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# Credit Risk and Banks Stability: An Empirical Analysis of Pakistani Banking Sector

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**Abstract:**

This study investigates the risk and stability of banks using the sample of thirty commercial banks operating in Pakistan between 2008 and 2015 with regards to financial and ownership mode. This study investigates the data related to financial mode with regard to conventional and Islamic banks. Results suggest that conventional banks have higher credit risk with initial inference and negatively significant in relation to equity. Whereas, Islamic banks establish the same relation insignificant. Risk proxy depicts similar results with initial inference. This study inferences the ownership mode findings in reference to foreign, private and public banks. Public banks have highest level of credit risk and confirm adversely our initial inference. Public banks also maintain the highest risk proxy value and negatively insignificant in relation with equity but confirms our initial inference. Islamic banks have high leverage, but minimum solvency risk means are more stable than conventional banks. Whereas, foreign banks have low leverage but minimum solvency risk means are more stable than private and public banks. Moreover, we find banks having negligible and/or negative default loans growth are negatively significant in relation with assets. Moreover, results depict that the stability of banks is negatively sensitive with earning assets, interest rates and positively sensitive with GDP growth.
***Keywords:*** Credit Risk, Insolvency Risk, Stability, Leverage

## 1. Introduction

Risk exposures are inherent in financial institutions. Over time, these institutions have developed techniques/systems to mitigate risks and improve the efficiency of their performance. Conventional and Islamic banks face different risk exposures due to differences in product structures and operational mechanisms. Understanding the difference in risk exposure for conventional and Islamic banks is essential because of the growing international presence of financial institutions operating on the principles of Shari'ah.

Islamic banking and finance has emerged internationally in various ways. Primarily, its growth is observed in countries where the government actively supports the promotion of Islamic financial systems. In some cases, conventional

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banks tend to open Islamic windows to cater to demand. Islamic banks and financial institutions operate in the corporate sector, competing with conventional financial institutions. On a larger scale, multinational financial institutions operate on *Shari'ah* principles, such as Islamic Development Bank. Capital market instruments and insurance are also demonstrating increasing demand internationally (Waemustafa & Sukri, 2015).

A few papers have delineated the particular risks innate in Islamic banking. One aspect of existing research emphasizes the necessity of prudential regulations to focus more on disclosure across Islamic banks and exposure to operational risks (Errico & Farahbakhsh, 1998; Hussein, 2016).The role of operational risk exposure in Islamic banks arises from PLS transactions (such as, mudarabah) where the bank neither has complete control over the operations of the business, nor can it demand collateral from the customer. Further, when profit and loss information is disseminated to investment account holders, the bank is exposed to withdrawal risk. Fewer studies focus on the determinants of bank profitability (Hassan & Bashir 2003; Rashwan, 2010) and here there is some evidence that better capitalized and loaned-out Islamic banks are more profitable.

To improve risk management practices, it is necessary to take into account the timing and exposure of the risks involved in different transactions (Sundararajan & Errico, 2002). As such a thorough analysis of risk profiles and variations across categories in the banking industry is necessary. Another issue in terms of risk exposure is the fact that due to withdrawal risk exposure, Islamic banks may choose to diverge from *Shari'ah* standards in order to maintain competitive returns, rather than pay PLS transactions on real performance (Obaidullah, 2005). This is a greater concern in systems where conventional and Islamic banking systems co-exist.

Cihak and Hesse (2010) and Abedifar et al. (2013) examine insolvency risk (using the Z-score measure) as well as other risks and typically find that small Islamic banks have lower default risk compared with small conventional banks. Cihak and Hesse (2010) also find that large Islamic banks are less stable than conventional banks whereas Abedifar et al. (2013) and Beck et al. (2013) find no such differences. This lack of consensus necessitates further investigation, particularly into individual economies, of different financial context to determine influence of risk and stability in financial institutions.

There is a fundamental gap in the existing literature when considering risk exposures and the coexistence of Islamic and conventional banks within a financial system. While numerous studies focus on comparing Islamic banks and conventional banks, very few consider risk alongside stability, while controlling for industry and economic effects. Furthermore, existing research does not determine the consistency of findings across ownership modes.

With the above-mentioned scenario in mind, the objective of this study is to identify the impact of equity on credit risk and solvency credit (stability) across financial modes and ownership modes. The research questions to meet this objective are: first, what is the impact of quality of equity on credit risk across financial modes and ownership modes? And second, what is the impact of quality of equity on solvency credit (stability) across financial modes and ownership modes?

This study finds a significant negative impact between credit risk and equity for conventional banks and a significant positive impact between credit risk and equity for public banks. The relation between credit risk and equity confirm our initial inference, but insignificantly negative for foreign and private banks. Conventional banks are exposed to higher levels of credit risk as compared to Islamic banks. The results also indicate a similarity between both exploratory and empirical results in reference to financing mode; conventional banks have negatively significant impact of credit risk and equity. In addition, public banks have the highest credit as compared to foreign and private banks. This study also shows that conventional and public banks are negatively significant in relation with assets; these banks show either negligible and/or negative classified and problem loans growth.

The remaining paper is divided into five sections. First a review of existing literature is covered, followed by data and methodology. Then regression analysis has been conducted to determine impact of independent variables on dependent variables. Then findings are discussed, followed by policy implications.

## 2. Literature Review

Islamic banks today exist in all parts of the world and are looked upon as a viable framework with numerous financial instruments to offer. While it was at first created to satisfy the needs of Muslims, Islamic banking has become an all-inclusive

financial institution in a brief amount of time, with a considerable portfolio to compete with conventional banking.

Global assets of Islamic finance have tripled worldwide from 2007 to 2014, now reaching two trillion USD (The City UK, 2015). Islamic banking represents the main form of Islamic finance, accounting for nearly 1.6 trillion USD at the end of 2014 (with Islamic banks particularly active in Asia and the Middle East), 300 billion USD account for Islamic bonds, 80 billion accounts for mutual funds, and 20 billion comprise of Islamic insurance (The Economist, 2014). The implications of the development of Islamic banking then has to be questioned. A large amount of research has been devoted to analyze how this expansion generates microeconomic effects on bank efficiency (Abdul-Majid et al. 2010; Srairi, 2010) and bank competition (Turk-Ariss, 2010; Weill, 2011) and macroeconomic effects on financial development (Gheeraert, 2014) and economic growth (Gheeraert & Weill, 2015; Imam & Kpodar, 2016). In addition to the growth in banking assets there is increasing competition between major financial centres to take the lead in Sukuk issuance and to develop a broader array of Islamic investment products (The City Uk, 2013). In the light of these developments it is appropriate to determine the risk and stability impacts of this system. A major issue to investigate in this area is how Islamic banking growth exerts an impact on financial stability: are Islamic banks associated with greater or lower risk than conventional banks?

Research indicates that growth in Islamic banking can be largely attributed to Islamic resurgence rather than inherent institutional/instrument qualities. This is because when Islamic financial institution portfolios are studied, a negligible portion of their portfolio consists of PLS instruments, indicating that majority portfolio returns are generated through products with designs and functions similar to conventional banks- while using the conventional benchmarks to calculate risk and return. (Chong & Liu, 2009) While a considerable amount of existing literature covers issues such as efficiency of Islamic banking, competition in the banking sectors of various economies, bank stability, asset quality and risk exposures in the banking sectors (Hesse & Cihak, 2007; Cihak & Hesse, 2010), it is essential to determine the role of instrument/portfolio differences among different categories of banks and their role in risk exposure and performance.

In Pakistan, the evolutionary technique for Islamic banking was embraced- to establish Islamic banks parallel to the current conventional banks. This incorporates three principle methods for advancement of the sector: primarily, full-fledged Islamic banks are urged to be set up; Islamic banks are allowed to establish subsidiaries; lastly, conventional banks are allowed to set up standalone Islamic banking branches. The parallel existence of conventional and Islamic banking has a fundamental flaw- the conversion of conventional banks to Islamic banks is slow and as long as the market for conventional banking is maintained, customers will continue their patronage with conventional banks.

The beginning rationale of the parallel framework permits a valuable way of presenting the Islamic banking framework in a short period of time and at a lower expense. Rationally, this should drive the general industry to be more competitive, prompting improved performance and improved efficiency of Islamic banking (Alias, Kamarulzaman, & Bhupalan, 1994; Kaleem, 2000). On the other hand, with facilities and incentives provided by the central bank to both conventional and Islamic banks, determining whether this performance has been accomplished through consistent risk management and increased stability across conventional and Islamic banks should be analyzed.

2.1. Measuring Risk and Stability in Banking

Risk is a continuous process where evaluation and re-evaluation are necessary to maintain balance. Effective risk management strategies do not require the elimination of risk; rather the management of risk to enhance returns. As such, there is variation in risk exposures of conventional banks and Islamic banks. Research indicates that in private sector banks, ownership structures significantly impact risk exposures; however, it has no significant role in affecting risk exposures in public banks (Ogura, 2006; Barry, Lepetit, & Tarazi, 2011).

While banking theory previously stated that there is a strong relationship between lending growth and loan quality, research shows that this relationship is far more complex than initially perceived. It requires a multi-pronged approach where factors affecting growth must be considered alongside loan quality measures, such as non-performing loans as well as interest rates (Claire, 1992). On this basis, research shows that loan growth can be directly attributed to bank riskiness; loan growth leads to an increase in loan loss provisions subsequent to a decrease in relative interest

income, and to lower capital ratios. In addition, loan growth also has a negative impact on the risk-adjusted interest income (Foos, Norden, & Weber, 2010).

In attempting to construct credit risk indicators for euro area banks and non-financial corporations, Gilchrist and Mojon (2017) find that the financial crisis of 2008 has dramatically increased the cost of market funding for both banks and non-financial firms. In addition, disruptions in corporate credit markets lead to sizeable contractions in output, increases in unemployment, and declines in inflation across the euro area. (Gilchrist & Mojon, 2017).

Boumediene (2011) and Swartz (2013) maintain that there are fundamental differences in credit risk exposures of Islamic banks and conventional banks as certain Islamic finance products lead to greater exposure, namely murabaha financing. Samad (2004) maintains that bank specific products will not increase the risk of Islamic banks because asset backed financing ensures a collateral which shifts risk to a customer instead of exposing the financial institution.

The concept of institutional memory hypothesis indicates that lending behaviour is pro-cyclical; where the easing of credit standards leads to deteriorating discipline of lending and adversely affects institution performance (Berger & Udell, 2004). Following the thread of interest rates and risk exposure, Delis and Kouretas (2011) indicate that the impact of interest rates on risk assets is diminished for banks with higher equity capital and is amplified for banks with higher off-balance sheet items. Further, as market factors, lending standards, aggregate allocation of credit and volume of lending were studied, Dell'Ariccia and Marquez (2006) find that the sequence of financial liberalization, lending booms and banking crises which are characteristic of the emerging markets can be outlined.

Identifying the importance of simultaneously assessing credit risk and interest rate risk in commercial banks, literature also shows that re-pricing characteristics of balance sheet and off-balance sheet items play a significant role in the economic value and capital adequacy of banks (Drehmann, Sorensen, & Stringa, 2010). Research indicates that changes in interest rates affect bank asset quality and further, bank stability (Jarrow & Turnbull, 2000; Carling, Jacobson, Linde & Roszbach, 2007; Alessandri & Drehmann, 2010). Research determining bank loan quality indicates that proxies reflect different levels of quality due to internal policies such as classifications, reserve requirements and policies regarding writing off loans

(Cebenoyan & Strahan, 2004; Gonzales, 2005; Altunbas, Carbo, Gardener, & Molyneux, 2007). When considering bank stability, the most widely used indicator is the Z-Score (Goyeau & Tarazi, 1992; Lepetit, Nys, Rous, & Tarazi, 2008). This indicator is inversely related to the probability of a bank's insolvency; the higher the Z-Score, the greater the stability, and vice versa.

Understanding the connection between the competition measured through Lerner index and stability measured through Z-score and NPLs, Kabir and Worthington (2017) find the competition-fragility hypothesis prevails for both conventional banks as well as Islamic banks. The effect is magnified in conventional banks, but overall median banks have the greatest capacity to mitigate credit risk through market power.

2.2. Credit Risks and Macroeconomic Policies

From a policy perspective, Kolapet (2012) indicates that credit risk arises from a combination of inappropriate credit policies, poor lending practice, limited institutional capacity, a volatile interest rate, poor management, inappropriate laws. Furthermore, Said (2013) shows that systemic inadequacies such as inadequate supervision by central banks, government interference and inadequate knowledge about borrowers also contribute significantly to increases in credit risks for financial institutions.

Building on research regarding macroeconomic factors that affect credit risk exposure and bank stability, research shows that while stricter regulatory regimes claim to increase stability, the reality may not be so. More recent literature indicates that bank supervision and regulatory environment behave as substitutes, rather than complements. (Fratzscher, König, & Lambert, 2016).

Nikolaidou and Vogiazas (2017) identify determinants of bank credit risk in sub-Saharan African countries and find that money supply conditions have a decreasing effect on non-performing loans, industry specific factors affect credit risk in South Africa and Uganda, and country specific factors affect credit risk in Kenya, South Africa and Zambia. This contributes to the persistence of high interest rate spreads in the region, as well as the financial inclusion thesis. Similarly, while studying the banks listed in Malaysia, Waemustafa and Sukri (2015) find that; regulatory capital and Islamic Contract are significant to credit risk of Islamic banks. For Conventional Banks, loan loss provision, a debt-to-total asset ratio, regulatory

capital, 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. This shows that a combination of industry specific, bank specific and economy specific factors all play a role in determining the level of credit risk. While building upon this, it becomes even more essential to identify these factors in our specific context.

Research indicates that financial intermediaries, including Islamic banks and conventional financial institutions, tend to be more disciplined in their allocation when considering short-term debt or demand deposits (Calomiris & Kahn, 1991; Jeanne, 2000; Diamond & Rajan, 2000; Diamond & Rajan, 2001). This in turn, could lead to lower withdrawal risk and may impact Islamic banks' loaning conduct exposing investment account holders to an additional credit risk caused by improper loan monitoring and lack of due diligence (Sundararajan & Errico, 2002). Conversely, it could also impose greater control and responsibility on the institution, ultimately resulting in higher levels of efficiency, decreased risk exposure and better returns than their conventional counterparts (Khan & Ahmed, 2001). As always, the balance between risk and return, and the role of transactions is tricky and must be handled with care. Where there are benefits, there exist dangers alongside.

When considering the forward sale of agriculture goods (salam), it is clear that commodity price risk and credit risk are inherent. On the other hand, when considering a lease contract (ijarah), all risks are borne by the institution until the end of the contract (Sundarajan & Errico, 2002).

On another aspect of risk exposure for Islamic banks arises from default penalties. While some schools of thought indicate that charging default penalty is not allowed, Islamic banks have overall utilized a method of rebates instead. This strategy is based on the assumption that a customer will make timely payments against financing, and may receive a rebate at the end of the term. Otherwise, the amount is retained by the bank. Conventional banks calculate default payment on the basis of default period, while Islamic banks calculate default payment on the complete loan term (Khan & Ahmed, 2001).

### 2.3. Income Diversification and Bank Stability

Research shows that asymmetrical information and incentives effect of banking agents affects the level of risk that a bank is exposed to and consequently its

performance. While there is limited evidence to support these perspectives in the developed world, the likelihood of impact in developing economy exists (Boyd & Runkle, 1993; Cihak, Maechler, Schaeck, & Stolz, 2009). Further, the wisdom of risk exposure in lending activities versus fee based products has been deemed a priori on the foundations that revenue from traditional lending activities is more stable, with lower exposure to financial and operating risks (DeYoung & Roland, 2001).

In terms of bank stability in the GCC region, literature indicates that diversification of income has a positive impact on bank stability, whereas ownership concentration exposes banks to higher levels of insolvency risk. Interestingly, this increase in exposure is not associated with any specific type of ownership category (Ashraf, Ramady, & Albina, 2016). Furthermore, conventional banks face higher levels of exposure despite income diversification, as compared to Islamic banks. This is attributed to bank specific factors, institutional quality and macroeconomic conditions (Abuzayed, Al-Fayoumi, & Molyneux, 2018)

Islamic banks operate on either current accounts or savings (investment) accounts. The bank is liable to return the principle on demand in the case of the former, and to generate a return on the latter, to be divided between institution and account holder as per agreed terms. The latter is also significant as it provides some pro-cyclical protection to the financial institution in adverse market conditions. However, these savings accounts may also cause liquidity mismanagement as Islamic banks have limited access to money market instruments. In that capacity, Islamic banks are fairly obliged from taking part in dynamic risk management through diverse portfolio allocation like conventional banks (Abedifar, Molyneux, & Tarazi, 2014).

Literature also indicates that financial institutions with higher risk exposures tend to charge higher interest rates in order to achieve target net interest margins/performance indicators. Further, banks face greater impacts from default risk due to greater concentration in short term assets and off balance sheet hedging instruments which promote more diversified margins generating asset base than deposit or equity financing (Angbazo, 1997). Further, as the interrelationships of bank interest rate and credit risk exposure, alongside performance and efficiency are observed, research supports the moral hazard hypothesis indicating that banks with

better performance have lower risk exposures and inefficiencies. In addition, a U-shaped relationship is detected between inefficiency and loan growth, indicating that operating efficiency improves at a decreasing rate as loan growth rate increases. This supports the hypothesis that entrenched managers who pursue a growth objective to enhance their own wealth tend to operate inefficiently (Kwan & Eisenbeis, 1997; Valverde & Fernandez, 2007).

## 3. Research Methodology

### 3.1. Data

The study includes the data of all commercial banks in Pakistan. The focal point of this research is to analyse the commercial banks in reference to financial mode and in reference to ownership mode. There are twenty five conventional and five Islamic banks are operating in the banking system in terms of financial mode; there are five public banks and twenty five private banks, of which four are categorized as foreign banks are operating in the banking system in term of ownership mode. This study does not incorporate the Islamic windows operations of conventional banks because they represent nominal part of banking system.

Beginning with an exploratory analysis to identify the prevailing trends within the banking sector regarding asset base, credit profiles, equity profiles, loan classifications, growth trends, and concentration. This exploratory analysis is done in direct reference to financial mode (Islamic bank and conventional bank) and ownership mode (public, private and foreign). This is followed by an explanatory analysis which utilizes two econometric models. The first model determines the impact of credit risk on equity. Based on the nature of the data, the appropriate method is GMM.

### 3.2. Variables

The dependent variable is credit risk, calculated as the proportion of credit risk to gross loans. The proxy for credit risk is classified loans (where classified indicates when a person becomes a defaulter to the bank, the outstanding principal against the loan is classified). The independent variable is the quality of equity, calculated as total equity as a proportion of total assets. Zscore is used as solvency credit proxy, and it captures the probability of default of a bank. Z-score compares the buffer of a bank's returns (capitalization and returns) with the volatility of those returns.

Control variables include assets, calculate as a log of assets and use as a proxy for size; loan growth, calculate as annual growth of gross loans; Non Interest Income, calculate as income other than mark-up/interest income; assets' growth, calculate as annual assets' growth; domestic interest rate, calculate by taking the SBP discount rate as a proxy; Herfindahl Hirshman Index, use to capture the market concentration as control variable, and is calculated by taking the sum of the square of the market share of each firm in the industry; GDP Growth, is calculated as the GDP per capita growth. In addition, five dummy variables are used to capture of stability differential of different banks.

**Table 1: Summary of Measures**

| | Name | Definition | Calculation | References |
|---|---|---|---|---|
| Dependent Variable | Credit Risk (%) | Credit risk as a proportion of gross loans and also use classified loans as proxy for credit risk as a proportion of gross loans | Credit Risk = $\frac{Classified\ Loans}{Gross\ Loans}$ | (Waemustafa & Sukri, 2015), (Acharya et al., 2014), (Cihak & Hesse, 2010) |
| | Z score | Used as solvency credit proxy - It captures the probability of default of a bank. Z-score compares the buffer of a bank's returns (capitalization and returns) with the volatility of those returns. | $\boldsymbol{ZScore} = \frac{\boldsymbol{ROA} + \frac{\boldsymbol{Equity}}{\boldsymbol{Assets}}}{\boldsymbol{\sigma ROA}}$ | (Lepetit & Strobel, 2015), (Cihak & Hesse, 2010), (Lepetit et al., 2008) |
| Independent Variables | Equity (%) | Equity as a proportion of assets use as independent variable | EQUITY = $\frac{TOTAL\ EQUITY}{TOTAL\ ASSETS}$ | (Altunbas et al., 2007) |
| Control Variables | Assets (ln) | Log of asset use as proxy for size as control variable | ASSETS = $\ln ASSETS$ | (Cihak & Hesse, 2010), (Altunbas et al., 2007) |
| | Loan Growth (%) | Annual gross loan growth and use as control variable | $LOANGROWTH$ | (Altunbas et al., 2007) |
| | Domestic Interest Rate (%) | SBP discount rates are use as proxy as control variable | $Domestic\ Interest\ Rate = SBP\ Discount\ rate$ | (Cihak & Hesse, 2010) |
| | HHI | To capture the market concentration use as control variable | $HHI = \sum_{i=1}^{n} S_i^2$ | (Cihak & Hesse, 2010) |
| | GDP Growth (%) | Use as control variable | $GDP\ GROWTH = GDP\ PER\ CAPITA\ GRO$ | (Cihak & Hesse, 2010) |

## 4. Data Analysis

### 4.1. Exploratory Analysis

The asset base of banks, as per aforementioned categorization, is as follows:

**Table 2: Asset Base of Bank**

| Financial Mode (PKR in Million) | | Percentage | Ownership Mode (PKR in Million) | | Percentage |
|---|---|---|---|---|---|
| Conventional Banks | 13,044,269 | 92.99% | Foreign Banks | 260,834 | 1.86% |
| Islamic Banks | 983,160 | 7.01% | Private Banks | 11,277,928 | 80.40% |
| | | | Public Banks | 2,488,667 | 17.74% |
| Total | 14,027,429 | 100.00% | Total | 14,027,429 | 100.00% |

This study uses risk as a multidimensional identifier focusing on risk management and bank stability. One of the risks inherent in the banking sector is credit risk that can only be managed if banks have quality assets. Any loss to banks against loan loss directly affects the equity of the banks; as loan losses increase it may lead the bank to insolvency. The objective of this research is to measure the impact of credit risk and equity for all commercial banks operating in Pakistan as whole, across the different modes of financing (conventional and Islamic) and ownership (public, private and foreign). The data shows as Table 3 and figure 1 increase in the level of credit risk as a proportion of gross loans in case of all types of banks, with significant differences in degree. Similarly, there is a decline in the level of equity as a proportion of assets in all types of banks is observed but with a significant difference in degree. When considering the different modes of financing, a nominal increase in credit risk proportion is observed, that is 7.38% but a very high degree of decline in equity proportion that is 197.71% in case of Islamic banks as compare to conventional banks over the study period. Results indicate that Islamic banks manage their quality assets in an excellent manner and are able to increase their leverage, probably through deposits. When considering these factors in terms of ownership mode, a minimum level of increase in credit risk proportion is observed, that is 3.29% in case of public banks but a high degree of decline in equity proportion that is 92.87% in case of private banks over the study period. This

indicates that public banks manage their quality assets in a better manner and private banks enhance their leverage level probably through deposits.

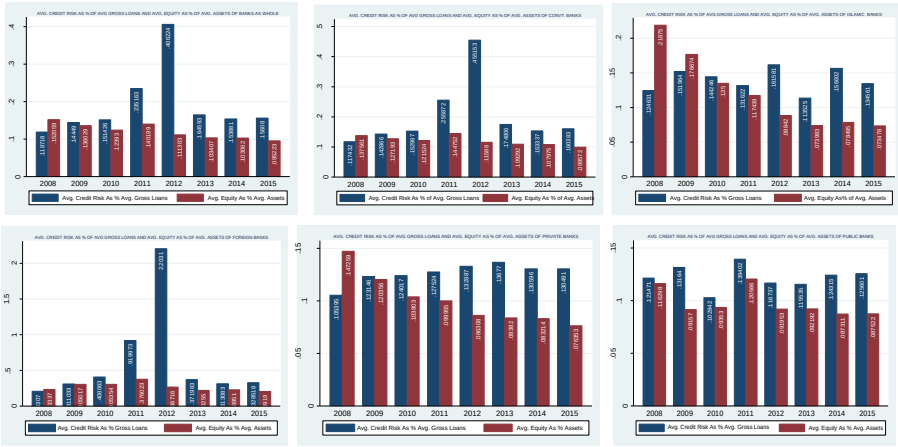

**Fig 1: Average credit risk as a proportion of average gross loans and average equity as a proportion of average assets**

Table 3: **Credit Risk and Equity Profiles Across Categories**

| Types Of Banks | Credit Risk as % Gross Loans | Credit Risk as % Gross Loans | Growth Rate | Equity as % Assets | Equity as % Assets | Growth Rate |
|---|---|---|---|---|---|---|
| | 2008 | 2015 | | 2008 | 2015 | |
| Banks As Whole | 11.87% | 15.61% | 23.94% | 15.21% | 9.52% | -59.69% |
| Conventional | 11.74% | 16.04% | 26.78% | 13.76% | 9.96% | -38.15% |
| Islamic | 12.46% | 13.46% | 7.38% | 21.88% | 7.35% | -197.71% |
| Foreign | 20.83% | 32.85% | 36.59% | 23.33% | 20.39% | -14.43% |
| Private | 10.54% | 13.05% | 19.23% | 14.73% | 7.64% | -92.87% |
| Public | 12.15% | 12.56% | 3.29% | 11.63% | 8.75% | -32.88% |

Banks calculate credit risk on the basis of estimations and judgments that sometimes differ from actual position, therefore this study also observes bank's actual classified and problem loans proportion of gross loans. On the basis of different modes of financing, a nominal increase in classified loans is observed that is 2.54% and also lower degree of increase in problem loans proportion that is 19.86% in case of conventional banks as compared to Islamic banks over the study period. Whereas, in term of managing gross loans portfolio in 2015, the Islamic banks having lower degree of classified and problem loans as a proportion of gross loans that is 7.85% and 6.78% as compared to conventional banks. On the other hand, when considering ownership modes, a negative increase in classified and problem loans proportion is observed, that is -12.48% and -10.14% in case of public

banks but the foreign banks having lower degree of classified and problem loans proportion in 2015. All results are evident from Table 4.

**Table 4: Classified and Problem Loans**

| Types Of Banks | Classified Loans As % G Loans 2008 | Classified Loans As % G Loans-2015 | Growth Rate | Problem Loans As % G Loans 2008 | Problem Loans As % G Loans-2015 | Growth Rate |
|---|---|---|---|---|---|---|
| Banks As Whole | 8.94% | 10.13% | 11.75% | 5.67% | 8.01% | 29.17% |
| Conventional | 10.32% | 10.59% | 2.54% | 6.61% | 8.25% | 19.86% |
| Islamic | 2.61% | 7.85% | 66.79% | 1.34% | 6.78% | 80.27% |
| Foreign | 1.49% | 3.50% | 57.29% | 0.90% | 3.50% | 74.37% |
| Private | 8.49% | 10.23% | 17.01% | 5.46% | 8.53% | 36.03% |
| Public | 16.91% | 15.03% | -12.48% | 10.38% | 9.43% | -10.14% |

When studying the data regarding assets base of banks in terms of their growth over study interval, it is observed in reference to financing mode Islamic banks grow with higher degree as compare to conventional banks. In reference to ownership mode, private banks grow with higher degree as compare foreign and public banks (see Table 5).

**Table 5: Growth of Asset Base**

| Types Of Banks | Asset Base 2008 | Asset Base 2015 | Growth In Nominal Value | Growth Rate |
|---|---|---|---|---|
| Banks As Whole | 5411179 | 14027429 | 8616250 | 61.42% |
| Conventional | 5093879 | 13044269 | 7950390 | 60.95% |
| Islamic | 187168 | 983160 | 795992 | 80.96% |
| Foreign | 133445 | 260834 | 127389 | 48.84% |
| Private | 4102989 | 11277928 | 7174939 | 63.62% |
| Public | 1044613 | 2488667 | 1444054 | 58.03% |

This study also initiates to determine the possible impact of banking sector concentration on risk-taking behaviour by including the Herfindahl-Hirschman Index (HHI) in the model. In reference to financial mode, conventional banks having a high degree of concentration as compared to Islamic banks. On the other hand, in reference to ownership modes, private banks have a higher degree of concentration as compared to public and foreign banks.

**Table 6 Financial Mode and Ownership Modes HHI**

| Year | HHI_CON | HHI_ISL | HHI_PRVT. | HHI_PUBL. | HHI_FRO |
|---|---|---|---|---|---|
| 2015 | 0.0750 | 0.0018 | 0.0604 | 0.0162 | 0.0001 |
| 2014 | 0.0759 | 0.0016 | 0.0591 | 0.0183 | 0.0001 |
| 2013 | 0.0774 | 0.0012 | 0.0606 | 0.0179 | 0.0001 |
| 2012 | 0.0781 | 0.0010 | 0.0597 | 0.0192 | 0.0001 |
| 2011 | 0.0743 | 0.0008 | 0.0536 | 0.0214 | 0.0002 |
| 2010 | 0.0761 | 0.0007 | 0.0533 | 0.0233 | 0.0002 |
| 2009 | 0.0775 | 0.0005 | 0.0540 | 0.0242 | 0.0002 |
| 2008 | 0.0811 | 0.0004 | 0.0569 | 0.0242 | 0.0004 |

4.2. Explanatory Analysis

**MODEL 1**

$$\frac{CREDITRISK}{GROSSLOANS} = \beta 0 \frac{EQUITY}{ASSETS} + \beta 1 \ln ASSETS + \beta 2 LOANGROWTH + \beta 3 DOMESTICINTERESTRATE + \beta 4 HHI + \beta 5 GDPPERCAPITAGROWTH$$

To confirm initially determined relationships, the GMM regression model is run with credit risk as a proportion of gross loans as dependent variable, to check the effect on different banks equity as a proportion of assets. Control variables include log assets, gross loan growth, HHI, the SBP discount rate and GDP growth. The results from the regression include the relation between credit risk and equity.

Significantly negative relation between credit risk and equity for conventional banks is confirmed through our initial inference, but insignificantly negative for Islamic banks in reference to financing mode. Results are indicated in Table 6(a).

**Table 6(a): GMM Model**

| | **Conventional Banks** | | | **Islamic Banks** | | |
|---|---|---|---|---|---|---|
| Credit Risk as % of Gross Loans | Coefficient | Standard Error | P Value | Coefficient | Standard Error | P Value |
| Equity as % of Assets | -2.49 | 0.68 | 0.00 | -0.19 | 0.12 | 0.13 |
| Log Assets | 0.06 | 0.11 | 0.56 | -0.04 | 0.02 | 0.11 |
| Gross Loans Growth | -0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.17 |
| SBP Discount Rate | 0.00 | 0.01 | 0.94 | 0.00 | 0.00 | 0.45 |
| HHI | 13.52 | 13.40 | 0.31 | 41.72 | 28.42 | 0.14 |
| GDP Growth | -0.00 | 0.01 | 0.64 | 0.00 | 0.00 | 0.18 |

Whereas, in reference to ownership mode the public banks are significantly positive but the result is adverse from our initial inference and the same relation confirm our initial inference but insignificantly negative for foreign and private banks. Results are indicated in Table 6 (b).

**Table 6(b): GMM Model**

| | **Foreign Banks** | | | **Private Banks** | | | **Public Banks** | | |
|---|---|---|---|---|---|---|---|---|---|
| Credit Risk as % of Gross Loans | **Coeffi** | **Std. Error** | **P Val.** | **Coeffi** | **Std. Error** | **P Val.** | **Coeffi** | **Std. Error** | **P Val.** |
| Equity as % of Assets | -0.35 | 3.16 | 0.91 | -0.10 | 0.08 | 0.24 | 0.47 | 0.21 | **0.02** |
| Log Assets | 1.69 | 0.96 | **0.07** | 0.01 | 0.01 | 0.34 | -0.01 | 0.02 | 0.47 |
| Gross Loans Growth | -0.00 | 0.00 | **0.00** | -0.00 | 0.00 | **0.00** | -0.00 | 0.00 | 0.38 |
| SBP Discount Rate | -0.03 | 0.07 | 0.61 | -0.00 | 0.00 | 0.42 | -0.00 | 0.00 | 0.13 |
| HHI | 65.51 | 1937.6 | 0.97 | 0.74 | 1.73 | 0.66 | -0.45 | 4.35 | 0.91 |
| GDP Growth | -0.10 | 0.12 | 0.40 | -0.00 | 0.00 | 0.32 | -0.00 | 0.00 | 0.13 |

Earlier it has been discussed that banks calculate the credit risk base on estimation and judgments, therefore, this study chooses classified loans as a proportion of gross loans as credit risk proxy. Similar results are observed in reference to financing mode that is conventional banks are negatively significant and Islamic banks are negatively insignificant. Referring back to Table 2, Islamic banks positioning substantial declines in equity, the substantial decline may include other factors that affect the empirical results. Referring back to Table 3, it is evident that Islamic banks position their minimum level of classified and problem loans in 2015. In reference to ownership mode this study shows that private banks are negatively significant and foreign and public banks are negatively insignificant. Conventional and public banks are also observed negatively significant in relation with assets. Referring back to table 3 a nominal growth in a case of conventional banks and negative growth in case of public banks is observed of classified loans, this inference confirms the relation between classified loans and assets. The results of the regression confirming the aforementioned inferences are provided in Table 7 (a) and 7 (b).

It has been discussed that with the increase in loan losses the bank's equity start dilute that lead the banks towards insolvency. Therefore, this study attempts to analyse the insolvency risk related to Pakistani banks which is directly related to bank's stability.

**Table 7(a): GMM Model**

| | Conventional Banks | | | Islamic Banks | | |
|---|---|---|---|---|---|---|
| Classified Loans as % of Gross Loans | Coefficient | Standard Error | P Value | Coefficient | Standard Error | P Value |
| Equity as % of Assets | -0.27 | 0.10 | 0.00 | -0.06 | 0.17 | 0.73 |
| Log Assets | -0.04 | 0.01 | 0.00 | -0.01 | 0.03 | 0.64 |
| Gross Loans Growth | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.17 |
| SBP Discount Rate | 0.00 | 0.00 | 0.86 | 0.00 | 0.00 | 0.59 |
| HHI | -7.56 | 2.01 | 0.00 | 10.73 | 39.47 | 0.78 |
| GDP Growth | -0.00 | 0.00 | 0.53 | -0.01 | 0.00 | 0.03 |

**Table 7(b): GMM Model**

| | Foreign Banks | | | Private Banks | | | Public Banks | | |
|---|---|---|---|---|---|---|---|---|---|
| Classified Risk as % of Gross Loans | **Coeffi** | **Std. Error** | **P Val.** | **Coeffi** | **Std. Error** | **P Val.** | **Coeffi** | **Std. Error** | **P Val.** |
| Equity as % of Assets | -0.14 | 0.16 | 0.37 | -0.24 | 0.10 | **0.02** | -0.45 | 0.63 | 0.47 |
| Log Assets | -0.03 | 0.04 | 0.42 | 0.00 | 0.01 | 0.64 | -0.19 | 0.08 | **0.01** |
| Gross Loans Growth | 0.00 | 0.00 | 0.37 | -0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.31 |
| SBP Discount Rate | 0.00 | 0.00 | **0.01** | -0.00 | 0.00 | 0.86 | 0.00 | 0.00 | 0.92 |
| HHI | -365.14 | 98.55 | **0.00** | -3.41 | 2.07 | 0.10 | -18.39 | 12.98 | 0.15 |
| GDP Growth | 0.00 | 0.00 | 0.81 | -0.00 | 0.00 | 0.64 | -0.02 | 0.00 | **0.00** |

In order to measure the stability within banks, this study employs the Z score as stability measuring tool, and also use as insolvency proxy. The banks' stability is related with higher Z score value. The data shows that Islamic banks are more stable as compared to conventional banks in reference to financing mode. Whereas, the foreign banks are most stable as compared to private and public banks in terms of ownership mode (see Table 8).

The regression model incorporates Zscore and control variables and dummy variables of different banks to check the robustness of results. The reported results

from regression measure the Zscore as solvency risk measuring tool. The model supports fix effect, therefore the LSDV model is applied.

**Table 8: Z Score in Financial and Ownership Mode Categories**

| Year | Zscore_CON | Zscore_ISL | Zscore_FR | Zscore_PR | Zscore_PUB. |
|---|---|---|---|---|---|
| 2015 | 9.4604 | **9.3114** | **10.8343** | 9.0133 | 25.4484 |
| 2014 | 9.7864 | **8.7014** | **16.0217** | 9.9061 | 5.5712 |
| 2013 | 9.8104 | **5.9682** | **19.2208** | 6.5626 | 21.8661 |
| 2012 | 12.8793 | **11.7001** | **25.2376** | 9.0958 | 20.6304 |
| 2011 | 11.5768 | **13.1374** | **14.1616** | 10.1832 | 20.9029 |
| 2010 | 5.6407 | **7.6574** | **13.0488** | 4.7770 | 6.3634 |
| 2009 | 5.1175 | **10.8374** | **11.2554** | 5.5943 | 2.9044 |
| 2008 | 5.5847 | **44.2075** | **25.4926** | 6.8005 | 3.2988 |
| | 7.2853 | **10.9988** | **15.1895** | 6.5347 | 6.1217 |

**MODEL 2**

$$Zscore = \beta 0 \frac{EQUITY}{ASSETS} + \beta 1 \ln ASSETS + \beta 2 NONINTERESTINCOME + \beta 3 \frac{NETLOANS}{EARNINGASSETS} + \beta 4 ASSETSGROWTH + \beta 5 LOANGROWTH + \beta 6 DOMESTICINTERESTRATE + \beta 7 GDPPERCAPITAGROWTH + DUMMYCONVENTIONAL + DUMMYISLAMIC + DUMMYFOREIGN + DUMMYPRIVATE + DUMMYPUBLIC$$

Referring to Table 8 on the Zscore of sample, it is clear that banks operating in Pakistan fall under stability mode but ranking them adds clarity. In reference to financial mode, Islamic banks rank first, which means they face lower levels of insolvency risk as compare to conventional banks (see Table 9). Similarly, in reference to ownership mode, private banks rank first, public banks rank second, which means they have less insolvency risk as compared to private banks (see Table 10).

## 5. Conclusion and Recommendations

The purpose of this study is to analyse the risk and stability of the banking system in Pakistan in reference to financial and ownership mode. When analying the credit risk and its relationship with equity in comparison between conventional and Islamic banks, in reference to financial mode exploratory results depict those conventional banks are having higher risk as compared to Islamic banks and it also confirms the

robustness. The regression test establishes significantly negative relation between credit risk and equity for conventional banks both empirically and confirm our initial inference, similar to existing research (Foos et al., 2010), whereas the same relation also confirms initial inference but insignificantly negative for Islamic banks, which contradicts existing literature (Acharya et al., 2014; Cihak & Hesse, 2010; Khan & Ahmed, 2001).

**Table 9: LSDV Model For Financial Mode**

| Zscore | **Coefficient** | **Stand Error** | **P Value** |
|---|---|---|---|
| Equity as % of Assets | .47 | .32 | 0.14 |
| Log Assets | .03 | .03 | 0.36 |
| Non-Interest Income | -3.49e-06 | 5.28e-06 | 0.51 |
| Net Loan as % of Earning Assets | -.59 | .17 | 0.00 |
| Gross Loan Growth | .00 | .00 | 0.10 |
| Assets Growth | .00 | .00 | 0.00 |
| GDP Growth | .11 | .01 | 0.00 |
| SBP Discount Rate | -.04 | .01 | 0.00 |
| Dum Conventional | -.42 | .06 | 0.00 |
| Cons. | 2.57 | .44 | 0.00 |

**Table 10: LSDV Model For Ownership Mode**

| Zscore | **Coefficient** | **Stand Error** | **P Value** |
|---|---|---|---|
| Equity as % of Assets | .28 | .37 | 0.45 |
| Log Assets | .04 | .03 | 0.25 |
| Non-Interest Income | -7.71e-06 | 5.99e-06 | 0.19 |
| Net Loan as % of Earning Assets | -.39 | .19 | 0.04 |
| Gross Loan Growth | .00 | .00 | 0.27 |
| Assets Growth | .00 | .00 | 0.94 |
| GDP Growth | .09 | .01 | 0.00 |
| SBP Discount Rate | -.05 | .01 | 0.00 |
| Dum Conventional | .40 | .11 | 0.00 |
| Cons. | -.32 | .07 | 0.00 |

This is attributed to the overall economic situation and its impact on the industry, as prior studies focused on a multi-country sample. Whereas, in reference

to ownership mode the foreign banks having higher level of credit risk as compared to public and private banks and it adversely relates to our initial inference. Whereas, the regression test establishes almost significantly positive relation between credit risk and equity, but the result is adverse from initial data inference. The relation between credit risk and equity confirms our initial inference but insignificantly negative for foreign and private banks.

This study uses classified loans as proportion of gross loans as credit risk proxy because the credit risk calculation by the banks is purely based on estimations and judgments. In reference to financial mode, the regression test establishes that conventional banks having high credit risk proxy as compared to Islamic banks and it also confirms our initial inference, similar to previous literature (Acharya et al., 2014; Cihak & Hesse, 2010; Cihak & Hesse, 2007). The results indicate a similarity between both exploratory and empirical results in reference to financing mode that is conventional banks are negatively significant and Islamic banks are negatively insignificant related to credit risk proxy and equity (Waemustafa & Sukri, 2015; Acharya et al., 2014). The insignificant results for Islamic banks may be due to some other factors such as the Islamic banks positioning show substantial decline in equity. Whereas, across all banks Islamic banks having minimum level of classified and problem loans in 2015. In reference to ownership mode, the regression test establishes that public banks have highest credit proxy as compared to foreign and private, whereas exploratory results also confirm the initial inference. In relationship between credit risk proxy and equity, we observe private banks are negatively significant and foreign and public banks are negatively insignificant, but it confirms our initial inference.

This study also shows that conventional and public banks are negatively significant in relation with assets; these banks shows either negligible and/or negative classified and problem loans growth (see Table 3). This study uses Z-score proxy to measure the insolvency risk and it is observed that none of banks type having insolvency risk thread but ranking them in reference to stability clarifies their relative position. In term of financial mode, the Islamic banks rank better than conventional banks, similar to Cihak and Hesse (2010) and in terms of ownership mode, the foreign banks rank first, public banks rank second and private banks rank third. Moreover, we also observe that for financing mode, banks are significantly sensitive for net loans as a proportion of earning assets (negatively) (similar to Cihak

and Hesse (2010)), assets growth (negative), SBP discount rate (negative) and GDP growth. Whereas, for ownership mode banks are significantly sensitive for net loans as a proportion of earning assets (negatively) (similar to Claire (1992), SBP discount rate (negative) and GDP growth. These results also establish that the stability of all types of banks are negatively sensitive with net loans as a proportion of earning assets, interest rates and positively sensitive with GDP growth.

Risk is intrinsic in strategic financial decisions. While risk measurement is necessary, management is far more appropriate. This requires understanding the originating point of risk and well as external and internal factors that influence risk exposure. The probability of success in competitive financial markets requires active and systematic work with risk.

The findings of this study indicate a new dimension for future policy, in reference to credit risk measuring decision by the banks. The findings show that all banks have higher levels of calculated credit risk as compared to actual defaults except public banks. This indicates that banks are measuring their credit risk with conservative approach, but it is different for public banks. Further, as conventional banks reveal a negative relationship between credit risk and equity, policies should encourage banks to increase to quality of their loan assets to decrease credit risk exposure.

While Islamic banks have shown a substantial decline in equity in the sample period, they are still the most stable in comparison to their conventional counterparts. In terms of ownership mode, foreign banks have been found to be most stable. Industry benchmarks should use these banks and best practices for credit risk management and stability should be researched further to create more universally applicable policies for the sector.

Lastly, public banks indicate highest levels of credit risk and private banks are the least stable in the ownership mode. This indicates a strong necessity of policy revision to ensure that these two categories better facilitate their clients in the banking system.

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