

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

The main purpose of this chapter is to explain the research methodology used in this study. This chapter deliberates on the research method adopted in this study to achieve its objectives based on the general consensus of the literature reviewed in the area of the study. The chapter is divided into twelve sections with this introduction. The sample of study and the sources of data are discussed in the second and third sections respectively. Data analysis software is presented in section fourth. The fifth section in this chapter presents the variables used in this study. The measure of the variables and conceptual framework of the study are shown in the sections sixth and seventh respectively. The hypotheses of the study are shown in the section eighth. The ninth and tenth sections display the estimation model of profitability determinants and estimation method of efficiency determinants used to achieve the objectives of this study. The panel data regression estimations are introduced in the eleventh section. The last section discusses the regression analysis and the violation to the regression assumptions.

4.2 Sample of Study

This study aims to identify the determinants of profitability in Malaysian Islamic banks, thus the population of the research is represented by the Islamic banks operating in Malaysia. The numbers of Islamic banks operating in Malaysia (local and foreign) are seventeen Islamic Banks as of the end of 2010 (Bank Negara Malaysia, 2010). All the Islamic banks in Malaysia (as the whole population of research) are studied. To increase the number of observations and degrees of freedom, the research uses quarterly data during the period from the first quarter of 2007 to the fourth quarter of 2010.

If each cross-sectional unit has the same number of time series observations, then such a panel data is called a balanced panel. But, if the number of observations differs among panel members, we call this an unbalanced panel (Gujarati, 2003). In the present study, the unbalanced panel is used because the number of observations differs among the Islamic banks.

The banks which are chosen to be within the scope of the study are as follows:

Table 4.1 The study period of Islamic banks in Malaysia

No	Banks	Period of study	Number of quarterly data
1	Bank Islam Malaysia Berhad	q ₁ 2007 to q ₄ 2010	16
2	Bank Muamalat Malaysia Berhad	q ₁ 2007 to q ₄ 2010	16
3	RHB Islamic Bank Berhad	q ₁ 2007 to q ₄ 2010	16
4	CIMB Islamic Bank Berhad	q ₁ 2007 to q ₄ 2010	16
5	Kuwait Finance House (Malaysia) Berhad	q ₁ 2007 to q ₄ 2010	16
6	Hong Leong Islamic Banking Berhad	q ₁ 2007 to q ₄ 2010	16
7	Al Rajhi Banking & Investment Corporation (Malaysia) Berhad	q ₁ 2007 to q ₄ 2010	16
8	Affin Islamic Bank Berhad	q ₁ 2007 to q ₄ 2010	16
9	EONCAP Islamic Bank Berhad	q ₁ 2007 to q ₄ 2010	16
10	AmIslamic Bank Berhad	q ₁ 2007 to q ₄ 2010	16
11	Asian Finance Bank Berhad	q ₁ 2008 to q ₄ 2010	12
12	Alliance Islamic Bank Berhad	q ₁ 2008 to q ₄ 2010	12
13	Maybank Islamic Berhad	q ₁ 2008 to q ₄ 2010	12
14	Public Islamic Bank Berhad	q ₁ 2008 to q ₄ 2010	12
15	HSBC Amanah Malaysia Berhad	q ₃ 2008 to q ₄ 2010	10
16	Standard Chartered Saadiq Berhad	q ₄ 2008 to q ₄ 2010	9
17	OCBC Al-Amin Bank Berhad	q ₄ 2008 to q ₄ 2010	9
Number of observations			236

4.3 Sources of Data

The data of bank-specific variables are collected from the quarterly balance sheet and income statements obtained from Malaysian Islamic banks. Regarding the macroeconomic variables, the data are collected from the Department of Statistics, Malaysia and the Statistical Bulletin of International Monetary Fund (IMF) database for the period from the first quarter of 2007 to the fourth quarter of 2010.

4.4 Data Analysis Software

This study uses the econometrics program E-Views 7.1 software for analyzing the data and producing the regression results, and for conducting the multiple regression analysis to find out the relationship between the variables and the determination of the effect of independent variables on the dependent variable. E-Views has been developed by economists and most of its uses are in economics. E-Views is a statistical package can be employed for all kinds of data such as cross-sectional, time series and panel data. It gives the related tests which are not available in other software packages like SPSS. For this purpose, the E-Views 7.1 software is employed mainly to test the study's relationships. Besides using E-Views software, the study uses the Gretl econometric software, especially, in the case when the appropriate model is being tested. The joint significance test, Breusch Pagan Lagrangian Multiplier test, Chow test and linearity test have clearly been adopted in the Gretl econometric software to test the appropriate model.

4.5 Variables of Study

The literature on bank profitability explains profitability through internal and external variables. Internal variables or bank specific variables are under the control of bank management. External variables are under the effect of the macroeconomic environment on banks' performance. Thus, the determining factors of bank

profitability are divided into internal and external factors, and their descriptions are provided in the following section.

4.5.1 Internal variables of the bank (bank specific variables)

Capital and Reserves to total Assets (CRTA)

Capital and reserves include funds contributed by owners, retained earnings, general and special reserves, provisions, and valuation adjustments. Capital represents a source of funds along with deposits and a borrowing which is regulated by the capital adequacy requirements. The relationship between capital structure and return is of considerable importance to all banks. Many previous studies on bank profitability find a positive relationship between the capital and reserves ratio and bank profitability (see for example: Demirguc-Kunt and Huizinga (1999), Bashir (2003), Naceur (2003), Davydenko (2011), Ramadan *et al.*, (2011) and Bennaceur *et al.*, (2008)). Thus, total equity and reserves to total assets is included in this study because it identifies bank capitalization and the ability of a bank to handle losses with shareholders. The capital and reserves ratio is expected to have a positive impact on profitability because well capitalized banks are often less risky and more profitable.

Overhead Expenses to total Assets (OHTA)

The overhead expenses refer to an ongoing expense of operating a business (for example; rent, utilities, wages, etc.) that is necessary to the continued functioning of the business but cannot immediately be associated with the products or services of the bank. The overhead to total assets is obtained by dividing personnel and non-interest expenses to total assets. The overhead is used to provide information on the variation in operation costs across the banks. Literature on bank profitability argues that reduced expenses improve the performance and hence, raise the profitability of banks, implying a negative relationship between operating expenses ratio and profitability (Bourke 1989). The overhead expenses-to-total assets ratio (OHTA) is expected to have a negative impact on profitability because efficient banks are expected to operate at lower costs, see for example: Guru *et al.*, (1999); Al Manaseer (2007); Sufian (2010b); Davydenko (2011); Akhtar *et al.*, (2011) and Said & Tumin (2011). On the other hand, a positive coefficient may be found if banks are able to transfer a portion of their operating costs to their customers and depositors. Hence the overhead-

expenses-to-total assets ratio may also be expected to have a positive impact on profitability, see for example: Bashir (2003), Naceur (2003), Haron (2004), Benaceur & Goaid (2008), Ahmad & Noor (2011).

Loans or Financing to total Assets (LOTA)

Islamic banks operate on a profit and loss basis which is interest-free lending. Hence, loans appear in the balance sheet of the Islamic bank under the name financing, advances and other loans. The financing and advances have been classified in the balance sheet of Malaysian Islamic banks into several categories. One of the main categories is the Shari'a concepts which include Bai' Bithaman Ajil (deferred payment sale), Al-Ijarah Thumma Al-Bai (finance lease), Murabahah (cost-plus), Al-Musyarakah (joint venture), Mudharabah (profit-sharing and loss), Bai' Al-Dayn (debt trading), Bai' Al-Inah (sale and buy-back agreement), Al-Istisna (contract manufacturing), Ijarah (leasing), Tawarruq (commodity murabahah), Qardhul Hassan (benevolent loan) and other Islamic contracts approved by the National Shariah Advisory Council.

Financing ratio is used to estimate the component of the income that is attributable to manage quality. As management decisions affect the composition of assets that brings higher return, these changes will be reflected in higher return to depositors and shareholders. Bank financing is expected to be the main source of income (namely profits) and also expected to have a positive impact on bank performance. Other things being constant, the more deposits are transformed into financing, the higher the profits. However, if a bank needs to increase the risk to have a higher financing -to-asset ratio, then profits may decrease (Naceur, 2003).

Previous studies on profitability of banks have found a positive relationship between loans or financing and profitability; see for example Bashir (2000), Bashir (2003), Naceur, (2003), Al Manaseer, (2007), Sufian (2009), Al-Jarrah *et al.*, (2010) and Ramadan *et al.*, (2011). A positive relationship between the ratio of bank financing (Islamic financial products) to total assets and profit is expected.

Deposits to total Asset (DTA)

The bank deposits are total deposits from individual, corporation, banks and other financial institutions (non-Mudharabah fund and Mudharabah fund). The deposits to assets ratio are total deposits over total assets. The banks use a percentage of their customers' deposits to lend to other customers as an investment.

The deposits of Malaysian Islamic banks accounted 86% on average from total Liabilities and Shareholders' equity during the period of this study, which means that the banks rely heavily on deposits on their investment, see Table (5.2). Deposits of the banks are considered the main source of bank funding and hence, it has an impact on the profitability of the banks. Deposits are included as an independent variable because they can measure the impact of liabilities on profitability.

Atemnkeng & Joseph (2000), Haron (2004), Haron *et al.*, (2004), Al-Jarrah *et al.*, (2010), Javaid *et al.*, (2011) and Rahman *et al.*, (2012) include the deposits in their studies and find a positive relationship with profitability. Therefore, it is expected that deposits will have a positive relationship with profitability.

Liquidity to total Asset (LATA)

Liquidity is defined as the extent to which the bank has funds available to meet the withdrawal demands of depositors. Banks need amounts of liquidity depending on their growth rate, variability in financing, deposit activities and the regulations of the Central Bank. Banks have to earn a profit and at the same time satisfy the withdrawal needs of its customers. If the bank uses all its profit-inducing funds in financing, it will not be able to meet the cash requirements of depositors. On the other hand, liquidity can be attained if the bank keeps a high proportion of cash against deposits (maximum safety), but this will bring low profits for the bank. Cash & short term investment and deposits & placements with banks & financial institutions divided by total assets are used to measure the liquidity ratios. A high liquidity ratio indicates excess liquidity and is potentially indicative of low profits, as has been found in the studies by Guru *et al.*, (1999), Al Harahsha (1999), El Biesi (2010) and Sufian (2011). On the other hand, Fotios & Kyriaki (2007) and Wasiuzzaman & Tarmizi (2010) have

found a positive relationship between liquidity and profitability. The negative relationship between liquidity ratio and banks' profitability is expected.

Efficiency (TE)

The efficiency refers to the ability of a bank to minimize factors used for a given target output or maximize output with given input factors. Tahir (1999) states that the efficiency refers to how well a bank can yield a maximum value of outputs from a given total of the inputs. Banking is no different from any other mature industries - the surviving companies are those that keep the costs down. (TE) is a measure of how effective a bank is in using overhead expenses in generating revenues. In other words, the efficiency ratio gives us a measure of how effectively a bank is operating. Efficiency can be measured by various ratios such as the cost-income ratio. However many studies on bank efficiency (for example, (Sufian (a) (b), 2007), Tahir *et al.*, (2011) and Shah *et al.*, (2012)) have used the Data Envelopment Analysis (DEA) method. In this study, the DEA is used with two inputs (total deposits, overhead expenses) and two outputs (total earning assets, total financing) to estimate the technical efficiency of Malaysian Islamic banks. This factor is incorporated in the profitability model.

Previous studies have shown that the efficiency of banks is linked with a positive relationship with their profitability for example, Jiang *et al.*, (2003), Park and Weber (2006), Sufian (2007a), Casu and Molyneux (2003), Kosmidou *et al.*, (2006), Seelanatha (2007), Kamaruddin *et al.*, (2008) and Noor and Ahmad (2012). Previous studies confirm that efficiency is one of the most important factors in explaining differences in profitability across the banks. Thus, a positive relationship between bank efficiency and profit is expected.

4.5.2 External variables

Following the description of the internal variables, this section presents external or macroeconomic variables, the financial structure as well as dummy variables which are used in this study.

Macroeconomic variables

Inflation Rate (INF)

Inflation is defined as a sustained general rise in prices in the economy, high inflation rates is associated with higher costs as well as higher income. Perry (1992) argues that the extent to which inflation affects bank profitability depends on whether inflation is anticipated or unanticipated. A fully anticipated inflation rate by the banks' management means that banks can appropriately adjust interest rates in order to increase their revenues faster than their costs and thus, acquire higher economic profits. However, if banks are slow in adjusting their interest rates, costs may increase faster than revenues and thus, affect profits negatively. In addition, banks would benefit from inflation if they had demanded for deposits on which they pay zero interest, provided that customers were slow in switching into interest-bearing deposits (Bashir, 2000). Considering the fact that banks are more able to anticipate inflation than a customer, hence the inflation seems to enhance banks' profitability (Al Manaseer, 2007). This variable is expected to have a positive impact on banks' profitability given their capabilities to pass on any increase in the cost of funds to their customers that are due to inflation. Demircug-kunt & Huisinga (1999), Bashir (2000), Jiang *et al.*, (2003), Haron (2004), Fotios & Kyriaki (2007), Al Manaseer (2007), Vong & Chan (2008), Sufian (2010b), Wasiuzzaman & Tarmizi (2010) and Davydenko (2011) have studied the relationship between inflation and banks' profitability and they have found a positive relation. Meanwhile, the results of Sufian and Chong (2008), Fotios & Kyriaki (2007), Azam and Siddiqui (2012) and Zeitun (2012) establish a negative relationship between inflation and banks' profitability.

Gross Domestic Product Growth Rate (GDPGR)

Gross Domestic Product measures the national output of an economy. It measures the volume of goods and services produced in a given year. The real GDP measures the actual increase in goods and services and excludes the impact of rising prices. The GDP is among the most commonly used macroeconomic indicators to measure the total economic activity within an economy. The GDP is expected to influence numerous factors related to the supply and demand for financing and deposits. As GDP growth slows down, particularly during recessions, credit quality deteriorates,

and defaults increase, thus, further reducing bank returns. The coefficient of the variable is expected to be positive, as noted by Sufian (2010b). The gross domestic product growth rate is measured by the real annual growth rate.

In line with findings of Jiang *et al.*, (2003) other empirical studies such as Williams (2003), Hassan & Bashir (2003), Fotios & Kyriaki (2007), Al Manaseer (2007), Khediri & Khedhiri (2009), Wasiuzzaman & Tarmizi (2010) and Davydenko (2011) have mentioned about a significant positive impact of the GDP growth on banks' profitability. Therefore, the gross domestic product growth is expected to have a positive impact on banks' profitability.

Gross Domestic Product per capita (GDPPC)

The GDP per capita measures the total output of a country by taking the gross domestic product (GDP) and dividing it by the number of the population. In other words, the GDP per capita takes into account the average GDP per person in the economy. Thus, the GDP per capita is used to check the impact of the level of income on bank performance. A rise in per capita GDP signals growth in the economy, that the countries with a higher level of GDP per capita have more active and efficient stock markets and the small but active stock markets have a higher turnover ratio (El Biesi, 2010). This variable is expected to have a positive impact on Islamic banks' profitability which is in line with findings of Bashir (2000); Hassan and Bashir (2003); Al Manaseer (2007) and El Biesi (2010).

Structural variables

Bank Size (LOGTA)

Bank size is considered an important determinant of its performance. The economies of scale theory postulates that if an industry is subject to economies of scale, large institutions will be more efficient and thus, will be able to produce services at a lower cost. Since large banks are assumed to enjoy economies of scale, they are able to produce their outputs or services more cheaply and efficiently than can the small banks. As a result, large banks will earn higher rates of profit if entry is restricted (Haron, 2004). In other words, the growing bank size is positively related to bank

profitability; this is because larger banks are likely to have a higher degree of product and loan diversification than smaller banks, which reduces risk, and because economies of scale can arise from larger banks, because reduced risk and economies of scale lead to increased operational efficiency.

Larger banks are expected to have a positive effect on bank profitability. As in most studies in banking, the natural logarithm of the bank's total assets is used as a measure of bank size to account for size-related economies. Following previous studies, it shows that the bank size is linked to a positive relationship with bank's profitability: Bashir (1999); Atemnkeng *et al.*, (2000); Williams (2003); Haron (2004); Kosmidou *et al.*, (2006); Al Manaseer, (2007) and Idris *et al.*, (2011). Therefore, the bank size is expected to have a positive impact on banks' profitability. However, the impact of bank size on profitability can also be negative; see for example: Hassan and Bashir (2003); Fotios & Kyriaki (2007); Bennaceur *et al.*, (2008); Sufian and Habibullah (2010a); Javaid *et al.*, (2011).

Bank Age (AGE)

This study uses the age variable due to the significant difference in the age of Malaysian Islamic banks. Bank age denotes the number of years of establishment for each bank. Newly established banks are not particularly profitable in their first years of operation, as they place greater emphasis on increasing their market share, rather than on improving profitability (Athanasoglou *et al.*, 2008). Therefore, older banks are expected to be more profitable due to their longer period of service, during which the banks could build up a good reputation. But according to the results of Dietrich and Wanzenrie (2010) newer banks seem to be even a little bit more profitable than older banks. This means that newer banks are able to pursue successfully new profit opportunities. Also, younger banks may be more efficient in terms of their IT infrastructure, which is reflected in the profitability measure as well. Otherwise, Mirzaei *et al.*, (2011) have found that the effect of bank age is highly significant, but older banks in emerging countries are more profitable, compared to their counterparts in advanced economies. However, when the bank age interacts with market share in return on average equity, the older banks have higher returns, irrespective of their economies. This variable is expected to have a positive impact on banks' profitability.

Concentration Ratio (CONC)

The concentration is measured in this study by the proportion of total assets held by the largest Islamic bank in the Islamic banking sector. In general, researchers measure concentration in terms of the percentage of assets held by the largest and the two or three largest banks. However, among researchers, there is no common agreement on the best measure of concentration to be applied when assessing the impact of market structure on performance (Tahir, 1999). The structure-conduct-performance theory postulates that market structure (concentration level of the market) through conduct link determines the performance (profitability) of banks. In line with theories of previous studies of Short (1979) Demirguc-kunt & Huisi (1999), Atemnkeng & Joseph (2000), Hassan & Bashir (2003), Fotios & Kyriaki (2007), Khediri & Khedhiri (2009), Sufian & Habibullah (2010a) and Sastroswito and Suzuki (2011) discover that there is a positive relationship between concentration and banks' profitability. Thus, this variable is expected to have a positive impact on banks' profitability.

Dummy Variables

Difference between Domestic and Foreign Bank (DDF)

Malaysian Islamic banks have changed dramatically after liberalization; thereby the Islamic banking industry in Malaysia has changed in terms of the type, to domestic Islamic banks and Foreign Islamic banks. Previous studies such as Bashir (2000) report that foreign-owned banks are more profitable than the domestic ones, because foreign banks benefit from tax breaks and other preferential treatments. That is in line with Awdeh (2005) who have found that foreign banks in Lebanon during the period of 1993 - 2003 are more profitable than all domestic banks and the determinants of domestic banks and foreign banks' profitability are different. This result is supported by Azam *et al.*, (2012) whereby foreign banks in the Pakistan between the 2004 and 2010 period are more profitable than its domestic banks. They have found that domestic and foreign banks have different profitability determinants, i.e. factors that are important in shaping domestic banks' profitability are not necessarily important for the foreign banks, and vice versa. Also, Tahir *et al.*, (2010) examine the relative efficiency levels of domestic and foreign commercial banks in Malaysia; their results suggest that profit ratios are slightly higher for foreign banks relative to domestic

banks. Meanwhile, Elyor (2009) finds the adverse result that foreign banks in Malaysia during the period from 2004 to 2008 have strong capital, but the statistics show that domestic banks are more profitable.

The (DDF) dummy variable is included to investigate whether there is a difference between domestic and foreign Malaysian Islamic banks. A dummy variable (DDF) is to represent the type of banks “1” for domestic Islamic banks and “0” for foreign Islamic banks.

Global Financial Crisis (GFC)

Performance of banks is related to changes in their environment and the behavior of their competitors. Economic theory reports that in a perfectly competitive situation, profit maximization is equivalent to cost minimization. Hence, exogenous factors such as regulation or economic shocks can cause sub-optimal performance.

As pointed out by Ibrahim (2010), Malaysia is not insulated from the global economic downturn. The deterioration in global economic conditions and the major correction in commodity prices in the second half of 2008 saw Malaysia's GDP growth moderating to 0.1% in the final quarter of 2008. The domestic economy experienced the full impact of the global recession in the first quarter of 2009, declining by 6.2%. The concerted and pre-emptive measures taken by the BNM, through the accelerated implementation of fiscal stimulus measures, supported by the easing of monetary policy and the introduction of comprehensive measures to sustain access to financing and the mitigation of any impact of the heightened risk aversion among banks, have contributed towards stabilizing the domestic economy in the second quarter and its subsequent recovery in the second half of the year. The economy resumed its growth momentum in the fourth quarter, growing by 4.4%. It can be concluded that, Malaysia was impacted from the global financial crisis during the period (final quarter of 2008, first quarter of 2009, second quarter of 2009 and third quarter of 2009).

Sufian and Habibullah (2010a) find that the Asian financial crisis exerts a negative and significant impact on the profitability of Indonesian banks. Also, Hasan and Dridi (2010) suggest that Islamic banks of Bahrain, Jordan, Kuwait, Malaysia, Qatar, Saudi Arabia, Turkey, and the UAE have been affected differently during the recent global

crisis 2008 than conventional banks. Similarly, Ahmad and Noor (2011) have indicated that Islamic banks' profitability of 78 Islamic banks in 25 countries for the period of 1992-2009 had not been impacted during the global financial crises.

Islamic banks were exposed to the impact of the global financial crisis during the period (2008-2009). In this respect, the GFC dummy variable is included to examine the effect of the global financial crisis on the profitability of Islamic banks in Malaysia, "1" for the period of the crisis (q₄ 2008, q₁ 2009, q₂ 2009 and q₃ 2009) and "0" other periods.

The most important variables that are expected to have an impact on the profitability of Malaysian Islamic banks were selected and the support of these variables from the literature is presented in the following Tables, which have included the variables that have a positive and significant impact on banks' profitability, negative and significant impact on banks' profitability and insignificant impact on banks' profitability.

Table 4.2: Internal variables that are used as determinants of banks' profitability, their signs and significance

Variables	Positive and significant	Negative and significant	Insignificant
Capital ratio	Naceur (2003) Bashir (2003) Hassan and Bashir (2003) Kosmidou <i>et al.</i> , (2006) Athanasoglou <i>et al.</i> , (2006) Al Manaseer (2007) Vong and Chan (2008) Li. Yuqi (2008) Bennaceur and Goaied (2008)	Pratomo and Ismail (2006) Al Manaseer (2007) Wasiuzzaman and Tarmizi (2010) Ramadan <i>et al.</i> , (2011) Ali <i>et al.</i> , (2011)	Guru <i>et al.</i> , (1999) Sanusi and Ismail (2005) Al Manaseer (2007) Aburime (2008a) Idris <i>et al.</i> , (2011) Said and Tumin (2011) Choong <i>et al.</i> , (2012)

	<p>Sufian and Chong (2008)</p> <p>Athanasoglou <i>et al.</i>, (2008)</p> <p>Khediri and Khedhiri(2009)</p> <p>Flamini <i>et al.</i>, (2009)</p> <p>Al-Jarrah <i>et al.</i>, (2010)</p> <p>El Biesi (2010)</p> <p>Sufian (2010b)</p> <p>Sufian and Habibullah (2010a)</p> <p>Ramadan <i>et al.</i>, (2011)</p> <p>Akhtar <i>et al.</i>, (2011)</p> <p>Said and Tumin (2011)</p> <p>Smaoui and Ben Salah (2011)</p> <p>Sastroswito and Suzuki (2011)</p> <p>Davydenko (2011)</p> <p>Rahman <i>et al.</i>, (2012)</p> <p>Ayadi and Boujelbene (2012)</p>		
Overhead expenses ratio	<p>Bashir (2000)</p> <p>Bashir (2003)</p> <p>Naceur (2003)</p> <p>Haron(2004)</p> <p>Al Manaseer (2007)</p> <p>Bennaceur and Goaid (2008)</p> <p>Ahmad and Noor (2011)</p>	<p>Guru <i>et al.</i>, (1999)</p> <p>Athanasoglou <i>et al.</i>, (2006)</p> <p>Al Manaseer (2007)</p> <p>Sufian (2010b)</p> <p>Al-Jarrah <i>et al.</i>, (2010)</p> <p>Sufian and Habibullah (2010a)</p> <p>Davydenko (2011)</p>	<p>Hassan and Bashir (2003)</p> <p>Flamini <i>et al.</i>, (2009)</p> <p>Idris <i>et al.</i>, (2011)</p> <p>Ramadan <i>et al.</i>, (2011)</p> <p>Jasmine <i>et al.</i>, (2011)</p>

		<p>Ramadan <i>et al.</i>, (2011)</p> <p>Akhtar <i>et al.</i>, (2011)</p> <p>Said and Tumin (2011)</p> <p>Smaoui and Ben Salah (2011)</p> <p>Sastroswito and Suzuki (2011)</p>	
Loans ratio	<p>Guru <i>et al.</i>, (1999)</p> <p>Bashir (2000)</p> <p>Bashir (2003)</p> <p>Naceur (2003)</p> <p>Sanusi and Ismail (2005)</p> <p>Al Manaseer (2007)</p> <p>Bennaceur and Goaid (2008)</p> <p>Al-Jarrah <i>et al.</i>, (2010)</p> <p>Olson and Zoubi (2011)</p> <p>Ramadan <i>et al.</i>, (2011)</p> <p>Sufian (2011)</p> <p>Sastroswito and Suzuki (2011)</p>	<p>Guru <i>et al.</i>, (1999)</p> <p>Hassan and Bashir (2003)</p> <p>Davydenko (2011)</p>	<p>Al Manaseer (2007)</p> <p>Javid <i>et al.</i>, (2011)</p> <p>Ramadan <i>et al.</i>, (2011)</p> <p>Rahman <i>et al.</i>, (2012)</p> <p>Jasmine <i>et al.</i>, (2011)</p>

Deposits ratio	<p>Guru <i>et al.</i>, (1999)</p> <p>Atemnkeng and Joseph (2000)</p> <p>Haron(2004)</p> <p>Alkassim (2005)</p> <p>Awdeh (2005)</p> <p>Al-Jarrah <i>et al.</i>, (2010)</p> <p>Javaid <i>et al.</i>, (2011)</p> <p>Rahman <i>et al.</i>, (2012)</p>	<p>Al Manaseer (2007)</p> <p>Davydenko (2011)</p>	<p>Jasmine <i>et al.</i>, (2011)</p>
Liquidity ratio	<p>Alkassim (2005)</p> <p>Fotios and Kyriaki (2007)</p> <p>Wasiuzzaman and Tarmizi (2010)</p> <p>Al-Jarrah <i>et al.</i>, (2010)</p> <p>Sufian (2011)</p>	<p>Al Harahsha(1999)</p> <p>Guru <i>et al.</i>, (1999)</p> <p>El Biesi (2010)</p> <p>Sufian (2010a)</p>	<p>Guru <i>et al.</i>, (1999)</p> <p>Haron(2004)</p> <p>Alkassim (2005)</p> <p>Al-Jarrah <i>et al.</i>, (2010)</p> <p>Davydenko (2011)</p> <p>Idris <i>et al.</i>, (2011)</p> <p>Said and Tumin (2011)</p> <p>Smaoui and Ben Salah (2011)</p> <p>Choong <i>et al.</i>, (2012)</p>
Efficiency	<p>Jiang <i>et al.</i>, (2003)</p> <p>Casu and Molyneux (2003)</p> <p>Kosmidou <i>et al.</i>, (2006)</p> <p>Park and Weber (2006)</p> <p>Seelanatha (2007)</p> <p>Sufian (2007a)</p>		<p>Abbasoglu <i>et al.</i>, (2007)</p> <p>Zamil (2007)</p>

	Kamaruddina <i>et al.</i> , (2008)		
	Khediri and Khedhiri(2009)		
	Ali <i>et al.</i> , (2011)		
	Noor and Ahmad (2012)		

Table (4.2) explains the internal variables which have a significant (positive or negative) impact on banks' profitability: capital ratios, overhead expenses ratio, loans ratio, deposits ratio, liquidity ratio and technical efficiency bank. Furthermore, the table presents the internal variables which do not have any significant impact on banks' profitability.

Table 4.3: Macroeconomic variables that are used as determinants of banks' profitability, their signs and significance

Variable	Positive and significant	Negative and significant	Insignificant
Inflation	Haron (1996)	Awdeh (2005)	Naceur (2003)
	Demirguc-Kunt and Huizinga (1999)	Fotios and Kyriaki (2007)	Hassan and Bashir (2003)
	Bashir (2000)	Sufian and Chong (2008)	Bennaceur and Goaid (2008)
	Jiang <i>et al.</i> , (2003)	Khrawish <i>et al.</i> , (2011)	Li. Yuqi (2008)
	Haron (2004)	Ali <i>et al.</i> , (2011)	Davydenko (2011)
	Kosmidou <i>et al.</i> , (2006)	Azam and Siddiqui (2012)	Ramadan <i>et al.</i> , (2011)
	Fotios and Kyriaki (2007)	Zeitun (2012)	Ali <i>et al.</i> , (2011)
	Al Manaseer (2007)		
	Vong and Chan. (2008)		Jasmine <i>et al.</i> , (2011)
	Aburime (2008b)		Sastroswito and Suzuki (2011)
	Athanasoglou <i>et al.</i> , (2008)		Ayadi and Boujelbene (2012)

	<p>Khediri and Khedhiri(2009)</p> <p>Flamini <i>et al.</i>, (2009)</p> <p>Sufian (2010a)</p> <p>Sufian (2010b)</p> <p>Al-Jarrah <i>et al.</i>, (2010)</p> <p>Wasiuzzaman and Tarmizi (2010)</p> <p>Sufian (2011)</p> <p>Smaoui and Ben Salah (2011)</p> <p>Davydenko (2011)</p>		
GDP Growth	<p>Jiang <i>et al.</i>, (2003)</p> <p>Williams (2003)</p> <p>Hassan and Bashir (2003)</p> <p>Kosmidou <i>et al.</i>, (2006)</p> <p>Fotios and Kyriaki (2007)</p> <p>Al Manaseer (2007)</p> <p>Khediri and Khedhiri(2009)</p> <p>Flamini <i>et al.</i>, (2009)</p> <p>Sufian (2010a)</p> <p>Sufian (2010b)</p> <p>Wasiuzzaman and Tarmizi (2010)</p> <p>Sufian and Habibullah (2010a)</p> <p>Davydenko (2011)</p> <p>Sufian (2011)</p>	<p>Fotios and Kyriaki (2007)</p> <p>Khrawish <i>et al.</i>, (2011)</p>	<p>Sanusi and Ismail (2005)</p> <p>Al Manaseer (2007)</p> <p>Li. Yuqi (2008)</p> <p>Sufian (2011)</p> <p>Ramadan <i>et al.</i>, (2011)</p> <p>Jasmine <i>et al.</i>, (2011)</p> <p>Ayadi and Boujelbene (2012)</p>

	Smaoui and Ben Salah (2011) Ali <i>et al.</i> , (2011) Zeitun (2012)		
GDP per Capita	Bashir (2000) Hassan and Bashir (2003) Al Manaseer (2007) El Biesi (2010)	Demirguc-Kunt and Huizinga (1999) Al Manaseer (2007) Sufian (2010b)	Athanasoglou <i>et al.</i> , (2006) Al Manaseer (2007) Bennaceur and Goaid (2008) Flamini <i>et al.</i> , (2009) Choong <i>et al.</i> , (2012)

Table (4.3) presents the macroeconomic variables which have a significant (positive or negative) impact on banks' profitability: inflation, GDP growth and GDP per capita. In addition, the results indicate that some of the relations have some insignificant impact on banks' profitability.

Table 4.4: Structural variables that are used as determinants of banks' profitability, their signs and significance

Variable	Positive and significant	Negative and significant	Insignificant
Bank size	Haron (1996) Haron(2004) Athanasoglou <i>et al.</i> , (2006) Al Manaseer (2007) Idris <i>et al.</i> , (2011) Khrawish <i>et al.</i> , (2011) Smaoui and Ben Salah (2011)	Hassan and Bashir (2003) Kosmidou <i>et al.</i> , (2006) Fotios and Kyriaki (2007) Sufian and Chong (2008) Bennaceur and Goaid (2008)	Atemnkeng and Joseph (2000) Pratomo and Ismail (2006) Athanasoglou <i>et al.</i> , (2008) Ramadan <i>et al.</i> , (2011)

	Davydenko (2011) Ayadi and Boujelbene (2012)	Sufian and Habibullah (2010a) Javaid <i>et al.</i> , (2011) Khrawish <i>et al.</i> , (2011) Rahman <i>et al.</i> , (2012)	Akhtar <i>et al.</i> , (2011) Said and Tumin (2011) Jasmine <i>et al.</i> , (2011) Sastrosuwito and Suzuki (2011)
Concentration ratio	Short (1979) Demirguc-Kunt and Huizinga (1999) Atemnkeng and Joseph (2000) Hassan and Bashir (2003) Athanasoglou <i>et al.</i> , (2006) Kosmidou <i>et al.</i> , (2006) Fotios and Kyriaki (2007) Khediri and Khedhiri(2009) Sufian and Habibullah (2010a) Sufian (2011) Sastrosuwito and Suzuki (2011)	Al Manaseer (2007) Garcia-Herrero <i>et al.</i> , (2009) Ramadan <i>et al.</i> , (2011)	Naceur (2003) Athanasoglou <i>et al.</i> , (2006) Al Manaseer (2007) Fotios and Kyriaki (2007) Athanasoglou <i>et al.</i> , (2008) Flamini <i>et al.</i> , (2009) Al-Jarrah <i>et al.</i> , (2010) Sufian (2010b) Sufian (2011) Ayadi and Boujelbene (2012) Choong <i>et al.</i> , (2012)

Table (4.4) presents the structural variables which have a significant (positive or negative) impact on banks' profitability: concentration ratio and bank size. Furthermore, some of the previous studies indicate that the concentration ratio and bank size do not have any significant impact on banks' profitability.

4.6 Measure of the Variables

The methodology of this study uses two dependent variables, return on assets and return on equity to estimate the profitability determinants of Islamic banks. The independent variables; 1) internal variables of the bank: capital ratio and reserves, overhead ratio, ratio of total loans, deposits ratio, liquidity ratio and technical efficiency. 2) Macroeconomic variables: The annual inflation rate, gross domestic product growth rate, The GDP per capita. 3) Structural variables: The bank size, bank age and concentration ratio. 4) The dummy variables: two dummy variables are included to account, (DDF) for the differences between the banks that may affect the determinants of Islamic banks' profitability, and the variable (GFC) to determine the effect of the global financial crisis on the profitability of Islamic banks in Malaysia.

Table 4.5: Measure of the dependent variables

Variables	Measurement
ROA	Return on Asset. The ROA is defined as the net income divided by total assets.
ROE	Return on Equity. The ROE is calculated by dividing the net income by shareholders' equity.

Table 4.6: Measure of the independent variables (Internal Variables)

Variables	Measurement
CRTA	This is a measure of capital and reserves as a percentage of total assets.
OHTA	The overhead-to-total assets ratio is total overhead expenditure as percentage of total assets.
LOTA	The ratio of total financing and advances over total assets.
DTA	The deposits ratio is total deposits from customers and deposits from banks and other financial institutions (both the non-Mudharabah fund and Mudharabah fund) over total assets.
LATA	The liquidity ratio is cash and short term funds placements with banks and financial institutions divided by total assets.
TE	The technical efficiency equals the total bank outputs divided by total bank inputs by using the Data Envelopment Analysis method.

Table 4.7: Measure of the independent variables (Macroeconomic Variables)

Variables	Measurement
INF	The annual inflation rate is the annual change in the consumer price indicators.
GDPGR	Gross domestic product growth is the real growth of the gross domestic product (at constant 2000 prices).
GDPPC	Gross domestic product per capita is the gross domestic product at constant 2000 prices divided by population.

Table 4.8: Measure of the independent variables (Structural Variables)

Variables	Measurement
LOGTA	The natural logarithm of total assets of individual Islamic banks, where it reflects the bank's size.
AGE	Number of work periods (quarterly) for each bank, where it reflects the bank's age.
CONC	The concentration ratio is measured by the proportion of total assets held by the largest Islamic banks divided by the total assets of the Islamic banking sector.

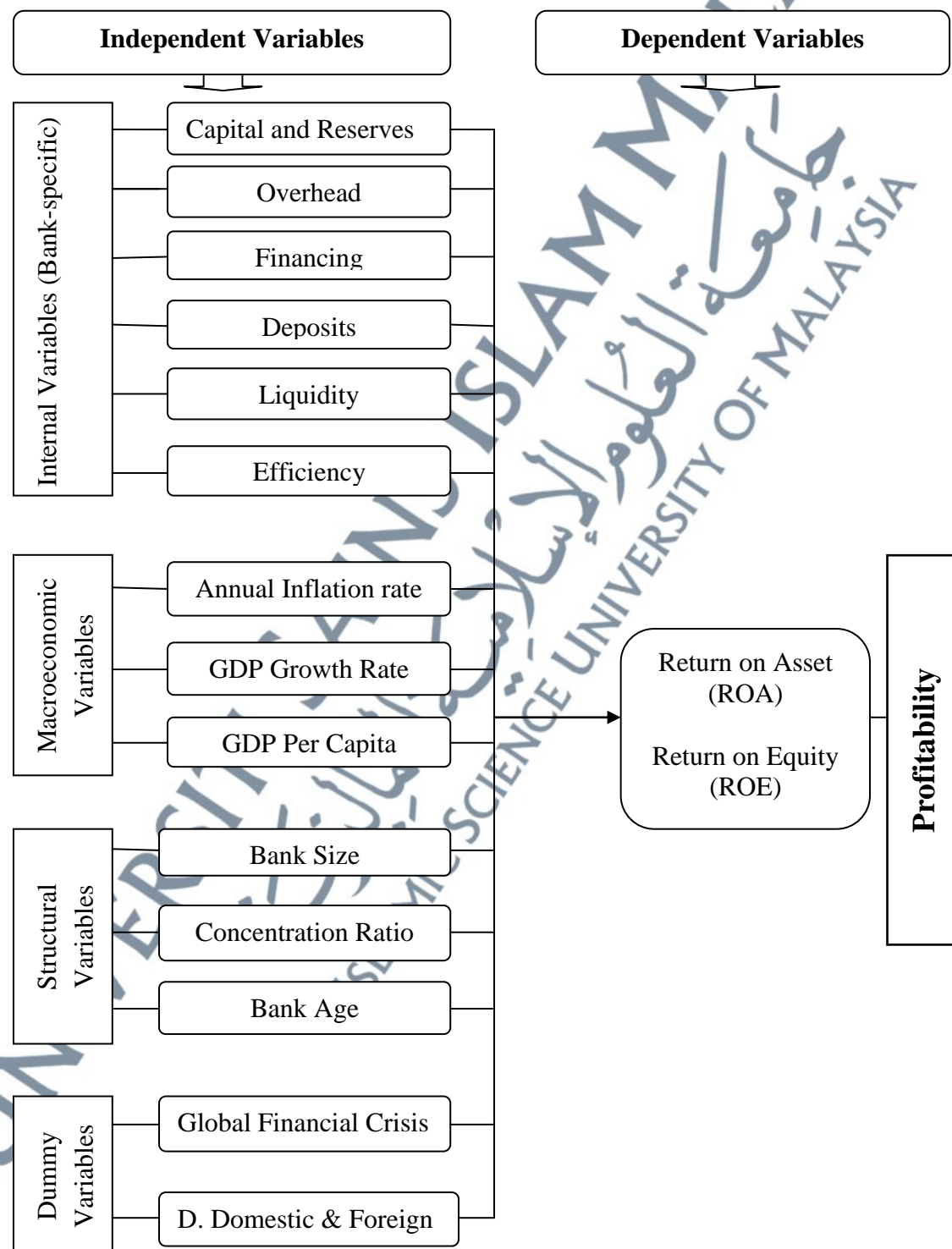
Table 4.9: Measure of the independent variables (Dummy Variables)

Variables	Measurement
DDF	This dummy variable represents the difference between domestic Islamic banks and foreign Islamic banks. A dummy variable is to represent the type of banks "1" for domestic Islamic banks and "0" for foreign Islamic banks.
GFC	Dummy variable is included to examine the effect of the global financial crisis on the profitability of Islamic banks in Malaysia, "1" for the period of the crisis (q ₄ 2008, q ₁ 2009, q ₂ 2009 and q ₃ 2009) and "0" for other periods.

4.7 The Conceptual Framework of the Study

Based on a review of the relevant literature, this section introduces a conceptual framework to address the relationships between the profitability of banks and internal and external variables. This conceptual framework is drawn in the Figure (4.1).

Figure 4.1: the Conceptual Framework



4.8 Hypotheses of the Study

This study is designed to answer the research questions, and a set of hypotheses are used as follows:

Question (1): *What are the determinants of the profitability of Malaysian Islamic banks?*

To answer this question the following hypotheses are formulated:

H_{1a}: There is a significant positive relationship between capital and reserves and bank profitability.

H_{1b}: There is a significant positive relationship between overhead expenses ratio and bank profitability.

H_{1c}: There is a significant positive relationship between loans ratio (financing) and bank profitability.

H_{1d}: There is a significant positive relationship between deposits ratio and bank profitability.

H_{1e}: There is a negative relationship between liquidity ratio and bank profitability.

H_{1f}: There is a significant positive relationship between efficiency and bank profitability.

H_{1g}: There is a significant relationship between inflation and bank profitability.

H_{1h}: There is a significant positive relationship between the gross domestic product growth and bank profitability.

H_{1i}: There is a significant positive relationship between the GDP per capita and bank profitability.

H_{1j}: There is a significant relationship between bank size and bank profitability.

H_{1k}: There is a significant positive relationship between bank age and bank profitability.

H_{1l}: There is a significant positive relationship between the concentration and bank profitability.

H_{1m}: There is a difference in the profitability between domestic Islamic banks and foreign Islamic banks in Malaysia.

Question (2): *Are these Malaysian Islamic banks affected by the 2008 global financial crisis in terms of their profitability?*

To answer this question the following hypothesis is formulated:

H₂: There is an effect of the global financial crisis on the profitability of Malaysian Islamic banks.

Question (3): *Can significant differences be found in the determinants of profitability between domestic and foreign Islamic banks in Malaysia?*

To answer this question the following hypothesis is formulated:

H₃: There are differences in the determinants of profitability between domestic and foreign Islamic banks in Malaysia.

Question (4): *Can the profitability variables determine the efficiency of these Malaysian Islamic banks?*

To answer this question the following hypothesis is formulated:

H₄: The banks' efficiency in the Malaysian Islamic banks is determined by the profitability variables.

4.9 Estimation Model of Profitability Determinants

4.9.1 Measure of profitability

The study uses two dependent variables, return on assets and return on equity to estimate the profitability determinants of Islamic banks:

Return on Assets (ROA)

Return on Assets is net earnings per unit of a given asset. Return on assets equals profit after tax/total assets. ROA is calculated by dividing the net income and total assets giving a ratio of earnings generated from the invested capital. ROA is the

management effective in generating profit on each dollar of investment (Hassoune, 2002). Heavy emphasis is put on ROA in the banking business as it precisely measures asset performance; the higher ratio indicates higher ability and therefore is an indicator of better performance. ROA is selected as the dependent variable in this study because it helps identify the effectiveness of bank assets.

Return on Equity (ROE)

Return on equity is net earnings per dollar of (total) equity capital. Return on equity equals profit after tax/equity capital. ROE shows how much profit the bank has generated on money invested by shareholders. ROE is calculated by dividing the net income by shareholders' equity. ROE also determines the degree of efficiency of the bank management in using shareholders' investments; the higher ratio is an indicator of higher managerial performance (Hassan and Bashir, 2003).

4.9.2 Multivariate regression analysis

The multiple linear regression analysis is used to analyze the cross-section time series data (Panel data) to find out the profitability determinants of Malaysian Islamic banks. The linear functional form is widely used in the literature and produces good results (Bashir, 2000). Many of the studies on bank profitability such as Bourke (1989), Short (1979), Bashir (2003), Naceur (2003), Haron (2004), Hassan and Bashir (2003), Sanusi and Ismail (2005), Alkassim (2005), Vong and Chan (2006), Kosmidou *et al.*, (2006), Fotios and Kyriaki (2007), Flamini *et al.*, (2009), Al-Jarrah *et al.*, (2010)) use linear models to estimate the impact of various factors that may be important in explaining bank profits.

The basic regression equation is as follows:

$$I_{it} = \alpha_i + \beta_1 B_{it} + \beta_2 M_{it} + \beta_3 S_{it} + \beta_4 D_{it} + \varepsilon_{it}$$

Where I_{it} represents bank profitability for bank i at time t . B_{it} are bank variables for bank i at time t . M_{it} are macroeconomic variables for bank i at time t . S_{it} are structural variables for bank i at time t . D_{it} are bank dummy variables. β_1 , β_2 , β_3 , and β_4 are coefficients. α_i is a constant. ε_{it} is an error term.

The research of Rice (2011) has suggested that, with many variables and with such a small sample, any attempt to build a stable predictive model can be a problem because of this blurring state of the correlated predictor variables. This “multicollinearity error” is directly a function of many correlated variables. Similarly, Khorana, *et al.*, (2005) revealed that if the sample size is not large and the multicollinearity problem is found, it cannot include many variables in one analysis. The higher multicollinearity among the independent variables, the lower is the reliability of the regression estimates (Baltagi, 2008).

According to Berenson *et al.*, (2012), measuring the collinearity among the independent variables is important towards building the most appropriate regression model. The analyzing of this study indicates that the correlations among some of the explanatory variables are high, which suggests that multicollinearity is present and that it might be serious, see Appendix (E-1). Given that the sample size is not large and the presence of multicollinearity problem, it cannot include all variables in one analysis. Thus, the variables are divided into two models. Dividing the independent variables between the two models is based on reducing the multicollinearity. The dividing of the independent variables into two models will improve the multicollinearity as suggested by Ibrahim (2011).

Accordingly, the following models are to examine the relationship between Malaysian Islamic banks' profitability and the potential determinant variables.

Model (1):

$$\text{ROA} = \alpha_0 + \beta_1 \text{OHTA} + \beta_2 \text{LOTA} + \beta_3 \text{DTA} + \beta_4 \text{GDPGR} + \beta_5 \text{GDPPC} + \beta_6 \text{CONC} \\ + \beta_7 \text{DDF} + \varepsilon_{it}$$

$$\text{ROE} = \alpha_0 + \beta_1 \text{OHTA} + \beta_2 \text{LOTA} + \beta_3 \text{DTA} + \beta_4 \text{GDPGR} + \beta_5 \text{GDPPC} + \beta_6 \text{CONC} \\ + \beta_7 \text{DDF} + \varepsilon_{it}$$

Model (2):

$$\text{ROA} = \alpha_0 + \beta_1 \text{CRTA} + \beta_2 \text{LATA} + \beta_3 \text{TE} + \beta_4 \text{INF} + \beta_5 \text{LOGTA} + \beta_6 \text{LOGAGE} \\ + \beta_7 \text{GFC} + \varepsilon_{it}$$

$$\text{ROE} = \alpha_0 + \beta_1 \text{CRTA} + \beta_2 \text{LATA} + \beta_3 \text{TE} + \beta_4 \text{INF} + \beta_5 \text{LOGTA} + \beta_6 \text{LOGAGE} \\ + \beta_7 \text{GFC} + \varepsilon_{it}$$

4.10 Estimation Method of Efficiency Determinants

4.10.1 Measure of efficiency

A non-parametric Data Envelopment Analysis (DEA) is used to measure input-oriented technical efficiency of the Malaysian Islamic banks during the period of q12007-q42010 for each bank. The DEA is a linear programming technique for examining the different efficiency of decision-making units (Yudistira, 2003). The main objective of the DEA is to determine which banks are operating on their efficient frontier and which banks are not. If the input-output of the bank combination lies on the DEA frontier, the bank is considered efficient. In contrast, the bank is considered inefficient if the input-output of bank combination lies inside the frontier (Tahir *et al.*, 2009).

Following Tahir *et al.*, (2011), this study uses the intermediation approach in which DEA model consists of two outputs, namely earnings assets and total loans, and two inputs, namely total deposits and overhead expenses to estimate the technical efficiency for Malaysian Islamic banks. The extraction of the efficiency score is used as data to measure the relationship between efficiency and profitability of the Islamic banks, as well as to measure the efficiency determinants of Malaysian Islamic banks.

The efficiency of each bank is computed as follows:

$$TE = \frac{\sum_{j=1}^n U_j Y_{jk}}{\sum_{i=1}^m V_i X_{ik}}$$

Where:

Y_{jk} is the amount of the j th output produced by the k th bank, X_{ik} is the amount of the i th input used by the k th bank, U_j is the output weight, V_i is the input weight.

$$X_{ik}, Y_{jk} \geq 0, \quad i = 1, \dots, m, \quad j = 1, \dots, n, \quad k = 1, \dots, s$$

$$U_j, V_i \geq 0, \quad i = 1, \dots, m, \quad j = 1, \dots, n$$

$$\sum_{j=1}^n u_j y_{jk} / \sum_{i=1}^m v_i x_{ik} \leq 1$$

4.10.2 Multivariate Tobit regression analysis

This study uses the DEA model to estimate the technical efficiency as the dependent variable, as well as the Tobit regression method to analyze the efficiency determinants of Malaysian Islamic banks. DEA score falls between the interval 0 and 1 ($0 < TE \leq 1$) making the dependent variable (TE) a limited dependent variable. In cases with a limited dependent variable (that the DEA index ranges between 0 and 1) the Tobit model is known to generate consistent estimates of regression coefficients (Grigorian and Manole 2006). The Tobit model was developed by Tobin (1958). Since the dependent variable is an estimated parameter and is bounded by one and zero, the least square regression analysis is not appropriate (Saxonhouse, 1976). Thus, Tobit multiple regression is used which allows limited dependent variables. A panel data Tobit regression model is used to analyze the factors that influence banks' efficiency.

The determinants of banks' efficiency are as follows:

Model (1):

$$TE = \alpha_0 + \beta_1 OHTA + \beta_2 LOTA + \beta_3 DTA + \beta_4 GDPGR + \beta_5 GDPPC + \beta_6 CONC + \beta_7 DDF + \varepsilon_{it}$$

Model (2):

$$TE = \alpha_0 + \beta_1 CRTA + \beta_2 LATA + \beta_3 TE + \beta_4 INF + \beta_5 LOGTA + \beta_6 LOGAGE + \beta_7 GFC + \varepsilon_{it}$$

The support of this stage comes from previous studies which have tested the determinants of banks' efficiency; see the studies of Casu and Molyneux (2003), Grigorian and Manole (2006), Zamil (2007), Sufian (2007b), Seelanatha (2007), Sufian & Habibullah (2010b), Garza-Garcia (2012), Shah *et al.*, (2012), Sufian *et al.*, (2012) and Noor & Ahmad (2012). For example, Seelanatha (2007) investigates the determinants of the efficiency of the local banks in Sri Lanka by using a Tobit

regression model for identifying the factors and significance of their influence. A set of variables namely assets' quality, capital strength, liquidity, profitability, GDP growth, inflation, bank size, old banks, stock market capitalization, commercial banks, privately-owned banks have been introduced to the regression models as potential explanatory variables of the technical efficiency. The similar variables are used by Seelanatha (2007) to determine the factors affecting the banks' efficiency. Similarly, Garza-Garcia (2012) uses the Tobit model to find out the main determinants of bank efficiency in the Mexican banking industry. The results indicate that, the determinants of increased bank efficiency are loan intensity, GDP growth and foreign ownership. On the other hand, non-interest expenses and inflation rate reduce bank efficiency.

4.11 Panel Data Regression Estimations

The analysis of the panel data is the subject of one of the most active and innovative bodies of literature in econometrics, partly because panel data provide such a rich environment for the development of estimation techniques and theoretical results (Greene, 2003). Panel data usually give the researcher a large number of data points, increasing the degrees of freedom and reducing the collinearity among explanatory variables, hence improving the efficiency of econometric estimates. Furthermore, longitudinal data allow a researcher to analyze a number of important economic questions that cannot be addressed using the cross-sectional or time-series data sets (Hsiao, 2003).

Gujarati (2003) gives the following advantages for panel data: Panel data estimation can take the bank's heterogeneity explicitly into account by allowing for individual-specific variables. By combining both time series and cross-section observations, panel data give more informative data, more variability, more degrees of freedom and more efficiency. By studying repeated cross-sections of observations, panel data are better suited to study the dynamics of change. Panel data can better detect and measure effects that cannot simply be observed in pure cross-section or pure time series data. Panel data allows the study of more complicated behavioral models. By

making data available for several thousand units, panel data can minimize the bias that might result if we aggregate individuals or banks into broad aggregates.

According to Al Manaseer (2007) the use of the panel estimation in this study can be justified to isolate any specific bank factors for which some banks might enjoy firm-specific competitive advantages over other banks. In addition, bank's profitability can be affected by economic booms and recessions in which the varying economic conditions from one time to another may have an impact on bank's profitability. Due to these factors, it is expected that the regression parameters of the profitability model may vary over time and vary across the sectional units.

In the panel data analysis there are three different models, each of the models are used in this study, namely the pooled model, fixed effects model and random effects model. These models are presented as follows:

4.11.1 Pooled Ordinary Least Squares

This method considers a constant intercept among all cross-sectional units. In the pooled estimation method, the intercept value and the coefficients of all the explanatory variables (both the slope and intercept) are the same for all the banks, as well as the fact that they are constant over time. This estimation method ignores any form of heterogeneity across units. In other words, if Heterogeneity is observed for all individuals, this means that there is only the constant term for all units, and then the entire model can be treated as an ordinary linear model and fit by least squares (Ramadan, 2009 and Asteriou and Hall, 2007).

The pooled model is defined according to the following regression model:

$$I_{it} = \alpha_0 + \beta X_{it} + \varepsilon_{it}$$

Where:

I_{it} = the dependent variable.

α_0 = the intercept.

β = the vector of coefficients.

X_{it} = the vector of k explanatory variables.

ε_{it} = the error term (the disturbance).

The assumptions underlying the pooled method are based on the assumption that the explanatory variables are non-stochastic (fixed) and the error term follows the classical assumptions, i.e. there is a zero mean value of disturbance, there is the case of homoscedasticity or equal variance of the disturbance, there is no Serial correlation between the disturbances, zero covariance between the disturbance and the explanatory variables.

To overcome the restrictions of using the pooled estimation method, this study uses fixed effect and random effect techniques. To identify which techniques are appropriate for this study, either the fixed effects model (FEM) or random effects model (REM), both kinds are estimated.

4.11.2 Fixed Effects Model

The fixed effects model (FEM) takes into account the “individuality” of each bank or each cross-sectional unit by letting the intercept vary for each company, but we can still assume that the slope coefficient is constant across firms. In other words, the FEM considers an intercept vary between cross-sectional units, each unit has its fixed, unique intercept and differences in the intercepts reflect the unobserved differences between these cross sectional units. The fixed effects estimation method assumes intercepts vary across banks but that each individual intercept does not vary over time (time invariant). These differences in intercepts among banks are due to the special features of each company, such as managerial style or managerial philosophy. Intercept can be allowed to vary between companies by using a dummy variable for each company (Gujarati, 2003).

The fixed effects model is defined according to the following regression model:

$$I_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$$

Where:

I_{it} = the dependent variable.

α_i = the intercept for firm i . ($i = 1, \dots, N$) is a constant coefficient specific to each bank.

B = the vector of coefficients.

X_{it} = the vector of k explanatory variables.

ε_{it} = the error term (the disturbance).

The subscript i in the intercept term is to clarify that the intercept of each bank included in the study may be different. In order to validate the fixed effects specification, it is important to test whether or not the individual coefficients α_i , $i=1, \dots, N$, are not all equal. The assumptions underlying fixed effects models are the same as for pooled models except for the intercept which may vary across the banks and so on in the fixed effects models while it is constant in the pooled models (Al Manaseer, 2007).

Gujarati (2003) mentions the following problems that apply to the fixed effects model: Introducing too many dummy variables will result in running up against the degree of freedom. With so many variables in the model, there is always the possibility of multicollinearity. The fixed effect approach may not be able to identify the impact of time-invariant variables (color, sex, and ethnicity). Therefore, the random effects model may be used to overcome the fixed effects' model problems.

4.11.3 Random Effects Model

The individual specific effects in the random effects model (REM) appear in the error component as a random disturbance that is the same for every observation in a given sample that is for a given bank here, but they are random across samples. The individual specific disturbance is one component of the total disturbance term (Murray, 2006). In other words, REM allows the intercept to vary between units, but variation is treated as randomly determined, therefore this model avoids the loss of the degrees of freedom compared with the FEM. The Generalized Least Squares (GLS) estimator is a combination between a group and within group variations (Greene, 2007).

$$I_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$$

Where:

I_{it} = the dependent variable.

α_i = the intercept.

B = the vector of coefficients.

X_{it} = is the vector of k explanatory variables.

ε_{it} = the composite error term, $\varepsilon_{it} = \mu_{it} + v_i$. μ_{it} is the random error term. v_i = the unobserved bank-specific effect.

In order to choose between the fixed effects model, and random effects model, Gujarati (2003) and Wooldridge (2001) state that if the error term and the regressors are uncorrelated, the REM may be appropriate, whereas if the error and the regressors are correlated, the FEM may be appropriate. The difference between the fixed and the random component is that in the fixed effects model, each cross-sectional unit has its own (fixed) intercept value. However, in the random effects model, the intercept represents the mean value of all the (cross-sectional) intercepts and the error component v_i represents the deviation of each individual intercept from this mean value. It is worth mentioning that the error term v_i is not directly observable; it is rather an unobservable or latent variable.

The Hausman test is used to select between the fixed effects and the random effects models. The null hypothesis is that the fixed effects and the random effects models do not differ substantially. The rejection of the null hypothesis means that the random effect model is not appropriate and that it is better to use the fixed effects model.

The Breusch-Pagan Lagrange Multiplier (LM) test is used to choose between the pooled model and random effects model. In addition, the joint significance test is used to choose between the pooled model and fixed effects model.

4.12 The Regression Analysis

The regression analysis is a statistical technique used to examine the relationship between one dependent variable and one or more independent variables. The main objective of the multiple regression analysis is to use the independent variables which values are known to predict a selected single dependent variable. The multiple regressions are performed, in order to test the determinants of bank's profitability for all Islamic banks in Malaysia by using two dependent variables, which are return on assets and return on equity. Before running the panel data regression, it is important to give a brief explanation on the violations to the regression assumptions such as multicollinearity, heteroscedasticity and autocorrelation.

4.12.1 The violation of the regression assumptions

4.12.1.1 Multicollinearity problem

One of the most important problems that can face the usage of the multiple regression analysis is the issue of multicollinearity among the regressors included in the regression model. If the value of the correlation coefficient is large, then problems from multicollinearity might lead to that the coefficients cannot be estimated with high precision.

The consequences of imperfect multi-collinearity can be summarized as follows:

- 1- Estimates of the OLS coefficients may be imprecise in the sense that large standard errors lead to wider confidence intervals.
- 2- Affected coefficients may fail to attain statistical significance due to low T statistics, which may lead us to wrongly drop an influential variable from our regression model.
- 3- The signs of the estimated coefficients can be the opposite of those expected.
- 4- The addition or deletion of a few observations may result in substantial changes in the estimated coefficients

There are some tests that can be conducted to identify the problem of multicollinearity. The first involves an examination of the correlation matrix to determine whether or not the independent variables are significantly correlated. The detection of the multicollinearity problem can also be undertaken by using the Variance Inflation Factor (VIF). The VIF is widely used to measure the degree of multicollinearity of the independent variable with the other independent variables in a regression model. It has been argued that as a rule of thumb, if the VIF of the variable exceeds 10, that variable is said to be highly collinear (Gujarati, 2003).

4.12.1.2 Heteroscedasticity problem

One of the assumptions of the regression model is that disturbances in the regression equation are homoskedastic and it should have a constant variance. Therefore, having an equal variance means that the disturbances are homoskedastic. However, it is quite common in the regression analysis to have cases where the assumption is violated. In general the problem of heteroscedasticity is likely to be more common in cross-sectional data than in time series data. However, this does not mean that heteroskedasticity in time series models is impossible (Asteriou and Hall, 2007).

The existence of heteroscedasticity is a concern in the application of the regression analysis, because the presence of heteroscedasticity can invalidate the statistical tests of significance. According to Asteriou and Hall (2007), there are some consequences of heteroscedasticity on the OLS estimators: In the case where the error term is u ; in this regression the equation is known to be heteroscedasticity, and then the consequences on the OLS estimators can be summarized as follows:

- 1- The OLS estimators are still unbiased and consistent. This is because none of the explanatory variables are correlated with the error term.
- 2- Heteroskedasticity affects the distribution of the increasing variances of the distributions and therefore, making the estimators of the OLS method inefficient.
- 3- Heteroskedasticity also affects the variances (and therefore the standard errors as well) of the estimated. In fact, the presence of heteroskedasticity causes the

OLS method to underestimate the variances (and standard errors) hence leading to values of T statistics and F statistics that are higher than expected.

The problem of heteroscedasticity could be remedied using White's heteroscedasticity adjusted standard errors (Tahir, 1999). The E-Views software allowed obtaining White's heteroscedasticity-corrected standard errors & covariance to solve automatically the problem of heteroscedasticity.

4.12.1.3 Autocorrelation problem

One of the assumptions of the classical regression model is the independence of the disturbances from one observation to another. If this assumption is violated, then the errors in the one-time period correlate with their own values in other periods and there is the problem of autocorrelation - also sometimes referred as serial correlation - strictly auto-correlated errors or disturbances. The above mentioned assumption assumes that the error terms U_i and U_j are independently distributed (Gujarati, 2003).

According to Asteriou and Hall (2007), the autocorrelation consequences on the OLS estimators can be summarized as follows:

- 1- The OLS estimators are still unbiased and consistent.
- 2- The OLS estimators will be inefficient and therefore are no longer BLUE.
- 3- The estimated variances of the regression coefficients will be biased and inconsistent, and therefore the hypothesis testing is no longer valid. In most of the cases, R^2 is to be overestimated and the t statistics will tend to be higher.

The Durbin-Watson test statistics is commonly used to test the null hypothesis that the residuals from an ordinary least-squares regression are not auto-correlated. The Durbin-Watson statistic coefficient ranges in value from zero to 4. A value near 2 indicates non-autocorrelation; a value towards zero indicates positive autocorrelation; a value towards 4 indicates negative autocorrelation. It can be strongly accepted that there is no autocorrelation if the Durbin-Watson value of the regression is positioned between the values of d_u and $4-d_u$, the distance between these values is named the zone of no autocorrelation.

4.12.1.4 Non-normality problem

The normality of the data is the other important assumption of regression. To test whether or not the independent variables and the dependent variables follow a normal distribution, some test can be undertaken for this purpose. The skewness and kurtosis are commonly employed to determine the distribution of the data. According to Gujarati (2003) the variables follow a normal distribution when the value of skewness equals zero or very close to zero, and the value of kurtosis equals 3 or very close to three. Skewness measures the difference between the average and the median of the data. In other words, the symmetry of the data is ascertained. For a symmetric distribution, the median is the average and so the skewness is zero. If the skewness is negative, that means there are more negative values and if the skewness is positive that means there are more positive values. Kurtosis is often used to measure the normal distribution of data. Data that have more kurtosis than normal is sometimes called fat-tailed, because their extremes extend beyond that of the normal counterparts.

4.12.1.5 Non-linearity problem

One of the important assumptions of regression models postulate that the relationship between the dependent and independent variables should be linear. According to Berenson et al., (2012), the commonly used method to evaluate linearity is to plot the regression residuals on the vertical axis against the corresponding values of the independent variable on the horizontal axis. If the linear model is appropriate for the data, we will not see any apparent pattern in the plot. However, if the linear model is not appropriate in the residual plot, there will be a relationship between the values and the residuals. Put simply, if there is no obvious clustering of negative residuals or a clustering of positive residuals the model is in linearity.

4.12.1.6 Non-normality of residual problem

One of the important assumptions of regression models is that the residuals are normally distributed. Jarque–Bera (JB) test of normality can be used to test the residual normally. The JB test of normality is based on the OLS residuals, the JB

statistics follow the chi-square distribution with 2df and the value of the JB statistics is expected to be zero. If the computed p value of the JB statistics in an application is sufficiently low, which will happen if the value of the statistics is very different from zero, one can reject the hypothesis that the residuals are normally distributed. But if the p value is reasonably high, which will happen if the value of the statistics is close to zero, we do not reject the normality assumption (Gujarati, 2003).

4.12.1.7 Non-stationary problem

Before analysing the regression model, it is important to test whether the profitability variables in the model are stationary or non stationary. The panel unit-root test is applied to check whether the variables in the model are stationary or non stationary. The problem with non-stationary data is that the standard OLS regression procedures can easily lead to incorrect conclusions. If the variables do not co-integrate, then we have the problems of spurious regression and econometric work becoming almost meaningless, therefore, any economic model using non-stationary data co-integration can become an over-riding requirement (Asteriou & Hall, 2007).