Are the factors accounting for islamic and conventional bank credit cycles really different ? Malaysian evidence based on two-step GMM approach

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Are the factors accounting for islamic and conventional bank credit cycles really different ? Malaysian evidence based on two-step GMM approach

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Abstract

Credit instability can cause severe negative impact to the long-term economic growth. It is also directly related to the recurring systemic banking and financial crisis. Driven by these motivations, this study aims to empirically analyze the factors that might explain credit cycle at bank level by taking Malaysia as the case study. We aim to make a comparison between Islamic and conventional banks by identifying whether the factors accounting for credit cycles between the two systems are different. By dividing the estimations into two data sets, the findings suggest: lagged credit cycle, asset price, excessive extension of bank credit and capital outflow are the factors that might influence credit cycle in the long term. While in the short-term, the factors are asset price, availability of loanable funds, banks' capital, banks' size, inflation, real interest rate, and capital outflows. Interestingly, our analysis supports empirically that there are some differences between Islamic and conventional banking system. Our findings acknowledged that Islamic banks hold some unique characteristics in the principles of its operations. Another important implication is that policy makers and industry players could observe the behaviour of the suggested factors and take the right actions to reduce the severity of the impact of unpredictable credit crunch.

Key words: credit cycle, determinants factors, Islamic and conventional banks.

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1.0 Introduction: Issue Motivating the Study

The process of financial development involves channelling saving from surplus unit to productive investments. This process allows for risk diversification, and the movement of funds in the economy will guide to the increase in economic activities and thus foster growth in the long run. The importance of well-functioning banking system to a country's economic development has strongly been supported by numerous empirical researches which typically in the context of finance-growth nexus (King and Levine, 1993; Levine and Zervof, 1998). Generally, this line of research measures the depth of financial markets and institutions by the size of private credit relative to GDP, and concludes a significant positive effect on long term economic growth. While a well-functioning banking system significantly boosts a country's economic growth, the volatility in banking sector can also cause a lot of problems. This was evidenced by recurring banking crises resulting from malfunction of the banking systems which generate serious disruptions to economic activities.

In the early literature, banking development was suggested to be positively and robustly correlated with the contemporaneous and future rates of economic growth, capital accumulation, efficiency of capital allocation, and productivity growth. The financial development could also significantly predict subsequent value of growth. This promotes the view that financial services stimulate economic growth by increasing the rate of capital accumulation and by improving the efficiency with which economies use that capital. Rajan and Zingales (1998) support this view by analysing cross country industry level data, and conclude that financial sector development positively influences industrial development.

Accordingly, the recurring financial and banking crises have led to the increased empirical reassessments of finance – growth relation; among the recent literature are Moshirian and Wu (2008, 2012), Hume and Sentence (2009) and Lin and Huang (2012). The main focuses have been to identify the adverse effect of banking industry volatility and future economic growth with the attempt to determine the signal of crisis. Theoretically, financial instability occurs when shocks to the financial system interfere with information flows that disturb the financial system process of channelling funds to those with productive investment opportunities and hence is likely to result in a contraction of output (Lin and Huang, 2012). Empirically, Moshirian and Wu (2009) suggest

that bank volatility is a good determinant of banking crisis for the subsample of developed markets, and this result is robust to the controls of macroeconomic indicators that are traditionally thought to be the determinants of banking crises. As such, analysing the factors accounting for credit cycles is crucial to restrain the negative impact of credit instability to the long-term economic growth.

Theoretically, there are many factors reported in the literature that could explain the volatility in credit supply. Credit cycles can be caused by the imperfection in bank credit markets (Weinberg, 1995). The results can come from three main factors which include a systemic tendency for banks to overextend themselves during general expansions of lending, government interventions, and the nature of credit market. Thus, credit cycles caused by banking expansions have received much attention in recent years as they are related with the notion of credit crunch, and strongly related to recent global financial crisis. Besides this, other theoretical papers such Bernake & Lown (1991), Weinberg (1995), Kiyotaki and Moore (1997), Rajan (1994), Rotheli (2012) have explained other factors that might account for credit cycle. Generally, the factors would affect either the demand side or supply side of credit or even both sides. As known, the theory would form the ground of a discipline, but they are still inconclusive, therefore, an empirical answer is required to sort out what really happened in reality.

Bringing Islamic finance into the context, some scholars argue that the occurrence of the recent global financial crisis was due to the natural harm existing in conventional banking system that is purely led by interest based system or “riba” in Islamic terminology. In principle, Islamic banking possess some unique characteristics in both sides of its balance sheets, whereby the contract of attracting deposits and giving financing are different from those of the conventional practices. Theoretically, conventional banks’ operations are based on pure loan system by charging interest and fees for services, but Islamic banks’ operations are based on profit and loss sharing, trading, leasing, charges for services provided, and using other sharia exchange contracts. Upholding these principles, Islamic banking should refer to a system of banking activities that is based on Sharia Laws that provide a fair platform to protect and benefit all parties involved in the transaction market and promote social harmony. The empirical research regarding Islamic banking and finance is still lacking.

The increase in the importance of Islamic banks to the economy is undisputable. In Malaysia alone, as one of the major Islamic finance markets in the world, according to Bank

Negara Malaysia (BNM), in 2012, Islamic financing accounted for 21% of total loan supply to the country. This figure starts from only 1% in 1997 and had grown substantially since the last 15 years. This is similar in the case of deposit where Islamic deposit to total deposit had markedly increased from only 1.5% in 1997 to 22% in 2012. These figures by themselves have communicated the increase in the importance of Islamic banks to the economy. This is supported by recent empirical study of Kassim et.al (2009), Sukmana & Kassim (2010), and Hasin & Majid (2011). In these studies, they conclude that Islamic banks' financing and deposit play important roles in the monetary transmission process in the Malaysian economy. In particular, both Islamic deposit and financing are shown to be statistically significant in linking the monetary policy indicator to the real output.

Therefore, as another contribution to this line of literature, this paper tries to empirically answer two main questions; what are the factors that influence Islamic and conventional banks' credit cycles? Are the factors accounting for credit cycles between the two systems different? In contrast to most of the previous empirical studies that only use the ratio of private credit to GDP or banks' stock price as a measure of banks' volatility, we additionally consider the volatility in the banking sector using bank-level data, and try to identify if there is any difference between Islamic and conventional banks by taking Malaysia as a case study.

This paper extends the previous literature in the following aspects. First, the paper analyses credit cycles at bank level instead of at an aggregated or country level. Second, the paper estimates the credit cycles using a specified model and not just by using a ratio or a simple log change of credit. Third, taking into account the contribution of Islamic banks to the economy and the uniqueness of its characteristics, the paper makes an attempt to compare the results and try to justify whether the factors accounting for credit cycles of the two systems (Islamic and conventional) are different.

The paper is organized as follows. The next section is the main objective of this paper. Section 3 presents a brief theoretical framework of credit cycle. Section 4 discusses the literature review of credit cycle. Section 5 describes the method employed in this paper. Data overview and descriptive statistics are provided in Section 6. In Section 7 empirical results, applying the tools described in Section 5 are discussed. Section 8 provides summary of results and some policy

implication. Finally, Section 9 brief out some concluding remarks pointing out directions for future research.

2.0 Objectives

Driven by the above motivations, specifically the paper tries to fulfil two main objectives:

First, this paper aims to empirically analyse the factors that influence Islamic and conventional banks' credit cycles in Malaysia at a bank-level.

Second, to make a comparison between Islamic and conventional banks by identifying whether the factors accounting for credit cycles between the two systems are different.

3.0 Theoretical Framework

Generally, we would define credit cycle as the cycle involving the supply of credit by lenders, or the access of credit by borrowers. The "cycle" indicates the swing between high and low credit availability. Therefore, either significant reduction or significant increase in the credit supply would cause the "cycle". Numerous literatures have made the attempted to provide the theoretical ground in this area of research, which latter could be divided into several main groups of proposition.

Rajan (1994) argues that credit cycles occur due to the influence of other banks. The influenced by other banks is not on the supply side but the changes in credit quality of the borrower which is the demand side. Intuitively, banks would maintain their credit policy only if borrowers have positive net present value. Therefore, in the absence of central bank intervention, the supply side should not exert independent influence on the level of credit.

Supporting the above, Kiyotaki and Moore (1997) present theoretically how credit constrains interact with aggregate economic activity over the business cycle. Shock to technology or income distribution might generate large, persistent fluctuation in output and assets prices. Therefore, credit constraints arise "*naturally*" because lenders cannot force borrowers to repay their debts unless it is secured. In this view, recessions lead to booms, and booms lead to

recessions. In other words, this view reflects that credit is like economy and business which is *"procyclical"*.

In slightly different perspective, Bernake & Lown (1991) point out that credit cycles are directly related to credit crunch. They define credit crunch as significant reduction in the supply curve for bank loan. The argument is that cycles in lending could be the result of weak demand or supply for credit or both. Weak demand for credit generally cause by the weak state of borrower balance sheets as a result of weak economic conditions or recession. On the other hand, reduction in the supply of credit might be caused by four main factors which are; availability of loanable funds, securitisation of bank assets, overzealous of regulations and shortage of bank equity capital.

In short, Bernake & Lown (1991) focus that credit cycle is much influenced by the supply side which is the bank specific factors as compared to the demand side. In addition, the macroeconomic factors are not being emphasis since they argued that intuitively, it can affect both sides of the system. In relation to this, by taking into account the macroeconomic factors and based on asymmetric information theory of financial instability, Mishkin (1998) listed out four main factors causing financial instability. The four main factors are, increase in interest rates, deterioration in banks' balance sheets, stock market decline and increase in uncertainty. All of these factors would worsen adverse selection and moral hazard problems, which then lead to foreign exchange crisis that may decline economic activities, this would lead to banking crisis thus dampen the decline in economic activities. Concisely, the four main factors are related and will cause a series of break in the system.

In a more detail explanation, increase in interest rates will increase the probability of bad credit risk, which cause the lenders to reduce credit supply, resulted in decline in investment and economic activities. A sharp decline in stock market would lead to a large decline in the market value of firms' net worth. Firms' net worth has similar role to collateral, and when the value of collateral declines, it provides less protection to lenders so that losses from loans are likely to be more severe. Deterioration in banks' balance sheets would follow by reduction in the capital, thus point up the bank to either: reduce their lending in order to shrink their asset base and thereby restore their capital ratios; or raise new capital.

Weinberg (1995) argues that credit cycles can be caused by the imperfection in bank credit markets. The imperfection can come from three main factors which include a systematic tendency for banks to overextend themselves during general expansions of lending, government interventions, and the nature of credit market. Among these factors, credit cycles causes by banking expansions which is the bank's behaviour in lending have received much attention in recent years as it related with the notion of credit crunch. Excessive expansions activities would resulted from bank's unrealistic optimism in good times, creating lending booms, thus would lead to significant increase in losses on loans. The cycle in lending standards coincides with the cycle in the amount of lending, which then followed by movements in loan losses. Therefore, in this view, lending activities and losses move in positive direction. The excessive extension of credit might result from banks' excessive tolerant attitude toward credit risk which due to imperfect information and competition drives in the market.

Summing up the above reviews, as discussed by Rotheli (2012), there are two groups of proposition define the notion of credit cycle. The first uncontroversial proposition simply state that lending is procyclical (Rajan 1994, Kiyotaki and Moore 1997). Secondly, farther reaching proposition of credit-boom or credit-crunch hypothesis holds that lending is not only cyclical but also excessive (Bernake & Lown 1991, Weinberg 1995).

Focusing on the issues and objectives of this paper, the notion of credit cycles are directly related to credit crunch is more relevant to our research. Therefore, the literatures concerning credit crunch thus far point up to three main general factors that might contribute to credit cycle. First, the stock market which describe the condition of businesses or the credit quality of the borrower that could be measure by the asset price; second, the bank's specific conditions that can be squeezed out from their financial statements; and third, the macroeconomic condition that could be represent by interest rate which can affect the both side of the system.

Consequently, these theoretical views provide the fundamental ground for bankers, policy makers and researchers. However, they are still inconclusive without an empirical test to give an answer of what really happened in reality.

4.0 Literature Review

Motivated by the recurring banking crisis which is mainly linked to the credit crunch, recent empirical studies has expanded their efforts to reassess the finance – growth relations and empirically test the factors that might explain the credit cycle. Credit cycle is related to credit crunch, transmitted to systemic banking crisis and affect the economic conditions as a whole (finance –growth nexus). The empirical assessment of this big picture can be achieved from different direction.

The fluctuation in banking system could be measured by the volatility in its stock price. In the context of finance-growth nexus, Moshirian and Wu (2009) study the relationship of banks volatility and banking crisis using macroeconomic and banks' specific risk management determinants by utilizing the data from 18 developed and 18 emerging markets. Their result suggested that macroeconomic and banking risk management indicators have different impact on the probability of banking crises for emerging and develop market. Specifically, banking industry volatility performs well in predicting systemic banking crises for developed markets but very poor for emerging markets, which suggest that the impact of market forces on the soundness of the banking system might be different for developed and emerging markets. In addition, macroeconomic and banking risk management indicators have different impact on the probability of banking crises. Therefore, the traditional cross-country results of the studies on banking crises need to be interpreted cautiously.

In the latter version of the research, focusing on the same issue, but utilising a different technique, Moshirian and Wu (2012) investigates the relationship between banking industry volatility and future economic growth by utilizing the recent dynamic panel GMM estimation techniques for 36 markets. They reported a positive relationship between bank stock returns and future economic growth that is significantly influenced by a series of country-specific and banking institutional characteristics. Contrary to this, the negative link between banking industry volatility and future economic growth is significantly affected by government ownership of banks, the enforcement of the insider trading law, systemic banking crises, and bank accounting disclosure standards, while the impact of financial development is ambiguous.

Within the same context but in a more definite approach, Lin and Huang (2012) define the bank volatility as the fluctuation in the credit. They estimate the volatility in banking system by

the standard deviation of the growth of private credit. In spite of this, the results are still consistent with the previous research. The results provide evidence that banking industry volatility may exert a negative impact on growth in a more economically integrated world. The negative impact is in terms of the growth of industries that are more externally financially dependent, and this finding is robust to various sensitivity tests. However, the detrimental growth effect of banking sector volatility disappears when the sample is restricted to the relatively placid 1980s. Compared to the 1980s, the 1990s are characterized by a more economically integrated world accompanied by more often unpredicted financial crises that disturb the banking sector. As such, the results imply that in a more economically integrated world, the stability of bank development may be important to long-run growth.

The analyses of bank volatility to growth have provided convinced answer that banking industry volatility may exert a negative impact on the long run economic growth. Looking it from a different angle, one might ask; what are the roots of the problem? Rephrasing it, what are the factors that might cause the volatility? Within this specific context, there are only a small number of empirical literatures making the attempt to answer the question. Among them are Gordon and He (2011), Rotheli (2012) and Hume and Sentence (2009).

With the view that the changes in credit standard mainly driven by the borrower's creditworthy, Gordon and He (2011) empirically test that credit cycles can occur without any change in the macroeconomic environment. In the theoretical model, they show that the bank competition for borrowers leads to periodic credit crunches, swings between high and low credit allocations. The reason is that bank lending standards vary through time due to strategic interaction between competing banks. Their argument was that in a credit crunch, all banks would raise their "lending standards", and stop making loans to some borrowers who previously eligible to receive loans. These changes in credit availability are caused by banks' changing beliefs, which based on the number of credit available and default performance of the rivals. In short, in this study, credit crunch derived from the changes in bank credit allocation.

As discussed in the previous section, there are two groups of proposition define the notion of credit cycle, one is procyclical, and the second it is not only cyclical but also excessive. Rotheli (2012) follows a different lead and investigates the dynamics of banks' expectations as a mechanism that can give rise to inefficient lending cycles. During recessions banks tend to become

overly pessimistic regarding expected loan losses and hence overprice credit risk which may take the form of a credit crunch. Given the reported magnitude of the effects on loan-loss expectations, banks' suboptimal learning can hardly be seen as the main driver of the credit cycle.

Taking both theoretical and approach, Hume and Sentence (2009) provide analysis of the credit boom and the macroeconomic context in which it developed. Their findings suggest that the boom was unusually long and associated with neither particularly strong growth nor rising inflation in the economies in which it took place. This type of credit and financial cycle is hard to reconcile with existing economic theory and argue that, while the ''global savings glut'' may account for the cycle's initial phase, other factors such as the conduct of monetary policy and perceptions of declining macroeconomic risk were more important from the mid-2000s onwards.

From the above review of literatures, the findings relating credit cycle hypotheses are controversial. In addition, none of them address the analysis from the perspective of Islamic financing. The lack of empirical research focusing in this area has made the issue remained unresolved. Therefore, this paper would like to make a humble attempt at addressing the issue with a view to filling up the gap in the literatures.

5.0. Methodology

Parallel with the objective of this study to analyse the determinant of credit cycle at bank level in Malaysia, this paper utilizes the panel techniques. Analysis of this paper involves two main steps. The first step is constructing the measure of credit cycles, and second, estimating the determining variables of credit cycles. The measure of credit cycle is estimated using panel fixed effect, and to estimate the determinants of credit cycle the paper utilize generalized-method-of-moments (GMM) estimation techniques developed for dynamic panel-data models. GMM techniques are preferred because they provide consistent estimators for the dynamic panel model. Compared to GMM, the OLS method has been criticized for generating biased coefficient estimates when applied to equations with lagged dependent variables and to the fixed effects model with a small time dimension (Moshiran and Wu, 2012).

In the second step we utilize two GMM techniques: the traditional first differenced GMM estimations, the recent system GMM estimations, we denote them as GMM(DIF) and GMM(SYS),

respectively. As discussed by Moshiran and Wu (2012), GMM techniques are preferred because they provide consistent estimators for the dynamic panel model. Although the GMM(SYS) estimator can usefully overcome many of the disappointing features of the GMM(DIF) estimator, simulations suggest that the GMM(SYS) is not superior to GMM(DIF) in the circumstances when the autoregressive parameter is below 0.8 and the number of time-series observations is moderately large.

In our case, the data set includes 35 banks with the longest time-series observation being 15 and the shortest 4. The number of time periods is relatively small, and the autoregressive parameter is relatively larger. Therefore, in this case GMM(SYS) might produce superior result compared to GMM(DIF). Despite this, we present the results based upon both GMM techniques

5.1 Model Specification

First, to construct the measure of credit cycle volatility, we follow Fidrmuc and Scharler (2013) and estimate the regression for each bank in the sample,

$$\Delta credit_{it} = \lambda_i + \lambda_t + u_{it} \quad (1)$$

where, $\Delta credit_{it}$ is the change in banks' credit and λ_i and λ_t are time and bank's fixed effects respectively. The estimated residual from this regression, $\hat{u}_{it}$, are the measure of credit cycles. Using this estimation, $cycle_{it}$ will vary between banks and time which able to exploit the panel structure of the data.

$$cycle_{it} = \log|\hat{u}_{it}| \quad (2)$$

In the second step, as suggested by theoretical literatures of Bernake & Lown (1991), Weinberg (1995), Rajan (1994), Kiyotaki and Moore (1997), and Mishkin (1998), we have deduce that credit cycles can be caused by two main factors. First, the asset price that measure the conditions of businesses or the credit quality of the borrower, this denote the demand side. Second, the banks' specific conditions that particularly effect the supply of credit. Lastly the third, the macroeconomic conditions that will act as the control variable since it can effect both demand and

supply for credit. Therefore, we construct the determinants of credit cycles based on dynamic regression of the following general form:

$$cycle_{it} = \alpha_{it} + \gamma cycle_{it-1} + \beta_1 AP_{it} + \beta_2 BS_{it} + \beta_3 ME_{it} + \varepsilon_{it} \quad (3)$$

Whereby, AP is asset price, BS is banks' specific determinants, and ME is macroeconomic determinants. Also included, the lagged dependent variable to capture the persistence in $cycle_{it}$. In order to capture the difference between conventional and Islamic banks effect on credit cycles, interactive dummy is added in the estimation:

$$cycle_{it} = \alpha_{it} + \gamma cycle_{it-1} + \beta_{11} AP_{it} + \beta_{12}(AP_{it} \times IS_{it}) + \beta_{21} BS_{it} + \beta_{22}(BS_{it} \times IS_{it}) + \beta_{31} ME_{it} + \beta_{32}(ME_{it} \times IS_{it}) + \varepsilon_{it} \quad (4)$$

a. Asset price

Asset price is simply the log of market price index which is FBMKLCI in our case. As supported by theory, a sharp decline in stock market would lead to a large decline in the market value of firms' net worth. Firms' net worth has similar role to collateral, and when the value of collateral declines, it provides less protection to lenders so that losses from loans are likely to be more severe.

b. Bank-specific determinants:

In the supply side, excessive banks' extensions of credit, capital constrains, and availability of loanable funds was suggested theoretically as banks' specific determinants of credit cycles. First, excessive extension of credit might result from banks' excessive tolerant attitude toward credit risk which due to imperfect information and competition drives in the market. Therefore, we proxy this condition with the measure of credit risk. Second, as explained by Bernake and Lawn (1991), credit crunch may be termed as capital crunch due to the strong evidence that support the links between bank capital and bank lending, hence we include bank capital to asset ratio as a measure of capital constrain. Third, intuitively, in order to lend, banks need to have funds, thus changes in deposit and other managed liabilities will measure the availability of loanable fund. In addition to

these, we also include the bank size which measured by the log bank's total asset with the aims to capture the behaviour of bank lending relative to its size.

c. Macroeconomic determinants (the control variables):

Macroeconomic determinants of credit cycles include GDP growth, inflation rates, interest rates, money supply to foreign exchange reserves, and depreciation of exchange rate. GDP growth and inflation rate will measure the economic condition of the country that reflects credit quality of the borrower that represents the demand of credit. This is in line with the notion of credit constraints arise naturally because lenders cannot force borrowers to repay their debts unless it is secured. Intuitionally, banks would maintain their credit policy only if borrowers have positive net present value. The short-term interest rate is included to capture the banks cost of funds, that may affect bank profitability increasing default rates. The ratio of M2 to foreign exchange reserves and exchange rate depreciation will measure the vulnerability of the banking system to sudden capital outflows triggered by foreign exchange risk.

To estimate Equation 1 and 4 in, we use annual data collected from Bankscope and DataStream. The summary for indicators of each determinant, their definitions and sources are presented in Table 1.

Table 1: Description and sources of variables

Variables	Descriptions	Data sources
	Dependent variable	
a. cycle	$\Delta credit_{it} = \lambda_i + \lambda_t + u_{it}$, where, $\Delta credit_{it}$ is the change in banks' credit and λ_i and λ_t are time and bank's fixed effects respectively. $cycle_{it} = \log\lvert\hat{u}_{it}\rvert$. The estimated residual from this regression, $\hat{u}_{it}$, are the measure of credit cycles.	Bankscope
	Independent variables	
b. cycle$_{-1}$	Lagged value of $cycle_{it} = cycle_{it-1}$	
c. Asset Price:		
Market Index (KLCI)	log of market index price of FBMKLCI	DataStream
d. Banks' specific determinants:		
Excessive extension of credit or credit risk (RISK)	Ratio of non-performing loan to total gross loan.	Bankscope
Capital constrains or capital crunch (CAPITAL)	Ratio of total equity to total asset.	Bankscope
Availability of loanable funds (FUNDS)	The changes of total deposits and managed liabilities.	Bankscope
Bank Size (SIZE)	Log of bank's total assets	Bankscope

	Control variables	
e. Macroeconomic determinants:		
GDP growth rate (GROWTH)	Growth = LOG(GDP_t/GDP_{t-1}). The GDP time series are constant prices.	DataStream
Inflation rates (INFLATION)	Measured by the rate of changes in consumer price indices (CPI).	DataStream
Real interest rates (REALINT)	Measured by the difference between three month treasury bill rate and consumer price index.	DataStream
Money supply to reserve (M2RESERVE)	Ratio of M2 to foreign exchange reserve.	DataStream
Depreciation/devaluation (REALDEP)	Changes in the rate of the real exchange rates.	DataStream

6.0 Data Description

The data set include information for 19 conventional banks and 16 Islamic banks over the period of 1997 to 2006, with the longest time series being 15 years and the shortest of 4 years. This includes all local and international Islamic and conventional commercial banks in Malaysia. Due to the limitation on the availability of data for most Islamic banks, we decided to construct two separate estimation, first for Islamic and conventional banks with data range from 1997 to 2011 (fifteen years), and second with data range from 2007 to 2011(five years). Therefore, we included 21 banks in long estimation with 315 observations (2 Islamic and 19 conventional banks), and 35 banks in short estimation with 175 observations (16 Islamic and 19 conventional banks). The

summary descriptive statistics of primary variables and the list of Islamic and conventional banks included in the study are presented in Table 2 and Table 3, respectively.

Table 2: Summary for descriptive statistics of primary variables

	CYCLE	KLCI	FUND	CAPITAL	RISK	SIZE
Long Estimation						
Mean	14.11467	6.806667	0.093407	10.31048	8.610630	16.52474
Median	14.13000	6.780000	0.085000	8.380000	6.165000	16.82000
Maximum	17.67000	7.330000	1.140000	35.34000	57.33000	19.63000
Minimum	9.970000	6.370000	-1.150000	-1.900000	0.100000	13.13000
Std. Dev.	1.109871	0.294999	0.240612	5.788724	8.145458	1.521603
Observations	315	315	315	315	315	315
Cross sections	21	21	21	21	21	21
Short Estimation						
Mean	14.08170	7.177115	0.122701	9.537538	3.538141	16.75456
Median	14.15559	7.280000	0.110759	7.900000	2.460000	16.75316
Maximum	17.41436	7.330000	1.065591	31.37000	23.23000	19.93000
Minimum	9.855253	6.780000	-1.150146	3.187000	0.080000	14.14000
Std. Dev.	1.206551	0.206588	0.274099	5.176910	3.863278	1.390157
Observations	175	175	175	175	175	175
Cross sections	35	35	35	35	35	35

Comparing between the short and long estimations, the descriptive statistics for some variables are likely the same. This particularly reflected to CYCLE and SIZE, where the mean and standard deviation are likely the same, which most probably due to the comparable maximum and minimum value. For KLCI and CAPITAL, the mean and standard deviations are slightly different. On the other hand, for FUND and RISK, there are sizeable different in the mean and standard deviations of the short and long estimations. Hence, it is expected here that if the different are material, they should be reflected in the estimation.

Table 3: The list of banks included in the study

No.	Name of Banks	Types of Banks	Range of Data	Estimation
1.	Affin Islamic Bank Berhad	IS, Local	2007-2012	Short
2.	AmIslamic Bank Berhad	IS, Local	2007-2012	Short
3.	Bank Islam Malaysia Berhad	IS, Local	1997-2012	Short & Long
4.	Bank Muamalat Malaysia Berhad	IS, Local	1999-2012	Short & Long
5.	CIMB Islamic Bank Berhad	IS, Local	2007-2012	Short

6.	Hong Leong Islamic Bank Berhad	IS, Local	2007-2012	Short
7.	Maybank Islamic Berhad	IS, Local	2007-2012	Short
8.	Public Islamic Bank Berhad	IS, Local	2007-2012	Short
9.	RHB Islamic Bank Berhad	IS, Local	2007-2012	Short
10.	Al Rajhi Banking & Investment Corporation (Malaysia) Berhad	IS, Int	2007-2012	Short
11.	Alliance Islamic Bank Berhad	IS, Int	2007-2012	Short
12.	Asian Finance Bank Berhad	IS, Int	2007-2012	Short
13.	HSBC Amanah Malaysia Berhad	IS, Int	2007-2012	Short
14.	Kuwait Finance House (Malaysia) Berhad	IS, Int	2007-2012	Short
15.	OCBC Al-Amin Bank Berhad	IS, Int	2007-2012	Short
16.	Standard Chartered Saadiq Berhad	IS, Int	2007-2012	Short
17.	Affin Bank	Conv, Local	1997-2012	Short & Long
18.	CIMB Bank Berhad	Conv, Local	1997-2012	Short & Long
19.	Hong Leong Bank Berhad	Conv, Local	1997-2012	Short & Long
20.	Malayan Banking Berhad - Maybank	Conv, Local	1997-2012	Short & Long
21.	Public Bank Berhad	Conv, Local	1997-2012	Short & Long
22.	RHB Bank Berhad	Conv, Local	1997-2012	Short & Long
23.	Alliance Bank Malaysia Berhad	Conv, Int	1997-2012	Short & Long
24.	Bangkok Bank Berhad	Conv, Int	1997-2012	Short & Long
25.	Bank of America Malaysia Berhad	Conv, Int	1997-2012	Short & Long
26.	Bank of Nova Scotia Berhad	Conv, Int	1997-2012	Short & Long
27.	Bank of Tokyo-Mitsubishi UFJ (Malaysia) Berhad	Conv, Int	1997-2012	Short & Long
28.	Citibank Berhad	Conv, Int	1997-2012	Short & Long
29.	Deutsche Bank (Malaysia) Bhd.	Conv, Int	1997-2012	Short & Long

30.	HSBC Bank Malaysia Berhad	Conv, Int	1997-2012	Short & Long
31.	JP Morgan Chase Bank Berhad	Conv, Int	1997-2012	Short & Long
32.	OCBC Bank (Malaysia) Berhad	Conv, Int	1997-2012	Short & Long
33.	Royal Bank of Scotland Berhad	Conv, Int	1997-2012	Short & Long
34.	Standard Chartered Bank Malaysia Berhad	Conv, Int	1997-2012	Short & Long
35.	United Overseas Bank (Malaysia) Bhd.	Conv, Int	1997-2012	Short & Long

Note: IS: Islamic, Int: International, Conv: Conventional

7.0 Empirical Results and Discussion

In this section, we estimate the credit cycle in Malaysia in the panel analysis using data for the full sample of 35 banks which divided into long estimations of 21 banks and short estimation of all 35 banks. Then, we test the possible determinants of the credit cycle using variables that were suggested theoretically. The objectives are to analyse the possible determinant of credit cycle and try to find out whether the factors account for credit cycle between conventional and Islamic banking system are different. To address this issue, we include interactive dummy of Islamic banks to cater the changes in the slope coefficient of Islamic banks if any.

Table 4 and Table 5 report the results for long data set estimations using GMM(DIFF) and GMM(SYS), respectively. While Table 6 and Table 7 present the results for short data set estimations using GMM(DIFF) and GMM(SYS), respectively. In each table, column 1 present the results from the regression of credit cycle on primary independent variables of KLCI, RISK, CAPITAL, FUND, and SIZE. Column 2 until 6 of each table present the regression results of credit cycle on primary independent variables with addition of one control viable, the aim is to see the macroeconomic effects on the regressions. At the bottom of each table, Robust *t*-statistics are reported in brackets. AB – AR1 and AB – AR2 are the Arrellano-Bond statistics for first and second-order autocorrelation of residuals. The results clearly indicate that our estimations fulfil

the requirement of Arrellano-Bond statistics of having autocorrelation in the first order and no autocorrelation in the second order.

7.1 Estimation of credit cycle with long data

In column 1 of table 4, evidence by the *p*-value, it is clear that only RISK contribute significantly in explaining the credit cycle. However, after adding the macroeconomic variable in isolation, the results slightly change. KLCI appeared to be significant in the estimation that includes GROWTH, INFLATION and REALINT, none of the primary variables significant after including M2RESERVE and the results in column 6 is slightly the same as column 1 after including REALDEP. Out of the five macroeconomic variables, only M2RESERVE appeared to have significant effect on credit cycle.

Table 4: Panel GMM (Differenced) estimations result for long data set

DETERMINANTS OF CYCLE	1	2	3	4	5	6
Constant	3.9588	4.1706	4.3402	4.4808	1.7155	2.9841
	[0.406]	[0.406]	[0.369]	[0.335]	[0.725]	[0.53]
Cycle-1	0.1752	0.1554	0.1849	0.1713	0.1340	0.2173
	[0.201]	[0.219]	[0.21]	[0.225]	[0.269]	[0.138]
Total (Islamic & Conventional)						
KLCI	0.6403	0.6673**	0.8262*	0.8319*	0.5663	0.6593
	[0.113]	[0.087]	[0.019]	[0.011]	[0.16]	[0.114]
RISK	0.0355**	0.0371**	0.0378**	0.0373**	0.0394	0.0347**
	[0.066]	[0.066]	[0.061]	[0.064]	[0.101]	[0.065]
CAPITAL	0.0133	0.0166	0.0157	0.0107	0.0418	0.0122
	[0.614]	[0.536]	[0.566]	[0.676]	[0.243]	[0.631]
FUND	0.2546	0.23357	0.3007	0.2842	0.4301	0.2166
	[0.427]	[0.439]	[0.354]	[0.383]	[0.193]	[0.506]
SIZE	0.1552	0.1458	0.0391	0.0256	0.2727	0.2154
	[0.651]	[0.659]	[0.901]	[0.929]	[0.427]	[0.518]
GROWTH		0.7936				
		[0.502]				
INFLATION			0.0627			
			[0.279]			
REALINT				-0.0566		
				[0.482]		
M2RESERVE					1.1587*	
					[0.001]	
REALDEP						-0.1861
						[0.462]
Islamic (Interactive Dummy IS)						
IS(KLCI)	-3.4058*	-2.9585*	-4.4657*	-5.0561*	-3.6388*	-3.6258*
	[0.008]	[0.015]	[0.041]	[0.070]	[0.016]	[0.006]
IS(RISK)	-0.3003*	-0.3166*	-0.2895*	-0.2915*	-0.2967*	-0.2806*
	[0.005]	[0.003]	[0.000]	[0.000]	[0.001]	[0.000]
IS(CAPITAL)	-0.3533*	-0.33924*	-0.3818*	-0.3687*	-0.4010*	-0.3152*
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
IS(FUNDS)	7.5651*	6.8074*	7.3565*	7.2559*	7.0021*	8.7287*
	[0.017]	[0.009]	[0.005]	[0.006]	[0.023]	[0.002]
IS(SIZE)	1.8896**	1.6292	2.3716	2.8354	2.0259	1.4833
	[0.067]	[0.143]	[0.158]	[0.213]	[0.107]	[0.167]
IS(GROWTH)		5.5610*				
		[0.004]				
IS(INFLATION)			-0.4003			
			[0.384]			
IS(REALINT)				0.5408		
				[0.383]		
IS(M2RESERVE)					-0.2265	
					[0.831]	
IS(REALDEP)						2.8541*
						[0.000]
AB - AR1	-2.582	-2.7167	-2.5246	-2.5325	-2.7731	-2.5565
	[0.0098]	[0.0066]	[0.0116]	[0.0113]	[0.0056]	[0.0106]
AB - AR2	-1.7181	-1.5777	-1.4606	-1.531	-1.7499	-1.2694
	[0.0858]	[0.1146]	[0.1441]	[0.1258]	[0.0801]	[0.2043]

Note: *p*-Values in parentheses, * indicate significant at 5% and ** indicate significant at 10%

Table 5: Panel GMM (System) estimations result for long data set

DETERMINANTS OF CYCLE	1	2	3	4	5	6
Constant	3.2879	3.1429	2.9675	3.3070	1.6002	2.7626
	[0.243]	[0.365]	[0.284]	[0.279]	[0.645]	[0.339]
Cycle-1	0.2138*	0.1931**	0.2166**	0.2101*	0.1735**	0.2425*
	[0.038]	[0.058]	[0.062]	[0.061]	[0.075]	[0.035]
Total (Islamic & Conventional)						
KLCI	0.6627*	0.6621**	0.768*	0.7811*	0.6023**	0.6976*
	[0.041]	[0.053]	[0.034]	[0.050]	[0.071]	[0.028]
RISK	0.0361**	0.0382**	0.0397*	0.0391*	0.0380	0.0333**
	[0.076]	[0.068]	[0.043]	[0.048]	[0.104]	[0.084]
CAPITAL	0.0243	0.0266	0.0268	0.0242	0.0585	0.0226
	[0.465]	[0.437]	[0.442]	[0.481]	[0.167]	[0.477]
FUND	0.2068	0.1866	0.2600	0.2432	0.4141	0.1686
	[0.524]	[0.547]	[0.432]	[0.468]	[0.219]	[0.606]
SIZE	0.1580	0.1756	0.1220	0.1126	0.2370	0.1530
	[0.435]	[0.425]	[0.587]	[0.677]	[0.242]	[0.466]
GROWTH		0.8414				
		[0.509]				
INFLATION			0.0511			
			[0.558]			
REALINT				-0.0461		
				[0.715]		
M2RESERVE					1.0592*	
					[0.008]	
REALDEP						-0.1765
						[0.575]
Islamic (Interactive Dummy IS)						
IS(KLCI)	-3.1913*	-2.749*	-4.1346*	-4.4793*	-3.5196*	-3.5428*
	[0.002]	[0.008]	[0.026]	[0.034]	[0.006]	[0.005]
IS(RISK)	-0.2957*	-0.3057*	-0.2840*	-0.2980*	-0.2897*	-0.2523*
	[0.005]	[0.008]	[0.002]	[0.010]	[0.002]	[0.000]
IS(CAPITAL)	-0.3835*	-0.3495*	-0.3955*	-0.4007*	-0.4328*	-0.3017*
	[0.000]	[0.000]	[0.002]	[0.007]	[0.000]	[0.000]
IS(FUNDS)	8.1002*	7.2283*	7.8964*	7.8587*	7.4540*	9.2591*
	[0.011]	[0.004]	[0.003]	[0.002]	[0.016]	[0.001]
IS(SIZE)	1.6920*	1.4907*	2.1229*	2.2172*	1.8696*	1.7777*
	[0.001]	[0.004]	[0.026]	[0.028]	[0.005]	[0.002]
IS(GROWTH)		6.1246*				
		[0.001]				
IS(INFLATION)			-0.3200			
			[0.474]			
IS(REALINT)				0.3963		
				[0.466]		
IS(M2RESERVE)					0.0176	
					[0.985]	
IS(REALDEP)						2.8997*
						[0.000]
AB - AR1	-3.0313	3.0548	-2.9017	-2.9153	-3.1136	-2.9365
	[0.0024]	[0.0023]	[0.0037]	[0.0036]	[0.0018]	[0.0033]
AB - AR2	-1.6949	-1.4805	-1.4531	-1.5326	-1.7178	-1.2744
	[0.0901]	[0.1388]	[0.1462]	[0.1254]	[0.0858]	[0.2025]

Note: *p*-Values in parentheses, * indicate significant at 5% and ** indicate significant at 10%

Accordingly, based on the findings, the results appeared to have expected sign, where the increase in RISK will increase the credit cycle. RISK is the measure of bank's extension of credit risk, presented by the ratio of non-performing loan to total gross loan. It indicates the percentage of default from the total gross loan. High RISK implies high exposure of loss from total credit. In theory, the cycle in lending standards coincides with the cycle in the amount of lending, which then followed by movements in loan losses. Therefore, in this view, lending activities and losses move in positive direction. In other words, increase in lending activities lead to increase in losses which measure by the increase in credit risk that would result in reduction of credit supply.

Recapping the definition, credit cycle is the cycle involving the supply of credit by lenders, or the access of credit by borrowers. The "cycle" indicates the swing between high and low of credit availability. Therefore, as either significant reduction or significant increase in the credit supply would cause the "cycle", high RISK indicates high extension of bank's credits that imply high loss which later on might lead to significant reduction in credit supply, and thus, contribute to credit cycle. Consistent with theory, as discussed by Weinberg (1995), excessive banks' extensions of credit would result in unrealistic optimism in good times, creating lending booms, thus would lead to significant increase in losses on loans.

Move on to asset price, KLCI was found to be positively significant in explaining the credit cycle. As expected, asset price and credit should have positive relationship since bank's lending decision largely depends on borrowers' credit quality. Asset price represent the market value of firms net worth that can imply the borrowers' credit conditions in the market as a whole. As explain in theory, a sharp decline in stock market would lead to a large decline in the market value of firms' net worth. Firms' net worth has similar role to collateral, and when the value of collateral declines, it provides less protection to lenders, thus losses from loans are likely to be more severe. This view was also supported by Rajan (1994) and Kiyotaki and Moore (1997). They justify that changes in credit occur mainly due to the changes in credit quality of the borrower, it is because lenders cannot force borrowers to repay their debts unless it is secured.

Scanning through the macroeconomic variables, only M2RESERVE contribute at significant order in explaining the credit cycle. M2RESERVE is simply the ratio of M2[1] to foreign exchange reserve. It is included in the estimation to cater the vulnerability of the banking system to sudden capital outflows triggered by foreign exchange risk. The results thus tend to indicate that the credit cycle is sensitive to the flow of capital generated by foreign exchange risk, whereby increase in money supply relative to foreign exchange reserve will contribute to the increase in credit. Besides this, as mentioned, macroeconomic variables are the control variables incorporated in the estimations to test the relative impact of other independent variables in the estimations. The results in column 5 clearly depict that, after the inclusion of M2RESERVE, other primary variables appeared to be insignificant. This might suggest the sensitivity of credit cycle to the capital flow is very high as compared to asset price and other primary variable.

Shifting to the interactive dummy variables for Islamic banks, the coefficients report significant value for most of the variables except for IS(SIZE) in estimation 2 until 6. Consequently, in answering the second question; *are the factors account for credit cycle between Islamic and conventional system are different?* Based on these estimations, they are statistically significant, thus suggest the factors account for credit cycle between the two systems are statistically different. However, it is too early for a conclusion since three main estimations have yet to be discussed. Most of the coefficient present negative sign suggesting the impact of the variables for Islamic banks are significantly lower compared to conventional banks. This is clearly the case for IS(KLCI), IS(RISK), and IS(CAPITAL). For IS(FUND) and IS(SIZE), they are positive suggesting the impact of these coefficient are higher.

Comparing the results with GMM(SYS) estimations for the same data set (Table 5), evidence by the P-value, in column 1, it is clear that three variables contribute significantly in explaining the credit cycle, which include the lagged of cycle, KLCI and RISK. After controlling macroeconomic factors, the results are quite consistent whereby only M2RESERVE appeared to be the only significant macroeconomic variable, however unlike the previous estimations where no other variables are significant, here, KLCI still remain significant.

[1] M2 = M1 + Narrow Quasi-Money. Narrow Quasi-Money = Savings Deposits + Fixed Deposits + NIDs + Repos + Foreign Currency Deposits Narrow Quasi-Money refers to the sum of deposits/ interest-bearing instruments (including SPI deposits and instruments) placed by the non-bank private sector with the commercial banks and Islamic banks (excluding interplacements among these banking institutions).

In addition to the above, the significant in the lagged value of cycle is suggesting that the credit cycle can be explained by its own past value. This might support the proposition that credit is procyclical (Rajan 1994; Kiyotaki and Moore 1997) where it arises "naturally". In this view, recessions lead to booms, and booms lead to recessions.

Analysing the difference for Islamic banks, interestingly, all primary variables report significant coefficients proposing consistent implication with the previous estimations. In short, based on these estimations (GMM(SYS) for long data set), the factors contributing in explaining credit cycle between Islamic and conventional banks are statistically different. For Islamic banks, the slope coefficients are inclining for IS(KLCI), IS(RISK) and IS(CAPITAL) as evidence by negative sign. While the slopes are steeper for IS(FUNDS) and IS(SIZE).

Most macroeconomic variables except M2RESERVE have no significant relationships with credit cycle, but some appeared to be significant for the dummy variables, this might point out to some explanation. As in the previous estimations, IS(GROWTH) and IS(REALDEP) are positively significant that might indicate Islamic banks are more vulnerable to macroeconomic factors as compared to the conventional banks. Macroeconomic factors can influence both the demand and supply of credits. In economy, the interaction of demand and supply are complex, the cycle in credit might arise from distraction in borrower's credit quality due to unprofitable project or reduction in loanable funds due to decrease in population aggregate income as a whole.

Despite the above, the findings tend to indicate that credit cycle are not influenced by the availability of loanable funds, bank's size and other macroeconomic variables such growth in GDP, inflation rate, interest rate and currency depreciation. However, these findings might only reflect the behaviour of specific banks that limited to specific time periods. To clarify the issue, we increase the number of banks in the analysis which will be discussed in the next section.

7.2 Determinants of credit cycle with short data

Recapping, estimations for short data set involve 35 banks (16 Islamic, 19 conventional) for five years (2007 – 2011). Scanning through the results presented in Table 6 and 7; the results

are substantially different as compared to estimations in long data. Presented in column 1 of Table 6, credit cycle can be significantly explained by CAPITAL and SIZE. CAPITAL is the ratio of total equity to total asset, it measure the extend of bank's capital relative to its total assets. Consistent with theory, the positive sign imply a causal link between low capital-asset ratios and low lending growth in the subsequent recession, as implied by the capital crunch story (Bernake & Lown 1991). Reduction in the capital generally resulted from deterioration in banks' balance sheets, thus point up the bank to either: reduce their lending in order to shrink their asset base and thereby restore their capital ratios; or raise new capital.

However, as explained by Bernake & Lown (1991), an alternative interpretation is possible. Suppose that economic conditions are serially correlated, so that a state or region doing poorly today will likely do poorly tomorrow. Then the relationship between the capital- asset ratio and credit cycle found in this estimation might be spurious, since it may be that previous economic misfortunes in a state both caused bank capital to fall and implied slower subsequent economic growth (and thus slower lending). Under this interpretation, there is not necessarily any causal link between bank capital and bank lending.

The capital crunch hypothesis implies that the most recent level of the capital-asset ratio is relevant to future lending, since it is the current level that must meet regulatory standards. Under the alternative interpretation, it is the recent change in the capital-asset ratio that should be relevant for predicting future conditions, since if recent times have been difficult the capital-asset ratio will have been falling, whereas if times have been good the capital-asset ratio will have been rising. This observation suggests inclusion of the recent change in the capital-asset ratio, together with the level of the capital-asset ratio, in the regression explaining lending.

Consequently, we do not include the change in CAPITAL to clarify the issue. However, referring to column 2 of Table 6, GROWTH is insignificant implying that there is no statistical relationship between the growth rate of GDP and credit cycle. This is also the case for other macroeconomic variables except for M2RESERVE. Hence, our estimation tend to reject the arguments, thus our estimations suffice the existence of causal relationship between banks' capital and credit cycle.

Moving on, the positive coefficient of bank's size implies "the bigger the bank, the higher the credit cycle". SIZE in this case is simply measured by the size of banks' total assets. Yet, a simple and direct deduction from the findings might point out to a bias conclusion. From different perspective, the bank's size can possibly measure the stability of a bank and the extension of risk that the bank could take. A bigger bank could provide more credit as it is supported by large asset and high capital buffer. This is depicted in the results since both CAPITAL and SIZE appeared to be significant.

Alternatively, the findings might also direct to behavioural economics of the credit cycle. From this outlook, the famous quote from recent global financial crisis of "too big to fail" will come into being. In this notion, besides of having large capital and asset, big banks are willing to take more risk due to the over optimism that the lender of last resort (the central bank) will always be the guard.

The difference of Islamic banks is captured by the significant value of IS(CAPITAL). In all six estimations, IS(CAPITAL) report sloppy coefficient with about more than 25% difference. The sloppy coefficient evidence by the negative sign proposing the causal relationship between banks' capital and credit cycle are lesser for Islamic banks. In other words Islamic financing are less vulnerable to sudden capital drop in banks' balance sheets.

Despite the above arguments and indications, GMM(SYS) tend to reflect considerable different result. In column 1 of Table 7, credit cycle can be explained by KLCI and SIZE, after controlling macroeconomic variables, only KLCI appeared to be significant and none of the variables report significant value in estimation 6. Interestingly, despite M2RESERVE, INFLATION and REALINT also proposed significant coefficient. The findings might put forward that within shorter time period, the flow of credit are more responsive towards monetary policy conditions.

Table 6: Panel GMM (Differenced) estimations result for short data set

DETERMINANTS OF CYCLE	1	2	3	4	5	6
Constant	-38.2172*	-40.6368*	-30.0682*	-26.7011*	-5.3478	-38.6024*
	[0.000]	[0.000]	[0.008]	[0.020]	[0.548]	[0.001]
Cycle-1	-0.0184	-0.0224	-0.0414	-0.0435	-0.0275	-0.0290
	[0.583]	[0.486]	[0.214]	[0.194]	[0.376]	[0.374]
Total (Islamic & Conventional)						
KLCI	-0.6782	-0.8483	0.0396	0.3614	2.1095*	-0.7295
	[0.266]	[0.302]	[0.976]	[0.790]	[0.011]	[0.332]
RISK	0.0021	0.0024	-0.0117	-0.0154	-0.0363	-0.0002
	[0.975]	[0.969]	[0.877]	[0.839]	[0.518]	[0.998]
CAPITAL	0.2564*	0.2670*	0.2106*	0.1915*	0.0446	0.2602*
	[0.000]	[0.000]	[0.000]	[0.002]	[0.549]	[0.000]
FUND	0.4160	0.3832	0.5190	0.5418	0.5704	0.4210
	[0.411]	[0.403]	[0.354]	[0.336]	[0.123]	[0.397]
SIZE	3.9858*	4.3099*	3.0241*	2.6401**	-0.038	4.1103*
	[0.000]	[0.000]	[0.048]	[0.091]	[0.972]	[0.001]
GROWTH		-0.7770				
		[0.584]				
INFLATION			0.0878			
			[0.443]			
REALINT				-0.1685		
				[0.305]		
M2RESERVE					5.5205	
					[0.001]	
REALDEP						-0.0625
						[0.862]
Islamic (Interactive Dummy IS)						
IS(KLCI)	0.0087	0.1611	0.7646	0.8705	1.1205	0.1827
	[0.996]	[0.929]	[0.716]	[0.672]	[0.518]	[0.915]
IS(RISK)	-0.0689	-0.0677	-0.0766	-0.0780	-0.0871	-0.0701
	[0.507]	[0.490]	[0.488]	[0.482]	[0.336]	[0.494]
IS(CAPITAL)	-0.3879*	-0.3981*	-0.3722*	-0.36007*	-0.2520*	-0.3981*
	[0.000]	[0.000]	[0.000]	[0.001]	[0.010]	[0.000]
IS(FUNDS)	0.6893	0.5937	0.3674	0.3308	0.3766	0.5293
	[0.565]	[0.634]	[0.772]	[0.794]	[0.729]	[0.672]
IS(SIZE)	-1.4541	-1.7681	-1.3273	-1.19595	-0.47007	-1.6956
	[0.320]	[0.276]	[0.502]	[0.548]	[0.752]	[0.328]
IS(GROWTH)		0.5009				
		[0.789]				
IS(INFLATION)			0.0598			
			[0.656]			
IS(REALINT)				-0.0878		
				[0.639]		
IS(M2RESERVE)					1.0341	
					[0.684]	
IS(REALDEP)						0.1569
						[0.734]
AB - AR1	-2.6688	-2.5535	-3.0115	-3.0558	-2.8639	-2.7096
	[0.0076]	[0.0107]	[0.0026]	[0.0022]	[0.0042]	[0.0067]
AB - AR2	1.1285	0.84255	1.5585	1.6024	0.86574	1.1041
	[0.2591]	[0.3995]	[0.1191]	[0.1091]	[0.3866]	[0.2695]

Note: *p*-Values in parentheses, * indicate significant at 5% and ** indicate significant at 10%

Table 7: Panel GMM (System) estimations result for short data set

DETERMINANTS OF CYCLE	1	2	3	4	5	6
Constant	1.8455	1.9753	-0.6160	-0.6916	-5.2080	3.7901
	[0.745]	[0.722]	[0.919]	[0.910]	[0.429]	[0.542]
Cycle-1	-0.0226	-0.0276	-0.0491	-0.0498	-0.0285	-0.0351
	[0.496]	[0.367]	[0.151]	[0.149]	[0.382]	[0.259]
Total (Islamic & Conventional)						
KLCI	0.7696**	0.8327	1.5950**	1.749*	1.8724*	0.6950
	[0.091]	[0.135]	[0.060]	[0.042]	[0.008]	[0.147]
RISK	-0.1166	-0.1153	-0.0856	-0.0797	-0.0450	-0.1060
	[0.128]	[0.152]	[0.312]	[0.337]	[0.464]	[0.210]
CAPITAL	0.0480	0.0513	0.0521	0.0512	0.0417	0.0551
	[0.415]	[0.404]	[0.357]	[0.358]	[0.424]	[0.379]
FUND	0.9310**	0.9645	0.8923	0.8651	0.6281	0.9552
	[0.084]	[0.107]	[0.164]	[0.167]	[0.120]	[0.135]
SIZE	0.4053	0.3707	0.1973	0.1693	0.0644	0.3309
	[0.335]	[0.408]	[0.738]	[0.776]	[0.920]	[0.471]
GROWTH		0.6366				
		[0.634]				
INFLATION			0.1899*			
			[0.044]			
REALINT				-0.2977*		
				[0.025]		
M2RESERVE					5.0842*	
					[0.001]	
REALDEP						0.3580
						[0.250]
Islamic (Interactive Dummy IS)						
IS(KLCI)	0.9082	0.8030	1.6683	1.8045	1.8414	1.0510
	[0.510]	[0.579]	[0.264]	[0.210]	[0.168]	[0.439]
IS(RISK)	0.0119	0.0117	-0.0355	-0.0432	-0.0781	-0.0028
	[0.914]	[0.916]	[0.769]	[0.717]	[0.386]	[0.981]
IS(CAPITAL)	-0.2310*	-0.2309*	-0.2350*	-0.2338*	-0.2204*	-0.2378*
	[0.031]	[0.033]	[0.014]	[0.012]	[0.007]	[0.023]
IS(FUNDS)	1.3578	1.20281	0.9627	0.8972	0.6041	1.1767
	[0.227]	[0.295]	[0.428]	[0.460]	[0.581]	[0.318]
IS(SIZE)	-0.2901	-0.2415	-0.6504	-0.7024	-0.8198	-0.3580
	[0.643]	[0.712]	[0.343]	[0.285]	[0.251]	[0.564]
IS(GROWTH)		-0.7244				
		[0.685]				
IS(INFLATION)			0.0474			
			[0.684]			
IS(REALINT)				-0.0860		
				[0.591]		
IS(M2RESERVE)					1.9403	
					[0.432]	
IS(REALDEP)						-0.1424
						[0.714]
AB - AR1	-2.8265	-2.9123	-3.2798	-3.2765	-2.824	-3.1114
	0.0047	0.0036	0.001	0.0011	0.0047	0.0019
AB - AR2	0.34604	0.48406	1.7614	1.7731	0.88455	1.0808
	0.7293	0.6283	0.0782	0.0762	0.3764	0.2798

Note: *p*-Values in parentheses, * indicate significant at 5% and ** indicate significant at 10%

INFLATION and REALINT are measured by the rate of changes in consumer price indices (CPI), and the difference between short-term interest rate and the contemporaneous inflation rate, respectively. Intuitively, the definitions of these two variables already give the hint towards refection of the results in a shorter term. Increase in interest rates will increase the probability of bad credit risk, because higher interest rate indicates higher cost of borrowing to the borrower and also higher cost of funds to the lender. Inflation on the other hand does not demonstrate direct connection to the lending. Inflation might increase the cost of living to and the cost of doing business to the borrower. Inflation also may act as a discount factor for the returns on investments that effect both borrower and lender. These factors might cause the lenders to reduce credit supply, which latter resulted in decline of investment and economic activities.

The difference of Islamic banks reported in GMM(SYS) estimations are consistent with GMM(DIF) where IS(CAPITAL) report sloppy coefficient with about more than 20% difference. The finding strengthens the position that Islamic financing are less vulnerable to sudden capital drop in banks' balance sheets. Under the international banking regulations of Basel II and IFSB (Islamic Finance Service Board), Islamic banks faced higher stress on capital as compared to conventional banks. This is due to the nature of its operations that mainly based on trading and profit and sharing. Transaction based on trading and partnership hold higher risk compared to transaction based on pure loan. Due to this, the international banking regulations imposed high risk weight on Islamic banking products. As a result, Islamic banks need to hold higher capital. Numbers of arguments arise due to this issue, particularly related to the decrease in the efficiency of Islamic banks. Conversely in our case, higher capital holding might put Islamic banking at advantage since they were more shielded to sudden capital crunch that might trigger extensive credit reduction and banking crisis.

Pooling the two techniques of estimations together, in a shorter term, the results suggested the determinants of credit cycle are CAPITAL, SIZE, KLCI and M2RESERVE for GMM(DIF), and KLCI, FUND, INFLATION, REALINT and M2RESERVE for GMM(SYS). However, as discussed by Moshiran and Wu (2012), in the case that the number of time periods is relatively small, and the autoregressive parameter is relatively larger, GMM(SYS) might produce superior result compared to GMM(DIF).

8.0 Summary of Results and Policy Implications

Analysing the factors accounting for credit cycle is crucial to restrain the negative impact of credit instability to the long-term economic growth. By identifying the determinants of credit cycle measurable control system could be suggested to the policy makers and industry in order to reduce the severity impact of unpredictable banking crisis. Summary of results are presented in Table 8, from this, several policy implications could be derived. Referring to the table, the results reported for both objectives are considerably different between long estimations and short estimations. Hence, we could infer the deference exist are in terms of the time frame, long data set estimations would capture the long-term and short data set estimations would capture short-term behaviour of credit cycles.

In long term, the results suggested four factors account for credit cycle, those are CYCLE-1, KLCI, RISK and M2RESERVE. These factors report positive sign indicating any increase or decrease of these factors will give causation effect to the cycle of credit. On the other hand, for short-term, KLCI, FUNDS, INFLATION, REALINT, and M2RESERVE are among the list, in addition to this, CAPITAL and SIZE could also be included. The suggested sign are positive and consistent in all estimations.

Table 8: Summary of results

Objectives	Long Estimations		Short Estimations	
	GMM(DIF)	GMM(SYS)	GMM(DIF)	GMM(SYS)
Determinants of credit cycles	KLCI RISK M2RESERVE	CYCLE-1 KLCI RISK M2RESERVE	KLCI CAPITAL SIZE M2RESERVE	KLCI FUNDS INFLATION REALINT M2RESERVE
The difference of	IS(KLCI)	IS(KLCI)	IS(CAPITAL)	IS(CAPITAL)

Islamic banks	IS(RISK)	IS(RISK)
	IS(CAPITAL)	IS(CAPITAL)
	IS(FUND)	IS(FUND)
	IS(SIZE)	IS(SIZE)
	IS(GROWTH)	IS(GROWTH)
	IS(REALDEP)	IS(REALDEP)

The difference of Islamic banks is more obvious in the long term where all the primary variables plus two macroeconomic variables indicate significant different. Even though some of the variables are not significant in the main estimations, the significant of dummy variables clearly indicate the differences between the two systems do exist. In shorter term, only capital is significantly different. However, the difference in capital contains high implication as discussed in the previous section.

Policy makers and industry players could observe the behaviours of these suggested variables and take the right actions to reduce the severity impact of unpredictable credit crunched. As explained in theory, these banking and economic factors are not standalone component in the system, these factors interact and affecting one another. For example, foreign exchange crisis may decline economic activities, lead to banking crisis thus dampen the decline in economic activities. Specifically the following policy implication could be list out:

i. *Implication for economic growth.* Unpredictable credit crunch can cause negative impact to long term economic growth. By knowing the factors that might influence credit cycle, policy makers could control these factors for the benefit of future growth. Asset price report significant positive influence to credit cycle in all estimations. The authorities could use this as the indicator of credit health in the country; this is particularly useful for the purpose of monitoring and policy implementation. The authorities could monitor the credit cycle by monitoring the level of interest and inflation rate. Increase in interest rate will increase the credit supply; accordingly, the authorities could slightly increase interest rate to avoid substantial reduction in credit supply. This is particularly the case for the short term.

ii. *Implication for monetary policy.* The findings suggest bank lending are vulnerable to sudden capital outflows triggered by foreign exchange risk. Capital outflow is the movement of assets out of a country. It occurs when foreign and domestic investors sell off their assets in a particular country because they no longer perceive it as a safe investment. The capital is withdrawn from the country (flows out) and may end up in another country or back in the investor's home country. The authorities such Bank Negara Malaysia could implement capital control to tackle this issue. However, they need to be aware since excessive control can scare off investors who want control over their assets and can give the impression that something is wrong with the country's economy or government that is not yet widely known.

iii. *Implication for banking regulation.* Compared to Islamic financing, conventional credit appeared to be more vulnerable to the drop in capital. As discussed in above, this might be due to higher capital charged faced by Islamic banks. For this reason, in a certain economic condition, the authorities could imposed higher capital requirement to banking sector to prevent capital crunch as it could give raise to credit crunch. However, the trade-off between banks efficiency should be carefully measured. The requirement could be made for a specific term since the findings suggest significant influence only in the short term.

iv. *Implication for Islamic banking system.* Our findings acknowledge the different of Islamic banks especially in the long term. Islamic banking system that based on unique trading and profit and loss sharing system might provide the solution to the recurring banking crisis with the view to achieve more harmonise economy. However there are great deals of factors that need to be analysed before this strong deduction could be made. Regardless of this, Islamic banking system might further develop and lead the new banking reform since there is some empirical evidence supporting its' sound banking system.

9.0 Conclusions and limitations

Taking Malaysia as the case study, based on our restrictive bank-level panel estimations, the factors accounting for credit cycle could be divided into two main proposition relative to time frame. First, in the long term, lagged of credit cycle, asset prices, excessive extension of bank

credit and capital outflow are the factors that might influence credit cycle. While in the short-term, the influenced factors are asset price, availability of loanable funds, banks' capital, banks' size, inflation, real interest rate, and capital outflows.

Rendering the determinants of credit cycle between Islamic and conventional systems, our analysis support empirically there are some differences between the two systems. It is acknowledged here that Islamic banks really hold some unique characteristics particularly in the principles of its operations. Hence, practicing Islamic banking system might reduce the severity impact of banking crisis to the long term economic growth. This deduction has a very strong policy implication to the industry since we are struggling to find out the solution to recurring banking crisis with the view to achieve more harmonise economy.

Then again, gazing the situation in a more comprehensive perspective, in a dual banking system with increase integration to globalization, Islamic banks do operate in the same environment as conventional banks. In the view that the law of demand and supply in the economy should affect all institutions in the same way, intuitively, Islamic banks could not effort to be unaffected. Therefore, whether the factors account for Islamic and conventional banks credit cycles are really different, a more comprehensive analysis should be made. In spite of this, the severity impact of a fall in bank lending to the macroeconomy as a whole depends on the availability of other forms of credit as substitute to banks loan. If the substitutes are available, a fall in bank lending will have only a small economic effect, if otherwise, the impact may be significant. Thus, even though Islamic banks do shield from some of the causing factors, it will not be the sole solution to the complex problems. Nevertheless, an alternative and sounder banking system has shades its light, the policy makers and industry has less reason to remain at the same position.

Our analysis contains a number of limitations. This study is limited to Malaysian market within specific time frame. As a result, the deduction may not be generalized to the world's complex environment. Hence, the study could be extended in the following ways. First, by increasing the number of sample, instead of focusing on a particular country, a mass sample could provide a more comprehensive findings. In addition, future study could also be done at aggregate level to capture the world complex environment as a whole and other neglected variables could be included in the estimations.

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