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Islamic Banks Credit Risk: A Panel study

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Abstract

The purpose of this paper is to investigate the determinants of credit risk in the case of Malaysia Islamic banks. Using a yearly bank level data from 1995 to 2013, this paper utilizes the fixed effect model to provide empirical evidences on Islamic banks credit risk in Malaysia. The empirical results demonstrate that a few bank-specific variables do significantly influence credit risk of Malaysia Islamic banks. The findings show that financing quality and capital ratio demonstrate consistent results regardless of specification and estimation models. The inclusion of ownership status also suggests that there is a significant difference between the local and foreign ownership Islamic banks in this regard. The finding added important evidence to the existing literature on credit risk specifically Islamic banks credit risk.

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1. Introduction

The Islamic banking and finance (IBF) industry has witnessed several important events during the last decade. Since their inception in 1975, IBs have now become a global phenomenon, including the United Kingdom (UK), China (Hong Kong), Australia, Singapore and much of Europe. In certain countries like Malaysia and Bahrain, the Islamic banking (IB) industry has evolved from a primarily domestic concern to one of international significance. This success for the IB

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industry is proven by its total assets value which grew from US$1.8 trillion estimated at the end of 2013 and is expected to be more than US$2.0 trillion by the end of 2014 (see IFSB, 2014). During the last ten years the IB industry has witnessed changes in economic conditions and the onset of a financial crisis. It is reported that IBs still remain strong and continue to grow globally.

Early studies on credit risk determinants had primarily focused on conventional banking credit risk management particularly in developed countries (Berger & DeYoung, 1997; Berger & Udell, 1990, 1994). A few other relevant studies have attempted to address IBs' risk management. For example, Febianto (2012) conducted a library-based research analysis, and Abedifar, Molyneux, and Tarazi (2012) did an empirical analysis on 24 Organization of Islamic Cooperation (OIC) countries. This paper aims to examine the key determinants of credit risk of Islamic banks in Malaysia by introducing Islamic financing types (IFT) and ownership status (Status) variables. Malaysia has been chosen as the sample country because of its position in the global Islamic banking industry. The Malaysian IBs are ranked third in the global IB industry following Iran and Saudi Arabia. Malaysia established its first Islamic banks in 1983. Since then, the number of IB products and services has expanded with the implementation of Interest-free Banking Scheme (IFBS) in 1993. The IFBS allowed conventional banks (CBs) to offer *Shari`ah*-approved products and services through Islamic windows. The IB industry in Malaysia received strong support from the government, and as at the end of 2014 there were 16 fully-fledged IBs and 4 international IBs operating in the country.

2. Literature review

Credit risk management studies have attracted the attention of many parties, particularly in developed countries. Investigating the factors that drive the credit risk in the banking sector is not only important to the bank's management but also to regulatory authorities. Prior studies have measured the credit risk by using the ratio of non-performing loans (NPL). In banking studies, the loan is classified as NPL when the payment of interest and principal are overdue by 90 days or more. Higher NPL causes the banks to experience lower profit margins and if the problem becomes more serious, it can lead to a crisis. Potential influences on the NPL include the types of borrower, bank management and adverse changes in the economic situation. The importance of efficient credit risk management invites many parties especially researchers, regulators and banks' management to investigate the determinants of credit risk in banking. This will help them to understand and propose a comprehensive credit risk management framework.

Most studies suggest that there are two strands of literature on the factors that drive credit risk. The most popular strand suggests that credit risk is driven by several bank specific variables (BSV) and the second strand argues that macroeconomic factors greatly influence the credit risk of banks. A survey of the literature informs us that previous studies normally examined the determinants of credit risk either using BSV or macroeconomic factors as explanatory variables. However, a few studies used both BSV and macroeconomics variables to explain the NPL of banks. The examples include Louzis, Vouldis, and Metaxas (2012) who examine the determinants of credit risk in Greece's banking sector by using macroeconomic and BSV as explanatory variables. They used the NPL of different loan categories as the dependent variables and find that NPL of Greek banks are mainly explained by macroeconomic variables such as unemployment, gross domestic product (GDP) and interest rates.

Most empirical studies that investigate the effect of the BSV on NPL, uses loan growth, loan quality, management quality, size, loan concentrations, and capital as the variables. Demirguc-Kunt (1989) has reviewed empirical literature on deposit-institution failures. He compared and summarized the models and variables for banking failure studies. Demirguc-Kunt concludes that capital adequacy, assets quality, management competence and earnings are among the significant explanatory variables for bank failure. Berger and DeYoung (1997) focus on the BSV as an indicator for problem loans and efficiency of the banks. Using a US commercial banks dataset for the period 1985 to 1994, they examined the inter-temporal relationship between problem loans and cost efficiency. They developed four hypotheses related to: i) bad management (low cost efficiency signal for poor management); ii) bad luck referring to external events; iii) moral hazard; and iv) skimming issue. They find evidence that cost efficiency and capital are negatively associated with problem loans. Angbazo (1997) uses US Bank Call Report Data for 1989 to 1993 to examine the relationship between net interest margins (NIM) and interest rates risk, default risk and off-balance sheet activities. The author claims that there is a significant relationship between size, NIM and default risk. More recent studies focusing on the BSV as the main determinant of credit risk include Konishi and Yasuda (2004); Godlewski (2005); and Jiménez, Lopez, and Saurina (2007).

2.1. Islamic banks and credit risk

Interest in risk management in IB has grown. An increasing number of studies on risk management of IBs focus on the processes of risk management, *Shari`ah* issues and related risks faced by IBs. Only a few studies address the issue of risk determinants, particularly credit risk. Although the number of empirical studies on IBs' credit risk is small, a few attempted to address the issues related to this specific kind of risk (Al-Tamimi & Al-Mazrooei, 2007; Hassan, 2009; Makiyan, 2008; Wilson, 2007). Researchers have addressed various risk management issues including credit risk; however, all these studies do not empirically identify the determinants of IBs' credit risk. Several empirical analyses examine their risk and most of them used a single country analysis and BSV as the explanatory variable. For example, How et al. (2005) studied IBs risk using 23 Malaysian commercial banks' data for 1988 to 1996. The authors found that banks offering Islamic financing (IF) have significantly less credit risk than banks that do not. They also suggest that size does significantly influence the credit risk of both IBs and CBs. More recently, Aisyah Abdul. Rahman, Mansor, and Meera (2009) examined the impact of lending structures and specific BSV on the insolvency risk of CBs an IBs in Malaysia from 1994 to 2006. Lending structures, provisions for loss and assets size affect Malaysian CBs and IBs in different ways. This conclusion implies that the regulatory bodies should introduce different capital guidelines for both banking systems, since their operations and products are substantially different.

The other study by Ahmad and Ahmad (2004) examine the key factors influencing the credit risk of Malaysian IBs. They used a dataset comprising one fully-fledged Islamic bank, six Islamic windows and six CBs for the period 1996 to 2002. This study reports that management efficiency, risk-weighted assets and size have a significant influence on Malaysian IBs' (MIBs) credit risk. They also discover there are similarities and differences between credit risk determinants for CBs and IBs. The authors note that IBs should have a comprehensive risk management framework and adequate disclosure of information on concentrations of financing assets and risks, which occurs in CBs' banking reports. Aisyah Abdul. Rahman and Shahimi (2010) analyse the impact of financing structure and BSV on credit risk using panel data analysis for Malaysian IBs from 1994 to 2008. They also incorporated macroeconomic variables into their framework. The results reveal that type of financing reacts differently to credit risk when the model was controlled for macroeconomic variables. The credit supply and spread of long-term interest rate and money market rate have a positive influence on credit risk. These indicate that the IBs should be able to manage credit supply by not excessively lending to risky sectors, which will only increase the credit risk exposures.

3. Data and methodology

The data is collected from financial statements and annual reports of 17 Malaysian IBs; these documents are located on the BankScope database and each bank's website. Eighty-nine (89) observations were collected from these 17 MIBs. The data on IFT offered by MIBs were retrieved from each bank's hard copy annual reports. However, some banks do not provide details about the types of financing they offer to clients, especially during the time they first started. For this reason, the sample period is limited to only 14 years (from 2000 to 2013) with the total number of observations reduced to 82 for the second part of the analysis when assessing the impact of Islamic financing structure on credit risk.

This paper employs the panel data technique to identify the determinants of credit risk of MIBs. Panel data is a technique that pools the sample observations in the cross-section over a certain period of time. In panel data, the observations are indexed through N x T dimension. N is the number of firms (panels) and T is the dimension of a time series, such as yearly, monthly or daily. t=1, 2,….., T of each i=1, 2,…., N cross-section observations in the sample. The panel data model fits this study because it can analyse changes at the bank level which cannot be done in either cross-section or time series models. Furthermore, using the panel data can also reduce the multicollinearity problem and provide a larger degree of freedom. These two can be achieved because the panel data technique increases the number of data points (Baltagi, 2005). The panel data model is expressed as:

$$y_{it} = \beta_0 + \beta_{it} X_{it} + u_{it} \qquad i=1,\ldots..N;\ t=1,\ldots..T \tag{1}$$

Where in (1) above, y_{it}, u_{it} are N x 1 vectors, X is N x k matrix, β is k x 1 vector and β_0 is an unknown constant coefficient to be estimated, and X_{it} refers to explanatory variable k for Islamic bank $_i$. The estimation for this study is written as:

$$CR_{it} = \beta_0 + \beta_{it} X_{it} + \alpha_i + \nu_{it}$$
$$\text{For } i = 1,\ldots..17 = N,\ t = 1,\ldots..14 = T,\ k = 1,\ldots..7 = \text{BSV's.} \quad (2)$$

Where;

i. X_{it} is a vector of explanatory variables measured at time t,

ii. α_i is unobserved in all periods but constant over time i,

iii. ν_{it} is a time-varying idiosyncratic error,

In equation 2, CR_{it} is the dependent variable which represents credit risk of the i_{th} Islamic bank (i=1,2,…..17) in t^{th} year (with t = 1, 2, …14), it is a function of a vector of independent variables which is indexed by k (k = 1,2,…..7) independent variables. These seven independent variables are: i) financing expansion (Fin Exp); ii) financing quality (FLP); iii) capital buffer (Cap Buffer); iv) capital ratio (CAPR); v) NIM; vi) management efficiency (MGT); and vii) log of total assets (SIZE). β_0 is the intercept. BPLM test, F-test for fixed effects and Hausman test is used to choose the appropriate model to be applied in this paper.

4. Finding and analysis

Table 1 summarizes the value of correlations for all variables used. The test identifies a few variables that have a relatively high correlation with the correlation values above 0.5. The variables are CAPR and capital buffer (0.795), SIZE and capital buffer (-0.575) and SIZE and CAPR (-0.583). To further investigate this issue, a VIF post-estimation test is applied. The results of this VIF test suggest that there is no multicollinearity problem occurs in the variables.

Table 1: Pairwise Correlation Matrix of Variables

	CR	Fin. Exp	FLP	Cap Buffer	CAPR	NIM	MGT	SIZE	EBF	SBF	STATUS
CR	1.000										
Fin. Exp	-0.269***	1.000									
FLP	0.488***	0.092	1.000								
Cap. Buffer	-0.097	-0.209**	-0.130	1.000							
CAPR	-0.135	-0.468***	-0.139	0.796***	1.000						
NIM	-0.043	0.122	0.135	-0.045	0.068	1.000					
MGT	0.214**	0.450***	0.137	-0.254***	-0.487***	-0.344***	1.000				
SIZE	0.170	0.416***	0.083	-0.576***	-0.584***	0.075	0.351***	1.000			
EBF	0.542***	0.059	0.327***	-0.124	-0.211**	0.060	0.295***	0.475***	1.000		
SBF	0.403***	-0.134	0.226**	0.122	0.106	0.164	0.018	-0.042	0.454***	1.000	
STATUS	-0.331***	-0.083	-0.057	0.353***	0.319***	0.083	-0.391***	-0.463***	-0.116	0.261**	1.000

Note: Fin. Expansion, the ratio of total financing to total assets; FLP, the ratio of loan loss provision to total assets; Cap Buffer, the ratio of total equity to total assets; CAPR, the ratio of TIER 1 & TIER 2 to total assets; NIM, net interest margin; MGT, the ratio of total earning assets to total

assets; SIZE is the natural logarithm of total assets. EBF is a dummy variable, 1 for equity-based financing, 0 otherwise; SBF is a dummy variable, 1 for supporting-based financing, 0 otherwise; STATUS is a dummy variable, 1 for foreign incorporated IBs, 0 otherwise. ***, ** and * denotes significance at 1%, 5% and 10% level, respectively.

4.1. Estimated results

The ratio of NPF to total financing (CR) is regressed against seven BSV, two dummies for IFT and a dummy for STATUS. The analysis is conducted using unbalanced panel data from 1995 to 2013. The total number of observations is 89 for the model without IFT variables and 82 for the model including IFT variables. White's (1980) cross-section is used to adjust the standard errors for potential occurrence of heteroskedasticity.

Table 2: Estimation results

Independent variables	Dependent variable: Credit risk							
	(1)		(2)		(3)		(4)	
	Coeff	S.E	Coeff	S.E	Coeff	S.E	Coeff	S.E
C	30.441*	16.065	65.057	48.313	-11.125	12.980	20.833	19.997
Fin. Exp	-0.239**	0.103	-0.009	0.172	-0.031	0.218	0.027	0.223
$Fin.Exp^2$	0.001	0.001	0.0001	0.001	-0.001	0.002	-0.001	0.002
FLP	1.353***	0.210	0.978	0.572	2.100***	0.270	1.447***	0.394
Cap. Buffer	0.361*	0.179	0.287	0.450	0.562***	0.144	0.245	0.227
CAPR	-0.137***	0.034	-0.089***	0.027	-0.126**	0.062	-0.095*	0.053
NIM	0.431*	0.222	0.290	0.187	0.078	0.424	-0.229	0.295
MGT	-0.040	0.023	-0.082*	0.045	0.034	0.036	-0.059	0.046
SIZE	-1.117	1.021	-3.725	3.097	1.062	0.681	-0.798	1.172
EBF			-0.756	0.841			3.257	2.103
SBF			-0.114	0.475			2.264	1.926
STATUS					-3.903***	0.946	-5.176**	2.337
R-squared	0.312		0.420		0.504		0.576	
No. of observations	89		82		89		82	
Dummy variables	No		Yes		Yes		Yes	
Firm fixed effects	Yes		Yes		No		No	

Notes: i) Columns (1) and (2) used panel fixed effects regression, column (3) used OLS regression, and column (4) used random effects GLS regression. All column results the Standard errors are adjusted for heteroskedasticity and covariance using White's cross-sections. *****, **** and * denotes significance at 1%, 5% and 10% level, respectively. The estimations are conducted on unbalanced panel data of 89 and 82 observations from 1995-2011 for 17 IBs. The observations are less due to the availability of data for financing types offered by banks. ii) Dependent variable is the ratio of non-performance financing to total financing. The independent variables are Fin. Exp, the ratio of total financing to total assets; FLP, the ratio of loan loss provision to total assets; Cap Buffer, the ratio of total equity to total assets; CAPR, the ratio of TIER 1 & TIER 2 to total assets; NIM, net interest margin; MGT, the ratio of total earning assets to total assets; SIZE, the natural logarithm of total assets; EBF is 1 for equity-based financing, 0 otherwise; SBF is 1 for supporting-based financing, 0 otherwise. STATUS is 1 for foreign IBs, 0 otherwise

Table 2 presents the regression results. Column 1 presents the results for base model, whereas credit risk is regressed against seven BSV. Different control variables are added to the model in columns 2 to 4. Fixed effects

(FE) specification is used in the regression in columns 1 and 2 only. In columns 3 and 4 a dummy for STATUS is included in the model, STATUS dummy is time invariant variable. Therefore, fixed effects model cannot be applied in these two columns. The BPLM test suggests pooled OLS regression is the better choice for the column 3 model and random effects generalised least square (RE-GLS) to be applied in column 4.

The explanatory power of results in column 1 is about 31.2% with five BSV having significant effects on credit risk at the 1%, 5%, and 10% significance level. Financing expansion shows a negative coefficient with credit risk in both fixed effects and OLS specification but not in RE-GLS. However, it only appears to have a significant effect for base model in column 1. This negative significant result is consistent with Aisyah Abdul. Rahman and Shahimi (2010). The analysis assumes that financing expansion to have a non-linear relationship with credit risk. The quadratic specification is used in all columns. For the FE model the relationship between financing expansion and credit risk is U-shaped rather than an inverted U-shape for the RE-GLS model.

Financing quality reports have positive significant relationships with credit risk for FE and RE-GLS specification in columns 1, 2 and 3, respectively. This variable is highly significant in determining the credit risk as all the coefficients are significant at 1% level. These results are as expected because more provisioning indicates that a bank may have a problem with financing quality. The downgrade in financing quality will potentially increase the risk of financing being defaulted. The coefficient declines in the fixed-effects specification model. It is worth mentioning that the FE model explores the differences between each individual bank. This suggests each bank in the sample exhibits different characteristics over time; for example, the risk management policy and its influence on the quality of the financing portfolio.

Bank capital is an important variable used by the bank to manage credit risk level. BCBS introduced the Capital Adequacy Framework to promote soundness and stability in the financial system by controlling the banks from taking on excessively risky activities (Basel, 1999). The BNM developed a capital adequacy framework for the Islamic banks (CAFIB) to safeguard IBs' risk management practices. Maintaining higher capital adequacy ratio helps IBs to improve due to diligence and discipline in managing risk exposures. The coefficients for CAR are negative and statistically significant regardless of specification and estimation methods. This demonstrates that more regulatory capital held by the IBs will help them to reduce their exposure to credit risk. It implies that higher CAR and prudent capital management policy can reduce the level of problem financing in MIBs.

The other proxy for the bank capital in this study is the ratio of total equity to total assets, Cap Buffer. Past studies report mixed results regarding the relationship of capital buffer and credit risk. For example, Godlewski (2005) finds a positive significant relationship between equity and risk, while Cebenoyan and Strahan (2004) report negative relationships between capital buffer and credit risk. This analysis finds capital buffer does have a positive coefficient and is statistically significant for columns 1 and 2 when the models were not controlled by the IFT dummy. A positive sign explains that IBs with more equity capital tend to have higher credit risk than banks with less equity. This implies that banks with higher equity capital tend to engage in more risky financing activities because they believe they have enough capital to buffer any potential losses.

NIM is only significant in the base model using the FE estimation method. When the estimation model includes the IFT and STATUS dummy, NIM is insignificant regardless of the estimation models. The MGT only shows negative significant results in the column 2 estimation, whereas the model was controlled for IFT. The earning assets of IBs consist of differently structured IF contracts. Therefore, IBs should carefully decide the proportion of each type of financing contract because different contracts expose IBs to different levels of risk. IBs' inability to manage this MGT will lead to a high credit risk level. With regard to the relationships between size and credit risk, we failed to find any significant relationships between these two variables in all estimations.

The observation of IFT dummies is important when examining whether different types of IFT have varied impacts on credit risk of IBs in Malaysia. We introduced two IFT dummies: EBF and SBF in columns 2 and 4. The EBF dummy takes a value of one for IBs that offers financing based on PLS contracts, while the SBF dummy takes value of one if the IBs offer financing using other than PLS and trading contracts. Surprisingly, we find that both IFT dummies do not show any significant effects on credit risk level of IBs. This implies that MIBs have efficient risk management frameworks in place and current policies that help IBs to mitigate risk from both types of financing structures.

This study also examines the impact of ownership status on credit risk of MIBs. Here we focus on the effect of local and foreign ownership rather than other types of ownership; for example government ownership, institutional

ownership or individual ownership. STATUS dummy takes a value of one for foreign owned banks and zero for locally owned banks. The outcome shows a negative coefficient for the ownership dummy with OLS and RE-GLS methods, implying that foreign IBs faced lower credit risk compared to local ones. It means that there is a statistically significant difference between foreign and locally owned IBs in relation to credit risk management. This is expected as foreign IBs contend have more expertise in terms of human capital. Foreign IBs may bring foreign managers into their teams who have the required skills and technological expertise. Lensink and Hermes (2004) discuss this matter, and according to them international expertise will transfer the knowledge and skills to the local personnel and indirectly improve a bank's risk management system.

5. Conclusion

The results suggest that a few BSV do significantly influence credit risk of MIBs. We find financing quality and CAR demonstrate consistent results regardless of specification and estimation models. The results suggest that any deterioration in financing quality forces the banks to allocate higher loss provisions, and consequently increase the implied credit risk level. There is also evidence that CAPR is negative and statistically significant in determining the credit risk level of IBs in Malaysia. Other explanatory variables demonstrate different effects across the estimation models. For example, capital buffer only appears to have a positive significant effect on credit risk in the OLS and FE estimation models. NIM only indicates significant results in the base model of the FE specification. When the IFT and ownership variables are included in the estimations, NIM is no longer significant. The inclusion of STATUS dummy suggests that foreign IBs are more likely to carry lower credit risk compared to local IBs, suggesting that there is a difference between the local and foreign ownership banks in this regard. The synergy between international and local experts in foreign IBs helps them to manage credit risk better.

There are several limitations of this study that should be focus to work on in future studies. This study only uses Islamic banks as a sample. For future study, a comparison between Islamic banks and conventional banks will also add value to the study. Future study may also include other internal variables and macroeconomics variables in examining the causes for credit risk in Islamic banks. By doing so, it will cover both micro and macroeconomics variables and the estimation are expected to give more insight on the credit risk management of Islamic banks.

Appendix A. Summary statistics

Variable	Obs	Unit	Mean	Median	Std.Dev	Min	Max
CR	92	%	5.715	3.910	5.537	0.070	22.113
Fin. Exp	104	%	51.206	54.480	16.951	0.826	79.642
FLP	103	%	0.870	0.529	1.259	-0.264	9.842
Cap. Buffer	104	%	9.906	7.737	8.716	-1.699	77.181
CAPR	104	%	21.494	14.425	28.218	-2.470	211.920
NIM	97	%	3.327	3.170	1.543	0.113	7.422
MGT	104	%	74.900	75.776	16.386	17.840	99.342
SIZE	104	US$	3,748,975	2,683,844	3,314,923	96,466	21,800,000

Notes: i). The observations range from 92 to 104 on fully-fledged IBs (unbalanced data of 17 banks for period 1995 to 2011). Sample data are not the same for all years due to banks being established in different years. The table presents the mean, median, standard deviation, minimum and maximum value of each variable. All the data are in ratio value except for SIZE which is thousand US$.
ii). CR is the ratio of non-performance financing to total financing; Fin. Exp, the ratio of total financing to total assets; FLP, the ratio of loan loss provision to total assets; Cap Buffer, the ratio of total equity to total assets; CAPR, the ratio of TIER 1 & TIER 2 to total assets; NIM, net interest margin; MGT, the ratio of total earning assets to total assets; SIZE is total assets value.

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