
Impact of Macroeconomic and Bank specific variables on Credit Risk in Pakistan: A Comparative Analysis of Islamic and Conventional Banks

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ABSTRACT

This study intends to investigate the impact of macroeconomic variables and bank specific variables on the credit risk in the banking sector of Pakistan. The effect has been evaluated for 4 Islamic banks and 13 for the conventional banks for 2008-2018. The study assessed the dynamic panel model using the GMM to classify the factors that control the extent of the credit risk. Outcomes of the study suggest that in the conventional banking system, GDP growth, unemployment, loan loss provision, inflation, real exchange rate, interest rate, capital adequacy ratio, return on assets, inefficiency ratio, and the bank size significantly affect the behavior of the credit risk. By contrast, in Islamic banks, all above mentioned variables are significant except financing loss provision and the interest rate. Therefore, to achieve a much more reliable banking system, the Government should establish prudent macroeconomics policies. In addition to that, taking into account the current economic condition, the high-level financial institutions should also consider the internal composition of the institutions to reduce the possibility of credit risk.

Keywords: Bank specific factors, macroeconomic factors, credit risk, dynamic panel model.

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INTRODUCTION

In recent years, the banking sector of any state has played a vital role in developing financial stability and helped attract foreign investors for investment from all around the world. The main component of the banking sector is economic stability and security. The banking sector and financial institutions also prove to be the cornerstone

for emerging countries. The economy that is emerging the banks plays a part in the intermediation for trade and other business purposes in it. Some studies shows that banking development has a positive and significant impact on the growth of the economy (Abu-Bader & Abu-Qarn, 2008; Cull & Xu, 2005; Galindo, Schiantarelli, & Weiss, 2007; Ratsimalahelo & Barry, 2010; Shan & Jianhong, 2006).

Recent literature also reflects that the relationship involved between the conventional banks and the enlargement of an economy is correlated and leads to the economic growth (Bojanic, 2012; Kar, Nazlıoğlu, & Ağır, 2011; Menyah, Nazlioglu, & Wolde-Rufael, 2014; Pradhan, Arvin, & Ghoshray, 2015). Banking crises are the reason for falling stock prices and thus the volatility of the financial and real economies (Goetz, 2018). But nowadays, recession in economy prevails, and deterioration in the transaction also occurs, which is the direct sign of the insolvency of the banks.

Since credit creation is the most profitable activity of any bank, it also contains risk. The credit risk is considered the prime origin of the bank's failure. (Gup & Kolari, 2005; Samad, 2012). Basel committee on supervision of banking state the definition of the credit risk as "the possible default of any debtor to meet the obligations in according to the terms of agreement" BIS (Jayanto). (Bhattacharya & Roy, 2008; Vodová, 2003) considerable loss emerges due to the default of borrowers in the repayment of their loan that contributes to the banks' insolvency, which directly leads to the banking crisis. Several studies acclaim that most of the bank's failures occur due to poor credit risk management (Jesus & Gabriel, 2006; Levine, Loayza, & Beck, 2000).

Two sorts of risk, systematic and unsystematic, are usually visible to the credit risk. Systematic risk is those types of risks that appear due to the sudden changes in politics, economics, and the financial market and the other causes that the firms do not easily manage. On the other side, unsystematic risk is that type of risk that results from the firm's management or the state of the industry (Yurdakul, 2014). Many variables like Interest rate, GDP growth, inflation, and the exchange rate may affect the systematic risk. The ability of these macroeconomic variables to validate the credit risk can vary across countries and from industry to other industries.

In addition to the macroeconomic situation that affects the bank's credit risk directly and on a large level. Such banks that are not well regulated could suffer from the unsystematic risk because of the irresponsible behaviour of the bank. The macroeconomic variables are such types of variables that are not handled by the banking authorities and impact the robustness of the bank through the external environment such as Government policies and therefore affect the decision making.

Literature Review

According to recent literature, the cause of the credit risk by which the credit risk is impacted is the two main factors, macroeconomic variables and the bank-specific variables. Which affect the soundness of the banks on a large level in both types of the banking sector (conventional and Islamic). Thus, this study focuses on the macroeconomic and bank-specific variables that influence the credit risk in the dual banking system in Pakistan.

Non-performing loans

In the banking sector failure, the credit risk proves favourable. From the various kinds of risk, credit risk is the prime risk that causes the bank's default. (Bhattacharya & Roy, 2008). A non-performing loan is the proxy of the credit risk. Credit risk is defined by the Basel Committee of Banking Supervision (2001) that is Credit risk is the chance of dropping the loan due to the occurrence of a credit event known as default risk. Credit risk is the degree of variation which occurs in the instrument of the debt and derivatives changes due to the worst credit quality of borrowers and counterparties (Chen, Steiner, & Whyte, 1998).

Macroeconomic factors

The problematic loans are closely related to economic activities. Fluctuation in economic activities also affects non-performing loans. In short macroeconomic factors are responsible for any financial crisis. The macroeconomic variables are such type the variables which are not handled by the banking authorities and impact the robustness of the bank through the external environment such as Government policies and therefore affect the decision making. The primary determinants that strongly influence credit risk are macroeconomic factors in the financial markets, legislation and economic conditions, such as those influencing risk (Corsetti, Pesenti, & Roubini, 1998; Hassan, Karels, & Peterson, 1994).

GDP growth

GDP growth is the average annual GDP growth rate at the market prices on constant local currency. And GDP growth and NPL are inversely correlated; the NPL decreases with GDP growth (N. Ahmad, 2003; Alexandri & Santoso, 2015; Beck, Jakubik, & PiloIU, 2013; Castro, 2013; Clementina & Isu, 2014; Dimitrios, Helen, & Mike, 2016; Ekanayake & Azeez, 2015; Fischer et al., 2001; Kuzucu & Kuzucu, 2019; Messai & Jouini, 2013; Salas & Saurina, 2002; Washington, 2014; Zaib, Farid, & Khan, 2014; Zribi & Boujelbegrave, 2011). In one study, the GDP is negative and insignificant associated with NPL (Anjom & Karim, 2016).

Inflation

Inflation is characterized as a continuous rise in goods and services. Many authors depict that to determine the influence of inflation rate on profitability. The negative relation between NPL and inflation rate also found in many banking sectors banking system of Hong Kong (Shu, 2002), the banking system of Tunisian (Zribi & Boujelbegrave, 2011), banking system of Romanian (Vogiazas & Nikolaidou, 2011), in case of banking system of Slovenian (Aver, 2008), (Bofondi & Ropele, 2011) and in case of banking industry of Napalese (Poudel, 2013). On the other hand, Inflation and NPL have positively correlated (Alexandri & Santoso, 2015; Anjom & Karim, 2016; Mehmood, Younas, & Ahmed, 2013; Tanasković & Jandrić, 2015).

Exchange Rate

The rate at which one currency can be exchanged for another is an exchange rate. It is often known to be the value of the nation's currency compared to another currency. The exchange rate and NPL are positively and significantly correlated (Castro, 2013; Chaibi & Ftiti, 2015; Farhan, Sattar, Chaudhry, & Khalil, 2012; Gabeshi. On the other side, exchange rate and NPL is inversely and significantly correlated with each other, which means that with the increase in the exchange rate, NPL decreases (Bucur & Dragomirescu, 2014; Gonsel, 2012; Havidz & Obeng-Amponsah, 2020; Poudel,

2013; Washington, 2014; Zribi & Boujelbegrave, 2011). The researchers have not found any significant relationship between exchange rate and credit risk (Aver, 2008; Kalirai & Scheicher, 2002).

Real interest rate

The interest rate is the rate of lending adjusted for inflation as measured by the GDP deflator. Recent literature suggests that the interest rate have a positive and significant effect on NPL (Abid, Ouertani, & Zouari-Ghorbel, 2014; Beck et al., 2013; Castro, 2013; Khemraj & Pasha, 2009; Poudel, 2013) in Sub-Saharan Africa' situation (Fofack, 2005), the banking sector of the Italian (Quagliariello, 2007) and also in case of Ireland, Portugal, Spain, Greece and Italy (Aver, 2008; Castro, 2013; Dash & Kabra, 2010; Louzis et al., 2012; Messai & Jouini, 2013; Nkusu, 2011).

Unemployment rate

Unemployment refers to an unemployed labour force but seeks some work or job. Unemployment and NPL are positively and significantly correlated (Dimitrios et al., 2016; Farhan et al., 2012; Klein, 2013). One of the studies depicts a positive and significant relation between unemployment and credit risk. Some show a positive but insignificant link between NPL and unemployment (Ekanayake & Azeez, 2015; Messai & Jouini, 2013). One of the studies also found no significant relationship between unemployment and credit risk (Valahzaghhard et al., 2012).

Bank specific factors

The function of the banks is not only to accept the deposit but also to lend credit to borrowers, and the arrival of credit risk is obvious. Credit risk is one of the main risks financial institutions face, and efficient risk management is important to manage the credit risk (Giesecke, 2004). It is found that the bank-specific credit determinants of the credit risk play an important role for the developing countries in the period of globalization and play an insignificant role in industrial economies (Mileris, 2012).

Bank size

In any analysis, bank size considers in the analysis of diversification. Bank size has negatively and insignificantly correlated with NPL (Alexandri & Santoso, 2015; Anjom & Karim, 2016; Cebenoyan, Cooperman, & Register, 1999; HU, Li, & CHIU, 2004; Salas & Saurina, 2002; Saunders, Strock, & Travlos, 1990; Tehulu & Olana, 2014). The inverse relationship between bank size and non-performing loans depicts that greater size of the bank decreases the ratio of non-performing loans as greater size banks have more control on risk management and because the larger banks have more capability to hold portfolios that are more diversifiable.

Inefficiency

Inefficiency is a bank-specific variable, and it is defined as total operating expense divided by total operating income for the period (Waqas et al., 2017). Fundamentally, the inefficiency ratio indicates the bank's operating efficiency, showing the bank's expenses about their revenues (Azhar Rosly & Afandi Abu Bakar, 2003). It is also found that inefficient banks hold riskier portfolios (De Lis, Martinez Pagés, & Saurina, 2001). Inefficiency has a negative and insignificant relationship with NPL found by (A. Ali & Daly, 2010).

Return on Assets

More profitable banks have less chance of loan defaults than others, and they can also manage risk in a more effective way (Narasimham committee report 1998). Banks with elevated profit are less pressurised to generate income and therefore less restricted to participate. Godlewski (2005) used ROA as a proxy for the performance demonstrates that banks' profitability negatively impacts the level of NPL ratio. This study measure (ROA) as a ratio of profitability. Profitability and NPL are negatively and significantly correlated (Abid et al., 2014; Chaibi & Ftiti, 2015; Louzis et al., 2012; Reddy, 2015).

Capital Adequacy ratio

The capital adequacy ratio is the relationship between risk-weighted assets and current liabilities when measuring risk-weighted assets. Adequacy ratio calculated by Total Capital to Total Assets (Tehulu & Olana, 2014). One of the studies revealed that the Capital Adequacy ratio has a negative and insignificant impact on NPL (Tehulu & Olana, 2014). Whereas one of the other studies argues that CAR has a positive effect on credit risk. Kumar, Stauvermann, Patel, and Prasad (2018), argue that the Capital Adequacy ratio has an insignificant impact on non-performing loans.

Loan Loss Provision

One study measured loan loss provision to total loans (N. H. Ahmad & Ariff, 2007). Other studies measured loan loss provision by the ratio of provision for bad and doubtful debt to the bank's gross loan (Ekanayake & Azeez, 2015). Higher loan loss provision shows a rise in credit risk and a decline in the performance of the loan. Many studies indicate that loan loss provision is positively and significantly related to NPL (N. Ahmad, 2003; A. S. Ahmed, Takeda, & Thomas, 1999; Fischer et al., 2001). One study found that loan loss provision is positively associated with non-performing loans but insignificant (M. O. Al-Smadi & Ahmad, 2009; Ekanayake & Azeez, 2015).

METHODOLOGY

We use both macroeconomic and bank-specific factors. Generalised Method of Moment is used for the analysis of this study. In this study, our dependent variable is non-performing loans. In contrast, independent variables are bank-specific and macroeconomic variables, where bank-specific variables are inefficiency, ROA, Capital Adequacy ratio, bank size and Loan loss provision. And macroeconomic variables are GDP growth, inflation rate, interest rate, Real Effective Exchange rate and unemployment rate. KPMG Hadi & co. (2017) survey Pakistani banking sector categorized into three groups (Large, medium and small). Although, Islamic banks introduced their group for Islamic banks, i.e., medium and small banks. According to the survey report, three banks fall in the medium category, and one of the Islamic banks falls in the small category. Thus, the study used these 4 Islamic banks 13 conventional banks for comparative analysis.

Table: 1 Definition and measurement of variables

| Independent variables | Definition | Source | Reference |
|-------------------------------------|--|---------------|--|
| Inflation | <p>The inflation calculates the average percentage rise for all goods and services in the consumer price index (CPI) prefers to use the inflation proxy.</p> $INF_t = \frac{CPI_2 - CPI_1}{CPI_1} * 100$ | SBP | (M. O. M. Al-Smadi, 2010; Effendi & Yuniarti, 2018a; Kabir, Worthington, & Gupta, 2015; Wulandari & Utami, 2019) |
| Real Effective Exchange Rate | <p>The real effective exchange rate is defined as the nominal effective exchange rate divided by a deflator or index of the costs.</p> | SBP | (H. A. H. Al-Wesabi, 2012; Haryono et al., 2009; Kabir et al., 2015) |
| Unemployment rate | <p>Unemployment denotes the share of the labour force and educated force without work yet accessible and looking for a business.</p> | PBS | (H. A. H. Al-Wesabi, 2012) |
| Interest rate | <p>Interest rate is defined as the percentage of that amount charged by the bank of an asset from the borrower for using it. KIBOR is used as the measure of the interest rate.</p> | SBP | (Diyanti & Widyarti, 2012) |
| Real GDP growth | <p>Utilize as a comprehensive measure business cycle.</p> | SBP | (Nugraini, 2015) |

| | | | |
|-------------------------------|---|----------------|---|
| Capital adequacy ratio | <p>The capital adequacy ratio is the relationship between risk-weighted assets and current liabilities. During measuring risk-weighted assets, we take into account combinations of risk.</p> $CAR_{it} = \frac{TIER\ 1\ CAPITAL + TIER\ 2\ CAPITAL}{TOTAL\ RISK\ WEIGHT\ ASSETS}$ | Annual reports | (Beck et al., 2013) |
| Return on assets | <p>ROA is a good proxy to measure the financial performance and utilize the management's efficiency. It shows us to check how the administration will turn its assets into net profit.</p> $ROA_{i,t} = \frac{Net\ profit}{Total\ Asset} * 100$ | Annual reports | (Setiawan & Putri, 2013) |
| Inefficiency ratio | <p>The inefficiency ratio points out the total operating expense to non-interest income. It gives the percentage of managerial costs qualified in earning non-interest income. This ratio is used to assess the bad management hypotheses.</p> $INEF_{i,t} = \frac{Operating\ Expenses}{Operating\ income} * 100$ | Annual reports | (Abid et al., 2014; Isaev & Masih, 2017) |
| Bank Size | <p>Natural log of banks assets. This ratio is used to test the size effect hypothesis that whether the size of the specified bank influences credit risk or not.</p> $BS_{i,t} = \frac{Total\ Asset}{\Sigma\ TOTAL\ ASSET}$ | Annual reports | (Babihuga, 2007; Şafakli, 2007) |
| LLP | <p>This ratio estimates the nature of the credit portfolio of a financial organization.</p> $LLP_{i,t} = \frac{Provision\ against\ NPL}{Total\ Gross\ Loans} * 100$ | Annual reports | (Gadzo, Kportorgbi, & Gatsi, 2019; Salim, Arjomandi, & Dakpo, 2017; Zolkifli, Uda, & binti Janor, 2018) |

| | | | |
|--|--|----------------|---|
| FLP | This ratio estimates the nature of the credit portfolio of financial organization. $FLP_{i,t} = \frac{\text{Provision against NPF}}{\text{Total Gross Financing}} * 100$ | Annual reports | (Abid et al., 2014; Isaev & Masih, 2017) |
| Dependent variables | Definition | Source | Reference |
| Credit risk Convention banks (CR) | It is a type of risk in which a borrower fails to pay the loan payment obligations, and it is used as a proxy for the bank's credit risk. $CR_{i,t} = \frac{\text{Non-performing loans}}{\text{Total Gross Loans}} * 100$ | Annual reports | (Babihuga, 2007; Şafakli, 2007) |
| Credit risk Islamic banks (CR) | It is a type of risk in which a borrower fails to pay the loan payment obligations, and it is used as a proxy for the bank's credit risk. $CR_{i,t} = \frac{\text{Non-performing Financing}}{\text{Total Gross Financing}} * 100$ | Annual reports | (Gadzo et al., 2019; Salim et al., 2017; Zolkifli et al., 2018) |

Specification of Model

According to the study, the model is distributed into two dimensions: the conventional bank and the Islamic system.

Credit Risk (Conventional banks)

$$CR_{i,t} = \beta_0 + \beta_1 CR_{i,t-1} + \beta_2 GDPG_t + \beta_3 INF_t + \beta_4 INT_t + \beta_5 REER_t + \beta_6 UN_t + y_7 INEF_{i,t} + y_8 ROA_{i,t} + y_9 BS_{i,t} + y_{10} CAR_{i,t} + y_{11} LLP_{i,t} + v_{i,t}$$

Credit Risk (Islamic banks)

$$CR_{i,t} = \beta_0 + \beta_1 CR_{i,t-1} + \beta_2 GDPG_t + \beta_3 INF_t + \beta_4 INT_t + \beta_5 REER_t + \beta_6 UN_t + y_7 INEF_{i,t} + y_8 ROA_{i,t} + y_9 BS_{i,t} + y_{10} CAR_{i,t} + y_{11} FLP_{i,t} + v_{i,t}$$

$CR_{i,t}$: CR is the one time lag dependent variables for the conventional bank that is the first model in the study, which indicate the quality of a loan in the study (non-performing loans) for bank (i) and at the time (t).

$CR_{i,t-1}$: The lagged dependent variable captures resolution in the loan quality over the period in conventional banks.

$CR_{i,t}$: CR is the dependent variable for the Islamic bank that is the second model in the study, which indicate the quality of a loan in the study (non-performing loans) for a bank (i) and at the time (t).

$CR_{i,t-1}$: It is the one time lagged dependent variable that captures the resolution of the loan quality over the time period in Islamic banks.

$GDPG_t$: The annual growth in the gross domestic product for the bank at time (t).

INF_t : Annual inflation rate (CPI used as a proxy) for the bank at the time (t).

INT_t : Interest rate (KIBOR) for the bank at the time (t).

$REER_t$: Real effective exchange rate for the bank at the time (t).

UN_t : Unemployment rate for the bank at the time (t).

$INEF_{i,t}$: Inefficiency for the bank (i) at the time (t).

$ROA_{i,t}$: Profitability ratio (Rate of Return on Assets) for the bank (i) at the time (t).

$BS_{i,t}$: Bank size (i) at the time (t).

$CAR_{i,t}$: Capital adequacy ratio for the bank (i) at the time (t).

$LLP_{i,t}$: Loan loss provision for the bank (i) at the time (t) (For conventional banks)

$FLP_{i,t}$: Finance loss provision for the bank (i) at the time (t) (For Islamic banks)

$V_{i,t}$: $V_{i,t}$: The composite error ($V_{i,t} = a_i + u_{i,t}$) the unobserved error by the bank can be represented by $a_i, u_{i,t}$.

β, y : It is coefficients used during dynamic panel estimation performed through the GMM technique.

To estimate dynamic panel data and get unbiased results, the experts prefer the GMM technique over the others and consider it one of the best and superior estimation techniques. The GMM estimation technique introduced by (Arellano & Bond, 1991;

Arellano & Bover, 1995; Blundell & Bond, 1998) is particularly intended for the econometric analysis of the dynamic panel data models. Additionally, the GMM method of estimation is used to address the issue of endogeneity when the model repressors are not severely exogenous but associated with the present or previous values of the error term. Estimation of the dynamic panel data model through the strategy FEM and REM model fails because the coefficient remains inconsistent. Correspondingly, the usage of Pooled OLS also generates biased estimates of the coefficients. Moving across the IV approach, a suitable tool is found for the lagged dependent variable, where the fixed impact is expelled from the model with the help of the first difference. The IV does not exploit all the data accessible and outcomes in a partial estimation of the coefficients. The GMM estimator, the extension of the IV approach, is considered a good estimator for dynamic panel data since it incorporates all available moment conditions. An increasingly reasonable estimation technique for estimating the dynamic panel data models in the literature is the GMM suggested by Blundell and Bond (1998). The GMM technique generates consistent and reliable coefficient estimates of the model using additional lag difference instruments and the lag level instrument.

Empirical Results and Discussion

Descriptive Statistics

Table: 2 Descriptive summary of the Macroeconomic variables for the Full sample

| Variables | Mean | Std.Dev | Min | Max |
|-------------------------------------|------|---------|-------|-------|
| GDP Growth | 3.82 | 1.42 | 1.2 | 5.7 |
| Inflation | 9.29 | 5.98 | 1.81 | 20.66 |
| Interest rate | 9.99 | 3.11 | 6.44 | 16.11 |
| Unemployment | 5.83 | 0.38 | 5.2 | 6.5 |
| Real effective Exchange Rate | 2.12 | 3.63 | -3.18 | 8.83 |

Source: own calculations (11*13=144) for conventional banks

(11*4=44) for Islamic banks

Table: 3 Descriptive summary of bank-specific variables for conventional banks

| Variables | Mean | Std. Dev | Min | Max |
|-------------------------------|-------|----------|------|-------|
| Non-performing loans | 10.85 | 5.84 | 2.90 | 33.64 |
| Capital Adequacy ratio | 14.86 | 6.60 | 5.55 | 29.56 |
| Bank Size | 5.08 | 0.59 | 3.86 | 6.48 |
| Loan Loss Provision | 5.79 | 26.07 | 0.01 | 21.14 |
| Return On Assets | 1.75 | 0.56 | 0.09 | 3.5 |
| Inefficiency Ratio | 1.67 | 1.34 | 0.77 | 6.91 |

(11*13=144) Source: Own calculations

Table: 4 Descriptive summary of the bank-specific variables for the Islamic banks

| Variables | Mean | Std.Dev | Min | Max |
|---------------------------------|-------------|----------------|------------|------------|
| Nonperforming Finance | 6.89 | 5.47 | 1.51 | 21.10 |
| Capital Adequacy Ratio | 16.82 | 7.59 | 9.58 | 24.04 |
| Bank Size | 5.09 | 3.10 | 3.95 | 8.08 |
| Financing loss provision | 0.63 | 0.61 | 0.02 | 2.60 |
| Return On Assets | 2.68 | 3.52 | -1.05 | 9.94 |
| Inefficiency | 2.96 | 1.34 | 0.77 | 6.91 |

Source: Own calculations (11*4=44)

Correlation Matrix

The Correlation Matrix is illustrated in table 5, which checks the correlation between the variables. The data of the Islamic banks are presented on the left-hand side. On the other hand, the right hand side presented the data for the conventional banks. Hence, findings point out that most of the variables are not closely correlated. Therefore, we can conclude based on the results that there is no multicollinearity problem amongst the variables based on low correlation.

| | | CONVENTIONAL BANKS | | | | | | | | | |
|--------------------------------------|------|--------------------|-------|-------|-------|--------|-------|-------|-------|-------|-------|
| IS LA MI C BA N KS | | GDPG | INFL | INTR | UN | REER | CAR | BS | INEF | LLP | ROA |
| | GDPG | 1.00 | -0.64 | -0.47 | -0.13 | -0.08 | 0.01 | -0.01 | -0.31 | -0.01 | -0.01 |
| | INFL | -0.64 | 1.00 | 0.62 | -0.30 | -0.45 | -0.08 | -0.10 | -0.05 | 0.12 | 0.10 |
| | INTR | -0.47 | 0.62 | 1.00 | -0.25 | -0.29 | -0.13 | -0.10 | -0.04 | 0.11 | 0.15 |
| | UN | -0.12 | -0.30 | -0.25 | 1.00 | 0.33 | 0.08 | 0.16 | 0.09 | -0.13 | -0.13 |
| | REER | -0.07 | -0.45 | -0.29 | 0.33 | 1.00 | 0.09 | 0.16 | 0.13 | -0.10 | -0.14 |
| | CAR | 0.14 | 0.24 | 0.09 | -0.45 | -0.22 | 1.00 | -0.27 | -0.04 | -0.11 | -0.08 |
| | BS | 0.01 | -0.30 | -0.28 | 0.46 | 0.32 | -0.51 | 1.00 | 0.04 | -0.20 | -0.11 |
| | INEF | 0.13 | -0.23 | -0.32 | -0.07 | 0.25 | -0.13 | -0.18 | 1.00 | -0.48 | -0.51 |
| | FLP | -0.04 | 0.03 | 0.07 | -0.05 | -0.081 | -0.13 | -0.17 | 0.11 | 1.00 | -0.42 |
| | ROA | -0.06 | 0.03 | 0.04 | 0.04 | 0.03 | 0.05 | -0.07 | -0.01 | 0.42 | 1.00 |

Table: 5 Correlation Matrix Islamic and Conventional Banking System

Source: The results of the regression using panel data

Macroeconomic variables are named as: Growth in Gross Domestic Product (GGDP), interest rate (INTR), inflation rate (INFL), Unemployment rate (UN) and the Real Effective Exchange Rate (REER). In contrast, the bank-specific variables are capital adequacy ratio (CAR), Bank Size (BS), Inefficiency ratio (INEF), Loan Loss provision (LLP), return on assets (ROA), Financing Loss Provision (FLP).

Empirical Results

This study currently inspects the influence of bank-specific and macroeconomic variables on credit risk by utilizing the GMM model.

To check the suitability and appropriateness of the specific models. This section tries to conclude the impact of macroeconomic and bank-specific variables on credit risk distributing the sample into the conventional and Islamic banking system. This research is worthy of notice to estimate various panel data models as shown in table (6) and rely on the GMM estimates model. Arellano-Bond model AR test and Hansen test are essentially measured over-identifying restrictions. The p-values of Arrelano AR (2) (0.318 and 0.647) and Hansen (1.00 and 0.886) analysis indicates that the instruments are appropriate for both the Islamic and conventional banking system. Hansen test probability value (P-value) is appropriately high, so the null hypothesis is that the instruments are exogenous and cannot be rejected as a group.

Table 6 displays the results of the GMM estimator, the study to take into account, for conventional bank all variables found significant. On the other hand, all variables excluding FLP and interest rates in Islamic banks are significant. The credit risk coefficient lag ($CR_{i,t-1}$) suggests a significant shock of the credit risk of the previous year observed in the current year both for the Islamic and conventional banks. It can be seen in table 6, which is higher credit risk has a positive influence on banks' present rates of credit risk in the last year. Moreover, such a lag of credit risk is of higher magnitude for the conventional bank. The related coefficient ($CR_{i,t-1}$) forecasts credit risk of 0.21% and 0.11% in the current year is driven by the credit risk for conventional and Islamic banks from the previous year. The statement illustrates the explanation behind the greater coefficient magnitude that the advances in traditional banks are provided to the customer as a loan.

Credit risk impact by Macroeconomic variables in Islamic and Conventional banking system

Growth in Gross Domestic Product

Table 6 demonstrates the result, which shows the impact of macroeconomic variables on both conventional and Islamic banking systems. GDP has a significant and negative correlation with the credit risk of conventional and Islamic banking systems.

As a result, higher GDP growth is observed for Islamic banks. The coefficient is associated with (0.76, 0.61). Islamic bank working is closely related to the real economy (Hasan & Dridi, 2011). For this reason, Islamic banks are more susceptible to economic change conditions. In addition to that, GDP offers information about the country's prosperity. If the rate of growth in GDP increases, then the economy's standard of living increases. The entrepreneur or the community's ability to repay will be high so that the credit risk portfolio can be reduced. The finding of this analysis is closer to that of (M. O. M. Al-Smadi, 2010; Effendi & Yuniarti, 2018b; Rahmawulan, 2008).

| Table: 6 Results Impact of macroeconomic and bank-specific variables on Credit Risk | | | | | | | | | | | |
|--|-----------------------|-----------------------|-----------------------|----------------------|----------------------|----------------------------|-----------------------|------------------------|------------------------|----------------------|---------------------|
| Conventional banks | | | | | | Islamic banks | | | | | |
| VARIABLES | Pooled OLS | RE | FE | FE(IV) | GMM | VARIABLES | Pooled OLS | RE | FE | FE(IV) | GMM |
| CRC_{i,t-1} | | | | | 0.769*** (0.310) | CRI_{i,t-1} | | | | | 0.613** (0.310) |
| GDPG | -0.055 (0.073) | -0.026*** (0.007) | -0.046 (0.056) | 0.116*** (0.036) | 0.232*** (0.094) | GDPG | 0.259 (0.551) | -1.877* (2.892) | 0.504 (0.504) | -0.644** (0.310) | -0.316** (0.140) |
| INFL | -0.141 (0.115) | -0.172*** (0.0651) | -0.187** (0.0687) | 0.0604 (0.197) | 0.158* (0.0841) | INFL | -4.877** (1.957) | 0.0741 (0.122) | -2.919 (2.833) | 0.116 (1.081) | -0.266** (0.111) |
| INTR | -0.0226 (0.228) | 0.0333 (0.137) | -0.0291 (0.145) | -0.664 (1.427) | 0.414** (0.2010) | INTR | 0.0741 (0.140) | -0.871** (0.263) | 0.105 (0.0802) | 0.201*** (0.0726) | 0.296 (0.316) |
| UN | 0.00923 (0.0133) | 0.0129 (0.0107) | 0.0151 (0.0103) | -0.0223* (0.0127) | 0.137** (0.0752) | UN | -0.871*** (0.283) | 0.243 (0.245) | -0.850* (0.297) | 0.160 (0.364) | 0.079*** (0.030) |
| REER | -0.0254 (0.0881) | -0.0187 (0.0323) | -0.00803 (0.0381) | -0.0554 (0.147) | 0.435** (0.210) | REER | 0.243 (0.190) | 0.245 (0.032) | 0.234 (0.239) | 0.398*** (0.141) | -0.325* (0.180) |
| CAR | -0.0437 (0.0735) | 0.126 (0.117) | 0.235* (0.124) | 0.180 (0.128) | -0.214** (0.109) | CAR | 0.190 (0.1030) | 0.00282** (0.00127) | -0.127 (0.612) | 0.031*** (0.247) | 0.151** (0.071) |
| ROA | -0.0020 (0.00830) | 0.0109 (0.0106) | 0.0136 (0.0130) | 0.0153 (0.00993) | 0.388*** (0.1460) | ROA | 0.00282 (0.000945) | -0.0798 (0.638) | -0.00374 (0.000798) | 0.0102 (0.00257) | -0.212** (0.101) |
| BS | 0.0195** (0.00804) | 0.0202 (0.0169) | 0.00915 (0.0268) | -0.0176 (0.0178) | 0.323** (0.1620) | BS | -0.0798 (1.102) | 0.113 (1.385) | 0.230 (0.868) | -2.582* (1.387) | -0.080** (0.037) |
| INFL | 0.310 (0.300) | 0.0299 (0.0904) | -0.0390 (0.0539) | 0.0246 (0.149) | 0.115** (0.05) | INFL | 0.113 (1.565) | 0.179 (0.145) | -0.365 (1.560) | 0.628** (0.311) | 0.415** (0.207) |
| LLP | 0.0258** (0.0108) | 0.0277*** (7.6005) | 0.0473*** (0.0107) | 0.0763* (0.0429) | 0.192* (0.109) | FLP | 0.179*** (0.074) | 11.22 (24.28) | 0.618*** (0.773) | -0.492* (0.271) | 0.092 (0.071) |
| Constant | 0.751 (13.98) | -4.295 (8.188) | -2.905 (9.897) | 3.264 (43.19) | 3.600** (14.8) | Constant | 9.711 | 7.223* (2.105) | 2.105 | 5.291 | -3.356* |
| Observations | 142 | 142 | 142 | 142 | 142 | Observations | 44 | 44 | 44 | 44 | 44 |
| R-squared | 0.571 | 0.417 | 0.451 | 0.593 | | R-squared | 0.439 | 0.4979 | 0.515 | 0.6719 | |

| | | | | | | | | | | | |
|---------------------|--|--|--|--|-------|---------------------|--|--|--|--|-------|
| AR(2)P-value | | | | | 0.647 | AR(2)P-value | | | | | 0.318 |
| Hansen test | | | | | 0.886 | Hansen test | | | | | 1.00 |

In parenthesis: ***, **, * indicate 1%, 5% and 10% level of the significance respectively. The detail of the variables given in chapter 3. Names of the macroeconomic variables Growth in Gross Domestic Product (GGDP), inflation rate (INFL), interest rate (INTR), Unemployment rate (UN) and the Real effective exchange rate (REER). Whereas the bank-specific variables are Capital Adequacy Ratio (CAR), Bank Size (BS), Inefficiency ratio (INEF), Loan Loss Provision (LLP), Financing Loss Provision (FLP) (For Islamic banks), Return on Assets (ROA).*

Inflation rate

The relationship between the inflation rate and the following period of exposure to the conventional bank is positive and significant associated credit risk. With the increase in the inflation rate, the credit risk also increases in conventional banks. If the central bank initiated an expansion in the monetary policy, firms and households might encounter a lack in the inflation demand.

Interest rate

The estimations suggest that the conventional bank's interest rate has positive and significant related to credit risk. An explanation is that, with the increase in the interest rate, the cost of borrowing will also increase because the banks tend to charge a high amount for the given loan. This finding is consistent with (Adebola, Wan Yusoff, & Dahalan, 2011; Warue, 2013). On the other hand, in Islamic banking, interest rates have an insignificant impact on credit risk.

Unemployment rate

In the case of a conventional bank, there is a positive and significant correlation between unemployment and credit risk. Consequently, the borrower's capability is weaker to pay their loan installments due to an increase in the unemployment rate and a decrease in income. This finding aligns with the following (Bofondi & Ropele, 2011; Nkusu, 2011), etc. Similarly, in the case of Islamic banks, the unemployment rate is significantly and inversely associated with credit risk.

Real effective Exchange Rate

The real effective exchange rate (REER) is also included in the model to examine external competitiveness. Thus, a real effective exchange rate positively influences credit risk in conventional banks. For instance, a real appreciation of the national currency illustrates that the country's goods and services are comparatively more expensive. Therefore, the ratio of credit increases. Conversely, in the case of Islamic banks, the real effective exchange rate has an inverse influence on credit risk.

Credit risk influence by the Bank-specific variables in Islamic and conventional banking system

Capital Adequacy Ratio

The capital adequacy ratio shows a negative and significant impact on the credit risk for conventional banks. In traditional bank, the level of the bank risk is also determined by the sound capital of the bank. If the capital adequacy ratio level is low, it is difficult for a bank to take the risk. This study is in line with previous research (Koehn & Santomero, 1980). On the other hand, the capital adequacy ratio has a negative and significant impact on the credit risk in the case of Islamic banks. If the capital adequacy ratio decreases, it specifies the decline in the portion of the capital. Drop in amount of capital occurs when there is a decrease in profit ratio or an increase in the risk-weight assets. And the result of a fall in the percentage of profit indicates a higher credit risk. According to the previous literature (Nugraini, 2015).

Return on Asset

The return on assets indicates a positive and significant relationship with credit risk for conventional banks. In particular, the top management is more effective in addressing the credit risks issues. They initiate loans on a political basis and not on

merit or rather with the prior approval of the branch manager. Therefore, the top management plays a vital role in managing the bank policies that face a higher credit risk (Yang et al., 2010). On the other side, the Islamic bank's return on assets negatively relates to the credit risk.

Bank size

The bank size is positive and statistically significant for the conventional banks with credit risk. The prestigious return facilitates the major banks to lend money to the risky borrowers because they can resolve the issues and have much capacity to absorb the losses. As a result, the bank is exposed to high risk. The present result is under the previous research (Aldoseri, 2012; Rajan & Dhal, 2003). On the other hand, In Islamic banks, the bank size has a negative and significant correlation with credit risk.

Loan loss provision/Financing loss provision

In conventional banks, the loan loss provision positively and significantly influences the credit risk. The present study follows the past literature, which is as follows (A. Ahmad et al., 2010; P. K. Ahmed, 1998; Anandarajan, Hasan, & Lozano-Vivas, 2003). On the other hand, in Islamic banks, loan loss provision has a positive but insignificant impact on credit risk. When there is a higher loan loss provision, the Islamic bank's credit risk rate will also be higher.

Inefficiency Ratio

This study shows the positive and significant correlation between Islamic and conventional banks' credit risk and inefficiency ratio. However, the level inefficiency ratio is higher for the Islamic bank. The explanation behind the higher magnitude of the bank is that the Islamic banks are moderately innovative in the marketplace and, with the low market shares, do not achieve economies of scale.

Summary of the Results

The outcome shows that all determinant variables are statistically significant in conventional banking system, such as GDP growth, inflation, unemployment, real exchange rate, interest rate, capital adequacy ratio, return on assets, loan loss provision, inefficiency ratio, and bank size on the credit risk. Similarly, in the case of the Islamic bank, GDP growth, inflation, unemployment, real exchange rate, capital adequacy ratio, returns on assets, inefficiency ratio, and bank size significantly affect the behavior of the credit risk except for the interest rate and the loan loss provision. In short, the overall findings show that the credit risk is influenced by the external factors and the internal factors that impact the credit risk, such as the return on assets inefficiency ratio regardless of both modes of the banking system (conventional, Islamic).

CONCLUSION

Using the GMM model, this study has estimated the dynamic panel model to identify the impression of the macroeconomic variables and the bank-specific variables on the dual type of banking system in conventional and Islamic banking systems. The data of macroeconomics factors and the bank-specific factors on an annual basis are taken from 2008-2018 to scrutinise the impact of these two factors on the dual banking system. The lag of the credit risk has been established in the Islamic and the conventional banking system mainly persistent. Still, it could be observed that the magnitude of the coefficient is higher in conventional banks compared to Islamic

banks. In short, the empirical discussion indicates that the dual banking systems, including the Islamic banking system and the conventional banking system, are different from one another with a perspective on credit risk. The result describes that the Islamic banks are better able to cope with credit risk and respond better than conventional banks because the Shariah rules prohibit pure speculation in monetary terms and allow work on the backed-based assets, which help out the Islamic banks. Moreover, profit sharing in the Islamic bank is a most distinctive feature. With this feature's help, sharing risk between investors and depositors provides shelter from shocking circumstances.

Policy recommendation

The empirical finding of this study will help formulate the policy measure to maintain the integrity of the banking industry. Some recommendations are as follow:

This study provides a straightforward overview of macroeconomic variables and the bank-specific variables that impact credit risk. With the knowledge of this, the banks' decision makers can concentrate on the size, capital, and loan to enhance their profitability, improve their operations, and mitigate the effect of the risk. If the decision-makers have prior knowledge of the factors, they can forecast the level of the risk. Furthermore, the bank with the low efficiency and the low level of capitalisation should also be considered, which can directly create the chance. Considering the macroeconomic variables, the decision-maker cannot handle the macroeconomic variables because these are out of control. However, decision-makers should support and put more effort into setting up a strong and powerful research team in the bank that can evaluate and forecast macroeconomic changes. The policymaker should apply the policies that can make lending easy such as lowering the interest rates by making the exchange rate stable and low rate of inflation through the contractionary and monetary policies. The Government should be pursuing sound economic policies that are favourable to promoting economic development and should introduce a business-friendly environment. At last, the bank should consider macroeconomic factors when giving loans because macroeconomic factors also seem to be important for determining the level of credit risk.

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