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**INSOLVENCY RISK DETERMINANTS AND CAPITAL  
REGULATION EFFECT ON CONVENTIONAL AND  
ISLMAIC BANKS OF PAKISTAN**



**SHAHZAD AKHTAR**

**UUM**  
Universiti Utara Malaysia

**DOCTOR OF PHILOSOPHY  
UNIVERSITI UTARA MALAYSIA  
MAY 2017**

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REGULATION EFFECT ON CONVENTIONAL AND ISLAMIC  
BANKS OF PAKISTAN**



**BY**  
**SHAHZAD AKHTAR**

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Universiti Utara Malaysia

**A Thesis Submitted to  
Othman Yeop Abdullah, Graduate School Business,  
Universiti Utara Malaysia  
In Fulfillment of the Requirement for the Degree of Doctor of  
Philosophy**

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## ABSTRACT

In the wake of several recent bank collapses following the 2008 global financial crisis, insolvency risk, previously understudied, emerges as one of the key risks in the banking sector. Hence, this study aims to fulfill this gap by investigating insolvency risk (measured by Z-SCORE) and its dependency on asset quality (nonperforming loans (NPL), provision for nonperforming loans (PNPL)), income structure (IATA, IITA, FBTA), macroeconomic factors (GDP growth, inflation (INF), Interest (INT) and Corruption (CUR)). Capital regulation (CAR) is incorporated in the research model to assess its moderating effect on the relationships between those independent variables and insolvency risk. 161 conventional banks and 35 observations from Islamic banks of Pakistan were analyzed from 2007 to 2015 period. The data were collected from the several sources such as Annual report of banks, Economic Surveys of Pakistan, World Bank database and Transparency International reports. Random Effect, Common Effect model and Hierarchical Regression were performed to identify the determinants of insolvency risk and the moderating effect of CAR on the banks. The results show that NPL, IITA, FBTA, GDP, INF and CUR were found significant with insolvency risk in conventional banks, while CAR moderated NPL, PNPL and INF with insolvency risk. For Islamic banks, GDP was negatively whilst CUR was positively related to insolvency risk. Both were significant. In contrast to conventional banks, CAR strengthened NPL, PNPL, IATA, IITA and FBTA relationship with the Z-SCORE. The findings of CAR effect on the relationship between asset quality, income structure and macroeconomic factors with insolvency risk were mixed in conventional and Islamic banks of Pakistan. The mixed results imply that policy makers and practitioners should develop different prudential regulations and risk management strategies to conventional and Islamic banks in order to mitigate insolvency risk, hence increase the sustainable growth of Pakistani banks.

**Keywords:** bank asset quality, income structure, macroeconomic factors, insolvency risk, capital regulations.

## ABSTRAK

Ekoran daripada keruntuhan beberapa bank baru-baru ini kerana krisis kewangan global 2008, risiko insolvensi, yang mana tidak banyak di kaji sebelum ini, muncul sebagai salah satu risiko utama dalam sektor perbankan. Oleh itu, kajian ini bertujuan untuk memenuhi jurang ini dengan menyiasat risiko insolvensi (diukur oleh Z-Score) dan pergantungannya kepada kualiti aset (NPL), peruntukan bagi pinjaman tidak dibayar (PNPL)), struktur pendapatan (IATA, IITA, FBTA ), faktor-faktor makroekonomi (pertumbuhan KDNK, inflasi (INF), faedah (INT) dan Rasuah (CUR). Regulasi Modal (CAR) yang terkandung di dalam model kajian adalah untuk menilai kesan kesederhanaan terhadap hubungan diantara pembolehubah-pembolehubah bebas dan risiko insolvensi. 161 pemerhatian dari bank konvensional dan 35 pemerhatian dari bank Islam Pakistan dianalisis daripada tahun 2007-2015. Data dikumpulkan dari beberapa sumber seperti laporan tahunan bank, Penyiasatan Ekonomi Pakistan, Pangkalan Data Bank Dunia dan Laporan Transparency International. Kesan Rawak, Model Kesan Biasa dan Regresi Hierarkaki telah dijalankan untuk mengenal pasti penentu risiko insolvensi dan kesan kesederhanaan CAR. Hasil kajian menunjukkan bahawa NPL, IITA, FBTA, KDNK, INF dan CUR adalah signifikan dengan risiko insolvensi di bank konvensional, manakala CAR, memberi kesan sederhana yang signifikan terhadap hubungan di antara NPL, PNPL dan INF dan risiko insolvensi. Bagi Perbankan Islam, KDNK adalah negatif manakala CUR berhubung secara positif dengan risiko insolvensi. Kedua-duanya adalah signifikan. Berbeza dengan bank konvensional, CAR mengukuhkan hubungan NPL, PNPL, IATA, IITA dan FBTA dengan Z-skor untuk bank Islam. CAR menunjukkan kesan yang berbeza kepada hubungan antara kualiti aset, struktur pendapatan dan faktor-faktor makroekonomi dengan risiko insolvensi di antara bank konvensional dan bank Islam. Keputusan yang berbeza itu memberi implikasi bahawa pengubal dasar dan pengamal harus membangunkan regulasi berhemat dan strategi pengurusan risiko yang berbeza untuk mengurangkan risiko insolvensi bank konvensional dan bank Islam di Pakistan.

**Kata kunci:** kualiti aset bank, struktur pendapatan, faktor-faktor makroekonomi, risiko insolvensi, peraturan modal.

## ACKNOWLEDGEMENTS

*In the name of ALLAH, the most gracious, the most merciful. Praise be to ALLAH, the creator and custodian of the universe. Salawat and Salam to our Prophet Muhammad, peace and blessings of ALLAH be upon him and to his family members, companions and followers.*

First and foremost, I would like to express my heartfelt thanks and gratitude to Allah S.W.T for His blessing and allowing me to complete this thesis. My foremost gratitude goes to my supervisor, Prof. Dr. Nor Hyati Bt Ahmed and Dr. Arfan Shahzad, for their professional guidance and devoting their expertise and precious times to guide me to reach this level. Thank you, for all that you did. Moreover, I would like to mention that not only I learned a lot about research but Prof Nor Hayati bt Ahmed taught me to be humble and helpful to others in all cases. I never met a person like her and I will never forget what she made me to learn. I cannot express my feelings in word but still I want to pay my special thanks to my dearest Prof. Nor Hayti bt Ahmed.

Furthermore, I would like to extend my thanks and gratitude to my father, mother, wife sisters, and brothers in law and all my family members, thank you so much for your support and prayers.

Additionally, I would like also to express my gratitude and thanks to Prof. Dr. Aman Ullah, Prof. Dr. Imran Sharif, Haroon Hussain, Asad ur Rehman and Javed Iqbal for their constructive comments and invaluable suggestions during and after the proposal defense session till final submission of thesis.

To all my friends especially Muhammad Imdad Ullah, Mohsin Altaf, Syed Wahid Ali, Khawja Saad, Tamoor Ali, Rashid Bhutta, Jawad Raza, Muhammad Saqib, Zohaib Ayub, Zohaib Aftab, Abbas Shah, Zain Shah, Aun Ali Bukhari, Syed Nusrat Ali, Mian Badar and Haseeb Khalid for invaluable time we spent together on discussion and mutual support throughout the tenure of my study.

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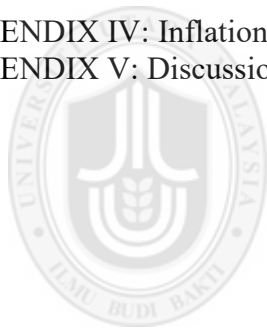


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## LIST OF ABBREVIATION

ADP	Annual Development Program
BCBS	Banking Committee for Banking Supervision
BLUE	Best Linear Unbiased Estimator
CD	Certificate of Deposits
CEE	Countries Central and East European countries
CII	Council of Islamic Ideology
CISS	Composite Indicator of Systemic Stress
CLRM	Classical Linear Regression Model
CPI	Corruption Perception Index
DFI	Development Financial Institutions
EDF	Export Development Fund
EU	European Union
FEM	Fixed Effects Model
FSM	Financial Services Modernization
GCC	Gulf Cooperation Countries
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GLB	Gramm-Leach-Bliley
HBFC	House Building Finance Corporation
IBB	Islamic Bank Bulletin
ICP	Investment Corporation of Pakistan
IMF	International Monetary Firm
MCB	Muslim Commercial Bank
MENA	Middle East and North Asian Countries
NAB	National Accountability Bureau
NIT	National Investment Trust
NPL	Nonperforming Loans
OECD	Organization of Economic Co-operation and Development
OIC	Organization of Islamic Conference
PLS	Profit and Loss Sharing
PPP	Pakistan People's Party.
PTC	Participation Term Certificate
REM	Random Effects Model

SBP	State Bank of Pakistan
TI	Transparency International
UAE	United Arab Emirates
UBL	United Bank Limited
VIF	Variance-Inflation Factor
NPL	Nonperforming Loans
PNPL	Provision for Nonperforming Loans
IATA	Income from Advances to Total Asset
IITA	Income from Investment to Total Asset
FBTA	Fee and Brokerage Income to Total Asset
CUR	Corruption



# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Failure of financial institutions can produce shocks to the economy. This is evident from the Global Financial Crisis (GFC) of 2008. A financial crisis imposes shocks on major sectors of the economy, which result in reduction in income, uplift of currency crises and shrinkage of wealth in the real economy (Levine & Zervos, 1998; Hoggarth, Reis, & Saporta, 2002; Čolaković, 2014; Varotto & Zhao, 2014; Ayadi *et al.*, 2015). Moreover, there is no standard discrimination for financial crisis between developed and developing countries. Both categories of countries have to face boom and bust of financial cycles. For example in the region of European Union countries, the average decrease in GDP was 4.3% due to GFC (Karanikolos *et al.*, 2013). Similarly, the regions of Organization of Economic Co-operation and Development Countries (OECD) and Central and East European countries (CEE) were badly affected by the financial crisis which decreased their economic growth, on average by 3% to 4% (Kapp & Vega, 2014; Corovei, 2015; Romer & Romer, 2015).

Furthermore, financial sector is also committed to the quality of financial institutions and its stability is very much dependent on the quality of the institution especially in emerging countries like India, China, Brazil, South Africa, Turkey and Egypt. The quality of the institutions is reflected in its credit rating which is significantly affected by asymmetric information and it is more prevalent in developing countries such as Pakistan. An institution with a lower credit rating has a lower quality of asset as compared to the one with higher credit rating. Therefore, an institution with

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## Appendix – I: List of Commercial banks of Pakistan

SR#	List of Banks In Pakistan	
	<b>Public Sector Bank</b>	Incorporation Date
1	First Women Bank	1989
2	NBP	1949
3	Bank of Khyber	1991
4	Bank of Punjab	1989
	<b>Private Commercial Banks</b>	
1	Allied Bank	1974
2	Askari Bank	1991
3	Bank Al Habib	1991
4	Bank Alfalah	1997
5	Faisal Bank	1994
6	Habib Bank	1950
7	Habib Metro Politan Bank	1992
8	JS Bank	2006
9	Mushlim Commvercial Bank	1947
10	National Investmetn Bank	1993
11	Samba Bank	2002
12	Silk Bank	2007
13	Sonari Bank	1992
14	Standard Chartered	2006
15	Summit Bank	2006
16	UBL	1959
	<b>Specialized Banks</b>	
1	Punjab Provincial Cooperative Bank	1976
2	SME Bank. Ltd.	2002
3	Zarai Taraqiati Bank	1991
	<b>Total Banks</b>	<b>23</b>
	<b>No of Observation Expected</b>	<b>23 * 9 (2007-2015)</b>
		<b>207</b>

Source: Quarterly Compendium, Statistics of Banking System by State Bank of Pakistan

## Appendix – II: List of Islamic bank of Pakistan

SR#	List of Islamic Banks	Incorporation Date
1	Al Baraka Bank	2007
2	Dubai Islami	2006
3	Burj Bank	2007
4	Bank Islami	2006
5	Meezan Bank	2002
<b>Total Banks</b>		<b>5</b>
<b>No of Observations</b>		<b>5*9 (2007-2015) = 45</b>

Source: Quarterly Compendium, Statistics of Banking System by State Bank of Pakistan



**Appendix III: Model Selection Tests (Common, Fixed and Random Effects Model)**

- Redundant Fixed Effects Test Results**

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Redundant Fixed Effects Tests

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Pool: Conventional Banks  
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.587611	-22,127	0.0005
Cross-section Chi-square	59.627039	22	0

---

- Hausman Test to select between Random Effects and Fixed Effects Model**

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Correlated Random Effects - Hausman Test

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Pool: Conventional Banks  
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0	11	1

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\* Cross-section test variance is invalid. Hausman statistic set to zero.

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- **Breusch and Pagan Lagrangian Multiplier Test to determine appropriate model between Common Effects and Fixed Effects Model**

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Breusch and Pagan Lagrangian multiplier test for random

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Test:  $\text{Var}(u) = 0$   
chibar2(01) = 57.50  
Prob > chibar2 = 0.0000

---



#### Appendix IV: Inflation Data of India

Country	Year	Inflation(%)
India	2000	4
	2001	3.7
	2002	4.4
	2003	3.8
	2004	3.8
	2005	4.2
	2006	6.1
	2007	6.4
	2008	8.4
	2009	10.9
	2010	12
	2011	8.9
	2012	9.3
	2013	10.9
	2014	6.4
	2015	5.88
Average		6.8175

Source:www.worldbank.org



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## Appendix V: Discussion on Insignificant Hypothesis

**H2a:** There is a significant relationship between provision for nonperforming loans/ financing to gross loans/ financing and insolvency risk of conventional banks in Pakistan.

The regression result indicates that there is no significant relationship between provision for nonperforming loans (PNPL) and insolvency risk (Z-SCORE) but the direction of relationship is negative in conventional banks of Pakistan. One of the reasons could be that an increase in provision for nonperforming loans is an indication of higher ratio of loan default for the year. However, provision for loan loss is an expense item and management prefers not to allocate higher provisions because it will lead to lower income. In such strategy the bank management try to reduce volatility in the earning and increase the stability and value of the bank (Kanagaretnam, Lobo, & YANG, 2004). The bank with such strategy is actually allowed by the State bank of Pakistan (Syed, 2007; Jameel Ahmed, 2009; Zaman, 2015). Furthermore, it is also recognized as discretionary action of management (Liu, Ryan, & Wahlen, 1997; Syed, 2007; Inayat Hussain *et al.*, 2011; Zaman, 2015).

Another reason could be that when loan loss provisions are relatively high, there are expenses of bad debts, that reduces income before interest and tax which is a part of numerator of calculating Z-SCORE. So, because of numerator value of Z-SCORE, this will relatively lower the value of Z-SCORE. The lower value of Z-SCORE is an indication of a riskier bank. Hence, when the value of Z-SCORE is lower there is an incentive to allocate a lower PNPL to improve banks stability (Leventis, Dimitropoulos, & Anandarajan, 2011). Therefore, manipulation in provision for nonperforming loans creates agency problem in which managers tends to increase personal incentives.

**H3a:** There is a significant relationship between income from advances/ financing and insolvency risk of conventional banks in Pakistan.

The regression result of relationship between income from advances (IATA) and insolvency risk (Z-SCORE) is insignificant which is on contrary to the developed hypothesis. The plausible reason for an insignificant result of income from advances and insolvency could be due to the increased dependency of government borrowing from scheduled banks (EconomicSurvey, 2015, 2016). Another reason could be lowered down expenses, low deposits rate, injection of equity, laying off employees, overhead costs, management risk aversion and reducing operating expenses. Thus, reducing expenses and gaining economy of scale increases income stability of banks or in other words it reduces insolvency risk as argued by some previous researcher's i.e. (Hughes and Mester (1998); Azureen, 2012). Similarly Rose and Hudgins (2006) also highlighted that reducing expenses and increasing revenue creates gap between revenues and expenses, this helps to increase bank income. So, the increase in income improves value of Z-SCORE that is an indication of a stable bank.

According to Lin *et al.* (2012) and Zhou (2014), income from advances is less sensitive and less volatile if banks have diversified its lending portfolio. Furthermore, if a bank is diversified in both traditional and nontraditional line of business it reduces the shocks to total income (Odesanmi & Wolfe, 2007). Thus, this can be a reason that if bank has diversified its portfolio of lending, it will reduce shock to its earning. In



other words, improved earning reduces insolvency risk of a bank. This is also in relation theory of modern portfolio that a diversified portfolio reduces risk (Markowitz, 1959; Markowitz, 1999).

**H8a:** There is a significant relationship between interest rate and insolvency risk of conventional banks in Pakistan.

The study hypothesized that there is a significant relationship between interest rate (INT) and insolvency risk (Z-SCORE) of the bank. The result indicates that the relationship between interest rate (INT) and insolvency risk (Z-SCORE) is insignificant. So, on the basis of result, NULL hypothesis is accepted and alternate hypothesis is rejected. According to Issing (2003), central bank of a country has to choose between interest rate and inflation rate. So, it can be one of the reasons that inflation has significant relationship with insolvency risk but interest rate does not have a significant relationship with Z-SCORE in conventional banks of Pakistan. Another reason of an insignificant relationship could be the correlation of interest rate and inflation. The argument states that if in a country inflation rate is high than asset return moves with inflation rate rather than interest rate (Hellwig, 1994). Thus, Pakistan is one of the countries with high inflation rate, so it can be a reason that inflation might play a major role in banking profitability and stability instead of interest rate. Moreover, as highlighted in the previous finding of Uhde and Heimeshoff (2009), if interest tend to rise in presence of inflation then inflation is probably influencing the profitability of banks, hence it can be a reason for an insignificant relationship between interest rate and insolvency risk in conventional banks of Pakistan. Furthermore, the results of this study are similar to the findings of previous authors i.e. (Angbazo, 1997; Konishi & Yasuda, 2004; Boyd & De Nicolo, 2005; Fabling & Grimes, 2005).

**H11a1:** Capital adequacy ratio moderates the relationship between income from advances/ financing and insolvency risk in conventional banks of Pakistan.

The use of CAR in the relationship between income from advances (IATA) and insolvency risk (Z-SCORE) does not produce a significant relationship. When CAR is low, the relationship was insignificant and beta coefficient was showing a positive direction. When CAR is high in the relationship, the direction of beta become negative but relationship remains insignificant. The reason could be that CAR may be a regulation which is for stability of nonperforming loans because CAR was introduced by Basel committee after credit crisis for maintaining cushion against financing. So, CAR reduces the impact of NPL of banks and hence due to extra cushion of minimum capital requirement may be able to produce stability in income from advances. The stability of income from advances reduces the standard deviation of ROA and will result in higher Z-SCORE. The higher Z-SCORE indicates a less risky bank.

In addition, Another reason of insignificant relationship could be that income from advances are relatively more stable and do not pose serious threat to insolvency risk (Lepetit *et al.*, 2008a). In relation to nonperforming loans CAR helps to reduce nonperforming loans and uplift asset quality, which increases income from advances. CAR might also help to reduce agency problem and disturbance in portfolio of advances income. So, it may be the reason that CAR interact with nonperforming loans and provision for nonperforming loans to stabilize income from advances.

**H11a2:** Capital adequacy ratio moderates the relationship between income from investments and insolvency risk in conventional banks of Pakistan

The regression results indicate that when CAR is low the impact of IITA on insolvency risk (Z-SCORE) is insignificant and Positive. So, when CAR is low, one unit change in IITA will increase the value of Z-SCORE by 0.1326 units reduce insolvency risk. When CAR is high the relationship become insignificant and direction of relationship remains positive. The reason could be a stable portfolio of investment and less earning volatility of investment income of conventional banks. If the portfolio of earning is less volatile will increase return on asset (ROA) and standard deviation of ROA will be small. Hence, this will increase value of Z-SCORE and can make bank more stable. The results of interaction CAR\*IITA highlights that CAR does not moderate the effect the effect of IITA on Z-SCORE.

**H11a3:** Capital adequacy ratio moderates the relationship between income from fee, commission and brokerage income and insolvency risk in conventional banks of Pakistan.

When CAR is low, the regression results show that FBTA increases insolvency risk. One unit change in FBTA will reduce value of Z-SCORE by 0.1343 units and increase insolvency risk. When CAR is high, the relationship between FBTA and Z-SCORE become insignificant. This highlights that CAR does no moderate the relationship between FBTA and insolvency risk. In relation to IITA, IITA reduces insolvency risk, while FBTA increases insolvency risk, when CAR is low is relative to modern portfolio theory. The reason of an insignificant relationship between CAR\*FBTA and Z-SCORE, could be that FBTA does not require any extra cushion to generate income from fee, commission and brokerage. Hence, it places manager's incentive for personal gain.

**H12a1:** Capital adequacy ratio moderates the relationship between GDP growth and insolvency risk in conventional banks of Pakistan.

The relationship between GDP and insolvency risk in conventional banks of Pakistan is positive and significant, one unit increase in GDP increases value of Z-SCORE by 12.5745 units and reduces insolvency risk, when CAR is low. The introduction of CAR in relationship between the GDP and insolvency risk actually convert the relationship to insignificant. The reason could be that higher growth of GDP increase the debt servicing capacity of bank, the better debt servicing capacity of bank will improve asset quality of bank. So, better asset quality may improve bank earning and make it easy to keep minimum capital requirement of tier 1 capital. Hence, it can be said that GDP growth help banks to improve CAR. Thus it might become the reason of an insignificant relationship. The results are inline to some of previous authors (i.e. Caprio and Klingebiel (1996) ,Agoraki, Delis, and Pasiouras (2011) and Vogiazas and Nikolaidou (2011b)) those highlighted that increase in GDP increases the stability of bank and reduces insolvency risk.

**H12a3:** Capital adequacy ratio moderates the relationship between interest rate and insolvency risk in conventional banks of Pakistan.

The relationship between INT and Z-SCORE in conventional banks of Pakistan is insignificant when CAR is low. Even when CAR is high, the relationship still remains insignificant. According to Hellwig (1994), there is a correlation between interest rate and inflation rate, so in some countries between interest rate or inflation rate one can influence the banking system (Issing, 2003). Therefore, it could be one of the reasons that inflation has significant positive relationship with insolvency while CAR is low and for interest the relationship with insolvency remains insignificant when CAR is low. When CAR is high, the relationship of inflation becomes positive and significant with Z-SCORE, while interest rate relationship remains insignificant. Another reason for this insignificant could be the argument that interest rate increases when inflation increases (Uhde & Heimeshoff, 2009), this defines that interest rate may be dependent on inflation.

**H12a4:** Capital adequacy ratio moderates the relationship between corruption and insolvency risk in conventional banks of Pakistan.

The regression results indicate that increase in corruption (CUR) will increase insolvency risk when CAR is low. One unit change in corruption (CUR) will reduce value of Z-SCORE by 6.1687 units. But when CAR is high, the relationship becomes insignificant and positive. The application of CAR does not reduce the effect of corruption and agency problem. According to Aidt (2009) and Swaleheen (2011) corruption is an obstacle in development of an economy, which indicates that it will increase insolvency risk of institution of an economy. The reason might be that corruption erodes the money supply in a system which can produce liquidity risk in an economy. The erosion of money from a system can cause higher nonperforming loans, and higher nonperforming loans reducing the income of an institution. The continuous reduction of money in a system increases debts on consumer. In relation to this increment of debts, consumer enables to pay debts than can cause insolvency risk to the bank. Furthermore, CAR does not hold cushion against the erosion of money produced by CUR. Therefore, CAR might not moderate the relationship between corruption (CUR) and Z-SCORE but the relationship between CUR and Z-SCORE becomes insignificant and reverse the direction of beta coefficient (negative to positive). Furthermore, there is no cushion of CUR in CAR; this can be a reason that CAR could not moderate the negative effect of CUR on Z-SCORE.

**H1b:** There is a significant relationship between nonperforming loans/ financing to gross loans/ financing and insolvency risk of Islamic banks in Pakistan.

The hypothesis is to find the significant relationship between nonperforming financing to gross financing. On contrary, the results of multiple regression show that there is no significant relationship between nonperforming financing (NPL) to gross financing and insolvency risk (Z-SCORE) in Islamic banks of Pakistan.

The insignificant relationship could be due to the small share of Islamic banking to overall banking system in Pakistan that is 8.9% (total Islamic banks assets to total banking assets of Pakistan) (Hassan, 2016). Moreover, the total contribution of financial sector in GDP of Pakistan is 3.25% and 5.5% in years 2015 and 2016 respectively (Recorder, 2016). Therefore, the smaller ratio of NPL which is 0.07% (see Chapter 5 Table 5.2) in Islamic banks may result in a very nominal ratio of NPL to GDP. Hence, this ratio may not be able to influence insolvency risk of Islamic banks.

The other reason could be that the relationship between nonperforming asset and insolvency risk is insignificant could be due to the Islamic mode of financing which is profit and loss sharing (PLS). According to Sundararajan and Errico (2002), Islamic banks can transfer credit risk to investment account holders, who do not have the same rights like equity holder but share the same risk. The share of profit and loss between a borrower and lender increase the capacity of Islamic banking to share losses and bear income volatility (Hasan & Dridi, 2010; Abedifar, Molyneux, & Tarazi, 2013).

Another reason could be that customers in Islamic bank are more risk averse. According to Miller and Hoffmann (1995), Osoba (2003) and Hilary and Hui (2009) that the relationship between risk aversion and religious inclination of individual is positive. This relationship can influence the performance of the bank's asset side by encouraging borrowers to fulfill the obligation from their side under Islamic loan contract. Therefore, the risk averse behavior and religious inclination of clients due to religiosity can help the banks to mitigate its default risk. Furthermore, According to Abedifar, Molyneux, and Tarazi (2013), the share of Muslim population in total population also effect the risk of default in Islamic banks. The author argues that if the total share of Muslim population in total population large, the Islamic banks are less likely to default. In Pakistan, the total share of Muslim population is 95% of total population. Thus, this could be the reason that religiosity factor reduces the insolvency risk of Islamic banks in Pakistan.

**H2b:** There is a significant relationship between provision for nonperforming loans/ financing to gross loans/ financing and insolvency risk of Islamic banks in Pakistan

The study hypothesize that there is a significant relationship between provision for nonperforming loans and insolvency risk. The regression results, on contrary indicate that there is no significant relationship between provision for nonperforming loans (PNPL) and insolvency risk (Z-SCORE). Islamic principles for lending is based on PLS (profit and loans sharing agreement) and use dynamic provisioning for losses. This might be a reason for an insignificant relationship. Moreover, Islamic banks are encouraged to use profit equalization and investment risk reserves for stable returns for investment account holders (Boulila Taktak, Ben Slama Zouari, & Boudriga, 2010). Hence, the use of dynamic provisioning and investment risk reserves might be a reason that the relationship between PNPL and Z-SCORE is insignificant in Islamic banks of Pakistan.

**H3b:** There is a significant relationship between income from advances/ financing and insolvency risk of Islamic banks in Pakistan.

The study hypothesized that there will be a significant relationship between income from advances/ financing (IATA) and insolvency risk (Z-SCORE) in Islamic banks of Pakistan. The regression result shows that there is no significant relationship between income from advances/ financing (IATA) and insolvency risk (Z-SCORE). Hence, the study rejects alternate hypothesis. There could be multiple reasons behind this insignificant relationship. A plausible reason can be that non-PLS mode of financing in Islamic banks is not much different from conventional but it is less risky as compared to conventional bank due to religious factor (Čihák and Hesse 2008). Islamic banks clients are ready to pay rent on financial services in alignment to their religious belief (Abedifar, Molyneux, & Tarazi, 2013; Beck, Demirgüç-Kunt, &

Merrouche, 2013). Moreover, due to moral religious obligation, Islamic banks enjoy substantially higher growth rate as compared to conventional banks (Khan, A. K., 2010). Furthermore, religiosity is not the only factor of growth; the other factor could be that Islamic banks are in their infancy phase and more growth focused, hence having higher growth rate. So, they are performing better than conventional banks (Obaidullah, 2005). Hence, it could be the reason that the relationship between IATA and Z-SCORE in Islamic bank of Pakistan is insignificant.

Another reason could be the Islamic sharia that prohibits excessive risk taking. According to Obaidullah (2005), in Sharia it is strictly prohibited to take excessive risk “Gharar”. Generally, Islamic banks offers reasonable profit rates which is agreed by both parties. In such agreements both customers and the bank are aware of the obligation. Therefore, it stabilizes the earning of the bank from mitigation of credit risk, liquidity risk. Hence, it helps a bank to reduce insolvency risk. Furthermore, one other reason could be that in Islamic banks the cost of monitoring and screening is lower as compared to conventional banks. This is because of PLS agreement and borrower’s status equaling to an equity holder. This actually helps the banks to reduce cost of monitoring and screening and it also helps to reduce agency problem between principal and agent (Beck, Demirgüç-Kunt, & Merrouche, 2013).

**H4b:** There is a significant relationship between income from investment and insolvency risk of Islamic banks in Pakistan.

The relationship between income from investment (IITA) and insolvency risk (Z-SCORE) is insignificant which is contrary to the hypothesis suggested in chapter 4. One of the reasons could be that Islamic banks have part from PLS and they have other financing contract such as Murabaha, Musharkah and Ijarah. The nature of contracts and fixed rate of payment allow Islamic banks to have steady cash inflow. This risk sharing agreement and fixed rate of payment provides additional protection to Islamic banks. Furthermore, due to risk sharing agreement Islamic banks tends to exercise smooth sources to generate income, this is because of their larger proportion of asset side (Čihák & Hesse, 2008).

Furthermore, Diamond and Rajan (1999) and Diamond and Rajan (2000) argued that the discipline imposed by a depositor to enter in an Islamic PLS relationship also reduces lending defaults. In addition to previous argument, another reason can be the unique nature of various Sharia constraints, that does not allow Islamic banks to take extra risk in their earning (Sundararajan & Errico, 2002).

Additionally, the proportion of Muslim population can be another factor that reduces the risk due to religiosity factor (Abedifar, Molyneux, & Tarazi, 2013). Another reason could be like risk sharing element works in both short term and long term agreement, because Islamic banks have smaller investment portfolio (Beck, Demirgüç-Kunt, & Merrouche, 2013). The concentration on a smaller portfolio increases the ability of managers to become master in the field that helps the banks to reduce volatility of earning. The less volatile earning reduces the standard deviation of ROA and increases value of Z-SCORE, hence stable value of Z-SCORE indicate a less risky bank.

**H5b:** There is a significant relationship between fee, commission and brokerage income and insolvency risk of Islamic banks in Pakistan.

The hypothesis of the study is that there is a significant relationship between fee, commission and brokerage (FBTA) income and insolvency risk (Z-SCORE) in Islamic banks, but regression results indicate that there is no significant relationship between fee, commission and brokerage (FBTA) income and insolvency risk (Z-SCORE). In accordance to sharia compliance, it is prohibited to pay predetermined payment and receipt of the services rendered by the bank. Therefore, in mode of Islamic banks, profit and loss sharing agreements and fee and commission service charges are determined when partnership contract is initiated (Čihák and Hesse 2008). Hence, payment of fee, commission services against a contract is determined when partnership contract is initiated. This might define that fee, commission and brokerage income is not based on accrual. It might be on actual realization of income. Therefore, fee and commission based income may reduce the volatility of revenue and this reduces the standard deviation of income resulting in a small change in the value of Z-SCORE and hence could produce an insignificant relationship between FBTA and Z-SCORE. Therefore, it could be a reason that partnership contract of Islamic banks with their customers are religion based (Obaidullah, 2005; Khan, F., 2010). Therefore, these partnership contracts might help to stabilize the earning of the banks and reduces volatility or in other words reduces insolvency risk.

**H7b:** There is a significant relationship between inflation rate and insolvency risk of Islamic banks in Pakistan.

The relationship of inflation (INF) in Islamic banks of Pakistan is found to be insignificant with (Z-SCORE). The results of regression revealed the relationship against the hypothesis developed by the study. The results of current study are in line with the previous research of Čihák and Hesse (2008), who argues that there is no significant relationship between inflation and insolvency risk of Islamic banks. Among many researchers i.e. (Hassan & Bashir, 2003; Al-Tamimi & Hussein, 2010; Kpodar & Imam, 2010; Srairi, 2010; Chun & Razak, 2015) highlighted that there is no significant relationship between inflation and profitability of Islamic banks. In addition, Kpodar and Imam (2010) highlighted that increase in inflation reduces the intermediary effect of Islamic banks because customer tend to invest more in fixed asset rather than financial asset. Therefore, it could be a reason that if inflation reduces the intermediary effect of Islamic bank then they may be unable to affect the earning of the bank. Furthermore, it will result in smooth earning for the bank and there will be no volatility in earning due to rise in inflation and will not affect Z-SCORE or in other words insolvency risk. Hence, it could be a reason that there is no significant relationship between inflation and insolvency risk in Islamic banks of Pakistan.

**H8b:** There is a significant relationship between profit rate and insolvency risk of Islamic banks in Pakistan.

The regression results of relationship between interest rate (INT) and insolvency risk (Z-SCORE), indicates that the relationship is insignificant. While, the study hypothesized that there is a significant relationship between interest rate (INF) and insolvency risk (Z-SCORE). The reason of insignificant relationship might be the prohibition of interest (Riba). Islamic banks have to follow the rule of Sharia. The

Sharia explains that predetermined rate of profit or fixed payment is exploitation and inconsistent with fairness of contract (Hassan & Bashir, 2003; Kpodar & Imam, 2010). According to Čihák and Hesse (2008), the determination of rent, clearance service fee and other income is determined at the time of initiation of partnership contract. So, it highlights that there might be less revision of rental or other agreed income. Therefore, less revision in agreed contract may not affect the volatility of profitability of banks. Hence, it could be another reason that INF has an insignificance relationship with Z-SCORE.

**H12b1:** Capital adequacy ratio moderates the relationship between macroeconomic factor GDP growth and insolvency risk in Islamic banks of Pakistan.

The relationship between GDP and insolvency risk (Z-SCORE) is significant when CAR is low. But when CAR is high, the relationship between GDP and insolvency risk (Z-SCORE) becomes insignificant but the direction of relationship becomes positive. Therefore, an insignificant relation between CAR\*GDP indicates that CAR does not moderate the relationship between GDP and Z-SCORE. In fact, CAR is a regulation imposed by State bank of Pakistan, so it can be said that CAR is a type of governance mechanism for banks. However, the use of CAR does not regulate the effect of GDP; this means that CAR may not have capacity to moderate the effect of GDP growth in Islamic banks of Pakistan. Another plausible reason can be that Pakistan is one among the countries of the world, which is suffering higher volatility in GDP growth (see Chapter 1, Table 1.6). The sharp increase and decrease in GDP growth is due to many factors, for example, law and order, political instability, bad governance and hike of corruption. So, these can become reasons for an insignificant relationship between CAR\*GDP and Z-SCORE.

**H12b2:** Capital adequacy ratio moderates the relationship between inflation rate and insolvency risk in Islamic banks of Pakistan

The relationship between INF and Z-SCORE is in significant, either when CAR is low or CAR is high. It can be seen in Table 6.11 that there is no affect of capital regulation on inflation. According to Kpodar and Imam (2010), in certain situations central banks of many countries are assigned to perform credit allocation to favored sectors of economy to rise up economic development, instead of keeping a check on inflation. Moreover, increase in inflation reduces the intermediary effect of Islamic banks and customer. In this situation customers starts to switch their investment from financial assets to fixed asset (Kpodar & Imam, 2010). Therefore, this phenomenon might highlight that the compliance of regulation may become weak and banking system remains underdeveloped. Thus, this could be the reasons that CAR is unable to moderate the relationship between INF and Z-SCORE.

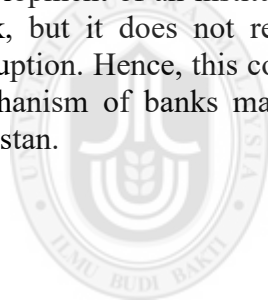
**H12b3:** Capital adequacy ratio moderates the relationship between interest rate and insolvency risk in Islamic banks of Pakistan.

The use of CAR does not moderate the relationship between interest rate (INT) and insolvency risk (Z-SCORE). The regression results of direct relationship between INT and Z-SCORE is insignificant. According to Chong and Liu (2009), Khan, F. (2010) and Kpodar and Imam (2010), the money does not produce money surplus itself as explained by Sharia principle. Therefore, interest (Riba) is prohibited in Islamic

banks. Furthermore, CAR is a governance indicator of banks devised in accordance to the guidelines of BASEL committee to regulate bank risk. Therefore, State bank of Pakistan devised CAR on the similar guideline of BASEL committee for conventional banks. SBP also directed Islamic banks to maintain the same CAR of conventional banks. So, CAR may not be designed to moderate the impact of interest on insolvency in Islamic bank. Thus, this could be a reason that CAR does not moderate the relationship between INF and Z-SCORE. Furthermore, Čihák and Hesse (2008) highlighted that profit rate, rent rate are defined at the initiation of contract. Therefore, interest rate does not play part in earing of Islamic banks. Hence, it could be another reason that CAR does not moderate the relationship between INF and Z-SCORE.

**H12b4:** Capital adequacy ratio moderates the relationship between corruption index and insolvency risk in Islamic banks of Pakistan

The relationship between CUR and Z-SCORE is significant and positive, when CAR is low. When CAR is high, the relationship becomes insignificant but direction remains positive. This indicates that CAR could not moderate the impact of corruption on insolvency risk. As explained by Houston (2007), when law implementation in a system is weak then corruption can play a significant role in development of an institutions. But on contrary to the previous argument, Houston (2007) also highlighted that increase in corruption has adverse effect on economy, which can result in bad development of an institution. Moreover, CAR is a form of regulation for stability of bank, but it does not require bank to hold minimum capital requirement against corruption. Hence, this could be another reason that increase in CAR as a governance mechanism of banks may not reduce the impact of corruption in Islamic bank of Pakistan.



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