



## **Bank Specific and Macroeconomics Dynamic Determinants of Credit Risk in Islamic Banks and Conventional Banks**

**Waeibrorheem Waemustafa<sup>1\*</sup>, Suriani Sukri<sup>2</sup>**

<sup>1</sup>School of Economic, Finance & Banking (SEFB), Universiti Utara Malaysia, Sintok 06010, Kedah, Malaysia, <sup>2</sup>School of Business Innovation and Technopreneurship (PPIPT), Universiti Malaysia Perlis, Kangar, 01000 Kangar, Perlis, Malaysia.

\*Email: [ibraheem\\_ahmad@hotmail.com](mailto:ibraheem_ahmad@hotmail.com)

### **ABSTRACT**

The study analyzes macroeconomic and bank specific determinants of credit risk in Islamic and Conventional Banks. Multivariate Regression analysis is applied on the sample of 15 conventional banks and 13 Islamic Banks in Malaysia over the period between 2000 and 2010. The finding shows that the banks specific determinants of credit risk are uniquely influenced the credit risk formation of Islamic and Conventional banks. The study found that risky sector financing; regulatory capital (REGCAP) and Islamic Contract are significant to credit risk of Islamic banks. For Conventional Banks, loan loss provision, debt-to-total asset ratio, REGCAP, size, earning management and Liquidity are significant factors influencing credit risk. As for macroeconomic factors only Inflation and M3 are significant to credit risk for both Islamic and Conventional banks.

**Keywords:** Determinants of Credit Risks, Murabahah and Bai-Bhithaman Ajil, Islamic contracts, Islamic and Conventional Banks

**JEL classification:** E3, E5, G2, P4

### **1. INTRODUCTION**

The collapses of banking industry emerge due to the increase in non-performing loans that contributes to credit risk. According to Vodová (2003) substantial loss arises due to borrowers default on their loan repayment contribute to insolvency and even bankruptcy that leads to banking crisis. Pappas et al. (2012) opined that many skeptics perceive that Islamic banks and conventional banks practice are identical, Waemustafa (2013) and Waemustafa and Sukri (2013) opined that there is need to understand how credit risk is formed in Islamic banks and conventional banks considering internal and external factors determinants. Previous theories suggest that banks assets mainly consist of loan while liabilities are deposit payable where any mismatch in asset and liability would contribute to liquidity risk and credit risk.

According to Kolapo et al. (2012) and Kithinji (2010) the formation of credit risk include, inappropriate credit policies, poor lending practice, limited institutional capacity, volatile interest rate, poor management, inappropriate laws, direct lending, massive licensing of banks, low capital and liquidity risk, laxity in

credit assessment, poor loan underwriting, poor lending practice, inadequate supervision by central banks, government interference and inadequate knowledge about borrowers. The study provides extensive review of literature regarding to the banks specific factors and macroeconomic factors affecting credit risk in Islamic banking and conventional banks.

According to Boumediene (2011) suggests that credit risk occurred in Islamic banks' Murabahah financing when customer opt to cancel to buy the commodity causing the bank to be liable for losses whereas failing to complete the installment repayment for the goods as stipulated also causes credit risk to Islamic banks. Samad (2004) reports that Islamic banks practically bear no risk when engaging in Murabahah financing as it is backed by asset as collateral as a result of the risk is shifted to customers. According Swartz (2013) Murabahah financing is exposed to credit risk when client failed to meet the obligation of scheduled repayment for the assets, which has been delivered by banks. Ali (2004) found that liquidity contributes to number of failure in Islamic banks and conventional banks alike despite having access to external liquidity of conventional banks. Therefore understanding the

nature of liquidity and its effect on credit risk is vital to derive for empirical evidence of interaction between liquidity and credit risk.

According to the statement above the following hypothesis is derived:

$H_a$ : there is a significant effect of bank specific and macroeconomic determinants on credit risk of Islamic banks and conventional banks.

The aim of this study is to investigate factors that determine credit risk between Islamic and conventional banks. The study also include numbers of new variables which are believed never been tested prior to this study in the context of credit risk formation namely, output gap, yield curve, Islamic interbank rate, and Islamic financing contract (ISCON) based on debt based Murabahah and deferred payment sale Bai-Bithaman Ajil (BBA) contract. The study employs fourteen bank specific variable and six macroeconomic variables that determine the level, relationship and their influences on credit risk for Islamic banks and conventional banks. The outcome of this research would provide new insight on how Islamic banks and conventional banks behave to these variables in term of their credit risk exposure considering numbers of important event that has taken place in Malaysian banking history from year 2000 to 2010 i.e. merger and acquisition, oil price hike and subprime mortgage crisis in 2008.

## 2. METHODOLOGY

The nature of this research is retrospective. The study employs multivariate regression analysis to measure the significant influence of bank specific and macroeconomic variables on credit risk between Islamic banks and conventional banks.

### 2.1 Data and Sampling

This study conducts ratio analysis on the data obtained from the annual reports during 2000-2010. The financial information was extracted from 15 Islamic banks and 13 conventional banks in Malaysia.

### 2.2 Variables

The study employs 16 bank specific variables and 6 macroeconomic variables. The credit risk was used as dependent variables measuring by nonperforming loans to total loans and nonperforming finance to total finance. The former was used to measure the credit risk for Islamic banks whereas the later is for measuring conventional banks' credit risk.

### 2.3 Internal and External Determinants of Credit Risk Model

According to Hiestand (2011) the pooled data was conducted using pooled model as the models provide constant coefficient to both intercept and slope. The pooled model of multivariate regression was used to determine the effect of banks specific factors and macroeconomic factors on credit risk for Islamic and conventional banks. The hypothesis was illustrated in Model 1 and 2.

Model 1: Pooled model of conventional banks

$$\text{Credit risk}_{CB} = \alpha + \alpha_1 \text{RSF}_i + \alpha_2 \text{FLP}_i + \alpha_3 \text{DTAR}_i + \alpha_4 \text{LEV}_i + \alpha_5 \text{REGCAP}_i + \alpha_6 \text{Size}_i + \alpha_7 \text{DER}_i + \alpha_8 \text{Finance}_i + \alpha_9 \text{RWA}_i + \alpha_{10} \text{EM}_i + \alpha_{11} \text{MGT}_i + \alpha_{12} \text{Liquid}_i + \alpha_{13} \text{DEPTA}_i + \alpha_{14} \text{ROA}_i + \alpha_{15} \text{Yield curve}_i + \alpha_{16} \text{CPI}_i + \alpha_{17} \text{GDP}_i + \alpha_{18} \text{Inflation}_i + \alpha_{19} \text{Output gap}_i + \varepsilon_{it} \quad (1)$$

Model 2: Pooled model of credit risk for Islamic banks

$$\text{Credit risk}_{IB} = \alpha + \alpha_1 \text{RSF}_i + \alpha_2 \text{FLP}_i + \alpha_3 \text{DTAR}_i + \alpha_4 \text{LEV}_i + \alpha_5 \text{REGCAP}_i + \alpha_6 \text{Size}_i + \alpha_7 \text{DER}_i + \alpha_8 \text{Finance}_i + \alpha_9 \text{RWA}_i + \alpha_{10} \text{EM}_i + \alpha_{11} \text{MGT}_i + \alpha_{12} \text{Liquid}_i + \alpha_{13} \text{ISCON}_i + \alpha_{14} \text{ROA}_i + \alpha_{15} \text{Islamic rate}_i + \alpha_{16} \text{GDP}_i + \alpha_{17} \text{Inflation}_i + \alpha_{18} \text{Output gap}_i + \alpha_{19} \text{M3}_i + \varepsilon_{it} \quad (2)$$

Where Credit Risk or  $CR_{it}$  is used as dependent variable of bank I at time t, the  $I = 1, \dots, T$ . The eq. 1 and eq. 2 employ number of variables including which are commonly found in the conventional finance theory due to its non-shari'ah based. However, Islamic rate and ISCON are specially designed for Islamic banks. The study uses Islamic rate as an alternative of interest rate in predicting interest rate movement of bank charges on conventional banks and Islamic banks. Thus, more variables are used in this study to investigate their influences on credit risk.

## 3. EMPIRICAL RESULTS AND DISCUSSIONS

The results of regression analyses in Table 1. Table 1 indicates that bank specific factors and macroeconomic factors collectively explained 44.7% and 67.2% of the variation in the credit risk of Islamic banks and conventional banks in Malaysia respectively. Three of bank specific variables out of fourteen variables are significantly related to credit risk for Islamic banks. They are ISCON, risky sector finance (RSF) and REGCAP. However, on a pooled basis, none of the external variables is significantly related to credit risk of Islamic banks. On the other hand, all the factors tested explained 63% of the variation in the credit risk of conventional banks. Among the 14 internal bank specific variables, seven variables are significant namely LLP, DTAR, REGCAP, size, risk weighted assets (RWA), equity multiplier (EM) and liquid. While inflation is the only external variable significantly related to credit risk of the conventional banks during the study period 2000-2010. Among the internal variables, ISCON contributed the highest in term of its effect on credit risk of Islamic banks with  $t$  value=6.265 and coefficient estimate=0.477. The positive sign of ISCON suggests that ISCON which is a new variable never tested before in previous research substantially affects credit risk with an increase in ISCON. For every 0.477 unit increase in ISCON financing, credit risk is estimated to increase by 1%. Hence, the findings suggest that Islamic banks should diversify its financing portfolio in various ISCON rather than mostly in BBA.

### 3.1. ISCON

ISCON shows positive and significant relationship to credit risk. The Islamic banks' ISCON of 0.482 with the  $t$  value=6.437 with significant at 0.01 level. This implies that every one unit increase in ISCON is contributed to the increases of credit risks by 0.482 units. Rosly and Mohd-Zaini (2008) report that for more than two decades Islamic banks' core business is mainly based

**Table 1: Bank specific factors and external factors determinants of credit risk (pooled model)**

| Variables<br>(constant) | Islamic banks |              |              | Variables<br>(constant) | Conventional banks |              |              |
|-------------------------|---------------|--------------|--------------|-------------------------|--------------------|--------------|--------------|
|                         | B             | t value      | P value      |                         | B                  | t value      | P value      |
|                         |               | <b>0.157</b> | <b>0.876</b> |                         |                    | <b>3.827</b> | <b>0.000</b> |
| RSF                     | 0.223***      | 2.867        | 0.005        | RSL                     | -0.079             | -1.018       | 0.311        |
| FLP                     | 0.044         | 0.644        | 0.521        | LLP                     | 0.263*             | 3.975        | 0.000        |
| DTAR                    | -0.069        | -0.578       | 0.564        | DTAR                    | -0.339***          | -2.203       | 0.029        |
| LEV                     | 0.125         | 1.589        | 0.114        | LEV                     | -0.051             | -0.650       | 0.517        |
| REGCAP                  | 0.177**       | 2.122        | 0.036        | REGCAP                  | -0.399*            | -3.791       | 0.000        |
| Size                    | 0.075         | 0.862        | 0.390        | Size                    | -0.340*            | -4.906       | 0.000        |
| DER                     | -0.089        | -0.671       | 0.504        | DER                     | 0.122              | 0.998        | 0.320        |
| Finance                 | 0.007         | 0.066        | 0.948        | Finance                 | -0.083             | -0.956       | 0.341        |
| RWA                     | 0.016         | 0.151        | 0.880        | RWA                     | 0.226*             | 3.896        | 0.000        |
| EM                      | 0.077         | 0.806        | 0.422        | EM                      | -0.229**           | -2.633       | 0.010        |
| MGT                     | 0.137         | 1.591        | 0.114        | MGT                     | 0.096              | 1.418        | 0.159        |
| Liquid                  | 0.002         | 0.029        | 0.977        | Liquid                  | -0.199***          | -2.459       | 0.015        |
| ROA                     | -0.037        | -0.414       | 0.679        | ROA                     | -0.061             | -0.814       | 0.417        |
| ISCON                   | 0.477***      | 6.265        | 0.000        |                         |                    |              |              |
| GDP                     | -0.052        | -0.762       | 0.448        | GDP                     | -0.042             | -0.748       | 0.456        |
| Inflation               | -0.138        | -0.340       | 0.182        | Inflation               | -0.258***          | -3.398       | 0.001        |
| Output gap              | -0.002        | -0.026       | 0.979        | Output gap              | -0.023             | -0.325       | 0.325        |
| M3                      | -0.074        | -0.483       | 0.630        | M3                      | -0.137             | -1.304       | 0.195        |
| Islamic rate            | -0.014        | -0.112       | 0.911        | Yield curve             | -0.021             | -0.240       | 0.810        |
| R <sup>2</sup>          | 0.447         |              |              | R <sup>2</sup>          | 0.672              |              |              |
| Adjusted R <sup>2</sup> | 0.375         |              |              | Adjusted R <sup>2</sup> | 0.624              |              |              |
| F ratio                 | 6.180         |              |              | F ratio                 | 14.101             |              |              |
| N                       | 165           |              |              | N                       | 143                |              |              |

N=143 for conventional banks and N=165 for Islamic banks. t value=Effect size. \*\*\*, \*\*, \*Denote statistical significance at the 1%, 5% and 10% level respectively.

on installment financing such as Murabahah, BBA or deferred payment sales which could explain the positive and significant impact of ISCON on credit risk. The Islamic concept (ISCON) represents more than 80% of total finance Haron (1998). This indicates that credit risk is primarily generated from ISCON. In the study of Rosly (2011) it is found that Murabahah financing in Islamic Banks contributed to credit risk when the payment of purchases is deferred to future date. ISCON has the largest positive coefficient of 0.477 and t value=6.265. This is a new insight on its enormous impact on credit risk creation. This result further confirm the finding of previous studies Rosly (2011) that Murabahah mode of financing through BBA or deferred payment sales contributes more than 90% of all Islamic banks financing. As a result, of any deterioration in Murabahah finance quality would contribute to lower credit risk creation. Conversely, increase in ISCON would lead to higher credit risk.

### 3.2. RSF

RSF is the second largest contributor of credit risk for Islamic banks based on the pooled model with the t value=2.867 and significant P value at 0.001 level. This implies that Islamic banks are vulnerable to experience credit risk from their financing exposure to the economic sectors such as real estate, property and residential which are considered very risky due to their strong correlation to the economic downturn and speculative elements leading to property price bubbles. RSF however, does not emerge as a significant determinant of credit risk for conventional banks.

### 3.3. REGCAP

Regulatory capital or REGCAP is the third largest variable that shows positive significant association to credit risk for Islamic banks. It is also a significant to the formation of credit risk

in conventional banks. Interestingly, under the pooled model REGCAP is negatively related to the credit risk of conventional banks. Despite both being very significant the contrasting effect of REGCAP on credit risk sets a distinct difference about the influence of REGCAP on credit risk between Islamic banks and conventional banks. However, this is not the case for Islamic banks during the period of study, where Islamic banks maintain 4 time larger capital requirement compared to conventional banks, despite larger capital Islamic banks tend to engage in risky sectors, this could be due to the fact that Islamic banks are better in term of credit risk management compared to conventional as evidenced from lower credit risk exposed by Islamic banks during the period of studies, this could be due to enormous losses that occurred in the year 2005 which causing Islamic banks to be more prudent in risk management in order to prevent such event to repeat again. The positive coefficient suggests that one unit increase in REGCAP causing 0.177 unit rises in credit risk for Islamic banks. The finding also consistent with Rahman and Shahimi (2010) opined that the positive relationship between credit risk and REGCAP possibly due to the fact that default risk has not yet surfaced, hence Islamic banks rely on REGCAP to absorb risk. On contrary conventional banks REGCAP indicates negative significant to credit risk, this indicates that conventional banks risk taking behavior is influenced by REGCAP as the lower the capital the higher is the credit risk, although the coefficient sign is consistent with theoretical intuition Sufian and Muhamed (2011), however effect is marginal as on average conventional banks maintain four times lower capital as compared to Islamic banks. The finding shows that REGCAP is not dominant in term of its impact on credit risk as it appeared to be the fourth after other internal and external variable with t value=-3.791 and significant at 0.001 level. Arnold and Lemmen (2001) also suggest that banks

diversify their assets through holding public debt, as the banks do not need to maintain capital against government securities. For Islamic banks in Malaysia, they also have to comply to Basel II requirement. The positive relationship between REGCAP and credit risk reflects the compliance to the REGCAP requirement.

### 3.4. Size

Size shows negative significant to credit risk of conventional banks with  $t$  value = -4.906 and significant  $P$  value at 0.001 in contrast to Islamic banks that shows positive but not significant to credit risk in pooled model. The study indicates that conventional banks credit risk decrease as the increase in REGCAP and Size of their assets portfolio. Basel II requires banks to increase their REGCAP if their size of risky assets and risk profiles are large. The well-diversified portfolio, good risk management and tactical strategies enable the conventional banks to reduce or mitigate their credit risk despite large size of risky assets. This could be the result of banks ability to lower funding cost with the advantage of economic of scale, thus increase profit as explained in Idris et al. (2011) and Ahmad and Ahmad (2004). Moreover, larger conventional banks are able to diversify their asset portfolio efficiently consequently reduce credit risks, Sufian and Muhamed (2011) Rahman and Shahimi (2010) and Said (2013). Cabilies (2012) opined that large banks that engage in loan sales as risk management tools take higher risk without compromising their risk portfolio consequently generate stable return; moreover large banks take more risk while increasing securitization that may also increase their risk portfolio.

### 3.5. RWA

RWA for conventional banks indicates positive and significant to credit risk with  $t$  value = 3.896 and significant at 0.001 level. On the other hand, RWA is not a significant determinant of credit risk for Islamic banks although there is a positive relationship as shown in Table 1. This implies that conventional risk-taking behavior is positively influenced with the level of weighted assets. Das and Sy (2012) found that banks with high RWA are severely affected during the worse stage of the crisis. Ahmad and Ahmad (2004) Ahmad and Mohamed (2007) suggest that large risky portfolio contribute to higher risk which is consistent to moral hazard hypothesis as conventional banks capital are relatively lower compared to Islamic banks despite of higher credit risk. Beltratti and Paladino (2013) their study shows that bank higher RWA banks generate lower return on equity while buffering more capital in anticipation of loan growth especially during credit crunch. The finding also shows that conventional banks RWA lower than their Islamic counterpart; this is due to possible manipulation by conventional banks to gain confident in the capital market and regulators even under distress Mariathan and Merrouche (2012). Acharya et al. (2013) suggest that risk weighted that derived from Basel II are the main causes of lower capital ratio as these higher risk weighted are not correlated with actual bank risks during distress, hence unreliable risk measurement that underestimated risk weighted that leads to excess leverage and credit risks.

### 3.6. EM

EM indicates negative significant relation to credit risk for conventional banks whereas Islamic banks show positive but no significant relation between EM and credit risk. The finding in

Table 1 shows that conventional banks EM is higher compared to their Islamic banks counterpart, the higher EM contributes to higher credit risk (Hamid and Azmi, 2011), Ika and Abdullah (2011) and Al-Hares et al. (2013). The study shows that conventional banks utilize more debt to convert into asset for financing as compared to Islamic banks as a result higher credit risk exposed by conventional banks, judging on the mean is 1.7551 and 1.9342 respectively. Khan et al. (2013) and Kalluci (2011) opined that as higher EM ratio indicates that banks are accepting more deposit which are predominately from debt consequently enable them to generate more return whilst exposing to higher risk during economic downturn.

### 3.7. Liquid

Liquid indicates negative significant relation to credit risk for conventional banks with  $t$  value = -2.459 whilst Islamic banks shows positive but not significant relation to their credit risk. The finding of this study shows that conventional risk taking behavior is negatively influenced by level of liquidity, the higher the liquidity the lower credit risk exposure, the finding is consistent to Cornett et al. (2011) who opine that high risk exposure banks would build up cash and other liquid asset while reducing making new loans as compared to low liquidity risk during banking crisis. Said (2013) found that liquidity is not significant to credit risk of Islamic bank in MENA region. The study also shows that conventional banks' liquidity ratio is lower as compared to Islamic banks with mean is 0.3640 and 0.4639 respectively. This suggests that conventional banks improve their liquidity and performance through securitization rather than maintaining liquid assets, which is consistent to the finding of Cardone-Riportella (2010). Ghousoub and Reed III (2010) found that steady economic growth contribute to lower liquidity risk consequently reduce the banks need to hold cash which allow banks to lend more to generate more return. Liquid assets of conventional banks are interest based. Improve liquidity enable customer to service their loans, thus lowers the credit risk for banks.

### 3.8. Inflation

Inflation rate is negatively and significantly to credit risk for conventional banks with  $t$  value = -2.459 and significant at 0.001 level whilst in the case of Islamic banks, it is negative but not significant to credit risk. Castro (2013) opined that high inflation can make debt servicing easier by reducing the real value of outstanding loans. But at the same time, it can weaken borrowers' ability to service debt by reducing real income. The finding of this study supports Shu (2002) who opine that acceleration in credit expansion will lower default rate as higher inflation prevail due to the fact that inflation enable borrowers to service their loan from the availability of funds. The study shows that inflation rate reach the highest level in 11 year of study period at 5.4% in 2008 whereas on average Malaysia inflation rate during the study period is at 2.15% the same period where US subprime mortgage crisis surfaced.

Other studies of Demirguc-Kunt and Huizinga (2010) found that the high fee income is associated with high inflation that affect banks' assets allocation decision into interest generating activities, fee generating and profitability by considering macroeconomic influences. On the other hand, in comparison to conventional banks' credit risk is not significantly influenced by inflation.

Interestingly, the regression result from the pooled model shows that none of the macroeconomic variables significantly affect credit risk of Islamic banks. The results provide empirical support, which concur with widely accepted claim that Islamic banking is recession proofed. Mkukwana (2013) shows that higher inflation rate forcing borrowers to miss loan repayment in order to fulfill basic need on necessities goods and service.

#### 4. CONCLUSIONS

This section exhibits the result of comparing the differences of the determinants of credit risk between Islamic banks and conventional banks from the perspective of banks specific factors and macroeconomic variables. The finding shows only four out of fourteen variable shows insignificant difference between Islamic banks and conventional banks for example, DTAR, DER, MGT and ROA. This suggest that there is no difference in term of solvency, leverage, management efficiency and profitability between Islamic banks and conventional banks whilst CR, RSL, LLP, LEV, REGCAP, SIZE, FINANCE, RWA, EM and LIQUID, these variable show significant different between Islamic banks and conventional banks. Moreover, the bank specific factor model indicates that numbers of variables indicates difference coefficient sign and significant in their influence on credit risk for example, REGCAP (-) for conventional banks (+) Islamic banks, size (+) for conventional banks (-) Islamic banks, DER (+) for conventional banks (-) Islamic banks, EM (-) for conventional banks (+) Islamic banks and liquid (-) for conventional banks (+) Islamic banks. The regression results of macroeconomics model indicate both Islamic banks and conventional banks show negative coefficient sign of Inflation, and M3 are negatively significant to credit risk for Islamic banks and conventional banks. The regression of pooled model shows that seven out of thirteen bank specific variable are significant to credit risk for example, LLP, DTAR, REGCAP, size, RWA, EM and liquid whereas macroeconomic variables indicate that one out of five variable is significant to credit risk namely Inflation. However, the pooled model for Islamic banks shows that three out of fourteen variables are significant to credit risk for example, RSF, REGCAP and ISCON whilst macroeconomics variables are not significant in the pooled model.

The finding of this study shows that there are other variables which is uniquely affect Islamic banks credit risk as evidenced in ISCON which a new variable tested in the study shows largest effect size on credit risk formation in Islamic banks, thus future research should be based on Islamic banks unique characteristic when determining factors that to be included in the equation in order to determine credit risk for Islamic banks more comprehensive manner.

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