Determinants of banks' margins: case of islamic and conventional banks: evidence from Malaysia based on GMM approach

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Determinants of banks' margins: case of islamic and conventional banks: evidence from Malaysia based on GMM approach

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Abstract

This paper analyses Islamic and conventional banks' margins in Malaysia using panel data estimation technique. The results tend to suggest that there exist substantial differences between Islamic and conventional banks in terms of factors determining banks' margins. Specifically, this study finds that for Islamic banks, important margin determinants are found to be operating costs, credit risk, efficiency, implicit payments, income from fees and commission, and non-interest income. While for conventional banks important factors are operating costs, risk component, market share, efficiency, size of operation, implicit payments, funding costs, and other earning assets. This means there are more factors influencing margin in conventional banks compared to those in Islamic banks. Our results indicate that three most important factors are operating costs, credit risk and efficiency for both banks. This suggests that improving credit risk management and efficiency would be the proper strategy to enhance banks' margins. Although non-traditional bank income activities have increased in recent years, its economic impact on margin is found to be quite minimal.

Keywords: Net interest margin, net profit margin, Islamic and conventional banks, Malaysia

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1. Introduction

The role of the financial intermediaries is to gather money and channel it to those who need money, in the most efficient manner regardless of the types of banks (Islamic or conventional banks). The similarities between Islamic and conventional banking is the sources of funds where both depends on depositor's fund by offering numerous depository schemes such as saving account, current account and investment account. In conventional banks, this process of accepting deposits and lending takes place at a cost in the form of interest to the depositor and borrower. The interest paid to the depositor and the interest charged to the borrower creates a spread called bank margin. An alternative, but equivalent, definition of that is bank net interest margin, the difference between average of yield of assets (interest revenue) and liabilities (interest expenses), also called the bank's mark-up (Drakos, 2002).

Generally, the spread between a conventional bank's interest earnings and expenses as a percentage of interest-earning assets vary across banks. Previous studies on banking-sector in developed countries documented a number of factors that affect the size of bank margins. Ho and Saunders (1981) and Saunders and Schumacher (2000) examine the US and European banking-sector. They find that the degree of risk aversion, the variance of interest rates, the size of transaction take on by the bank, and bank market structure are associated with bank margin. Angbazo (1997) argues that risk is an important factor in setting bank margin. He finds that both credit risk and interest rate risk are two basic factors affecting the margins in the US banking-sector for 1989-1993. Another study examine bank margin in European Union for the period 1993-2000 (Maudos and Fernández de Guevara, 2004). Overall, they find that market structure and operating costs have an impact on the bank margins. Lin et al. (2012) point out, the existing literature on determinant of bank margins does not adequately account for the effects of diversification. They extend Angbazo (1997) study focus on bank margins and diversification in Asian. However, their analysis does not included banks in Malaysia.

Based on the above studies, data analysis covers bank located in different countries and with different environment characteristics. This complicates comparison of the factors influences bank margin across countries. Despite it is of great interest to analyse the determinants of the bank margin, most of the studies, however, focus mainly on developed banking-sector, fewer studies has been done in developing countries, and as well as the literature on bank margins for Islamic banks is hardly available. In this context, the

determinants of the bank margins have not been estimated for the specific case of the Malaysian banking system. Malaysia practice dual banking system where the non interest based of Islamic banking operates together with the interest based of conventional banking system. The growth of Islamic banks has registered a tremendous development of their business, customer base and market share (Bank Negara Malaysia, 2015). Given this expansionary trend, it seems reasonable to consider the determinants of bank margins of both Islamic and conventional banks in providing intermediaries services.

As financial intermediaries, Islamic and conventional banks have the same problems in their operation. Among others, there have default risk on financing, liquidity risk in assets side, and in liabilities side have costs efficiency. This paper examines the determinants of banks' margin suggested by Ho and Saunders (1981) and its extensions modified for the Malaysia case. The modified model in this study is followed the literature on determinants of bank margins, which take into account the effect of financing spread variables, bank-specific characteristics, and diversification activities on bank margin. The study sample is subdivided into two groups based on the type of bank. To this end, this study differentiates among two types of bank: Islamic and conventional banks. This allows us to examine variations in the impact of bank margin determinants across banks.

The paper is organised as follows: Section 2 reviews previous literature on the determinants of bank margins. Section 3 discusses data and variables selection. Section 4 describes the estimation methodology used in the analysis. Section 5 presents and discusses the estimation results. The last section provides some concluding remarks.

2. Literature review

There are numerous study investigate bank margin in the developed countries. The dealership model proposed by Ho and Saunders (1981) provides a theoretical model to analyse the determinants of bank margins or spread. The dealership model considers banks acting as intermediaries between lenders and borrowers in financial market. Ho and Saunders empirically estimate the dealership model for the US banks in the period 1976-1979. They find that bank margin depends on four factors: the degree of risk aversion, the variance of interest rates, the size of transaction take on by the bank, and bank market structure. The model proposed by Ho-Saunders model has been extended by other researchers to analyses the

determinants of bank margins. For example, Angbazo (1997) incorporated types of risk; find that high bank margin is associated with high credit risk, liquidity risk, and interest rate risk. In contrast, Williams (2007) finds a negative relationship between credit risk and interest margin in Australia. Maudos and Fernández de Guevara (2004) extent the model by adding operating cost and degree of market power variables and confirm these variables have significant impact on bank margin. Carbó-Valverde and Fernandez (2007) suggested that beside risks, bank specialization factors, macroeconomic control variables, and other bank-specific factors play important role in its pricing strategy. They find that all the risk measures less significant on bank margin. While Maudos and Solis (2009) find that high margin can be explained mainly by operating costs and market power.

2.1. Operating cost

The criticism of Ho-Saunders model is fail to consider bank as a corporation which having certain production function associated with intermediation services, such as the administrative cost to maintain loan or deposit contracts. Maudos and Fernández de Guevara (2004) respond to this criticism and extend Ho-Saunders model by adding the operating costs, to capture the bank production function associated with bank services. They consider bank operating costs as a determinant of net interest income. They argue that even in the absence of market power and any kind of risk, bank essentially need to cover their operating costs, which are a function of deposit taken and loans granted. Therefore, bank operating at higher cost level will have to charge higher margins. Maudos and Fernández de Guevara find a positive relationship between operating costs and bank margin.

A positive impact of operating costs on net interest margin has been supported by other studies. A study by Maudos and Solis (2009) concludes that the most significant economic impact on bank margin is the determined operating costs in the Mexican case during 1993-2005. They find that banks have high operating costs pass these on to their customers by setting higher interest rates on lending and lower deposits rates, therefore resulting to higher bank margins. Another study by Entrop et al. (2015) extend Ho-Saunders model to investigate the factors that influence intermediation fees when a bank's balance sheet shows maturity mismatch. They find that the operating costs are highly significant and associated with bank margins in German case.

However, banks' operating costs are likely also including expenses due to inefficiency and those not related to financial intermediation activities. High bank margins may associate with a low degree of efficiency. Gelos (2008) finds that low operational efficiency is an important factor driving high bank interest margins in Latin America. On the other hand, Vander Vennet (2002) and Claeys and Vander Vennet (2007) find that higher efficiency reduces bank interest margin significantly. They point out that banks with higher operational efficiency may pass the lower costs to their customers in the form of lower borrowing rates and/or higher deposit rates, thereby lowering interest margin.

2.2. Risk component

There are few studies also expand the dealership model by integrating risk component to investigate the bank margins. Angbazo (1997) extends Ho-Saunders model by incorporating interest rate risk and default risk, and the interaction between these two types of risk, to investigate whether the risk affects the bank margins of US banks in the year 1989-1993. Angbazo finds that bank with higher interest rate risk exposure and more risky loan is associated with higher bank margins. Drakos (2002) adopt Angbazo model to investigate the determinants of bank margins in Greek. The result is consistent with Angbazo findings. The finding supports the view that credit, interest rate and liquidity risks are significant determinants bank interest margins.

Maudos and Fernández de Guevara (2004) take into account the link between riskiness and the margin. Their model specifically differentiates between market risk and credit risk, and their interaction as separate factors affecting the bank margin. The model view banks acting as pure intermediaries between demanders and suppliers of funds. But both arrive randomly, this exposes banks to interest rate risk. Furthermore, banks also face credit risk, as it is uncertain in advance whether the loans would be paid or not by the borrowers. A risk-averse bank therefore will demand a higher margin for higher credit risks. Maudos and Fernández de Guevara find that credit risk, interest rate risk, market risk and risk aversion, affect the bank interest margin positively. This shows that banks with greater risks work with higher margins. Similarly, Maudos and Solis (2009) find that high market interest rates volatility has higher bank margins in the Mexican banks.

However, there are also some notable contradictory results. For example, Williams (2007) finds that credit risk has a significant and negative impact on bank margin in Australia.

Interesting, in Carbó-Valverde and Rodríguez Fernandez (2007) study, all the risk measures such as credit risk, interest rate risk and liquidity risk employed in their study seem to be less significant with bank margins. Hutapea and Kasri (2010) use autoregressive distributed lag model to test the cointegration between the Indonesia Islamic bank margin and its determinants. They result shows that there is a negative relation between Islamic bank margins and interest rate volatility.

2.3. Market structure

Another factor driving the bank margin is market structure. The Lerner index (direct measurements of market power) is widely used in the case of banks to proxy market structure. According to the market power paradigm, increased in market power would lead to monopoly profits. Maudos and Fernández de Guevara (2004) include Lerner index in their model to examine bank margin. Their results indicate a positive and significantly relationship between the Lerner index and bank margin. Another study by Maudos and Solis (2009) also find that banks with higher market power are having higher intermediation margins. The recent study by Entrop et al. (2015) is consistent with the early findings. They conclude that the Lerner index is highly significant and have a strong impact on bank net interest margin.

Similarly, banks with large market share or the degree of market concentration enhance market power in banking product pricing and consequently increase bank margin. Saunders and Schumacher (2000) find a positive relation between market concentration and bank margin. Fungacova and Poghosyan (2011) use Herfindahl index to capture the market structure in Russian banking sector. The Herfindahl index is proxied by the sum of squares of individual bank asset shares in the total banking sector. Fungacova and Poghosyan result shows that the sign of the coefficient of the Herfindahl index is negative and insignificant. However, when they control for ownership structure, foreign bank samples show a positive and significant relation between Herfindahl index and bank margin.

2.4. Non-traditional activities

In practice, bank revenues from lending activities tend to be cyclical, which depend on the demand of loans and the stage of economic cycle (Lin et al., 2012). Given that banks may emphasis on “non-traditional” banking activities to seek diversification via activities such as commission and fee-based services, and financial advice in order to compensate for declining profitability (Entrop et al., 2015). As such, banks are able to diversify into non-interest income

services and products that are related to the present interest income generating activity, and increase their revenues (Mercieca, Schaeck and Wolfe, 2007). In particular, diversified banks may be in a strong position to draw profits earned from non-interest income activities.

Carbó-Valverde and Rodríguez Fernandez (2007) extend Ho-Saunders model by including the importance of "non-traditional" activities. They proposed a multi-output model to examine the relationship between bank margins and non-traditional activities in European banking. They find that banks with a higher degree of diversification in "non-traditional" activities tend to have lower interest margins. Similarly, Lepetit et al. (2008) and Maudos and Solis (2009) find that banks with greater reliance on "non-traditional" activities are able to charge lower lending rates. Lin et al. (2012) extend Angbazo's (1997) model by incorporating bank diversification activities to explore how its influence bank margin. They conclude that well diversifying income sources help to smooth banks financial performance, and reduce the impact of idiosyncratic risk on net interest margin.

3. Determinants of bank margin and variables selection

This section discusses both the dependent and independent variables considered in this study. Within our presentation of the independent variables, this study considers financing spread determinants suggested by the theoretical model (Ho and Saunders, 1981; Maudos and Solis, 2009; and Fungacova and Poghosyan, 2011; among others), bank-specific control and diversification variables not predicted by the theoretical model, but are likely influence bank margin (Carbó-Valverde and Rodríguez Fernandez, 2007; and Entrop et al., 2015).

3.1. Dependent Variable

The dependent variable this study investigates is the bank margin. The bank margin is defined as net interest margin (NIM) in conventional banks or net profit margin (NPM) in Islamic banks. Net interest margin define as the difference between interest revenue and financial costs in relation to total assets banks (Maudos and Solis, 2009; and Entrop et al., 2015). Net profit margin is measure by earning on financing activities minus on deposits to total asset in Islamic banks.

3.2. Independent Variables

The following sub-section describes financing spread determinants as well as bank-specific control and diversification variables that affect bank margin.

Taking previous studies as references, the financing spread determinants of this study are:

(a) Operating cost. In line with previous research, this study includes operating cost as a determinant of bank margin. The operating cost is proxied by the ratio of total operational expenses to total assets. Maudos and Fernández de Guevara (2004) and Entrop et al. (2015) observe that those bank having high operating costs, charge higher lending rate and/or offer lower deposit rate, which result higher margins. In view of this, operating costs are expected to have positive relation on intermediation margin in Islamic and conventional banks.

(b) Credit risk. In banks the financing activities are their major source of income. As such banks are facing credit risk due to the uncertain of loan is going to be paid or not in future. Generally, when a borrower credit risk increases, the higher risk premium on financing cost, the greater bank margin is. Ideally, the credit risk can measure by variables such as problem loans or default loans. However, BankScope database only provide the loan loss provision, thus in this study credit risk is proxied by the loan loss provision to total gross loan ratio. Maudos and Fernández de Guevara (2004) find that banks with higher ratio of loan loss provision face higher credit risk, and likely to charge higher margins. Thus, this variable is expected to have a positive influence on Islamic and conventional bank margin.

(c) Liquidity risk. The ratio of liquid assets to short-term funding is used as measure of liquidity risk. The liquidity risk refers to bank having insufficient cash or borrowing capacity to meet either deposit withdrawals or new financing demand, thereby forcing banks to borrowing emergency funds at possible excessive costs (Drakos, 2002). Therefore, when banks liquidity risk increases and consequently increase the bank margin to cover the excessive cost of funding incur. However, the evidence is inconsistent. Carbo-Valverde and Rodriguez-Fernandez (2007) find that liquidity risk have a positive effect on bank margins. In contrast, Fungacova and Poghosyan (2011) find that liquidity risk is negatively affect bank margins. Both Islamic and conventional banks face liquidity risk; however, the effect on intermediation margins remains unclear a *priori.*

(d) Risk aversion. Another basic financing spread determinant of banks refers to their risk aversion. Following the study of Maudos and Fernández de Guevara (2004) and Maudos and Solis (2009), risk aversion is measured by the ratio of equity to total assets. A higher proportion of equity indicates greater risk aversion of a bank. Generally, equity is considered to be the most costly form of liabilities in term of expected return compare to deposits. Therefore, the higher risk aversion bank, the greater the margin is expected in order to cover the higher cost of equity financing Maudos and Fernández de Guevara (2004). Accordingly, we expect higher risk aversion ratio to have a positive relationship with Islamic and conventional bank margins.

(e) Market share. Most previous studies use Lerner index or Herfindahl index as proxy for market structure (Maudos and Fernández de Guevara, 2004; Maudos and Solis, 2009, Fungacova and Poghosyan, 2011; among others). This study uses the market share as a proxy for market power. We follow Claeys and Vender Vennet (2008), using market share to capture the market power of a bank. The market share is calculated as bank share of loans in the total loans of banking sector. Maudos and Fernández de Guevara (2004) observe that banks with large market shares are able to exercise market power in setting price to earn higher margins. Therefore, a positive relationship between the market share and the intermediation margin in Islamic and conventional banks is expected.

Prior studies on bank margins include a number of bank-specific control variables not predicted by the theoretical model; however, there have impact on bank margin. Taking previous studies as reference, the following variable are used:

(f) Size of operations. Bank size is often considered an important determinant of its margin. This study uses the logarithm of total loans of the bank as a proxy for its size of operations (Maudos and Fernández de Guevara, 2004; and Maudos and Solis, 2009). Theoretical it predicts a positive relationship between the size of operations and bank margin. As a bank is increasing the size of operations would also lead to a greater of potential loss. Thus, bank would require a greater margin. On the other hand, economies of scale suggest that larger banks would provide more loans with lower margin compare

to smaller banks. Therefore, this study does not have a particular prior regarding the expected sign of this coefficient on Islamic and conventional bank margins. The overall effect needs to be investigated empirically.

(g) Efficiency. Efficiency refers to the quality of management, is measured by the operating cost to gross income ratio. Good management implies that bank managers are investing high earning assets and low-cost liability. The higher levels of operating cost to generate one unit of gross income reflect banks are not efficient in their management. An increase in this ratio suggests that a decrease in the efficiency, which would have lower net interest margin (Maudos and Solis, 2009). Thus, the estimated coefficient in this study is expected to have a negative sign.

(h) Implicit interest payments. The implicit interest payments refer to the cost of additional services for which bank customers have not been charged (Entrop et al., 2015). Maudos and Fernández de Guevara (2004) and Maudos and Solis (2009) find a positive relation between implicit interest payments and bank margin. This is because in order to compensate for the cost of additional services, banks have to set higher lending rate on loan, so a greater margin. In contrast, Entrop et al. (2015) observe opposite direction. In this study, implicit interest payments are defined as the difference between non-interest expenses and non-interest income to total (interest-bearing) assets. Thus, the estimated coefficient in this study is expected to have a positive sign.

(i) Opportunity cost of holding reserves (OCP). Following Entrop et al. (2015), the proxy of opportunity cost of reserves using the cash and reserves with central bank (non-interest bearing reserves) to total assets (interest-bearing). Banks are required to maintain reserves at the central bank, but these reserves bear zero return. The opportunity cost of this reserve is the return on earning assets foregone by holding deposits in cash. This cost is considered an additional expenses of bank and it depends on the size of reserves and the opportunity cost foregone (i.e., money market rate). Thus, the greater the reserve amount, the higher the opportunity costs, and highest bank margin is needed. Accordingly, the sign of the coefficient is expected to be positive.

(j) Funding costs. To our best knowledge, funding costs variable is not used up to now in the study of the determination of bank margins. This study include funding costs proxy

by the interest (or financing costs in Islamic banks) expenses to total deposits ratio. Generally, banks major source of funds are from customers deposits, and they have to pay interest on these deposits. Banks with higher funding costs are expected to recuperate this cost by setting higher lending rate. Therefore, a positive relation to Islamic and conventional bank margins are expected.

Finally, diversification variables in this study are as follows:

(k) Net non-interest income (NII). In accordance to Maudos and Solis (2009) and Entrop et al. (2015), net non-interest income is measured by the non-interest income minus non-interest expenses to total assets. This measure captures the impact of all sources of the non-interest income generated by diversified banks on its margin. A diversified bank is able to offer its traditional banking products with small margin or negative margin, with the objective of keeping and/or attracting customers (Maudos and Solis (2009). As a result, the estimated coefficient for net non-interest income is expected to be negative.

(l) Income from fees and commission (FEE). Define as the net fee income to total assets. Higher level of fee-income activities reflects the greater focus and ability of a bank diversify to non-traditional activities. Lepetit et al. (2008) conclude that fee-based services affect bank margin and loan pricing. They find that banks with greater proportion of fee-based income are associated with lower lending rates. This translates into expected negative effects on bank margin in Islamic and conventional banks.

(m) Other earning assets to total assets (OEA). Total earning assets other than loans to total assets. A higher value of this ratio implies greater diversification toward "non-traditional" activities. It is expected that bank margins should decrease as a result of higher income diversification (Carbó Valverde and Rodríguez Fernandez, 2007).

Table 1 provides description summaries of the dependent and independent variables, their proxies, as well as the predicted coefficient sign of their impact based on the theoretical argumentation.

Table 1: Variable description and expected impact on the bank margin

Variables	Description	Expected Coefficient
Dependent variable		
Bank margin (BM)	Is proxied by: (i) net interest margin (NIM) defines as interest income minus interest expenses to total assets in conventional; and (ii) net profit margin (NPM) define as earnings on financing activities minus payment on deposits to total assets in Islamic banks.	
Independent variables		
Determinants of the financing spread (FS_{it})		
Operating costs	Proxy by the ratio of total operational expenses to total assets, to captures the impact of operating costs on the margin. The operating costs of banks are expected to have positive influence on bank margin.	+
Credit risk	Is proxied by the loan loss provision to total gross loan ratio. The greater the expected risk of default, the greater will be the margin.	+
Liquidity risk	Is proxied by liquid assets to short term funding. Previous evidence is inconclusive; therefore, do not have a particular prior regarding the expected sign of this coefficient.	?
Risk aversion	The ratio of equity to total assets is used as a proxy for bank risk aversion. The expected coefficient for risk aversion is positive.	+
Market share	The market share is calculated as bank *i*'s share of loans at time *t* in the total loans of banking sector. It is expected to have a positive sign.	+
Bank-specific control variables (BS_{it}^{j})		
Size of operation	Is defined as the logarithm of total assets. The evidence is mixed; therefore, do not have a particular prior regarding the expected sign of this coefficient.	?
Efficiency	Measured by the operating cost to gross income. It is expected to have a negative impact on bank margin.	-
Implicit interest payments	Is defined as the difference between non-interest expenses and non-interest income to total (interest-bearing) assets. A positive sign is expected.	+
Opportunity cost of holding reserves	Is proxied by cash and reserves with central bank (non-interest bearing reserves) to total assets (interest-bearing). However, previous evidence is inconsistent; therefore, do not have a particular prior regarding the expected sign of this coefficient.	?
Funding costs	Interest (or financing) expenses to total deposits ratio. It is expected that a high ratio will be associated with higher margin due to cost consideration in the price setting.	+
Diversification variables (DI_{it}^{n})		
Income from fees and commission	Is proxied by net fee income to total assets. Its expected sign is negative.	-
Non-interest income	Is calculated as the non-interest income minus non-interest expenses to total assets. A negative sign is expected.	-
Other earning assets to total assets	Is calculated as the total earning assets other than loans as a ratio of total assets. A negative sign is expected.	-

Note: "+" indicates an expected positive coefficient, "-" a negative coefficient, and "?" that the effect cannot be predicted a priori, respectively.

4. Data and Methodology

4.1. Data

The sample used is formed by an unbalanced panel of data from 249 annual observations, corresponding to 16 Islamic and 20 conventional banks. The dataset are unbalanced panel because there were banks entering and leaving the banking sector due to mergers. The bank annually balance sheet and income statement are obtained from *BankScope* database maintained by *Bureau Van Dijk*. All the ratios are calculated based on the standardised accounting format provided by *BankScope* in order to ensure comparability across banks.

Table 2 reports the descriptive statistics of the bank margins and their determinants, number of observation of the full sample, as well as for subgroup of Islamic and conventional banks. In addition, this study checks also whether there exist any significant differences between the variables of the Islamic and conventional banks. For this purpose, the *t*-test value in the last column is reported. There are some noteworthy features in the data, especially, those highlighting differences between Islamic and conventional banks. On average, the net profit margin in Islamic banks is lower than conventional banks. The mean bank margin for Islamic banks is 2.836, while the conventional banks ratio reports an average of 2.896. For the mean of total financing amounts, the Islamic banks is RM12,712.78 million, whereas conventional banks is RM43,704.32 million. This indicates that the size of Islamic banks is relatively small compare to conventional banks. The ratio of operating costs is higher for Islamic than conventional banks, which corresponds to 0.040 and 0.036 ratios, respectively.

The risk aversion of banks also differs considerably between Islamic and conventional banks. Conventional banks are having higher risk aversion, this might implies that conventional are better capitalization. The market share ratio is used as an indicator of a bank market power, the t-test value shows that it is significant differences exist in both type of banks. The market power means of conventional banks is higher, as compare to the Islamic banks. This indicates that conventional banks have the highest value of market power, which might suggest a monopolistic competition structure in the banking-sector. As for the efficiency ratio, the conventional banks are lower than Islamic banks, imply than conventional banks are more efficient in operational. These observations not unexpectedly, as conventional banks, on average, size of operation is greater, and able to achieve economies scale and improve the efficiency. Finally, the diversification variables, income from fees and commission, and Non-

interest income ratios in conventional banks are higher compare to Islamic banks. This might implies that conventional banks place greater emphasis on diversifying their income sources.

Table 2: Means of variables

Variables	*All banks*	*Islamic banks*	*Conventional banks*	*t-test*
Bank margin (%)	2.869	2.836	2.896	2.169
Total loans/financing (RM'000)	30,013.28	12,712.78	43,704.32	-6.247
Operating costs	0.038	0.040	0.036	3.315
Credit risk	0.005	0.008	0.003	2.858
Liquidity risk	0.376	0.337	0.408	-2.955
Risk aversion	0.097	0.088	0.105	-3.511
Market share	0.028	0.012	0.041	-6.300
Efficiency	0.932	0.959	0.910	6.254
Implicit interest payment	0.013	0.018	0.008	9.489
Opportunities costs of holding reserves	0.031	0.025	0.036	-3.143
Funding costs	0.031	0.031	0.030	0.414
Income from fees and commission	0.078	0.052	0.097	-7.464
Non-interest income	0.159	0.070	0.229	-15.337
Other earning assets to total assets	0.389	0.375	0.400	-1.360
Observations	249	110	139	
No. of banks	36	16	20	

Source: All bank-level data used are obtained from the BankScope database

Notes: The mean value of the variables used in the regressions of study. The sample consists of 16 Islamic banks and 30 conventional banks operating in Malaysia over the period 2008-2014. The t-test value is the test result of the difference between the means of the Islamic and conventional banks.

4.2. Methodology

This section discusses the empirical model used to investigate the determinants of bank margin. Carbó-Valverde and Rodríguez Fernandez (2007) state that the current values of the bank margins may be determined by their previous values. We therefore use two-step generalized method of moments (GMM) estimator introduced by Arellano and Bond (1991) to investigate the impact of various determinants on bank margin. This study estimates a regression model of bank margin (BM) (calculated as the difference between financial income and financial costs divided by total earning assets) as a function of financing spread (FS), bank-specific control variables (BS) and diversification variables (DI). The dynamic model to be estimated is as follows:

$$BM_{it} = \delta BM_{it-1} + \sum_{k=1}^{K} \beta_k FS_{it}^{j} + \sum_{l=1}^{L} \gamma_l BS_{it}^{l} + \sum_{n=1}^{N} \beta_j DI_{it}^{n} + \eta_i + \nu_{it} \quad (1)$$

In the bank margin function, FS_{it}^{j} = (operating costs, credit risk, liquidity risk, risk aversion and market share), BS_{it}^{l} = (size of operation, efficiency, IIP, OCR and price of deposit), and FD_{it}^{n} = (FEE, NII and OEA). For $t = 1,\ldots T$, where T is the number of periods observed and $i = 1,\ldots I$, and I is the total number of banks. Therefore, subscripts i and t refer to bank i at time t, respectively. The η_i is an unobserved time-invariant bank-specific effect and ν_{it} is a disturbance term. Given that the independent variables and dependent variable are correlated with η_i, transformation of first-difference is required to eliminate the individual effects. Arellano and Bond (1991) propose a two-step GMM estimator to address this issue. In the first step, the error terms (ν_{it}) are assumed to be both independent and homoscedastic, across banks and over time. In the second step, the residuals obtained in the first step are used to construct a consistent estimate of the variance-covariance matrix, thus relaxing the assumptions of independence and homoscedasticity (Carbó-Valverde and Rodríguez Fernandez, 2007). In addition, due to small sample used, the two step standard errors are computed in accordance with the Windmeijer (2005) finite-sample correction.

5. Results

Table 3 presents the results of the different estimations of this study. First, equation 1 is estimated for the all sample, regardless of Islamic or conventional banks. Next, perform separate estimations based on sub-samples of Islamic and conventional banks. All regression are estimated using two-step standard GMM instrumental variables techniques, as the autoregressive parameter is below 0.8 and the time series observations are moderately large (Moshirian and Wu, 2012).

In order to determine the consistency of the estimators, this study use Hansen over-identifying test, this tests the overall validity of the instruments and serial correlation (Arellano and Bond, 1991). Table 3 shows that the Hansen test value is insignificant, therefore no evidence is found to reject the null hypothesis in all regressions. This indicates that the model is correctly specified and the instruments are valid. The second test examines the assumption of no serial correlation of the errors in levels. This study use the statistic proposed by Arellano and Bond (1991) to test the absence of autocorrelation. The evidence shows that no significant second-order autocorrelation (AR 2). Hence, the Hansen's null hypothesis and the autocorrelation tests are not rejected; this suggests that the dynamic model is validated. Table 3 shows that the coefficients on the lagged dependent variable on the right-hand side has a

significant positive sign in all regressions, this suggest that past bank margin has impacts on the bank margin in the current year.

5.1. All Samples

5.1.1 Financing spread variables

The first column in Table 3 reports estimation results for the all sample. The estimated coefficients show that all financing spread variables are significant and with predicted sign. With regard to the operating costs variable, the result shows that the coefficient is highly significant and most sizable in economic terms among other determinants. The positive sign of the coefficient is in line with the model predictions. This suggests that high operational costs incurred by banks are passed to their customers by way of higher margins charged for financial services. The positive sign of the coefficient is consistent with that obtained by Fernández de Guevara (2004) for Spanish banks; Maudos and Fernández de Guevara (2004) for European banks; and Maudos and Solis, (2009) for Mexican banks.

Next, the estimated coefficient for credit risk is positive and significant at the level of 5%. The result of this study is consistent with previous study (i.e., Maudos and Fernández de Guevara, 2004; and Maudos and Solis, 2009). Credit risk is the risk of non-payment or default on financing due to the inability of the borrowers to fulfil their obligations to bank. Thus, the increase of credit costs is related to default rates when banks need to increase the loan loss provision to cover potential losses. Therefore, the greater the credit risk exposure, the higher risk premium on financing, consequently the financing price (interest rate) will increase and present higher bank margin.

The coefficient on the liquidity risk is found to be positive and significantly, which indicates that as this ratio increases, the bank margin also increases. This finding is in line with Carbo-Valverde and Rodriguez-Fernandez (2007). In the banking environment, liquidity risk arises from the inability of a bank to accommodate decreases in liabilities or to fund increases in assets. This study uses liquid asset to short-term funding as a proxy for liquidity risk. Our results suggesting that when bank loans are backed up by liquid assets, or high levels of illiquid assets in loans, the banks are more likely to charge higher interest rate due to the higher cost of funds.

Regarding bank's risk aversion, measured by its equity to total assets, the coefficient has the expected positive sign and is significant. A potential explanation is that bank holding high equity is relatively costly and reduces bank profitability. Therefore, banks are expected to seek to lower the cost of holding relatively high equity ratio by demanding an extra spread (premium) in the banks' margin. This finding is consistent with the previous studies, whose find banks with high risk aversion will require a higher margin in order to cover the higher costs of equity financing compared to external financing (Carbó-Valverde and Rodríguez Fernandez, 2007; and Maudos and Solis, 2009).

The market share variable included as market power, which is proxied by loans of a bank in the total loans of banking sector. Table 3 shows that the coefficient is positive and significant. The result is consistent with Maudos and Fernández de Guevara (2004), and Maudos and Solis (2009). This suggesting that bank with greater market share would able to charge higher financing rates in order to have higher bank margin. This also reflecting the fact that bank with higher market share could exercise it monopoly power and set highest margin.

5.1.2 Bank-specific control variable

Considering the bank-specific control variables, this study includes size of operations, efficiency and implicit interest payments, opportunities costs of holding reserves, and price of deposit which might be influence bank margin. The results in Table 3 show that all estimated coefficients, with the exception of one concerning the opportunities costs of holding reserves variable, are significant. Of the five bank-specific control variables, the one with the strongest impact appears to have been the implicit interest payments. The implicit interest payments refer to the cost of additional services for which customers have not been charged. The positive coefficient seem to suggest banks that experience higher cost on implicit interest payments is transferred to their financing rate to finance the additional costs.

The effect of size on bank margin is statistically significant and negative; this indicates that large operation size is associated with a low margin. This seems to suggest that large banks aggressively grow their credit business at low margins. Growth may be caused by the following factors. First, large operations are expected to be associated with higher potential loss or impaired loans which reduce bank margin. This factor might not be relevant in the Malaysia banking sector, as most of the banks have relatively moderate impaired loans. Second, this growth might be driven by the economies of scale as larger banks charge lower margins. The

result of this study is in line with Maudos and Fernández de Guevara (2004), and Fungacova and Poghosyan (2011).

Another determinant is the quality of bank management. The quality of management, proxy by the efficiency ratio, expected affects the bank margin negatively (a negative coefficient implies lower efficiency). In this study, efficiency is defined as operating cost to gross income ratio. The estimated coefficient for efficiency ratio is negative and significant. This suggesting that when banks are having inefficient, there are not able to reduce their costs, and at the same time would reduce bank margin. This result is consistent with Maudos and Solis (2009).

Concerning bank's opportunity cost of holding reserve measure by its cash and reserves with central bank (non-interest bearing reserves) to total assets (interest-bearing). Table 3 result shows that the coefficient has the expected positive sign, however is not significant. Consistent with the findings of Maudos and Fernández de Guevara (2004), this study suggests that the proportion of the capital does not affect the financing rates. Finally, funding costs variable, banks have to pay interest on their deposits, thus this variable is included in this study examine the effect on bank margin. According to MacCarthy et al. (2010), customer deposit is the primary source of bank loan, thus, this study expect funding costs is positively relate to bank margin. The coefficient of funding costs is significant with the positive sign indicating the banks with high funding costs have to pass on these costs to borrowers, which leads to higher margins to compensate the banks.

5.1.3 Diversification variables

Given the "non-traditional" banking activities may provide a more stable income; banks are likely to seek functional diversification via activities, such as non-interest income services and products, transaction fees and commissions (Lin et al., 2012). However, the existing literature on determinant of bank margins does not adequately account for the effects of diversification (Lin et al. (2012). Therefore, this study included diversification variables into the model for analysing the determinants of bank margin.

The results regarding diversification variables are as follow. The fee and non-interest income variable has insignificant effect on bank margin. The coefficient for other earning assets to total assets variable is negative and significant. This implies that more diversified

banks have lower margin, although only the other earning assets to total assets variable is significant. The possible explanation is that when banks are more diversified, there could charge lower spreads for loans to gain higher income from noninterest activities, because they consider the two sources of income as substitutes for each other (Carbó-Valverde and Rodríguez Fernandez, 2007).

Table 3: Regression results

	All sample	Islamic banks	Conventional banks
Bank margin$_{i, t-1}$	0.412** (0.031)	0.378** (0.039)	0.488** (0.012)
Financing spread:			
Operating costs	0.195** (0.022)	0.092** (0.022)	0.328*** (0.016)
Credit risk	0.010** (0.023)	0.281* * (0.025)	0.386** (0.008)
Liquidity risk	0.005** (0.021)	-0.012 (0.223)	0.015*** (0.006)
Risk aversion	0.025** (0.028)	0.007 (0.506)	0.021** (0.042)
Market share	0.099***(0.001)	0.511* (0.063)	0.028*** (0.009)
Bank-specific control variables:			
Size	-0.005*** (0.000)	0.001 (0.818)	-0.002** (0.028)
Efficiency	-0.006*** (0.000)	-0.017***(0.000)	-0.002***(0.006)
Implicit payments	0.126***(0.000)	0.574***(0.001)	0.115** (0.033)
Opportunities costs of holding reserves	0.006 (0.809)	0.129 (0.341)	-0.001 (0.978)
Funding costs	0.024** (0.037)	0.011 (0.363)	0.033** (0.028)
Diversification variables:			
Income from fees and commission	0.063 (0.907)	0.070** (0.050)	-0.006 (0.258)
Other earning assets to total assets	-0.033***(0.000)	-0.002 (0.922)	-0.031***(0.000)
Non-interest income	-0.071 (0.891)	-0.128** (0.016)	-0.002 (0.528)
Number of observations	249	100	139
Arellano-Bond order 1 [p-value]	[0.089]	[0.091]	[0.095]
Arellano-Bond order 2 [p-value]	[0.572]	[0.477]	[0.120]
Hansen test [p-value]	[0.445]	[0.907]	[0.922]
F-statistic	23.35	179.15	49.47
Number of instrument	15	15	15
Number of groups	36	16	20

Note: This table reports results from GMM estimations of the effects of financing spread, bank-specific control and diversification variables on bank margin. The dependent variable is the bank margin. The period covers the years from 2003 to 2011. The Hansen test is the test for over-identifying restrictions in GMM model estimation. Arellano-Bond order 1 (2) are test for first (second) order serial correlation (H_0: no autocorrelation); p-values are shown in square brackets. *, ** and *** denote significant at the 10%, 5% and 1% level, respectively.

5.2 Islamic vs Conventional banks

Column 2 and 3 in Table 3 shows the estimation for subsample, to capture differences impact of bank margin determinants for Islamic and conventional banks. The fact that determinants of bank margins might different in both types of bank has not been properly investigates in the literature so far. For this purpose, this study is subdivided the sample into Islamic and conventional banks.

The results for Islamic and conventional banks largely confirm the findings in previous section. Therefore, in this section the discussion focus on highlighting some relevant differences between the two regression results. Table 3 shows that the coefficient for operating costs are significant and display the expected positive signs in both groups. The observation reflects the fact that regardless of Islamic or conventional banks, they respond similarly to change in operational costs when setting the financing rates. The impact of operating costs on the bank margin is economically relevant: an increase by 100 basis points in operating costs translates into an increase of 92 basis points in the Islamic bank margin; for conventional banks the increase amounts to as much as 328 basis points. This suggest that banks incur high costs will logically need to operate with higher margins to enable them to cover their higher operating costs.

Islamic banks differ from the conventional banks in three respects. First, margin of Islamic banks are affected by the changes in operating costs and credit risk, and significant at the 5% level. The sign of the estimated coefficients is positive and consistent with the previous studies. The credit risk economic significance is higher than the operating costs when setting the margin. This implies that profit margin of Islamic banks is highly affected by change in credit risk of financing portfolios. By contrast, positive and significant signs are obtained in the variables operating costs, credit risk, liquidity risk, risk aversion and market share, and observe that conventional banks will set higher interest rates in order to have higher margin.

The second different feature of Islamic banks is in the bank-specific control variables, indicating that size of operation and funding costs is insignificant, while these variables are significant influences conventional banks margin. Generally, the size of operation is related to the market share of the individual bank. Despite Islamic banks attempts to expand their presence in the banking sector, however, there is no evidence to shows that they benefit from the economies of scale in setting bank margin.

The third different feature of Islamic banks is in the diversification variables, indicating that fees and non-interest income is significantly influence bank margin. In contrast, these two variables is insignificant impact on conventional margin. This might suggest that the importance of fee-based income has affected the net profit margin of the Islamic banks.

6. Conclusions

Bank margins vary across banks as there have to deal with different pricing strategies. Applying the GMM estimator technique on panel data set across 36 banks. This paper analyses how financing spread, bank-specific control variables, and diversification activities factors affect bank margin. The study sample is further subdivided into Islamic and conventional banks, respectively.

Overall, the results suggest that there exist differences in terms of the impact of bank margin determinants across Islamic and conventional banks. Specifically, this study finds that for Islamic banks, important margin determinants are found to be operating costs, credit risk, efficiency, implicit payments, income from fees and commission, and non-interest income. While for conventional banks important factors are operating costs, risk component, market share, efficiency, size of operation, implicit payments, funding costs, and other earning assets. The bank diversification, as measured by income from fees and commissions, has positive impact, whereas non-interest income has negative impact on bank margin in Islamic banks. However, these variables are not significantly related to conventional banks margin. Therefore, bank diversifications not help banks to increase their margin.

Despite apparent differences, this study also documents certain similarities across Islamic and conventional banks. The results show that operational efficiency is by far the most important determinant of bank margin. Higher operating costs are reflected in higher financing rates. Implicit payment turns out to be another important determinant of bank margin, and this finding as evidence of additional operating costs. The result also indicates that high credit risk leads to higher bank margin. In the light of the evidence obtained, it is important to reduce operating costs, to manage credit risk, and to improve bank size of operation as they benefit from the economies of scale, which lower bank margins and benefit consumers.

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