

## **The Relentlessness of Credit Risk in Islamic and Conventional Banking of Pakistan**

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### **Abstract**

The great depression of the 20<sup>th</sup> century raised serious concerns and had undisputable impacts over the management of the world financial system. The recent past 2008 financial meltdown in the U.S and 2010 Eurozone financial crisis was not just a reminiscence of the great depression, but exposes the risks associated with the conventional financial system. Policymakers, financial experts and nonprofessionals are grappling with how best to mitigate the risks or develop a less-risky system to complement the conventional banking system, which in turn could save the world from further unforeseen global financial trauma. The current study paves the way to gauge the propensity of credit risk especially after the world financial crisis-2008 in Islamic and conventional banks of Pakistan. Methodologically, the research employs Z-Score, Altman's Z-Score, NPL ratio, Distance to Default and Default Probabilities to gauge the magnitude and the enormity of the credit risk. The findings of the study postulate the conventional banking in Pakistan felt more credit risk in realization with Islamic banking. However, the chances to go into bankruptcy prevails both banking systems but the conventional banks have more sound financial position to absorb trauma in near future. The more integrated paradigm of conventional banks of Pakistan with the world banking system needs to curb more risk over the passion to earn more profit.

**Keywords:** Credit Risk, NPL, Altman Z-Score, Merton's Model, Islamic and conventional banking, Pakistan

The role of the financial system in the contemporary global economic system is important but implicative. The risk experienced by the financial market in one country upholds a risk on the rest of financial activities on the globe (Hassan, 2009). The financial system increasingly spurs the growth of finances, trade and commerce the world over. The expanding paradigm stimulates high financial risk as well. The heart of financial globalization can better be explicated from the lens of the financial system that indeed makes the contemporary financial globalization distinctive from an earlier form of globalization. Nevertheless, the financial meltdown of 2008 and the Euro zone economic problems, all points with a direction that neither the western nor conventional financial system is immune to disaster that could tear the world apart. The risks associated with the conventional financial system has generating debate among scholars but the current financial crises-2008 in the United States and the Euro zone triggered the debate for a new narrative; whether or not there can be a less-risky system that

can replace or complement the conventional banking system and thus save the world from further unforeseen global financial trauma.

It has quite comprehended that financial institutions are closely associated with the nonfinancial institutions, therefore, the execution of economic activities in between or among other organizations hardly possible without the involvement of banks. The risk associated with non-financial organizations would be multiplied double time if the risk involved on financial institutes. Therefore, it gains more concentrations that a special emphasis on alleviation of risk may be given to financial institutions; especially in the depressions. The risk mitigation process gain more attention especially after the Second World War II. It has perceived that risk touched at maximum when the insurance cost reached out of control after 1950s and become incapable to manage risk. To reduce the prevailing risk new techniques about risk management through derivatives were introduced in 1970s. This technique got high repute in 1980s and many of the financial and non-financial institutions incepted these models especially to mitigate credit risk and market risk. In 1990s a special emphasis was given on operational and liquidity risk management (Dionne, 2013). The recent financial crises 2008-2009 gained more attention to reduce the risk involved in financial markets.

### **Risk in Banking Industry**

The basic objective of banks is to transfer surplus funds to deficit funds. The scope of banking operation does not confine with taking and lending funds only, even it considers involvement in every step of life. The applicability of banks can be realized in financing, investments, establishing new projects, supporting government in difficult time and providing financial support to prospective customers not in the homeland but supporting in abroad as well. As the viability of the banks prevails in every step of life that ultimately creates its importance. The multi dimension tasks foster the uncertainty and the uncertainty brings risk. The banks can maximize profit once they take and manage their financial risk effectively.

The former chief Raghuram Rajan of International Monetary Fund (IMF) wrote an article after the financial crises-2008. He argued that substantial profit can be made through taking a risk and it can be restrained through asking for compensation of assumed risk. He coded an example of Goldman Sachs generating mighty profit through bearing risk even the manager of bank suggested not to put investment in riskier opportunity. Moreover, he also suggested investor can make profit might bearing negligible risk through entering a credit derivative contracts (Rajan, 2008).

The concept of risk is associated with the wrong implied action. The uncertainty and variation in expected return argued as risk. Mismatches in cost and revenues also called as risk. The recent international financial crises 2008 in particular and the other financial

distress observed in previous two decades put considerations about the stability of economic conditions of a country. This financial turmoil shifts responsibilities upon think takers to govern such financial system that provides the calm, harmony and stability from a small depositor to a large scale (systematic risk). It is believed in large scale that the financial misbalance causes the panic in the society, financial vulnerability and contamination in society (Summer, 2003). A particular environment/ surrounding significantly contribute on the overall business environment. Peaceful environment strengthens the business/ operational environment whereas the unpleasant/ stressful leads to risk. The question arises “Is environment risk would be a source of financial risk? By keeping environmentally progressive and to curtail financial risk the banks usually give more importance to regulations, enforcement and then reputational risk (Prorokowski, 2016).

### **Risk Identification and Measurement**

Risk management is an integral part of every financial organization, it starts with the identification of associated risk, measurement, monitoring and finally controlling the risk (Mokni, Echchabi, Azouzi and Rachdi, 2014). In modern times, the risk management became a wide and broad concept that spurs more attention, vigilance and strict adherence with the updated models. The risk management in organizations got more attention especially after the international financial crises 2008. Even more, the curriculum being revised at universities level and given weight age as a subject in different scope of studies and specialized courses are opted in the finance field particularly. The basic operational purpose of banks is to maintain the liquidity demand and supply in very decent and affective manner. This mismatch in financing and investment, turmoil economic conditions and uncertain withdrawal of funds create liquidity problems. However, it is quite difficult to maintain requirements of funds in consortium with market need especially in perfect competitions and explicit massive influence factors (Ismal, 2010).

After investigating the outcomes and potential variation in risk involved are the leading steps used to assess the risk. The intensity of variation in outcomes and magnitude of associated risk supports to rank the importance of risk management and measurement for that organization. After identification of risks, explicit models should be developed and may apply to measure identified risks (Williams, Smith and Young, 1995). It is argued that the high credit risk even leads to insolvency of the banks. It is further pointed out that the mid 1980's financial crises is caused by the credit risk (How, Karim and Verhoeven, 2005). Credit risk is the most important risk (Masood, Al Suwaidi, and Thapa 2012; and Elgari, 2003) that needs to be managed effectively whereas, the banks have to survive for long term they are required to management credit risk efficiently (Arunkumar and Kotreshwar, 2005).

The basic objective of this credit risk management is to maximize the risk adjusted return (Spuchl'áková, Valašková and Adamko, 2015).

### **Review of Literature on Credit Risk**

It is a general perception of investors and lenders to investigate the financial capability/ position of available opportunities either can generate profit or repay obligations. If, investor realizes any doubt the borrower is not in a position to repay debts, he/ she feels uncertain to their principal and additional (interest) amounts might he will reluctant to invest. Even more, there is any iota of doubt of insolvency the confidence level of investor will ultimately be trembling. The legal contamination caused by insolvent borrower also peak the credit risk. Credit risk can be described as “the chances of default by the counterparty to repay obligations within specified time” or the borrower fails to pay obligations within specified period on agreed terms and conditions (Spuchl'áková, Valašková and Adamko, 2015). The transactions with the conventional banks have always been established as debtors and creditors relationship. This debtor-creditor's relationis ultimately inherent credit risk. A borrower deviates with the pre specified set of rules may penalize with heavy financial penalties butthis mismatchultimate hurt the cash generation capabilities and payments to financial institutions against obligations; this mismatches lead to surface credit risk (Mengze and Wei, 2015).

Lefcaditis, Tsamis and Leventides (2014) highlighted the concept of risk measurement they pointed out how important is to measure credit risk and supportive to get guidelines from Basel-II. The Basel-II reveals the importance of additional retained capital for compensating the credit risk. Internal Risk Based capital requirements given in Basel II provide the minimum level of capital requirements maintained by the banks to cover the current risks of their portfolio for outstanding loans. In the same juncture, it lacks the realization of concentration risk. Beresford-Smith, and Thompson (2007) provided quantitative technique that handle uncertainty in the area of credit risk management based on info-gap theory. To measure uncertainty and significant uncertainty, the probability of defaults and loss given default are used respectively. Information gap decision theory used to formulate flawless loan book portfolios, which are effective across uncertainty. Robustness and uncertainty in the info-gap theory is useful to regulate loan portfolio that gives linkage to mounting uncertainty. In credit rating categories (CRCs) characterized by probability in a given time frame loan amounts are considered as decision variables, these variables provide highest loan portfolio which satisfy the work demand in such a way that normal default amount should be less than an overall profit. Simply by choosing optimum interest rate, one can simply satisfy the normal losses of administrative concern and institution's desire on expected profits. It is presented that how to develop an optimum loan

books that robust satisfy the demand by choosing the convenient interest rate rates in the CRCs. The study provides the implications of info-gap theory can be realized fruitful on credit risk along with other risks like operational and market.

The very low credit risk realized in the operations of financial institutions are the indicators of efficient and good governance practices that leads to good financial performance (Ayayi, 2012). Arunkumar&Kotreshwar (2005) pointed out that the credit risk management becomes a big challenge for financial organizations in the environment where the market itself is deregulated. Imbalances either in the capital structure or optimizing the micro lending segments in the credit risk portfolio leads to enhance credit risk. To avoid this demise the early warning system may be introduce and advance Basel-II risk management technique would be an appropriate tool for risk management. Operationally the banks become insolvent when cash generated from lending or from investments in other opportunities or even selling of their financial securities are lesser than the funds used for cash withdrawal payments, executing operational activities and payments against debts. In practice, the conventional banks comprehensively focus on credit risk but Islamic banks rigorously consider credit risk too. It is phenomenal and long existence of conventional banks to have decent and reliable credit mitigation models. It is theoretically comprehended that conventional banks have sophisticated risk calculation modes (Hussain and Al-Ajmi, 2012) and equally applicable in Islamic banks as well but operationally needs to explore the applicability of these models in Islamic banks.

The philosophy of Islamic banking is based on equity relationship. It is different with the conventional borrowing/ lending with additional interest. The equity relationship is inaugurated either through personal involvement in business activity or through financial certificates. Therefore, the Islamic banks are more stable than the conventional banks (Pappas, Ongena, Izzeldin and Fuertes, 2016). Many of the Islamic financial instruments (Murabahah, Istisna and Salam) is the source of debt financing but carries delay in payments is ultimate the cause of credit risk too (Elgari, 2003).The equity considerations in Islamic banking not only make distinguish with counter conventional banking even more, gives superiority on ethical and efficiency grounds. The law of contracts in Islamic paradigm provides different dimensions of profit and loss sharing in the form of Musharakah and Mudharabah. The less existence of Musharakah and Mudharabah contracts in the asset side as compared to liabilities side of the balance sheet provoke dual treatment of banks on management and risk bearing. The equally treatment of this contract would be handsome to manage risk (Febianto, 2012).

Elgari (2003) argued that Islamic banks have more credit risk as compared to counter conventional banks and proportionate level of debts

in Islamic banks is high as compared to conventional banks. It disseminated at this point of junction that Islamic banks are busy to control over debts rather by optimizing the operation of the same banks. Boumediene (2011) compared credit risk of nine Islamic and nine conventional banks from 2005 to 2009 by using the Black and Scholes's 1974 option pricing model. The empirical results found that Islamic banks have high credit risk as compare to the counter conventional banks.

The recent high growth in the Islamic banks paved the ways for investors to put their capital with full confidence in Islamic banks. To ascertain the confidence of the investors, the think tank has done a lot of work on strengthening the philosophical approach of profit and loss (PLS) sharing account. To get more confidence of the investors or depositors, different sort of risk models associated with PLS account introduced and different techniques furnished to mitigate the risk. The overall philosophy (strategy) on risk management is complex as compared with conventional banking (Masood, Al Suwaidi and Thapa 2012).

Kozarević, Nuhanović&Nurikić (2013) articulated the feature and risk management practices in the Islamic and conventional banks of Bosnia and Herzegovina through a specific framework. The different types of risks (Operational, liquidity, credit and market) both in Islamic and conventional banks surveyed. It is found that operational risk, liquidity risk, credit risk relatively bit high in Islamic banks than as conventional banks, but the market risk moderately high in Islamic banks as compared to conventional banks. Instead of stated risk foreign currency risk also realized in conventional banks but at low pace, importantly it influences the operations of a bank.

Hassan (2009) realized the extend of implications of risk management practices to assess and control different types of risk faced by Islamic banks in Brunei Darussalam. It is generalized that Islamic banks abundantly face exchange rate, credit and operational risk but overall the Islamic banks have sophisticated techniques to assess and analyze risk involved with the financial activities. In particular the Islamic banks of this country are efficient in credit risk management.

### **Calculation of Credit Risk**

Credit risk is the most important risk (Masood, Al Suwaidi, and Thapa 2012; and Elgari, 2003) that needs to be managed effectively whereas, the banks have to survive for long term they are required to management credit risk efficiently (Arunkumar and Kotreshwar, 2005). The basic objective of this credit risk management is to maximize the risk adjusted return (Spuchl'áková, Valašková and Adamko, 2015).

To comprehend the imperative magnitude and intensity of credit risk in conventional and Islamic banks the following quantitative models are applied. The time line 2008 to 2014 is considered for this study. To

ascertain a significant result four Islamic and four conventional banks are opted for statistical results.

### **Altman's Z-Score**

It is a phenomenal contribution made by the Professor Dr. Edward I. Altman to assess and predict certainty of organizations' default in near future. The wide applicability of this model is investigated not only in the banking industry (Chander&Chandel, 2010; Bodla& Verma (2009) but even in the services (Stepanyaan, 2014) and manufacturing companies (Satish &Janakiram, 2011) as well. The Altman's formula usually based on five accounting ratios. The required relevant financial information is computed from the retrieving financial statements. The inferred information highlights the probability of default. The higher computed value, the less chances to go into bankrupt. The applicability and accuracy in measurement has assessed through the calculated accurate historic defaults i-e 72-80%. The reciprocal relations of Z-Score with probability to bankrupt are realized. The Altman's Z-score is calculated as follow:

$$\text{Altman Z-Score} = 1.2\text{A} + 1.4\text{B} + 3.3\text{C} + 0.6\text{D} + 1.0\text{E}$$

Where:

A = Working Capital/Total Assets

B = Retained Earnings/Total Assets

C = Earnings before Interest & Tax/Total Assets

D = Market Value of Equity/Total Liabilities

E = Sales/Total Assets

The Z-score's value (1.8) reveals that the organization most probably will go into bankrupt, while companies having scores greater than 1.8 but less than 3.0 is considered in moderate bankrupt i-e is inclusive in gray area and companies with score more than 3.0 are almost in the safe zone.

### **Z-Score**

The concept of Z-score being realized to eloquent the number of deviations of individual values with the mean value of the population. It is quite easy to compute and supportive to comprehend the understanding on the risk association. If the calculated value is greater that mean value inherits less risk than the overall market carries whereas if, the z-score's value is in negative revels more variation from the market. To get the statistical z-score the past accounting ratios are computed from the retrieved financial statements.

The formula for Z-Score is

$$Z = (k + \mu) / \sigma$$

Where;

- k is the total owner's equity capital
- $\mu$  is average net income as a percent of total assets, and
- $\sigma$  is standard deviation of return on assets (average net income as a present of assets) as a proxy of return volatility.

In effect, the Z-score measures the number of standard deviations a bank's ROA requirements to drop below its expected value before depleting its equity and the bank becoming insolvent, such that a higher (lower) Z-score designates that a bank is less (more) solvent.

### **Non-Performing Loans (NPL) Ratio**

A philosophy behind non-performing loan is more chances of uncollectable lent amounts. It is obvious and clear that if, the net period exceeds 90 days then the loan becomes NPL or even the interest due is uncollected from the last 90 days or more.

“A loan is nonperforming when costs of interest and principal are historical due by 90 days or more, or at least 90 days of interest payments have been capitalized, refinanced or delayed by contract, or payments are fewer than 90 days overdue, but there are other good causes to doubt that payments will be made in full” (International Monetary Fund).

A number of researchers have used a simple NPL ratio as a way to calculate credit risk in banking (Das & Ghosh, 2007; Fiordelisi, Marques-Ibanez, & Molyneux, 2011; Jiménez, Lopez, & Salas, 2010). This study calculates the NPL ratio by simply dividing the total amount of doubtful loans held by the bank by the net amount of loans, such that a higher NPL ratio indicate the amplified probability of economic failure. One simple advantage of the NPL ratio is that it is a straight forward measurement of bank solvency and one difficult for management to manipulate.

### **Distance to Default (DD) & Default Probability (DP)**

The importance of Merton's model is realized at large scale, but the recent financial crises 2008 increased the applicability at widespread in recent times. KMV model articulates the concept furnished by Merton to adopt the changes in realization of original values.

According to Merton's model, the nominal value of firm's requirement considered as a terminal value for firm's assets. The KMV Corporation has perceived from a sample of numerous hundred companies that firms are generally more likely to default when their assets' value reach a certain critical level somewhere among the value of total liabilities and the value of short-term debt. Therefore, in practice, using this alone as the threshold in the tail distribution might not be a perfect measure of the actual probability of default. KMV implements an additional step and refers to this critical threshold for defaulting as the Default Point” (Ong, 2005).

The state of vagueness of formal insolvency and the state when assets value fall lower the value of liabilities makes theory of determining exact threshold level for default position quite easy. For KMV Model Default Point (DPT) is more or less estimated by the sum of all the short-term debt (STD) and partial of the long-term debt (LTD).



The “KMV-Merton default forecasting model” creates a ‘probability of default’ for each firm in the sample at any given point in time. The resulting z-score, which is mentioned to as the distance to default, is then substituted into a collective purpose to determine the probability that the value of the firm will be fewer than the face value of debt at the forecasting viewpoint. The “KMV-Merton model” estimates the market value of debt by applying the “Merton (1974) bond pricing model”. The “Merton model” makes two mainly essential assumptions.

1. *The total value of an organization is assumed to follow geometric Brownian motion, because of the demand and supply forces.*

$$dV = \mu V dt + \sigma_V V dW \tag{1}$$

Where,

- V is the total value of the firm,
- $\mu$  is the expected continuously compounded return on V ,
- $\sigma_V$  is the volatility of firm value and
- dW is a standard Weiner process.

2. *The firm has issued just one ‘discount bond’ maturing in period T.*

Under these two expectations, the ‘equity of the firm’ is a ‘call option on the underlying value of the organization with a strike price equivalent to the face value of the firm’s debt and at maturity T. Moreover, the ‘value of equity’ is a function of the total value of the firm that can be solved through Black-Scholes-Merton Formula i.e.

$$E = V N(d1) - e^{-rT} FN(d2) \tag{2}$$

Where,

- E is the market value of Equity
- F is the face value of the firm’s debt,
- r is the instantaneous risk-free rate,
- N(·) is the cumulative standard normal distribution function.

$$d1 = \frac{\ln(V/F) + (r + 0.5\sigma^2 V)T}{\sigma V \sqrt{T}} \tag{3}$$

and d2 is just  $d2 = d1 - \sigma V \sqrt{T}$

The KMV-Merton model makes use of two important equations. The first is the Black-Scholes Merton equation (2), expressing the worth of a firm’s equity as a function of the worth of the firm. This study estimates the market worth of equity by multiplying number of shares with the closing price mentioned on the respective stock exchange to calculate the value of equity and then put in equation (2) to calculate the worth of firm’s assets. The second relates the volatility of the firm’s value to the volatility of its equity. Under Merton’s assumptions the value of equity is a function of the value of the firm and time, so

$$\sigma_E = \left(\frac{V}{E}\right) \frac{\partial E}{\partial V} \sigma_V . \tag{4}$$

In the Black-Scholes-Merton model, it can be shown that  $\partial E \partial V = N(d1)$ , so that under the Merton model's assumptions, the volatilities of the firm and its equity are related by

$$\sigma_E = \left(\frac{V}{E}\right) N(d1) \sigma_V. \quad (5)$$

Where  $d1$  is calculated by using equation 3.

Now in order to calculate distance to default this study use equation (2) and (5) and solved them simultaneously to get our required distance to default.

### Parameter's Estimation

To ascertain the market value of firm's assets and volatility of assets the parameters used in KMV model and equation may be calculated through excel. Importantly, to recognize the value of firm and volatility in assets, Distance to Default (DD) considered an important factor. Intuitions behind this calculation are to get purified and confident results with accuracy. To calculate accurate value in volatility of assets that really base on day-to-day interaction with the market while the value of firm's asset is based on accounting going-concern assumptions. The under mentioned two equations are assured for firm's value of assets and volatility in equity with taking some assumptions for calculating distance to default.

**The Volatility of the Equity.** The volatility of equity can be measured by the historical prices of stock mentioned on the stock exchange by simply calculating the return on equity and then using this return this study predict the volatility of the equity.

Formula for calculating return

$$R_i = \ln(\text{prt} - \text{prt} - 1)$$

Formula for calculating volatility of equity

$$\sigma_E = \frac{\sqrt{\frac{1}{n-1} \sum_{i=1}^n \mu_i^2 - \frac{1}{(n-1)} \left(\sum_{i=1}^n \mu_i\right)^2}}{\sqrt{\frac{1}{n}}}$$

$n$  is the number of days of trading, which is approximately equal to 253.

**Market Value of the Equity.** The market worth of equity is assumed through, the number of floated shares multiplied with market closed price on the specified date.

**Risk-free Rate.** The risk free return is considered as the rate of return realized on Treasury bill.

**Time.** Generally, it is perhaps very difficult for us to take into account the exact maturity of the liabilities of each firm so here this study assume that this study take a time period of one year for maturity of liabilities i.e.  $T$  is equal to one.

**Liability of the Firm.** As this study do not know the exact time of maturity of firm's liabilities, and so its value, so this study take the whole liabilities which is the sum of short and long term liabilities, and obviously this study take this data from the firm financial year reports.

**The Value and Volatility of the Firm's Assets.** These two figures can't be calculated from the historical record or data provided at the stock exchange as discussed earlier. This study has to solve two equations mentioned above to solve them simultaneously. These calculations are complicated, and either this study use mat lab or excel to solve the solutions of the system of the equations.

**Distance to Default (DD) and Implied Default Probability (IDP).** Once this study has calculated all our parameters, this study could start to calculate DD using the d2 formula mentioned above. Then this study calculates IDP or DP using normal distribution.

### **Results and Analysis**

To make comprehensive discussion on credit risk through different opted models, it is apportioned as descriptive analysis and inferential statistics.

#### **Descriptive Statistics to Ascertain Credit Risk**

To articulate the concept of credit risk and its applicability through different philosophical models (Z-Score, Altman's Z-Score, NPL, Distance to Default, Default Probabilities) to operate economic activities in Islamic and conventional banking are applied. The under mentioned constructed Table 1 extends the discussion on considered aspect (credit risk) for both banking systems. The statistical calculated mean value (79.6) of Z-score for conventional banks against Islamic banks' mean value (51.0) is quite high that highlights the Islamic banks have more risk as counter conventional banks. Whilst, the higher value of standard deviation (89.8) for Islamic banks in comparative with conventional banks (66.5) also indicates high volatility in Islamic banks. The phenomenal approach to assess the credit risk through Z-Score indicates the highest mean value carries minimal risk whilst the lower mean value bear highest risk (Pappas, Ongena, Izzeldin and Fuertes, 2016). The philosophy behind calculation of Altman's Z-score highlights the probability to go into bankrupt, the higher the value the less chances to bankrupt and vice versa. The ascertained calculated mean value (2.1) for Islamic banks reveal less chances to go into bankrupt as compared with conventional banks (0.6). However, the standard deviation put a little cunning concentration on Islamic banks to stabilize the volatility. To strengthen this justification the standard deviation in Islamic banks (2.9) indicates more volatility in Islamic banks in contrast with conventional banking (0.8). Another technique NPL ratio reveals the higher magnitude of credit risk in Islamic with conventional banks. The mean value 1.17% for Islamic banks compared with 0.97% for conventional banks indicates Islamic banks take more risk with conventional banks. The overall calculated value of distance to default

(DD) and default probability (DP) in conventional banks is higher than the Islamic banks that indicate Islamic banks carry less risk as compared with conventional banks at 95% confidence interval.

**Table 1: Descriptive Explanations of inferred Results Computed from Selected Models**

|                      | Islamic Banks |        |         |         |          | Conventional Banks |        |         |         |          |
|----------------------|---------------|--------|---------|---------|----------|--------------------|--------|---------|---------|----------|
|                      | Obs.          | Mean   | Minimum | Maximum | St. Dev. | Obs.               | Mean   | Minimum | Maximum | St. Dev. |
| <b>Credit Risk</b>   |               |        |         |         |          |                    |        |         |         |          |
| Z-Score              | 105           | 51.0   | 2.2     | 540.8   | 89.8     | 112                | 79.6   | 1.0     | 367.5   | 66.5     |
| Altman Z-Score       | 105           | 2.1    | (0.2)   | 11.3    | 2.9      | 112                | 0.6    | (0.0)   | 5.0     | 0.8      |
| NPL                  | 105           | 1.17%  | -9%     | 14%     | 3%       | 112                | 0.97%  | -1%     | 17%     | 2%       |
| DD                   | 28            | 2      | 1.43    | 2.14    | 0.18     | 28                 | 1      | 1       | 2       | 0        |
| DP                   | 28            | 3.81%  | 1.61%   | 7.60%   | 1.49%    | 28                 | 7.13%  | 3.10%   | 11.47%  | 2.42%    |
| <b>Bank Specific</b> |               |        |         |         |          |                    |        |         |         |          |
| Log Total Assets     | 105           | 19.28  | 16.06   | 21.85   | 1.26     | 112                | 21.40  | 16.81   | 28.95   | 2.42     |
| Assets Growth        | 90            | 23.99% | -60.53% | 193.80% | 28.04%   | 96                 | 15.29% | -9.68%  | 71.80%  | 10.73%   |
| Loan to Assets Ratio | 105           | 50.34% | 9.93%   | 91.81%  | 15.35%   | 112                | 52.16% | 14.79%  | 73.81%  | 13.82%   |
| Return on Assets     | 105           | 0.63%  | -4.35%  | 5.87%   | 1.84%    | 112                | 1.29%  | -1.91%  | 3.47%   | 0.84%    |

In context with controlled variables, the overall value of assets for conventional banks is greater as compared with Islamic banks. However, this study makes significant differences in some of the other variables. The average growth in assets of Islamic

banks found 23.99% compared with 15.29% for conventional banks. This growth indicates a potential to realize a substantial growth in Islamic banks compared with conventional banks. The findings are consistent with the previous studies (Hassan and Dridi, 2010; Khan, 2010; Usman & Khan, 2012) i-e growth in Islamic banks is higher than conventional banking. Whilst the Islamic banking is based on Shariah and the ideology of Pakistan is based on Islam too, therefore, people of Pakistan are shifting their banking from conventional to Islamic banking. Similarly, the loan to asset ratio and ROA are comprehensively carrying higher mean values for conventional banks than Islamic banks. This indicates the conventional banking still managing their business in effective way and generating more profit than Islamic banks. Meanwhile, the deviation in loan to assets ratio and ROA for Islamic banks is higher as compared with conventional banks.

Table 2: *Group Mean Comparison Z-Score Test by Years*

| Year | Islamic Banks |       |         |         |          | Conventional Banks |        |         |         |          | T-Test   |
|------|---------------|-------|---------|---------|----------|--------------------|--------|---------|---------|----------|----------|
|      | Obs.          | Mean  | Minimum | Maximum | St. Dev. | Obs.               | Mean   | Minimum | Maximum | St. Dev. |          |
| 2008 | 15            | 48.39 | 2.20    | 319.36  | 77.84    | 16                 | 68.93  | 19.54   | 181.47  | 49.39    | -0.87084 |
| 2009 | 15            | 78.71 | 3.21    | 540.76  | 148.41   | 16                 | 110.49 | 22.04   | 367.51  | 110.49   | -0.68699 |
| 2010 | 15            | 67.52 | 3.99    | 382.05  | 119.33   | 16                 | 85.00  | 0.97    | 251.93  | 69.91    | -0.49329 |
| 2011 | 15            | 41.88 | 4.77    | 267.84  | 65.82    | 16                 | 81.80  | 19.86   | 224.76  | 65.18    | -1.69562 |
| 2012 | 15            | 43.29 | 4.21    | 293.82  | 71.57    | 16                 | 80.77  | 18.75   | 243.50  | 64.68    | -1.52635 |
| 2013 | 15            | 39.48 | 4.80    | 246.29  | 60.42    | 16                 | 66.64  | 4.68    | 193.01  | 49.73    | -1.36151 |

|      |    |       |      |        |       |    |       |      |        |       |          |
|------|----|-------|------|--------|-------|----|-------|------|--------|-------|----------|
| 2014 | 15 | 37.65 | 5.12 | 224.04 | 54.03 | 16 | 63.91 | 8.53 | 167.31 | 46.16 | -1.45051 |
|------|----|-------|------|--------|-------|----|-------|------|--------|-------|----------|

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In the second stage, this study compare the group mean of our credit risk measures, namely, DD, DP, Z-score, Altman Z-score and NPL by year. Among to the sample banks in Pakistan present the DD score for Islamic banks is 1.80 and 1.49 for conventional banks. Throughout the sample period, Islamic banks generally have lower credit risk than conventional banks. However, overall the value of t-stat is less than 5%, which shows the Islamic banks have significantly lower credit risk than conventional banks by DD. Above tables provide the results of the mean comparison test of default probability by country and year. Conventional banks in Pakistan present higher probability of default i.e. 7.13% and 3.81% in Islamic banks. As shown, the probability of default was significantly higher for conventional banks in 2014 and significantly lower in Islamic banks in 2009. Once again, our results provide evidence that the probability of default is significantly different between these two banking systems.

To make comprehensive explanation on the probability of bankruptcy through Altman’s Z-score on annual basis the under mentioned table furnished.

*Table 3: Group Mean Comparison Altman's Z-Score Test by Years*

| Islamic Banks |            |             | Conventional Banks |             |
|---------------|------------|-------------|--------------------|-------------|
| Years         | Mean Value | Stand. Dev. | Mean Value         | Stand. Dev. |
| 2008          | 0.3732     | 0.59021     | 0.2999             | 0.1184      |
| 2009          | 0.4934     | 0.8906      | 0.3971             | 0.1907      |
| 2010          | 0.3351     | 0.6076      | 0.3268             | 0.19942     |
| 2011          | 0.3009     | 0.3467      | 0.4217             | 0.10497     |
| 2012          | 0.2711     | 0.26897     | 0.4001             | 0.11768     |
| 2013          | 0.2383     | 0.33484     | 0.2861             | 0.17965     |
| 2014          | 0.6529     | 0.73322     | 0.3960             | 0.14309     |

The above inserted table broadly highlights the existence of credit risk both in Islamic and conventional banking in Pakistan. It is keenly observed that after the recent international financial crises-2008 the conventional banks slightly increased the magnitude of credit risk in comparison with Islamic banks. While little passing of time (after 2011) the conventional banks stabilized this demise and showed stability in their credit risk. However, in recent two years (2013 and 2014) the Islamic banking system trounced the existing turmoil and mitigated the existing credit risk. The values of standard deviations show variation in credit risk still prevailing and the Islamic banks carry more chances to increase this risk in comparison with Islamic banks.

To comprehend the stability of banks in broader aspects, the analysis is further divided on yearly basis. The under-mentioned table carries the proxy of stability of Islamic and conventional banks by taking the mean values and standard deviation of Z-score of all Islamic and conventional banks.

*Table 4: Group Mean Comparison of Z-Score Test by Years*

| Islamic Banks |            |             | Conventional Banks |             |
|---------------|------------|-------------|--------------------|-------------|
| Years         | Mean Value | Stand. Dev. | Mean Value         | Stand. Dev. |
| 2008          | 29.0550    | 2.7502      | 31.1300            | 16.4483     |
| 2009          | 43.6275    | 43.8746     | 36.3550            | 12.3964     |
| 2010          | 24.5075    | 14.1389     | 45.3275            | 13.1795     |
| 2011          | 17.3875    | 5.6214      | 40.3075            | 19.0290     |
| 2012          | 15.0625    | 6.1279      | 39.8700            | 15.8197     |
| 2013          | 13.9200    | 6.2909      | 27.5075            | 18.9557     |
| 2014          | 14.7700    | 4.7430      | 30.5325            | 17.7240     |



The statistical analysis reveals surprising results in the stability of banking after the great historic financial crises-2008. The overall conventional banks reveal sound stability here in Pakistan in comparison with Islamic banks. It is found little problem with the stability for conventional banks just after ending this demise. However, the values of standard deviation reveal more volatility in conventional banks as compared with Islamic banks. This volatility draws attention to focus on the perception of the customers both in Islamic and conventional banks. However, the persons associated with conventional banks revealed less confidence. As the Islamic banks, operate their financial activities by offering them ownership. Therefore, the confidence of investors is little strong on Islamic banks in comparison with conventional banks.

*Table 5 Group Mean Comparison of NPL Ratio by Years*

| Years | Islamic Banks |             | Conventional Banks |             |
|-------|---------------|-------------|--------------------|-------------|
|       | Mean Value    | Stand. Dev. | Mean Value         | Stand. Dev. |
| 2008  | 0.0060        | 0.01118034  | 0.0140             | 0.01002496  |
| 2009  | -0.0040       | 0.02895686  | 0.0180             | 0.00360555  |
| 2010  | -0.0105       | 0.02847367  | 0.0140             | 0.00212132  |
| 2011  | 0.0020        | 0.01220655  | 0.0125             | 0.00165831  |
| 2012  | 0.0015        | 0.00492442  | 0.0088             | 0.00553963  |
| 2013  | -0.0245       | 0.03774586  | 0.0133             | 0.02750795  |
| 2014  | -0.0045       | 0.00668954  | 0.0013             | 0.00396074  |

The strength ability of banks in recollection of funds (loans and interest) which is due for more than 90 days calculated on yearly basis. The calculated mean values of Islamic banks found prospective to recollect the overdue amounts in comparison with conventional banks, but the overdue amounts peeping mounting high in conventional banks. In many of the years like 2009, 2010, 2013 and 2014 the Islamic banks revealed more recollections that were previously to be collected. Whereas the conventional banks demonstrated the overall tendency to collect due funds diminished over time. After immediate of the financial crisis and with the passing of time the confidence of conventional banks trembled and led the amounts increased. Furthermore the values of standard deviations finds more volatile in Islamic banks in comparison with conventional banks which mean the Islamic banks need more attentions on recollection policies.

*Table 6: Group Mean Comparison of Distance to Default by Years*

| Islamic Banks |            |             | Conventional Banks |             |
|---------------|------------|-------------|--------------------|-------------|
| Years         | Mean Value | Stand. Dev. | Mean Value         | Stand. Dev. |
| 2008          | 1.7264     | 0.218226872 | 1.4076             | 0.10722932  |
| 2009          | 1.6719     | 0.199721882 | 1.4892             | 0.20137647  |
| 2010          | 1.7442     | 0.140401396 | 1.5152             | 0.25218771  |
| 2011          | 1.8356     | 0.207465853 | 1.5104             | 0.21562552  |
| 2012          | 1.8469     | 0.107730529 | 1.4924             | 0.11936468  |
| 2013          | 1.8972     | 0.066775309 | 1.4839             | 0.20531952  |
| 2014          | 1.9503     | 0.050327099 | 1.4999             | 0.14519302  |

The overall suspect of distance to default (DD) is quite reliable both in Islamic and conventional banks. The conscious parameter has assured, it mean the banks have placed more amounts against their liabilities and the probability to default is comprehensively controlled. But the Islamic banks comparatively revealed good position in comparison with conventional banks. The conventional banks put little more considerations on increasing the level of assets after financial crises-2008 but after 2012 the considerations diminished and decreases the level of assets against liabilities whereas the Islamic banks showed vice versa. Meanwhile the conventional banks continuously are increasing the risk of default.

*Table 7: Group Mean Comparison of Default Probability by Years*

| Islamic Banks |            |             | Conventional Banks |             |
|---------------|------------|-------------|--------------------|-------------|
| Years         | Mean Value | Stand. Dev. | Mean Value         | Stand. Dev. |
| 2008          | 0.0466     | 0.01946234  | 0.0788             | 0.016129695 |
| 2009          | 0.0486     | 0.01539148  | 0.0751             | 0.027779016 |
| 2010          | 0.0425     | 0.01086070  | 0.0700             | 0.029442144 |
| 2011          | 0.0375     | 0.01596952  | 0.0677             | 0.023745899 |
| 2012          | 0.0346     | 0.00869624  | 0.0682             | 0.017063881 |
| 2013          | 0.0302     | 0.00541448  | 0.0728             | 0.025321869 |
| 2014          | 0.0269     | 0.00367157  | 0.0667             | 0.020797344 |

The deduced default probabilities exist in both categories of banking system, but the conventional banks overall revealed more probability of default. The severity of the international gigantic financial crisis-2008 is peeping influence in the financial system of Pakistan; especially in the conventional banks. As the conventional banking system is susceptible with the international traditional banking system therefore it felt more severity of international crisis-2008. Strategically the conventional banks giving more emphasis on the vulnerability of the

credit risk therefore default probability is depleting with the passing of time.

### **Conclusion**

The hallmark of this study is to measure the propensity of associated credit risk primarily focusing on the secondary data. To make comprehensive statistical analysis the data was retrieved from the financial statements and made measureable after thorough calculation in Microsoft Excel. The financial statements were downloaded from the website of the State Bank of Pakistan (SBP) and websites of respective sampled banks. To realize the magnitude of credit risk different models like Z-Score, Altman's Z-Score, NPL, Distance to Default and Default Probabilities for Black Schole model applied. The statistically calculated values in general disseminate conventional banking carries more credit risk compared with Islamic banking in Pakistan. The calculated Z-score point out the volatility in Islamic banks were quite high with conventional whereas the chances of bankruptcy prevails for both banking system but it is quite high in Islamic banks as compared with conventional banks. The magnitude of NPL ratio postulates the readers the strength-ability of the conventional banks to recollect overdue amounts has weakened over the passage of time. Meanwhile, the overall calculated value of distance to default (DD) for the Islamic banks is more admirable and supportive to mitigate the downturn in near future but default probabilities (DP) in conventional banks was little higher than the Islamic banks. The overall statistical results though the severity of credit risk felt more in conventional banks but it possess a sound financial position to mitigate adverse position in near future too. The less credit risk associated with the Islamic banks express the confidence of the people of Pakistan over the Islamic banks against conventional banks. Whereas, the equity relationships in Islamic banks propagates the ideology of Islamic banking, which strengthen the bindings of people of Pakistan with this banking system..

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