FACTORS AFFECTING CREDIT RISK IN ISLAMIC BANKS

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Abstract
This paper probed the effects of bank specific variables on the credit risk of Islamic banks with concentration only on full fledge Islamic banks of Pakistan. The research was conducted with the help of panel data collected for ten years. Data were gathered from all the four full-fledged Islamic banks taken as census sampling. Data were analyzed using pooled OLS. The results confirmed capital ratio and profitability with significant negative impact on the credit risk. However, bank size, management efficiency, and lending to risky sectors were found insignificantly related to credit risk. Thus, increasing capital might curtail the credit risk of the banks. Similarly, increased profitability would prove helpful in absorbing credit risk. Therefore, maintaining an adequate capital is essential for a bank to manage credit risk. Similarly, Islamic banks should focus on increasing their profitability through the efficacy of loan recovery mechanisms and increasing customers' net.

Key words: Bank Size, Capital, Management Efficiency, Risky Sector, Profitability

1. Introduction

Credit, undoubtedly, is an 'obvious' part of most of the banking systems. Credit extension in conventional banking is mostly based on interest. However, in Islamic banking no direct interest based lending/credit is involved owing to the prohibition of interest in Islam. Nevertheless, credit is created in Islamic banks on the basis of real transactions. For instance, in Murabaha sale of asset is made on deferred payment basis. In Musharakah, funds are invested on profit and loss sharing basis with no direct involvement of credit. However, in such dealing the bank usually becomes sleeping partner, not actively involved in the management of the operation of joint venture. So, the bank's share of profit and/or investment may be considered as credit towards the other partner (entrepreneur). Further, at times, the active partner (entrepreneur) may default not paying the bank's share of profit/investment and can lead to the emergence of credit risk. Similarly, Mudarabah is also a form of profit and loss sharing mode of Islamic financing. In this

form of financing one partner (the bank) provides funds/capital and the other partner (entrepreneur) invest/manage the funds. The provider of funds/capital is called 'Rabb al mal' and the entrepreneur/manager of funds is called 'Mudarib'. The profit share according to predefined ratio and the loss is borne by the funds' provider. In such arrangement the whole fund/capital of the Rabb al mal (bank) is at the mercy of the entrepreneur and entails credit risk. Though Musharaka and Mudaraba are well-defined and popular sources of financing, however their application has been limited as sources of financing (Hasan, 2002; Farooq and Ahmed, 2013). Likewise, other such modes as Salam- forward sale arrangement and Ististna- forward sale/manufacturing obligations (Muhammad and Chong, 2007) are also used as proxies of credit extension facilities that create credit risk.

As explained, each of the aforementioned modes of financing poses a distinct and unique threat to the quality of the assets (credit) of the bank owing to their nature and certain obligations in *Shari'ah*. For example, in Murabaha, there is right for the buyer of the agreement to reject the products' delivery that is already purchased by the bank (Rahman and Shahim, 2010). Similarly, both Musharaka and Mudaraba are vulnerable to credit and operational risks (Astrom, 2013). Likewise, Mudarabah financing is the riskiest mode for a financier in Islamic banking system (Bacha, 1997) as the whole venture/project is supposed to be financed by the bank with no equity participation by the managing partner (entrepreneur). Further, in Mudaraba, the bank is constrained not to take part in the management of the business thereby increasing its risk (Rahman and Shahim, 2010). However, such financing may not be implemented practically by Islamic banks in Pakistan due to "prudential regulations of SBP, which may not allow banks to extend 100 percent financing for any project" (Shah, 2018, p.50). Similarly, a customer can reject the product if it is not up to his/her expectations in the cases of Salam and Istisna. Given such risks in the course of businesses of Islamic banks, there is a dire need for research work to determine the factors that may drive banks towards loan losses or, eventually, bankruptcy.

1.1 Research Problem

Pakistan is witnessing an impressive growth in Islamic banking (Riazuddin, 2017). Islamic banks have become an essential part of the country's banking system. However, the challenges and the risks these banks face are quite distinct from those of the conventional banks due to the entirely different nature of financing creating different nature of credit risks. This is primarily because of the unique nature of their operations owing to Shariah injunctions. Hence, the current study intends to disclose certain factors specifically associated to the bank that affect credit risk and ascertain the effects of such bank specific determinants on credit risk of Islamic banks in Pakistan.

1.2 Significance of the current study

Islamic banking significantly expanded in Pakistan during recent past. However, it is still in an "embryonic" stage in the country (Shah *et al.,* 2016). Thus, it needs a very strong support and a coherent approach in order to survive and compete with the centuries old conventional banking system. Inadequate decisions with regard to regulatory controls and financial systems can push it into financial crisis (Setiawan, 2018). Hence, it is highly important to properly ascertain and closely monitor all the potential risks associated with such system. Credit risk is one of those risks (How *et al.,* 2005).

The current research is an imperative attempt to add value to the theory of credit management. For instance, no study has been conducted with respect to bank specific factors of credit risks in Islamic banks of Pakistan till yet. Abbass *et al.* (2014) examined impact of credit exposure on banks' performance. Mismana *et al.* (2015) worked on bank specific factors of Islamic banks in Malaysia that might not be referred to in Pakistani context owing to different dynamics of markets and economies of the two countries. Besides, plenty of research (How, Karim & Verhoeven 2005; Rahman & Shahimi, 2010; Misma 2012; Pestova & Mamonov 2012; Waemustafa & Sukri, 2015; Haryonoa *at al*., 2016) on various aspects of credit risk management. However, none of them focused specifically on bank specific factors with respect to credit risk of full fledge Islamic banks in Pakistan. Hence, this piece of paper may prove to be a good addition to the body of knowledge in this subject. Moreover, this study finds capital ratio and profitability negatively affecting the credit risk. Therefore, the State Bank of Pakistan (SBP) can take prudent measures to minimize the credit risk of Islamic banks through proper monitoring of these variables especially regulatory capital. Consequently, the chances of Islamic banks' loans' losses would lessen, thereby preventing the Islamic banking system from going into jeopardy. Hence, this study can have policy implications also.

The remaining study comprises 4 sections. Section 2 reviews the existing literature regarding credit risk and its determinants including non-performing loans, bank size, management efficiency, capital, loan extension to risky sectors, banks' profitability besides agency theory and efficiency risk hypothesis. Section 3 elaborates on the methodology followed in this research. Section 4 reports and explains the results. Section 5 closes the paper and suggest some remedial measures for refining the credit management process in Islamic banks.

2. Literature Review

Regarding the credit risk of the banking industry, three strands of research exist. The first emphasizes on the macroeconomic factors causing credit risk (Lin *et al.,* 2016; Ali and Daly, 2010; Castro, 2013). Second strand of work concentrates on microeconomic i.e. institution specific factors that cause credit risk (Berger and DeYoung, 1997; Misma, 2012; Mismana *et al* 2015). A third strand incorporates both the micro-economic and macro-economic factors (Zribi and Boujelbène 2011; Louzis *et al.,* 2012; Ghosh 2015; Waemustafa and Sukri 2015; Haryonoa *et al* 2016; Sandada and Kanhukamwe 2016)

Credit risk is also called default risk that is the inability and/or unwillingness of the debtor to repay the obligations as they come due. It is also described as the change in the total value of a portfolio due to unexpected deterioration in the quality of credit (McNeil *et al.,* 2005). In other words, the risk that arises when a party is unable to meet its contractual obligations resulting in an economic loss is called credit risk (Jorion, 2010). Manaba *et al.* (2015) states that credit risk is highly 'pervasive' and is associated with the lending and deposit activities that are the core operations of the bank. However, investigation of the factors of credit risk is essential for both the management of bank and the regulatory authorities (Mismana *et al.,* 2015) as credit risk seriously hits the profitability of the banks (Noman *et al.,* 2015) that can lead to crisis (Vodová, 2003). As the loan losses occurring due to the default by the borrowers are required to be primarily offset against the profit. Resultantly, it reduces the profit and lead to overall losses by the bank.

However, strong capital serves as an effective buffer against such losses. Basel Committee (2000) also declared credit risk as one of the most detrimental risks for banking. Credit risk is measured in terms of non-performing loans (NPL) that is popularly accepted as an indicator for quantifying credit risk.

SBP describes NPL as the advances and loans whose mark-up or principal or part thereof is overdue for ninety or more days (SBP, Prudential Regulation VIII, 2000). Berger and DeYoung (1997) define NPL as the percentage of loans in total assets that are either due for the past 90 days or they are kept in non-accrual basis. Rahman and Shahimi (2010) used NPLs as variable for credit risk. Haryonoa *et al.* (2016) found 2.33% of the total Islamic banks' assets of Indonesia as NPL over the period i.e. 2004 - 2012. Furthermore, Louzis *et al* (2012) found macroeconomic variables mainly affecting NPLs in Greek banks. Ghosh (2015) found GDP, unemployment, inflation etc. affecting NPLs in the US banking industry. For measuring credit risk, the NPLs ratio has been used as an indicator in many studies (Berger and DeYoung 1997; Misma 2012; Waemustafa and Sukri 2015). Other studies considered 'provision for loss loans as proxy for credit risk (Abedifar *et al* 2012; How *et al.,* 2005). Misma (2012) suggested a significant relationship of financial expansion, capital buffer, capital ratio and financial quality with the credit risk of the banks.

Bank size is another important variable that has been used in numerous studies for manifold purposes. It has been used to ascertain its impact on bank's profitability (Aladwan, 2015), market power (Bikker *et al.,* 2006), stability (Adusei 2015), etc. Aladwan (2015) found significant variation in the profits of different sized banks. Similarly, Bikker *et al.* (2006) concluded that with difference in banks' sizes, market powers vary. Added to this, Adusei (2015) concluded that bank size positively affected banks' stability. How *et al.,* (2005) observed inverse connection between the size of bank and credit risk. They argued that bigger sized banks would face relatively less credit risk due to holding comparatively more information and better capacity to monitor loans by large banks (Haryonoa *et al.,* 2016). On the other hand, Waemustafa and Sukri (2015) found bank size insignificant while calculating the credit risk for Islamic banks, however, it was observed significant for conventional banks. Similarly, Ahmad and Ahmad (2004) found insignificant association between NPLs and bank size. The current research intends to examine the following relation between the size of bank and the credit risk.

H_1: Bank's size significantly affects the credit risk.

Management efficiency is also considered important in the examination of credit risk. Berger and DeYoung (1997) found management efficiency inversely related with credit risk. Using Granger –causality test, they suggested cost efficiency as an important factor for future non-performing loans. Inefficient managers would find it difficult to cope with the challenges of properly monitoring the loans (Haryonoa *et al.,* 2016). Haryonoa *et al.* (2016) observed banks' profitability affecting credit risk. Mismana *et al* (2015) measured management efficiency through the ratio of earning assets to total assets of a bank. They found management efficiency insignificant to credit risk. Conversely, Ahmad and Ahmad (2004) argued that management efficiency had a positive bond with the credit risk of Islamic banks and a negative bond with credit risk of conventional banks. This presumed connection between the two factors may be converted into the following hypothesis.

H_2: Management efficiency significantly affect the credit risk.

No business can come into existence without a sufficient amount of capital. Capital serves as an effective buffer against the loan losses if the profit proves insufficient to absorb such losses. Similarly, Basel capital accord requires all banks to hold a prescribed ratio of capital to risk weighted assets. With the increasing vulnerabilities for banks amid financial crises, capital ratio has become more significant in banking discourse. Capital buffer has thus been widely studied as a major factor affecting credit risk. Capital ratio and capital buffer both carry considerable significance for the capital of a bank. Lindquist (2004) defined capital buffer as the ratio of 'excess capital to risk weighted assets'. On the other hand, Mismana *et al* (2015) defined capital buffer as the ratio of total equity to total assets. Misma (2012) argued that capital for a bank can either be a debt capital or equity capital. A relatively high equity capital would, undoubtedly, decrease the borrowing cost. However, it would enhance the overall cost of borrowing. Mismana *et al* (2015) discovered capital buffer significantly affecting the NPLs. Lindquist (2004) also found a negative relation between risk of the saving banks and capital buffer. Capital buffers also affect business cycles of banks. Capital buffers were found negatively related with the business cycle (Ayuso *et al.,* 2004; Shim, 2013). Though less employed, capital ratio has also been witnessed as a significant variable. Mismana *et al* (2015) defined it as a ratio of tier 1 and tier 2 capitals to total assets. They found it to be statistically significantly to the NPLs. This research also considers capital ratio as an important factor that can affect credit risk. Resultantly, the third hypothesis is developed.

H₃: Capital ratio significantly affect the credit risk of the bank.

Researchers have also identified financing to risky sectors like real estate as a determinant of credit risk (Ahmad and Ahmad 2004; Rahman and Shahimi, 2010). Waemustafa and Sukri (2015) disclosed that exposure in risky sectors are significantly and positively connected with the credit risk of Islamic banks, however, such exposure does not affect credit risk in conventional banks. Rahman and Shahimi (2010), keeping macroeconomic variables controlled, also found real estate financing affecting credit risk in Islamic banks. Ahmad and Ahmad (2004) compared credit risk determinants of Islamic and conventional banks and found financing in risky sector positively significant in both types of banks. In Pakistani context, Small and Medium Enterprises (SMEs) sector, despite efforts remained the highest risky sector for the banks to lend funds (SBP 2015). The increased credit risk in SMEs was attributed to the lack in trainings, financial resources and technical advancements in SMEs. SBP (2015) further pointed out textile sector as the largest industry representing higher concentration risk. This argument was also corroborated by State Bank report regarding '*Policy for Promotion of SME Finance*' (SBP 2017). The current study also considers SMEs and textile as risky sectors for Pakistani banks leading to build the following hypothesis.

H₄: Risky Sector Investment significantly affect the credit risk of the bank.

Pestova and Mamonov (2012) mentioned bank's profitability as a factor affecting credit risk. Haryonoa *et al.* (2016) explained this variable in the perspective of agency theory (Fama 1980). Haryonoa *et al.* (2016) explained that highly profitable banks were more comfortable to monitor and control loans. They found banks' profitability affecting credit risk. Messai and Jouini (2013) also found banks' performance negatively affecting credit risk. Makri *et al.* (2014) observed return on equity (ROE) strong influencing NPLs. Magali (2013) found credit risk management significantly influencing the performance of Savings and Credits Cooperative Societies in Tanazia. Similarly, Afriyie and Akotey (2013) observed positive association amongst NPLs and rural banks' profitability. Likewise, in Pakistan's context, using loss loan provision as a surrogate

for credit risk, Abbass *et al.* (2014) found credit risk negatively affecting profitability of the firms. This relationship can be converted into the following hypothesis.

H_5: Profitability significantly affect the credit risk of the bank.

A brief reference of agency theory and efficiency hypothesis is worth noting because Haryonoa *et al.* (2016) found bank specific credit risk determinants dependent on agency theory (Fama 1980) and efficiency risk hypothesis. According to agency theory managers deviate from their obligated tasks at the expense of the interests of the principals (Fama 1980). Similarly, the efficiency risk hypothesis describes the association between efficiency and credit risk. It creates certain connection between efficiency and problem loans. In simplest terms, it explains the tradeoff between risk of taking efficient decisions and potential problem loans (Haryonoa *et al.,* 2016). Sandada and Kanhukamwe (2016) also recognized agency theory as an important concept for examining the credit risk of banks. They observed a significant rapport between credit risk and macroeconomic and microeconomic factors of the banks. Pestova and Mamonov (2012) found macro-economic variables significantly affecting credit risk. Macro-economic indicators like money supply expansion and foreign exchange were inversely related with credit risk. However, unemployment was observed having had a positive relation with the credit risk of the Romanian banks (Bucur and Dragomirescu 2014). Unemployed people might approach banks for credit for consumption purposes resulting in increased credit but with insufficient repayment capacity/ability automatically increasing credit risk. However, banks should not extend credit without any proper repayment evaluation of the borrower. Waemustafa and Sukri (2015) observed inflation significantly negatively related with conventional banks' credit risk and insignificant for Islamic banks.

It is observed that almost the all of the above discussed studies were conducted in countries other than Pakistan except Abbass *et al.* (2014). However, Abbass *et al.* (2014) explored the impact of credit risk on returns. Thus, the micro-economic determinants of the credit risk are required to be examined because Islamic banking system is still in an embryonic stage in Pakistan (Shah *et al* 2016) and studying their working and vulnerabilities in the Pakistani dynamics is the need of the hour. So, this research intends to investigate the effects of certain determinants including bank size, management efficiency, capital ratio, loan extension to risky assets and bank's profitability on credit risk of the full fledge Islamic banks working in Pakistan. The prescribed relationships (proposed hypotheses) are shown in the following figure.
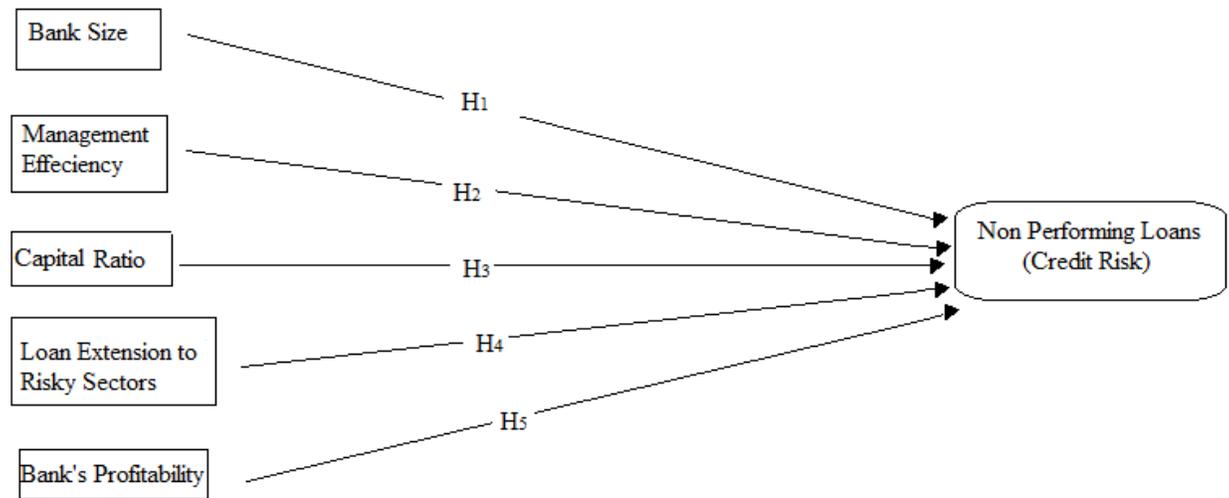
Figure 1: Theoretical Framework

3. Research Methodology

It is observed from figure 1 that this study explains the effects of the five independent variables on credit risk, the dependent variable through testing the respective hypotheses. Bank size, cost efficiency, capital ratio, loan extension in risky sectors and bank profitability are considered as independent variables.

All the four banks offering full fledge Islamic banking services in Pakistan including Meezan Bank Limited, Albaraka Bank Limited, Bank Islami and Dubai Islamic Bank constituted the population for this research. Since the size of the population was small and analyzing the entire population was practically possible, therefore data were collected from the whole population. This technique may be called as census study, as it studies the total research population (Creswell 1996). Kothari (2004) argued that if universe is 'too small', the whole population can be taken and that there is no use of making sample out of such population.

NPLs has been used as surrogate of credit risk. NPLs are those advances and loans whose mark-ups and/or principals or part thereof are overdue for ninety days or more (SBP Statistical Bulletin 2008; SBP Prudential Regulation VIII 2000). NPL has been popularly applied as a surrogate for credit risk by previous researchers (Haryonoa *et al* 2016; Mismana *et al* 2015; Misma 2012; Louzis *at al.,* 2012; Rahman and Shahimi, 2010; Berger and DeYoung 1997). NPL ratio is calculated by dividing the total value of a bank NPL by its total loans and advances (Misma, 2012). Mathematically,

$$\text{NPL Ratio} = \text{NPL of the bank/ Total Loans and Advances}$$

Similarly, bank size is defined as the total value of the assets held by banks (Misma 2012). It is ascertained by taking natural log of the total assets of the bank (Mismana *et al* 2015). Benoit (2011) stated that natural log of the variables is taken to make relationship among the variables linear, besides shaping skewed data into an 'approximately' normal distribution. Bank size was

taken into account as an independent variable by previous researchers also (Haryonoa *et al* 2016; Waemustafa and Sukri 2015; How *et al.,* 2005; Ahmad and Ahmad 2004). Mathematically,

Bank size= natural Log of the total assets of the bank

Management efficiency is ascertained by calculating the ratio of total earning assets to total assets (Mismana *et al* 2015). Earning assets are those assets that earn profit in form of interest or dividend. Management efficiency has been used by previous researchers (Haryonoa *et al* 2016; Mismana *et al* 2015). Mathematically,

Management efficiency = (cash and balances with treasury banks + Balances with other banks+

Due from financial institutions + Investments + Total loans and advances) ÷ Total assets

Captital Ratio (CAR) is computed by adding tier 1 and tier 2 capitals and dividing it into total assets (Mismana *et al* 2015). The addition of tier 1and 2 capital is also called regulatory capital. Consequent to the financial crisis maintaining certain regulatory capital ratio has become highly significant. CAR was also used by previous researchers (Mismana *et al* 2015; Misma 2012). Mathematically,

CAR= (tier 1 + tier 2 capitals)/ total assets of the bank

Islamic banks would certainly face credit risk if they make investment in risky sectors (Waemustafa and Sukri 2015). According to State Bank small and medium enterprises (SME) sector and textile Industry are the most risky sectors in the country because of their credit and concentration risks respectively. This research classified these two sectors as risky and computed their impacts on NPLs. The measurement of the impact of investment in risky assets was borrowed from previous research (Waemustafa and Sukri 2015; Rahman and Shahimi, 2010; Ahmad and Ahmad 2004).

For measuring the effect of profitability on NPLs, return on assets (ROA) was applied. ROA was computed by dividing the total profitability in total assets (Messai and Jouini 2013). Previous researchers also used the banks' profitability (Haryonoa *et al* 2016; Messai and Jouini 2013). Mathematically,

ROA= Annual total profit (loss) of the bank/ total assets of the bank

Table 1 gives the summary of variables, their proxies and respective formulas used for their measurements**.**

Table 1: Variables, Proxies and Respective Formulae for Measurements

Variable	Proxy	Formula
Credit risk	Ratio of NPL of the bank	total NPL÷ total loans and advances
Bank size	Total assets of the bank	natural log of total assets
Management Efficiency	-	total earning assets ÷ total assets
Capital	Capital Ratio	(tier 1 + tier 2 capital) ÷ total assets of the bank

Risky Investment	-	-
Bank Profitability	Return on assets	total annual profit ÷ total assets of the year

Panel data covering 10 years, from 2008 to 2017 (both inclusive) were collected from the annual reports of the banks. Data related with all the variables under investigation were easily available in the annual reports. The annual reports were collected from the websites of the respective banks. Since, it was a panel study, annual reports were collected for ten consecutive years viz. 2008 till 2017. A panel study is a practice of pooling the observations of the samples in a cross-section order over a determined period of time. In panel data frame, the observations are tabled in 'N * T' format; N representing the number of banks and T time in years. (Mismana *et al* 2015). Previous studies also applied panel data sets (Misma 2012; Mismana *et al* 2015; Haryonoa *et al* 2016).

Multiple regressions was employed for analyzing the effect of the five proposed independent variables on the credit risk, dependent variable. The following regression equation was applied.

$$CR_{IB} = \alpha + \beta_1 BSize + \beta_2 MGT + \beta_3 CBF + \beta_4 RSI + \beta_5 PERF + \acute{\varepsilon}$$

Where,
α = Unobserved constant over all times;
β = coefficient of regressors
CR = Credit Risk of the Islamic bank, i.e. (total NPL ÷ loans and advances);
BSize = bank size, i.e. (ln) of the total assets of the bank;
MGT = Management efficiency, i.e. (total earning assets ÷ total assets);
CAPR = Capital ratio of the bank [(tier 1 + tier 2 capital) ÷ total assets of the bank)];
RSLE = Loan extension to risky sectors;
PERF = Performance of the bank, i.e. (total annual profit ÷ total assets of the year);
$\acute{\varepsilon}$ = Error Term.

In order to conduct multiple regression, ordinary least squares (OLS) was employed using statistical software Eviews 10. All assumptions were witnessed to be fulfilled before using OLS.

4. Results and Discussion

Table 2 shows the descriptive statistics. For each variable, there were a number of 40 observations. The data comprised observations from four banks for a time frame of 10 years (4*10=40). Consequently, the total number of 6 variables - one of them dependent, while the other 5 being independent- made for a total of 240 observations (4*10*6= 240). For the purpose of understandability, as the logarithm transformed variables are not 'immediately interpretable' (Darmouth Education Statistics Handouts[1]), the descriptive statistics analysis for bank size has been done without taking the log of values.

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[1] https://math.dartmouth.edu/~matc/eBookshelf/statistics/CPS/cps3.pdf

Table 2: Descriptive Statistics

	Credit Risk	Capital Ratio	Bank Size	Management Efficiency	Performance (ROE)	Risky Sector Loan Extension
Observations	40	40	40	40	40	40
Mean	0.074	0.095	1.56E+08	0.917	0.002	0.170
Median	0.056	0.079	91054092	0.921	0.004	0.158
Maximum	0.228	0.267	7.82E+08	0.975	0.017	0.349
Minimum	0.002	0.050	16537387	0.723	-0.029	0.083
Std. Dev.	0.057	0.047	1.71E+08	0.049	0.009	0.070

The mean for credit risk is 7.3%, whereas its median is 5.5% that indicate a large number of banks entailed slightly higher credit risk as mean greater than median manifests positively skewed observations. Same interpretation applies for the capital ratio that has a mean of 9.4% against a median of 7.9%. This implies that a large number of banks has a marginally more regulatory capital. The same applies to the case of bank size where the mean is also bigger than the median. It is worth mentioning here that in the case of negatively and positively skewed data, median becomes more reliable measure for central tendency (William Paterson University NOVA Guide).

Though the mean of the management efficiency is less than the median, however the difference is very small - almost negligible. This hints towards a normal distribution in data related with management efficiency indicating equal management efficiency in all banks. In case of performance measured by return on assets (ROA), the data is negatively skewed signaling that more banks have less profitability than the average. Regarding the risky sector loan extension, the mean is more than median hinting that more banks lend money to riskier sector.

Standard deviation is one of the most commonly used methods of measuring dispersion. Standard deviation measures the 'variation' of data from the mean in that data. Table 2 shows the standard deviation of credit risk is 5.6% dispersed around its mean of 7.4%. For the capital ratio, it is 4.7% around the mean of 9.4%. Similarly for the bank size, the dispersion is 1.71 billion around the mean of 1.56 billion. The standard deviation of management efficiency is recorded at 4.9% around the mean of 91.7%. Observations of ROE are 0.08% dispersed around the mean of 0.02%. For loan extension to risky sector, the dispersion is recorded at 7% around the mean of 16.99%.

4.1 Regression Analysis

Before applying the ordinary least square (OLS) regression, all the requisite assumptions of regression including heteroscedasticity, autocorrelations and multicollinearity, were examined. Table 3 shows the p value (0.0952) at 5 % level of significance that confirms the nonexistence of heteroscedasticity in the data checked through the Breusch-Pagan-Godfrey test.

Table 3: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.079831	Prob. F(5,34)	0.0921
Obs*R-squared	9.368788	Prob. Chi-Square(5)	0.0952
Scaled explained SS	7.084207	Prob. Chi-Square(5)	0.2145

Autocorrelation was checked through Breusch-Godfrey Serial Correlation LM test (Gujrati, 2004) shown in table 4 indicating no autocorrelation in the data, as the p value is greater than 0.05 and H_0 cannot be rejected in this case also.

Table 4: Breusch-Godfrey Serial Correlation LM Test

F-statistic	2.782892	Prob. F(2,32)	0.0769
Obs*R-squared	5.926441	Prob. Chi-Square(2)	0.0517

Multicollinearity was also not found in the data. It was checked through Variance Inflation Factor (VIF) method on the Gretl statistical software. The results are presented below. As the VIF values for all the variables are in the range of 1 to 3 that confirms no multicollinearity in the data.

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Variance Inflation Factors
Minimum possible value = 1.0
Values > 10.0 may indicate a collinearity problem

      B_size    2.072
     Mgt_eff    3.212
        Capr    2.679
   Risky_inv    1.849
        Prof    1.656
```

As far as the random sampling assumption was concerned, the whole population was taken into consideration known as census sampling. After examining the assumption of regression, the method of pooled OLS was employed using Eviews 10 owing to the nature of pooled data that were examined. The results are summarized in table 5 given below.

Table 5: Regression Analysis

Variable	Coefficient	t-Statistic	Prob.
B_SIZE	-0.013506	-1.813155	0.0786
MGT	-0.455312	-1.957749	0.0585
CAPR	-0.969809	-4.176966	0.0002
RSLE	0.122769	1.108178	0.2756
PERF	-2.437432	-2.213860	0.0336

C	0.582892	2.589315	0.0141

R-squared	0.412872
Adjusted R-squared	0.326530
S.E. of regression	0.046361
Durbin-Watson stat	1.271407
Log likelihood	69.34475
F-statistic	4.781800
Prob(F-statistic)	0.002045

As depicted in the table 5, the F-statistic confirms the fitness of model. R square is 0.412. However, adjusted R^2 is 32.6% indicating the variation in credit risk caused by the five identified variables. The findings further show an insignificant influence of the bank size on the credit risk. Hence H_1 is rejected. This result is similar to previous research (Waemustafa and Sukri 2015; Ahmad and Ahmad 2004). However, How *et al.* (2005) found bank size significantly affecting the credit risk. Logically speaking bigger size banks appears to be in better position to manage and absorb credit risk. However, the difference of findings of previous researches warrants further investigation of this argument. Similarly, no relationship is observed between the management efficiency and credit risk. Therefore, H_2 is rejected. Mismana *et al* (2015) also found similar results; however, Ahmad and Ahmad (2004) found a significant relationship between credit risk and management efficiency against the findings of the current research. Nevertheless, the capital ratio is found significantly related with credit risk. Hence, H_3 is accepted. It is natural to observe a significant effect of capital on credit risk as capital is the most effective buffer available to the bank against the loans losses and other exigencies. This result is also consistent with Mismana *et al* (2015). Contrary to the capital ratio, the loan extension to the risky sector does not affect the credit risk of Pakistani Islamic banks. Hence, H_4 is rejected confirming no relationship between the credit risk and loans to risky sectors. This result is in contradiction with previous research (Waemustafa and Sukri 2015; Rahman and Shahimi, 2010; Ahmad and Ahmad 2004). However, a significantly negative relationship is observed between the profitability of the bank and credit risk. It is technically indicating that less risk of default results in higher profitability. On the other hand higher profitability provides the banks with more space to absorb loan losses. Hence, H_5 is accepted. Previous research (Haryonoa *et al.,* 2016; Messai and Jouini 2013) also reported similar findings.

5. Conclusion and Recommendations

The study under review investigated the effects of bank specific variable on the credit risk of Pakistani Islamic banks with the help of panel data collected for ten years using pooled OLS. Capital ratio and profitability of the banks were found to have significant negative impact on the NPLs. This relationship indicated that increasing regulatory capital might curtail the credit risk of the banks. Similarly, increased profitability would prove helpful in absorbing NPLs/credit risk. However, bank size, management efficiency, and lending to risky sectors were found insignificantly related to credit risk.

Thus, it can be inferred that maintaining an adequate capital is essential for a bank to manage credit risk. This also implies that an enhancement in the regulatory capital can minimize the ratio of NPLs. Therefore, the SBP and the Islamic banks should concentrate on maintaining sufficient level of banks' capital. Besides, credit risk also needs to be carefully monitored on continuous basis in order to minimize the NPLs' level. Similarly, Islamic banks also need to focus on increasing their profitability. This can be done by further strengthening the efficacy of loan recovery mechanisms, besides increasing customers' net and banking services. Such measures can further aid in minimizing their credit risk.

The current study was undertaken keeping the macro-economic variables constant. Future research may be conducted to examine the combined effect of macro-economic and micro-economic variables on the credit risk of full fledge Islamic banks in Pakistan. Though Haryonoa *et al* (2016), Waemustafa and Sukri (2015), Pestova and Mamonov (2012), Misma (2012), Rahman and Shahimi (2010), and How *et al* (2005) have conducted research considering such variables, however they all pertain to the countries other than Pakistan. Second, the current study concentrated on full fledge Islamic banks in Pakistan. However, conventional banks operating Islamic branches are also an important part of Islamic banking system, therefore future research may include such banks also. It is pertinent to explain that the data were collected from the annual reports assuming them to be reliable.

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