that Islamic banks have been somewhat immune to the significant negative influence of the financial crisis on their efficiency and performance, and that they could perform better than conventional banks. The results are consistent with

prior findings on other countries (Hasan & Dridi, 2010; Mirza et al., 2015). A plausible explantion is that Islamic banks are less leveraged as they are assets based, with strong real sector linkages. As pointed out by Mirza et al. (2015), the fact that Islamic banks are not permitted to invest in exotic instruments would render them less susceptible to financial crises.

The margins of Islamic banks and conventional banks tend to be similar during the crisis period (coefficient 0.001, t-value -1.170). It might be argued that although Islamic banks are seen as a safer channel for deposits during crisis times, they might not be able to convert substantial deposits to higher income earnings due to contraction on the demand side, coupled with conservatism on the supply side (Dietrich and Wanzenried, 2011).

While there is a clear relationship between crisis and asset quality (non-performing loans/finance), Islamic banks' interactions with crisis show that they are better equipped and are better in terms of asset quality (lower non-performing finance) in comparison with their conventional counterparts, highlighting the resilience of Islamic banks under crisis conditions. Overall, the results suggest that Islamic banks, be they subsidiaries or stand-alones, have greater resistance to crisis than their conventional counterparts.

4.3 Robustness Check

The differentiation among the three issues of this research would be availing in the light of a comparison in terms of the behaviour of the independent variables with respect to each banking model. The influence of various banking models on the behaviour of the independent variables in their relationship with dependent variables might be shaped in a different way. To test this, we incorporate the interaction terms between the independent variables and three dummies of banking models as shown in each Panel B of Tables 7-9.

The results of Model 4 (Panel B) in Table 7 show that total assets exhibit different behaviour with respect to their influence on efficiency. Specifically speaking, Model 4 shows that the total assets of stand-alone Islamic banks have a positive and significant link with efficiency, indicating that size does matter for stand-alone Islamic banks. It might also indicate that stand-alone Islamic banks are smaller in size and the economics of scale has huge contribution to their efficiency compared to the well-established conventional banks and their subsidiaries. This argument that the smaller size banks tend to benefit from the economics of scale is found by Lee and Kim (2013). Our findings also support earlier evidence produced by Miah and Sharmeen (2015) who substantiated that the Islamic banks capitalise on the economics of scale more than conventional banks.

With respect to capital influence on efficiency, it is revealed that capital for stand-alone Islamic banks and Islamic subsidiaries of conventionals is positively related to efficiency, although it is not much different from conventional banks (Model 5, Table 7), which suggests that when a bank holds lower capital it would contribute to lower efficiency of the bank, as it is more apparent for stand-alone Islamic banks with their low level of capital growth as indicated in Table 2. Their lower level of equity growth contributes to their low level of efficiency, while conventional banks and their Islamic subsidiaries with higher growth of equity are able to work more efficiently compared

to the stand-alone Islamic banks. Overall, the result confirms the baseline findings that capital requirement is important for all banks regardless of their nature and structure. However, these results are not consistent with the findings of Miah and Sharmeen (2015) who find a negative link between efficiency and capital for Islamic banks only.

Physical assets (PA) effects on the efficiency exhibit indifference among the three banking models, be they conventional banks, Islamic subsidiaries of conventional banks or the stand-alone Islamic banks, as shown in Table 7 (Panel B, Model 5). Liquidity of the banks (Model 6, Table 7) shows a different behaviour pattern for Islamic banks compared to conventional banks. As shown in Model 6, the liquidity relationship is significant and positive for Islamic banks, which may suggest that an increase in the liquidity ratio enables banks with more liquid resources to supply more loans, and hence loans would be reflected in efficiency improvements. These results are also consistent when all variables are included simultaneously in Model 7.

Table 8 also shows some robustness tests in Models 4-7 to check for consistency of the stability results in Models 1-2, when the bank-specific variables are taken into consideration in their interactions with banking models. The evidence in Model 4 indicates that there is no difference in the results between Islamic subsidiaries of conventional banks and their parents, given their total assets (interaction term of IBs subsidiaries with LnTA), although total assets of stand-alone Islamic banks show superiority over conventional banks in terms of their effects on the margins. Positive results would indicate that the larger stand-alone banks have higher margins compared with smaller banks. In terms of other interactions on the variables with banking models, the results show insignificant differences with physical assets, liquidity and capitalisation as shown in Models 5, 6, 7 and 8.

Finally, Models 4-8 in Table 9 show the robustness of the results in Models 1-2 conditional on the interaction terms of the bank-specific factors and the banking model. In Model 4, the results of interactions between Islamic subsidiaries and total assets show that total assets of Islamic subsidiaries of conventional banks are related negatively and insignificantly to non-performing loans/finance and thus it does not differ much from their parents. This would indicate that larger assets might enable banks to have better risk management practices in addition to adequate resources to manage their funds (Alhassan et al., 2014). This is indeed the case for stand-alone Islamic banks, where small size and limited available resources for risk management appear to contribute to the increase in non-performing finance.

Capital shows a negative link with asset quality. Higher capital and higher non-performing loans/finance translate to low quality of assets. It might indicate that banks with higher level of non-performing loans force themselves to use their capital to absorb the losses, which leads to further deterioration in capital adequacy. Such relationships do not hold for conventional banks.

5. Conclusion

One of the major findings of previous studies is that the performance and efficiency of the Malaysian banking sector varies among banking models. As competition intensifies among the banks, assessments of efficiency for the banking industry in Malaysia have

become very critical, now that the country is on track to be a global hub of the Islamic finance industry. This study adds to the literature by providing further evidence on the efficiency of conventional and Islamic banks in Malaysia. More importantly, it extends the previous research by showing how stand-alone Islamic banks differ in terms of efficiency from the Islamic subsidiaries of well-established conventional banks. In addition, cross-comparisons among conventional banks, stand-alone Islamic banks and Islamic subsidiaries of conventional banks shed new light on the stability and asset quality of these banking models.

It could be argued that Islamic banks which are subsidiaries of conventional banks are more efficient than stand-alone Islamic banks, as their background arm's-length support system and capitalisation are very different. The study reports that there are differences among different types of banks, viz. conventional banks, Islamic subsidiaries of conventional parents, and stand-alone Islamic banks. It shows that Islamic subsidiaries perform better than stand-alone Islamic banks as well as their own conventional parents. Furthermore, the results show that Islamic subsidiaries are more stable in terms of their financing income compared to their conventional parents and stand-alone Islamic banks, while the stand-alone Islamic banks have lower asset quality in comparison with both Islamic subsidiaries and their conventional parents.

Caution must, however, be exercised in drawing policy inferences or implications from the results of the study. The finding that conventional banks and their Islamic subsidiaries tend to be more efficient and more stable with better asset quality, in comparison with stand-alone Islamic banks, is in consonance with the hypothesis outlined at the outset, thanks apparently to the width of their scale and depth of their experience. The surprise, if any, springs from our observation that the Islamic subsidiaries tend to perform better than their parents in terms of efficiency, stability and asset quality. One plausible explanation, as alluded to earlier, is that the Islamic subsidiaries of conventional banks have the unique privilege associated with the support and protection they get from their conventional parents, not to mention the *Shari'ah* oversights in addition to the industry regulations which provide additional checks and balances.

No wonder, Islamic subsidiaries are overtaking stand-alone Islamic banks in terms of growth of deposits and financing, with a rapidly growing market share of the Islamic banking business. In other words, Islamic subsidiaries are gaining grounds in Malaysia at the expense of stand-alone Islamic banks. No doubt, in the short run, Islamic subsidiaries are contributing more to the rapid growth of the Islamic finance industry in the country than do the stand-alone Islamic banks. This, however, may not bode well for the development of the Islamic banking industry in the long run. If this trend is to persist, the chances are that Islamic banking will stay put in the first phase of product differentiation, Islamising conventional products with *Shari'ah* compliance and shy away from the next phase of product innovation. As Islamic subsidiaries of conventional banks are in the driver's seat, it is likely to be a case of "more of the same", with conventional parents doing their innovations which their Islamic subsidiaries would continue to passively Islamise the conventional products through *Shari'ah* compliance, which means that Islamic banking would be stuck in the initial phase of product differentiation, without scaling up the value chain with product development and innovation.

Research and development (R&D) in Islamic banking can come about, only if stand-alone Islamic banks take charge of the industry, which is not the case now. It is stand-alone Islamic banks that have compelling reasons to be passionate about Islamic banking, because they are in it based on strong religious convictions, quite unlike Islamic subsidiaries which are in it mainly for profit.

We must hasten to add that there is absolutely no insinuation that the products of the Islamic subsidiaries of conventional banks are any less Islamic than that of stand-alone Islamic banks, as all of them are subject to the same set of rigorous *Shari'ah* screening and oversight. Regardless, the evidence clearly suggests that Islamic subsidiaries have apparently grabbed the thunder away from stand-alone Islamic banking pioneers. Stand-alone Islamic banks cannot reclaim their territory unless they can proliferate with a critical mass to outnumber the Islamic subsidiaries of conventional banks, before they can become large through mergers, for size does matter as shown by several previous studies, including Miller and Noulas (1996), Naucer and Kandil (2009), Sufian and Habibullah (2010), Beck et al. (2013), and Mirza et al. (2015).

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