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

SHAHZAD AKHTAR

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BY

SHAHZAD AKHTAR

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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 berbayar (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, membei 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.

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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

lower credit rating is much vulnerable to economic shock and financial crisis (Shen, Huang, & Hasan, 2012; Hau, Langfield, & Marques-Ibanez, 2013).

Moreover, macroeconomic factors play an important role in a financial crisis (Demirgüç-Kunt & Detragiache, 1998; Llewellyn, 2002). Demirgüç-Kunt and Detragiache (1998), Louzis, Vouldis, and Metaxas (2012) and Chaibi and Ftiti (2015) highlighted that lower GDP growth, higher unemployment rate, higher interest and inflation rate are favorable to banking crisis. In contrast, Andrei (2014) found that GDP contributes lesser impact on bank risk as compared to other variables like exchange rate and unemployment rate. The other macroeconomic factors which are also involved in banking crisis are Export Development fund (EDF), Interest rate and certificate of deposits (CD's). With respect to Pakistan, it was observed that GDP, inflation and interest rate are effecting the banking system of Pakistan (Hussain, 2004, 2012; Khalid & Hanif, 2014).

Besides other main macroeconomic factors attention towards growing corruption is needed. It is a significant factor that impede the economic growth and also considered as a single biggest obstacle in economic growth (De Vaal & Ebben, 2011; Farooq *et al.*, 2013). This is also supported by the statement made by the Secretary General of United Nation "Ban ki-moon" on corruption day stated that "corruption is a threat to the economic growth and stability of democracy; it distorts markets, curbs economic growth and discourages foreign investment" (Nguyen & Van Dijk, 2012; UnitedNation, 2015).On the contrary, among some of the researchers i.e. (Samuel, 1968; Beck & Maher, 1986) argued that corruption expedite the decision making of many entrepreneurs.

Mauro (1995), Mauro (1998a) was the first person to introduce an econometric model for corruption. The author highlighted that if a country improves corruption perception index (CPI) points from 6 to 8, it will ultimately result in an increase of 0.5% points in annual GDP. Vice versa, the growth of a country also helps in reducing corruption (Treisman, 2000; Bai *et al.*, 2013). Furthermore, corruption is a contributory factor for the World's financial crises which affect the banks' balance sheets. For example, in the case of Hanbo Corporation of South Korea, the strong ties between firms and politicians led to a serious deterioration of asset quality and which resulted in a financial crisis (Park, 2004, 2012).

1.2 Emergence of Islamic Banking

The global financial crisis (GFC) 2008 has not only shed doubts on the proper functioning of conventional ''Western'' banking, but has also increased the attention on Islamic banking because of their better performance during the crisis (Hasan & Dridi, 2010; Beck, Demirgüç-Kunt, & Merrouche, 2013). After GFC 2008 Islamic banking has not only gained importance in Muslim world but also non-Muslim dominated countries such as UK, U.S.A and Australia. Islamic banks have more than 300 Islamic financial institutions across 70 countries including 5 Islamic banks in UK and 19 Islamic financial institutions in U.S.A (Johnes, Izzeldin, & Pappas, 2014). The growth of Islamic banking remains remarkable and observed wider acceptance in last two decades (Kabir & Worthington, 2014).

In terms of performance, there is no significant difference between conventional and Islamic banks in pre and post period of crisis of 2008 in Pakistan. However, Islamic banks performed better in the time of crisis period 2008-2009, but large losses occurred

in conventional banks of Europe and U.S.A. Islamic banks have also contributed to economic and financial stability during GFC crisis years of 2008 and 2009 (Čihák & Hesse, 2008; Beck, Demirgüç-Kunt, & Merrouche, 2013). This is due to the fact that Islamic banks remained profitable because they were more liquid and better capitalized and less involved in off balance sheet items (Hasan & Dridi, 2010; Khediri, Charfeddine, & Youssef, 2015).

Although Islamic banks are better off than conventional but their assets are not more than 1% percent of the total global assets of the banks. This means that Islamic banking market share is smaller than conventional banks. The interesting fact is that growth of Islamic assets is very rapid between 15-20 percent per year (TheBankers, 2013). The total Islamic banks asset were USD 250 billion in 2007 (TheEconomist, 2008; Aurthur, 2009; Awan, 2009; Khan, F., 2010; Gheeraert & Weill, 2015) which were increased to USD 1166 billion in 2012 representing 366.4% growth and expected to rise up to USD 1.8 trillion in 2015 (IMF, 2015; Pappas *et al.*, 2015; Young, 2015). The share of the asset is expected to grow more because of the acceptance of Islamic banking by Muslim and Non-Muslim populations. The Gulf Cooperation Countries (GCC) contain 34% of Islamic bank assets whereas only Iran has 42.7% Islamic assets of World Islamic banks assets in year 2012 (Abedifar, Molyneux, & Tarazi, 2013; Said, 2013; Srairi, 2013; Islam, Alam, & Hossain, 2014; Al-Tamimi *et al.*, 2015).

1.3 Insolvency Risk Banking

A banking risk may be considered as a risk associated with some events which may occur in banking transactions (Ghosh, 2012; Bessis & O'Kelly, 2015). Banking and risks are highly associated with each other by nature of business and banks are

highly exposed to risks. A bank plays a role of financial intermediation and due to this role; the risk which the bank bears is forwarded in the lending activities. The evolution of a bank revolves around taking risks and how the risks associated with its transaction is managed. The management of risk will determine a bank's return on the transaction. In the study by González-Hermosillo (1999), the author highlighted that risks such as credit risk, liquidity risk, insolvency risk, market risk, operational risk and overall risk for the banks are associated with banking transactions. Athukorala and Warr (2002) mentioned that higher risk is not only related to higher return but it is also related to higher risk of failure.

In the era of 21st century, the banks of developed and under developed economies have adopted to the new environment to stabilize the financial system by diversifying their products and introduction of innovative strategies (Lepetit *et al.*, 2008a; Essid, Boujelbene, & Plihon, 2014; Chen, Huang, & Zhang, 2016; Maudos, 2017). The banking system provides market functions such as create medium of exchange, trade among outer agents, stimulate the savings and lending to the potential creditors and debtors. Thus, the strong banking system has valuable contributions in development of an economy (Hermes & Lensink, 2013). For example the Chinese rapid economic development depends on its strong banking system and other financial institutions (Berger, Hasan, & Zhou, 2009; Chava *et al.*, 2013). Hassan, Sanchez, and Yu (2011) and Abduh and Azmi Omar (2012) provide findings that financial intermediaries enhance the efficiency of economic growth by allocating capital to capital deficit units.

1.4 Banking Sector of Pakistan (1948-2015)

The banking sector of Pakistan has gone through several stages of development. The State Bank of Pakistan (SBP) was incorporated in 1948 and the number of commercial banks were 5 until year 1971 (Khalabat, 2011). In year 1974, the role of State Bank of Pakistan was marginalized and thirteen new banks were introduced and all five (5) previously working banks were nationalized under Nationalization Act of 1974 (Khan, Shahrukh Rafi Aftab, & Safiya, 1993; Haque, 1997; Burki & Ahmad, 2010; Khalabat, 2011). By the year of 1990, the banks were highly politicized and a large amount of lending turned into bad loans (Khan, Shahrukh Rafi Aftab, & Safiya, 1993). The Bank Nationalization Act of 1974 was amended in year 1992. The control was transferred to management and 23 new banks were granted license for operations. Furthermore, the interest rate was streamlined and auction based system was introduced for open market operations (di Patti & Hardy, 2005; Burki & Ahmad, 2010; Khalabat, 2011). The post reforms era starts from year 2006 when consolidation of financial sector was performed. As a result by the year 2010, there were 25 domestic, 6 foreign and 4 specialized banks, which were operating in Pakistan (Khalabat, 2011).

Furthermore, the economic impact of the financial sector cannot be denied as the banking sector of Pakistan plays an important role in the development of economy. The contribution is measured by financial depth or deepening, which is ratio of broad money to GDP for banking sector of Pakistan. The banking sector of Pakistan on average has 38% broad money to GDP ratio from year 2007 to 2012 (EconomicSurvey, 2007, 2011). In the year 2013, the ratio was 39.6% which slightly declined to 37.8% in 2014. The ratio improved to 39.1% in year 2015 (EconomicSurvey, 2015, 2016).

Besides conventional banking the effort for Islamization of banks was started in 1980's and the whole financial system was suddenly converted to Islamic financial system which resulted in failure. The higher judiciary of Pakistan placed verdict that the practices of Islamic banks were not in compliance with Islamic laws. Therefore, in year 2002 State Bank of Pakistan (SBP) started practicing a parallel Islamic banking system with conventional banking system, which resulted in five (5) full-fledged Islamic banks by the year 2011, having 799 operating branches throughout the country (Mansoor Khan, Ishaq Bhatti, & Siddiqui, 2008; IBB, 2011; Hanif *et al.*, 2012). This network of Islamic banks was further widened to 2075 branches by the year 2015 (IBB, 2015). The first license to an Islamic bank was given in year 2002 and the very first licensed Islamic bank was Meezan Bank Limited (MBL). The profitability of Meezan bank is low but solvency position of the bank is higher than the counterpart conventional banks in Pakistan (Moin, 2008; Akhtar, Ali, & Sadaqat, 2011) .

The growth of Islamic banking industry of Pakistan in the last ten year remained remarkable. The number of branches increased from 17 to 1304 from year 2003 to 2013, which further increased to 1,574 in 2014 and 1,597 in year 2015 (IBB, 2013, 2014, 2015). The average annual increase of asset recorded 62%, deposit 69% and investment and disbursement increased by 61% per year (Hanif, 2014). The total share of the Islamic banking in the banking sector of Pakistan in year 2011 was 6.4%, and in the year 2012 the total assets were amounted to 644 billion rupees (Ali, Akhtar, & Ahmed, 2011; Khan *et al.*, 2013). Currently, Islamic banks of Pakistan holds 15% of the total financial market share of Pakistan and is expected to cover 20% share of the overall banking industry by the year 2020 (DawnReport, 2015; CTReport, 2016).

1.5 Issues in Banking Sector of Pakistan

The banking sector of Pakistan is one of the financial intermediary systems which is involved in lending and recovery of credit. The banking sector of Pakistan is much vulnerable to risks. The most critical issue is **asset quality** which is not properly addressed since the last three (3) decades from year 1990; this has contributed to accumulation of risk to banking sector of Pakistan. The issue of **nonperforming loans** is one of the causes leading to an increase in the number of transactions of mergers and acquisitions as it can be seen in Figure 1.4. The transactions which are 47 in total between bank to bank and bank to development financial institutions from year 2001 to 2016 showing on average three (3) transactions per year (Pervez, 2011; PakistanStockExchange, 2016; PSE, 2016).

Nonperforming loans in Pakistan banking sector are increasing since the many decades. In the Table 1.1, it is shown that the non-performing loans in the year 2000 were amounted to 240 billion rupees and increased to 244 billion rupees in year 2001. However, from 2003 to 2007, it gradually decreased to 218 billion rupees. The gradual decrease in nonperforming loan was due to two reasons, (1) The total loans increased and (2) better risk management was practiced which helped the borrower's to pay their debt (FSR, 2006; AJJNEWS, 2007; EconomicSurvey, 2008). Moreover, from onward 2007, 2008 and 2009, the banking sector of Pakistan showed a high increase from 218 billion rupees to 446 billion rupees. The increasing trend remained intact from year 2009 to 2012 and nonperforming loans increased from 446 billion to 618 billion rupees. From the years 2012 to 2015 nonperforming loans slightly declined from 618 billion to 605 billion rupees. Nonperforming loans are again on increasing trend, in first quarter

of 2016 nonperforming loans amounted to 619 billion rupees, as can be seen in Table 1.1.

The ratio of **nonperforming loans to total loans** remained in double digit except the years 2005, 2006 and 2007. The Table 1.1 shows that from year 2000 to 2004 the ratio of nonperforming loans remained in double digit figures, which were 19.5% and 11.6% respectively. The years 2005, 2006 and 2007 observed increase in total loans and better risk management was practiced, which declined the ratio of nonperforming loans to total loans to single digit ratio i.e. 7.6% in 2007 (AJJNEWS, 2007). The nonperforming loans (NPL) ratio of Pakistan banks since 2008 until 2015 was again in double digits' figure. In the first quarter of year 2016, the ratio of nonperforming loans recorded is 11.7% as shown in Table 1.1.

Table 1. 1
Nonperforming loans (in billion rupees) and nonperforming loans to total loans ratio(%)

Year	NPL (in billion rupees)	NPL/Loans
2000	240	19.5%
2001	244	23.4%
2002	232	21.8%
2003	211	17%
2004	200	11.6%
2005	177	9%
2006	175	7.3%
2007	218	7.6%
2008	359	10.5%
2009	446	12.6%
2010	556	14.9%
2011	592	16.21%
2012	618	14.47%
2013	607	13%
2014	605	12.3%
2015	605	11.4%
March 2016	619	11.7%

Source:EconomicSurvey (2007), EconomicSurvey (2008), EconomicSurvey (2011), EconomicSurvey (2015), EconomicSurvey (2016), SBP(QuaterlayCompendium) (2013), SBP(QuaterlayCompendium) (2015), www.worldbank.org, www.pbs.gov.pk

Table 1.2 and Figure 1.1 provides the evidence that the **nonperforming loans** in Pakistan are the highest among the other Asian countries like India, Sri Lanka and Malaysia. The Malaysian economy was facing high rate of nonperforming ratio in the year 2000 but it had successfully reduced non-performing loans ratio to 1.6% by the year 2015. The average ratio of nonperforming loans from year 2000 to 2015 in Malaysian banks is 7.54%. The average nonperforming loans of India and Sri Lanka remained in single digit from year 2000 to 2015 which were 5.58% and 8.95% for India and Sri Lanka respectively. Based on the statistics presented in Table 1.2, the average ratio of nonperforming loans for Pakistan is 13.91%, which is greater than the ratios of 5.58%, 8.95%, and 7.54% of India, Sri Lanka and Malaysia respectively. Therefore, it is evident from Table 1.2 that the ratio of nonperforming loans of Pakistan is very high.

Table 1. 2

Comparison of Nonperforming loans to Gross Loans with India, Sri Lanka and Malaysia

Year	Pakistan	India	Sri Lanka	Malaysia
2000	19.5	12.8	15	15.4
2001	23.4	11.4	15.3	17.8
2002	21.8	10.4	15.3	15.9
2003	17	8.8	13.7	13.9
2004	11.6	7.2	9.1	11.7
2005	9	5.2	9.6	9.39
2006	7.3	3.5	n/a	8.5
2007	7.6	2.7	n/a	6.5
2008	10.5	2.45	n/a	4.81
2009	12.6	2.21	n/a	3.63
2010	14.9	2.39	n/a	3.35
2011	16.21	2.67	3.82	2.68
2012	14.47	3.37	3.63	2.02
2013	13	4.03	5.58	1.85
2014	12.3	4.35	4.23	1.65
2015	11.4	5.88	3.24	1.6
Average	13.91	5.58	8.95	7.54

Source:EconomicSurvey (2007), EconomicSurvey (2008), EconomicSurvey (2011), EconomicSurvey (2015), EconomicSurvey (2016), SBP(QuaterlayCompendium) (2013), SBP(QuaterlayCompendium) (2015), www.worldbank.org, www.pbs.gov.pk

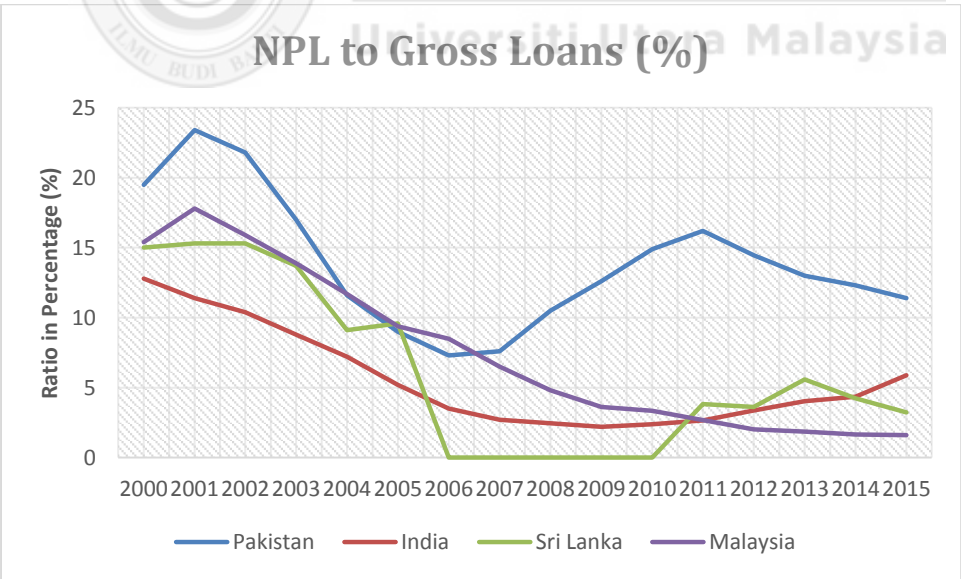


Figure 1. 1

Nonperforming loans to Gross Loans (%) of Pakistan, India, Sri Lanka and Malaysia

Source: www.worldbank.org.

The Islamic banks of Pakistan have better ratio of nonperforming financing as compared to the conventional banks operating in Pakistan. Table 1.3 shows that the nonperforming ratio of Islamic banking was slightly higher in year 2011 and 2012, which were 7.60% and 7.66% respectively. But, the ratio of nonperforming financing gradually declined to 4.90% by the year 2015. The average nonperforming financing ratio between years 2008 to 2015 of Islamic banks is 2.02%, which is lesser then 13.91% of conventional banks working in Pakistan. Farooq and Zaheer (2015) highlighted that more stability of Islamic banks in Pakistan is due to faith based believes, increase in total advances and better risk management strategies for borrowers. On contrary, Haneef *et al.* (2012), Ahmad and Bashir (2013) and Ahmad (2013) highlighted that the increase in nonperforming financing was due to low risk management practices and agency problem which is persistent in banking sector of Pakistan. Furthermore, the average nonperforming financing in Islamic banks between the years 2008 to 2015 was 16.67 billion rupees. Moreover, it can be seen in Table 1.3 that nonperforming financing in Islamic banks of Pakistan are showing an increasing trend.

Table 1. 3
Islamic Banks Nonperforming Financing (In billion rupees) and NPF to Total Financing Ratio

Year	NPF Billion Rupees	IB's NPF to Financing
2008	3.42	2.3%
2009	10	6.31%
2010	13.82	7.3%
2011	15.8	7.60%
2012	18.54	7.66%
2013	18.9	5.70%
2014	19.8	4.70%
2015	33.1	4.90%
Average	16.67	2.02%

Source: IBB (2011),IBB (2012), IBB (2013), IBB (2014), IBB (2015) by State Bank of Pakistan

The rise of nonperforming loans has diverted banks of Pakistan to restructure the portfolio of earning. The banking sector of Pakistan is now not only involved in lending activities but they are also involved in nontraditional activities such as investment, securitizing, fees and brokerage income. Lepetit *et al.* (2008a), Apergis (2014), Chen, Huang, and Zhang (2016) and Maudos (2017) highlighted that higher involvement in diversification makes banking system more complex and produces higher risk for banks. This is due to interconnectedness of nontraditional earning with traditional activities which give rise to agency problem.

Table 1.4 and Figure1.2 shows the structure of income of five largest conventional banks of Pakistan. The income from advances has a stronger growth rate from year 2001 to 2009 in conventional banks. After the year 2010, there was a sharp decline in advances income. On average change in the income from advances growth was 16.28% from years 2001 to 2015. On the other side, the average change in growth of income from investment found fluctuating. The maximum growth of income from advances was in year 2011, which was 56.33% and the minimum change in growth was recorded in year 2004, which was -14.33%. The sharp decline of income from advance in the years 2010 to 2015 was because the banks made more focus on income generated from investments. The other part of income is fee, commission and brokerage of the banks. The income from fee and brokerage remained very much volatile from years 2001 to 2015. The highest change in growth of fee and brokerage was recorded in 2004 which was 51.02% and minimum change in growth was 0.47% in year 2010. On average the change in growth of fee, commission and brokerage income was 19.51% from the year 2001 to 2015. It can be seen in Table 1.4 and Figure 1.2 that the all three types of income i.e. income from advances, income from investments and income from

fee, commission and brokerage are showing volatility, this indicates that the income generation in conventional banks of Pakistan is not smooth and hence can increase insolvency risk.

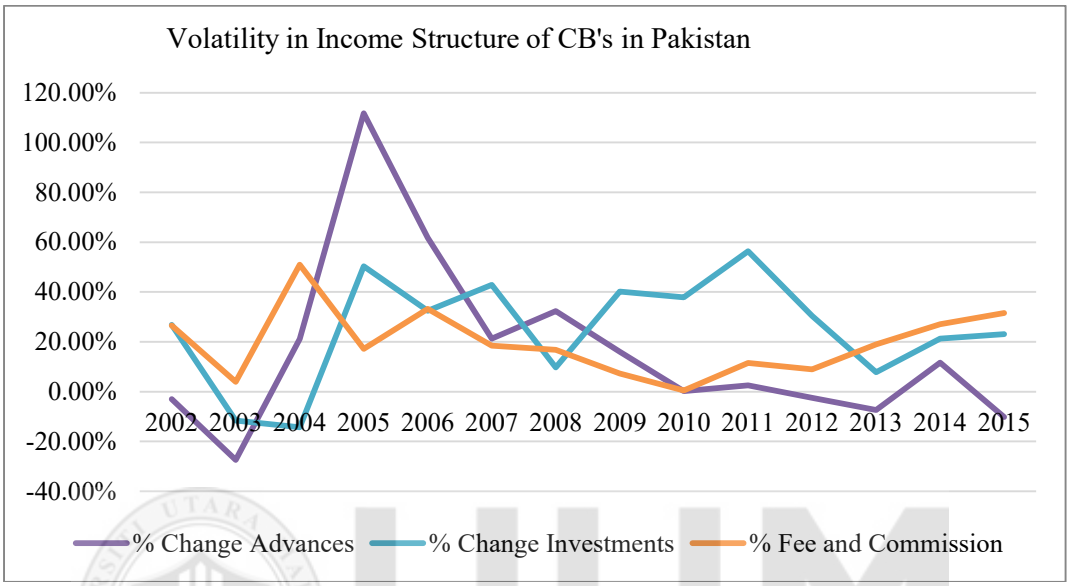


Figure 1. 2

Volatility in Income Structure of Conventional Banks in Pakistan

Source: Financial reports (2007-2015) of Allied Bank, Alfalah Bank, Bank of Punjab, Bank Al-Habib, Habib Bank

Table 1. 4
Income Structure of Conventional Banks in Pakistan

Year	Income from Advances in (Rs.000)	Income from Investment in (Rs.000)	Fee and Commission in (Rs.000)	% Change Advances	% Change Investments	% Fee and Commission
2001	25,101,530	11,626,126	2,519,807			
2002	24,341,325	14,747,327	3,187,784	-3.03%	26.85%	26.51%
2003	17,654,729	13,028,821	3,313,964	-27.47%	-11.65%	3.96%
2004	21,390,129	11,161,528	5,004,655	21.16%	-14.33%	51.02%
2005	45,291,320	16,781,998	5,864,740	111.74%	50.36%	17.19%
2006	73,270,878	22,239,003	7,816,533	61.78%	32.52%	33.28%
2007	88,830,217	31,781,121	9,260,331	21.24%	42.91%	18.47%
2008	117,590,702	34,881,986	10,817,795	32.38%	9.76%	16.82%
2009	136,347,734	48,887,389	11,605,948	15.95%	40.15%	7.29%
2010	136,635,917	67,406,496	11,660,451	0.21%	37.88%	0.47%
2011	140,033,148	105,375,652	13,005,093	2.49%	56.33%	11.53%
2012	136,453,990	137,476,745	14,175,774	-2.56%	30.46%	9.00%
2013	126,435,265	148,248,245	16,863,551	-7.34%	7.84%	18.96%
2014	141,077,031	179,867,972	21,431,114	11.58%	21.33%	27.09%
2015	126,660,358	221,452,876	28,193,497	-10.22%	23.12%	31.55%
Average Change During the Period (2007-2015)				16.28%	25.25%	19.51%

Source: Financial reports (2007-2015) of Allied Bank, Alfalah Bank, Bank of Punjab, Bank Al-Habib, Habib Bank

The income structure of Islamic banks in Pakistan is very much similar to the conventional banks. The change in growth of income from advances in five (5) Islamic banks between the years 2010 to 2015 is 28.79%. Table 1.5 and Figure 1.3 is also evident that the major focus was given to investment by all these five (5) Islamic banks of Pakistan. The average change in growth of investments was 67.19% between the years 2007 to 2015. The change in growth of fee, commission and brokerage income on average was 24.23% which is higher than the average growth in conventional banks which is 19.51%.

Table 1. 5
Income Structure of IB's in Pakistan

Year	Income from Advances in (Rs.000)	Income from Investment in (Rs.000)	Fee and Commission in (Rs.000)	% Change Advances per year	% Change Investments per year	% Fee and Commission Per year
2007	4,964,862	724,105	776,524			
2008	8,739,536	2,119,734	836,718	76.03%	192.74%	7.75%
2009	10,308,677	3,722,609	949,196	17.95%	75.62%	13.44%
2010	11,117,282	4,921,651	1,027,938	7.84%	32.21%	8.30%
2011	18,169,249	15,676,856	1,373,894	63.43%	218.53%	33.66%
2012	19,746,957	21,814,421	1,935,040	8.68%	39.15%	40.84%
2013	20,919,504	22,853,993	2,656,002	5.94%	4.77%	37.26%
2014	28,920,472	17,605,939	3,356,807	38.25%	-22.96%	26.39%
2015	32,441,406	18,562,875	4,235,703	12.17%	5.44%	26.18%
Average Change During the Period (2007-2015)				28.79%	68.19%	24.23%

Source: Annual Report of IB's of Pakistan from year 2007-2015

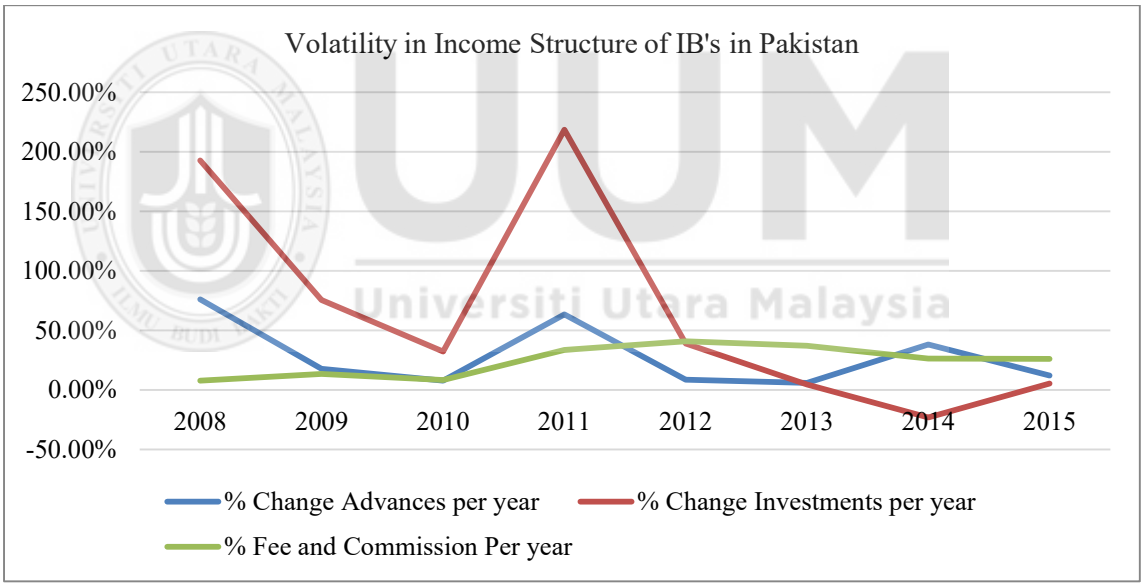


Figure 1. 3
Volatility in Income Structure of IB's in Pakistan
Source: Annual Report of IB's of Pakistan from year 2007-2015

Apart from bank related factors, the significant impact of macroeconomic factors such as lower GDP growth, higher inflation rate, higher interest rate and corruption on banking sector cannot be denied (Demirgüç-Kunt & Detragiache, 1998; Llewellyn, 2002; Castro, 2013; Farooq *et al.*, 2013). The macroeconomic factor such

as GDP growth of Pakistan is fluctuating in nature. The GDP growth of Pakistan observes booms and bust is a random manner as can be seen in Table 1.6. The growth of GDP was highest in year 2005 which was 7.67% and lowest was 1.7% in year 2008. On average the growth of GDP was 4.18% between years 2000 to 2015. The other macroeconomic factor that affects the banking system is inflation. Table 1.6 shows that inflation in Pakistan between years 2000 to 2003 was nominal but it increased to double digits by the year 2008, a sharp increase from 7.6% in year 2007 to 20.3% in year 2008 was reported. From the year 2008, it started to decline gradually from 20.3% to 4.81% in year 2015. On average the inflation of Pakistan between the years 2000 to 2015was 8.43%.

The interbank lending rate in Pakistan was in double digit from year 2006 to 2015 except year 2015. The banking sector has seen a peak of 15% in year 2009 and the steady declined to 7 % in year 2015. The average of interbank lending rate from year 2004 to 2105 remained to 11.67% as shown in Table 1.6. Next to interbank lending rate, corruption is one of the major problems prevailing in Pakistan. This is the only single factor which effects the economy and banking sector directly. On average, corruption score of Pakistan among the nations of the World was 24.87 between the years 2001 to 2015. The lower average score of Pakistan in corruption makes the country as one of the corrupt nations of the World[1].

[1] The lower score on corruption perception index define higher existence of corruption while higher score highlights lower level of corruption (TransparencyInternational, 2015)

Table 1.6
Macroeconomic Factors of Pakistan

Years	GDP growth	Inflation	Interest	Corruption Perception Index
2000	4.26	4.4	n/a	n/a
2001	1.98	3.1	n/a	23
2002	3.22	3.3	n/a	26
2003	4.85	2.9	n/a	25
2004	7.37	7.4	7	21
2005	7.67	9.1	9	21
2006	6.18	7.9	11	22
2007	4.83	7.6	12	24
2008	1.7	20.3	13	25
2009	2.83	13.6	15	24
2010	1.61	13.9	14	23
2011	2.75	11.9	14	25
2012	3.51	9.7	14	27
2013	4.41	7.7	12	28
2014	5.41	7.2	12	29
2015	4.24	4.81	7	30
Average	4.18	8.43	11.67	24.87

Source:EconomicSurvey (2015), EconomicSurvey (2016), www.Transparency.org, www.worldbank.org, www.pbs.gov.pk

In terms of capital regulations, the major boost of capital regulation in financial sector was seen in 1997 when amendments were made in SBP Act of 1956 and Bank Companies Ordinance of 1962 (SBP, 2003). The banking sector of Pakistan was directed to maintain 8% risk weighted capital requirement, otherwise they will be converted to nonscheduled banking institution (SBP, 2003; Malik, 2005; Pervez, 2011; Malik, 2014).

1.6 Problem Statement

The banking sector of Pakistan is facing immense pressure from different micro and macro factors. The total number of transactions of mergers and acquisition was 47; these mergers were between banks to banks and banks to DFI's between years 2001 to 2016, as presented in Figure 1.4. Furthermore, the number of conventional banks in

Pakistan has been reduced from 41 in December 1997 to 23 at the end of 2007 through mergers, acquisitions and closures due to poor financial health (StateBank, 2008). Furthermore, Mansha (2012) stated that small banks should merge with each other or they may be taken over by larger equity based banks because they cannot stay longer in the market due to high presence of risk. On the other hand, DeYoung and Roland (2001) highlighted that mergers create antitrust in depositors and loans seekers, which results in financial distress and closure of branches. In year 2015 Khadim Ali Shah Bukhari Bank Limited (KASB) was taken over by Bank Islami Pakistan (Iqbal, 2014; Immaduddin, 2015; Iqbal, 2015; PakistanStockExchange, 2016). In addition, BURJ Bank which was an Islamic bank has been merged into Al-Baraka Bank Pakistan after completion of due diligence process and final approval given by State Bank of Pakistan (Hussain, 2016).

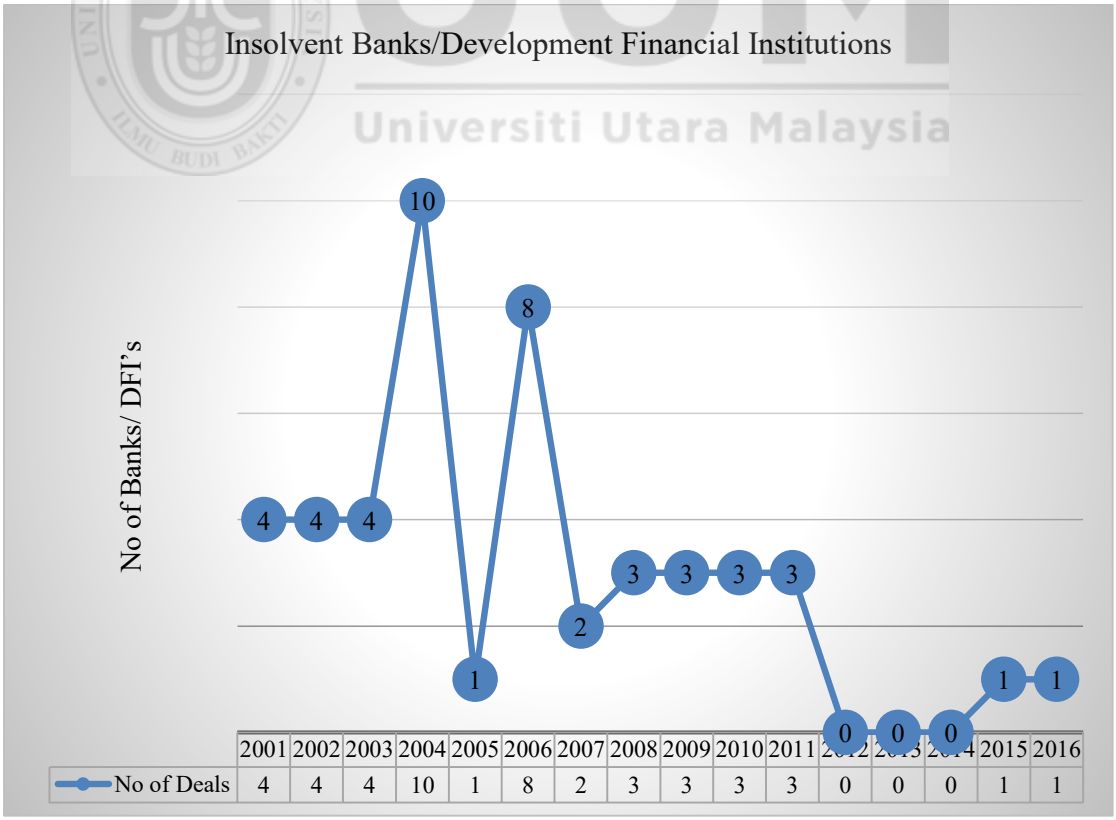


Figure 1. 4
Insolvent Banks and DFI's over the years
Source: PakistanStockExchange (2016)

The merger exercises taking place in the Pakistan banking sector is one of the strategies taken by the Central bank to strengthen its banking sector from the adverse effects of financial risks, mainly the **credit risk**. The major credit risk issues are primarily related to the increasing growth in **nonperforming** loans since 1990. During the first quarter of 2000 and 2016, the nonperforming loans rose from 240 billion rupees to 619 billion rupees respectively. The worst year of experience was 2012 in which nonperforming loans were 618 billion rupees. Based on the statistics presented in Table 1.1 and Figure 1.5, Pakistan has experienced double digit NPL ratio and higher growth of NPL. The average ratio of nonperforming loans to loans since year 2000 to 2015 remained 13.91 % (EconomicSurvey, 2007, 2008, 2011; Lawai, 2012; EconomicSurvey, 2015, 2016). The study of Jutasompakorn *et al.* (2014) argued that higher nonperforming loans will ultimate result in high probability of the banking default risk and ultimately insolvency risk.

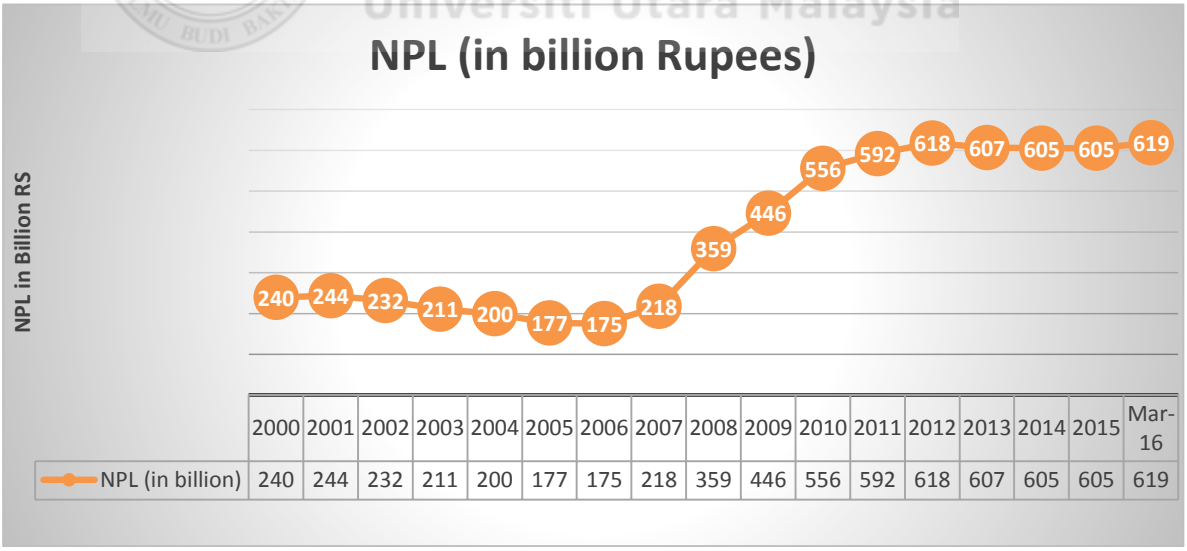


Figure 1. 5
Growth of Nonperforming Loans Over the Years in Billion Rupees

- **Asset Quality**

Higher ratio of **nonperforming loans** creates financial system crisis and impedes stability and sustainable growth (Chaibi & Ftiti, 2015). This could be seen taking place in Pakistan. The conventional banking system of Pakistan has higher growth of nonperforming loans, which is in double digit figure since year 2000. On the other hand, the Islamic banking system is new as it commenced its operations in year 2002 but on average, the nonperforming loans ratio was 2.02% (see Table 1.2) between years 2010 to 2015.

The phenomenon of nonperforming loans often started from high increase in credit growth. Banks often increase their market share and lending goal by extending credits to low quality borrowers, thus resulting in nonperforming loan as banks may face problems to receive their debt obligations from these low quality borrowers. This phenomenon will contribute to credit risk and ultimately to in insolvency risk (Carlson, Shan, & Warusawitharana, 2013; Shim, 2013).

The banks in Pakistan either conventional or Islamic have higher growth of nonperforming loans as shown in Table 1.1 and Table 1.3. There are numerous studies i.e. (Fonseca & Gonzalez, 2008; Büyüksalvarci & Abdioglu, 2011; Jin, Kanagaretnam, & Lobo, 2011) that define the relationship of higher growth of nonperforming loans and insolvency risk. The higher growth of nonperforming loans is still a critical issue in the banking sector because it does only reduce the performance of the banks but also threaten the solvency of Pakistan banks Thus, the issue of nonperforming loans and insolvency risk is a research gap which needs to be empirically examined for both

conventional and Islamic banks of Pakistani in order to ensure the long-term sustainability of the banks and sound financial system of Pakistan.

- **Income Structure**

Nonperforming loan is one of the reasons that compel the banks to change their **structure of income**. Interest income is the main source of earning for conventional banks. However, liberalization of prudential rules has made banks to diversify their income sources from interest income to **non-interest income** to mitigate the financial risks In the past studies(Lepetit *et al.*, 2008a; Berger, Hasan, & Zhou, 2010; Apergis, 2014; Maudos, 2017), it is highlighted that diversification in noninterest income significantly impacts insolvency risk. Nonetheless, the banks are more involved in noninterest income activities, resulting in higher level of insolvency risk as compared to the banks which are involved only in interest income activities (Lepetit *et al.*, 2008a; Apergis, 2014; Cheng, Zhao, & Zhang, 2014; Bian, Wang, & Sun, 2015; Chen, Huang, & Zhang, 2016; Maudos, 2017). This finding is further supported by Williams and Prather (2010) and Chen, Huang, and Zhang (2016) who found that banks' higher involvement in fee-based income is more risky than interest based income because it is more volatile and less predictive in nature. In contrast to the concept of diversification, (DeYoung & Roland, 2001; DeYoung & Torna, 2013; Apergis, 2014) show that limited involvement in diversification of income reduces risk and increases profit.

Empirical evidences from previous literature shows that noninterest income is more risky than interest margin income because it only offers diversification in earning based portfolio but not in risks of the bank (Williams & Prather, 2010; DeYoung & Torna, 2013). Noninterest income also produces higher insolvency risk and higher

return volatility than disbursement of loans (Stiroh, 2004a; Stiroh & Rumble, 2006; Lepetit *et al.*, 2008a). Studies on US banking concluded that it creates positive effect for both profitability and insolvency (Li & Zhang, 2013; Apergis, 2014). Therefore, from these studies, it can be deduced that there are conflicting results of income structure influence on banks insolvency risk and earning portfolio risk. Such effect has not been investigated yet with banks in Pakistan.

With respect to the banking sector of Pakistan (conventional and Islamic), the income structure of banks is **volatile**, as evident from Table 1.4 and Table 1.5. This is due to inability of bank to assess creditors' and debtors' credit quality. Furthermore, change in the growth of fees, commission and brokerage income has affected the credit disbursement to different sectors of the economy (Bari, 2011; Qureshi, 2011; Ali, 2013). Based on the previous literature i.e. (DeYoung & Roland, 2001; Cheng, Zhao, & Zhang, 2014; Meslier, Tacneng, & Tarazi, 2014; Chen, Huang, & Zhang, 2016; Maudos, 2017), higher involvement in other nontraditional activities has significant impact on insolvency risk which is persistent in both conventional and Islamic banks of Pakistan. Hence, the issues highlighted give a great motivation to investigate the issue of income structure. Moreover, this presents an important gap as there are few studies done on the relationship between income structure and insolvency risk in Pakistan banks both conventional and Islamic. The novelty of this study is that the income structure is decomposed into income from advances, income for investments, fee, commission and brokerage income. Each income type is being investigated to assess its influence on insolvency risk which past study has not attempted to do. The findings will address the theoretical gap in literature and it will also provide a richer set

of information and new empirical evidence on the relationship between income structure and insolvency risk.

- **Macroeconomic Factors**

Besides institutional factors, macroeconomic factors such as GDP, inflation rate, interest rate and corruption play an important role in development of an economy. Growth rate of the country expedite the healthy and soundness of banking system whereas in adverse conditions bank bear financial shocks (Berger, Hasan, & Klapper, 2004 b; Mercieca, Schaeck, & Wolfe, 2007; Osamwonyi & Michael, 2014). Bank's risk is significantly affected by the **GDP growth** rate, an increase in growth rate will lessen the bank risk and vice versa (Castro, 2013). This is because the debt servicing capacity of the country and its individuals increases with an increase in GDP growth rates (Louzis, Vouldis, & Metaxas, 2012). Salas and Saurina (2002) and Jakubik (2007), indicates that GDP growth rate and interest rates are the main macro factors that affect the risk of the banks.

Gul, Irshad, and Zaman (2011) highlighted that GDP has significant and positive impact on bank performance. Pakistan has observed high GDP growth in year 2004 and 2005 which were 7.37% and 7.67% respectively, but after year 2006 there was a sharp decline. The maximum growth of GDP observed in 2005 was7.67 % and the lowest 1.8% in 2010 as shown in Table 1.6. The GDP growth of Pakistan is fluctuating over the period 2000-2015. The fluctuation in GDP equally effects on conventional and Islamic banks of Pakistan. The volatility in GDP is therefore issue for sustainability and stability of banks in Pakistan. Thus, such influence of GDP on

insolvency risk especially over the study period of 2007-2015 must be assessed to fulfill the research gaps of not having an in depth analysis of GDP on insolvency risk of banks.

Bank risk is also affected by the current and lag **inflation** rate of the country (Thiagarajan, Ayyappan, & Ramachandran, 2011). For example, risk experienced by banks of North Cyprus and Euro Zone are influenced positively by the inflation rate (Rinaldi & Sanchis-Arellano, 2006; Gunsel, 2012; Poudel, 2013; Andrei, 2014). Some others researcher have the same consistent views that inflation has significant relationship with bank risk (Shu, 2002; Vogiazas & Nikolaidou, 2011a; Zribi & Boujelbène, 2011). In contrast, the experience of Greece, Ireland, Portugal, Spain and Italy (GIPSI) banking system showed that there is no significant influence produced by inflation on bank risk (Aver, 2008; Bofondi & Ropele, 2011; Castro, 2013). Further to that, the effect of inflation is adverse where growth of GDP is lower or volatile (Demirgüç-Kunt & Detragiache, 1998; Alexiou & Sofoklis, 2009; Ali, Akhtar, & Ahmed, 2011).

Inflation poses a major issue because Pakistan is one the countries which has higher inflation rate as compared to some other countries of the region like India which has average inflation rate of 6.88%[2] compared to 8.43% of Pakistan over the period 2000 to 2015. The inflation in Pakistan reached the highest value of 22% in year 2008 and the minimum rate was recorded in year 2002, which was 3.1% as displayed in Table

[2] The average of inflation rate for India has been calculated by taking inflation data from www.worldbank.org. see also Appendix IV

1.6. Hence, based on the results of the previous researches, the current study will fulfill the gap by investigating the impact of inflation on insolvency risk in context of both conventional and Islamic banks of Pakistan. This is also to test whether the higher rate of inflation influences the risk of the banks (Poudel, 2013) applies to banks in Pakistan.

Another macroeconomic variable of great interest is **interest rate**. According to the study of Andrei (2014), interest rate produces a powerful impact on bank risk as compared to some other macro variables. Louzis, Vouldis, and Metaxas (2012) and Osamwonyi and Michael (2014) also show that lending interest rates have significant correlations with insolvency risks of banks. Salas and Saurina (2002) and Jakubik (2007) highlighted similar result that interest rate is the main macro factor that effect the risk of the banks.

In the case of Islamic banks of Pakistan, they engage in limited profit and loss based contracts and they are very much similar to the conventional banks business operations. In terms of profit rate, the Islamic banks in Pakistan, on average charge 2% higher than conventional banks (Baele, Farooq, & Ongena, 2014). The stability of Islamic banks for profit rates is similar to conventional banks but they are less volatile in their earning in relation to interest rate (Abedifar, Molyneux, & Tarazi, 2013). Based on the review of past studies, interest rate has significant influence on conventional and Islamic banks. This could be the case for Pakistan since the average interbank lending rate for Pakistan banking sector is in double digit figure from years 2006 to 2015 as shown in Table 1.6. However, there is yet to be a published result to confirm the influence of interest rate on conventional and Islamic banks insolvency risk, such an

absence poses a constraint to Pakistani banking system in designing and implementing sound monetary policies to curb bank risks which are high in Pakistani banks.

Another factor which frequently surfaces in recent studies is **corruption**. Awe (2012) argued that corruption impedes the economic growth and minimizes the chances of economic development because of the misuse of public resources. The banking sector of Pakistan has experienced a very sluggish growth in last eight (8) years. which was on average 2.6% per year (GDP growth) due to corruption (EconomicSurvey, 2015). One of the major persisting problems is non-eradication of corruption. This is due to certain reasons such as weak institutions, low level of public sector salaries, discretionary authority of administrator and higher level of inflation (Farooq *et al.*, 2013). In Pakistan on average, 30 percent of costs of all development projects are given as under table bribes. This increases the overall price of a public project and contributes negatively to GDP growth (Svensson, 2003; De Vaal & Ebben, 2011).

In a recent fraudulent case, the National Accountability Bureau of Pakistan has arrested two banks employees for an embezzlement of Rs.55 Million rupees in utility bills of Sui Northern Gas Pipelines (SNGPL) (NAB, 2015). Furthermore, many cases were reported regarding disbursement of loans by taking bribe from beneficiary parties in different branches like, Thatta and Suawal of Habib Bank Pakistan. (HabibBank, 2009).

Corruption Perception Index is included as a variable in this study because Pakistan is continuously performing very poorly on the Corruption Perception Index of Transparency International as depicted in Table 1.6 (Riaño & Hodess, 2008). Pakistan

was declared as 37th, 50th 49th and 51th most corrupt country in year 2012, 2013, 2014[3] and 2015 respectively among the nations of the World (TransparencyInternational, 2012, 2013, 2014, 2015). Despite of apparent evidence of its negative impact, the study of corruption impact on financial soundness has sadly being neglected. Therefore, it is considered as the first time that corruption be studied in relation to insolvency risk for Pakistan conventional and Islamic banks.

- **Capital Regulation**

One of the measures taken by the international regulatory body such as Bank of International Settlement (BIS) to manage banking risks is by introducing capital regulation. The aim for development of macro prudential rule is to curtail the systematic risk, reducing the impact of financial crisis on economy and increasing the immunity of financial system (Angelini, Neri, & Panetta, 2014). Initial work on capital adequacy regulation was done on capital index developed by Barth James, Caprio Gerard, and Ross (2004) to calculate the strictness of capital requirement for each country. This is known as pillar of Basel I (Bushman & Williams, 2012). Past results brought forward by Abderrazek (2009) and cited by Bukhari and Qudous (2012), highlighted that capital adequacy ratio has a positive relationship with profitability of the banks in Gulf Cooperation Council (GCC). However, in case of Pakistan, the structural changes made in all the four stages of development were necessary to address the week banks for the

[3] The rank of Pakistan is based on the numbers obtained in survey or Transparency International (www.transparency.org)

banking sector stability. In spite of the efforts, the issues of nonperforming loans and volatility in income structure which threats insolvency risk are still prevailing in the Pakistan banking sector. Therefore, it places concerns on the effectiveness of capital regulation in order to mitigate insolvency risk. In addition, the study of Azureen (2012) on Malaysian banks used capital regulation as a moderator between loan concentration and risk taking. In contrast, the current study is taking capital regulation as a moderator between asset quality, income structure, macroeconomic factors and insolvency risk for conventional and Islamic banks of Pakistan to fill the research gap.

The structural changes made in all the four stages of development were necessary to address the week banks for the banking sector stability. In spite of the efforts, the issues of nonperforming loans and volatility in income structure which threats insolvency risk are still prevailing in the Pakistan banking sector.

The preceding paragraphs have highlighted the critical issues in the banking sector of Pakistan such as; risk of high nonperforming loans, change in income structure which contributes to insolvency risk. Furthermore, the macroeconomic factors such as GDP growth, inflation rate, interest rate and corruption are critical factors those also affect the banking system stability and need to be empirically tested.

1.7 Research Questions:

The research questions derived from problem statement are:

1. Is there any significant relationship between asset quality (nonperforming loans/ financing to gross loans/financing and provision for nonperforming

loans/financing to gross loans/financing) and insolvency risk of conventional and Islamic banks of Pakistan?

2. Is there any significant relationship between income structure (income from advances, income for investments, fee, commission and brokerage income) and insolvency risk of conventional and Islamic banks of Pakistan?

3. Which of the macroeconomic factors (GDP growth, inflation rate, interest rate, and corruption perception index) significantly influence the insolvency risk of conventional and Islamic banks of Pakistan?

4. Does capital regulation (capital adequacy ratio) moderates the relationship between asset quality, income structure, macroeconomic factors and insolvency risk of conventional and Islamic banks of Pakistan?

1.8 Research Objectives

The followings are the research objectives that are based on research questions:

1. To determine the relationship between asset quality which is based on nonperforming loans/financing ratio and provision for non-performing loans/financing ratio with insolvency risk of conventional and Islamic banks of Pakistan.

2. To investigate the empirical relationship of income structure (income from advances, income from investment, fee and brokerage income) with insolvency risk of conventional and Islamic banks of Pakistan.

3. To identify which macroeconomic factor (GDP growth, inflation, interest rate, corruption) significantly influencing the insolvency risk of conventional and Islamic banks of Pakistan.

4. To examine the moderating effect of capital regulations (capital adequacy ratio (CAR)) on the relationship between asset quality, income structure, macroeconomic factors and insolvency risk of conventional and Islamic banks of Pakistan.

1.9 Significance of the study

`The study has taken asset quality, income structure and macroeconomic factors to explain the influence of these variables on insolvency risk in conventional and Islamic banks of Pakistan. The major issues in the banking sector of Pakistan are asset quality and income structure. The two issues are complementary to each other. Moreover, the study has taken macroeconomic factors to determine the effect of these macroeconomic factors on bank insolvency risk (conventional and Islamic). Therefore, this study would help in policy building to improve the quality of asset and the optimal portfolio selection for income generation of the banks. The fact is that this study includes both the conventional and Islamic banks as the sample of the study is significant. Therefore, it will provide insights into the different/ similar impacts of these variables on the insolvency risk of Pakistani banks in specific and also in general.

This study extends the normal scope of banking studies in Pakistan by examining the moderating effect of capital regulation in the conceptual framework of the study. It would give an insight to the banking sector of Pakistan in terms of "how capital regulation is moderating the relationship between asset quality, income structure and macroeconomic factors with insolvency risk?". This would give a new path way to the policy makers of Pakistan to assess the effectiveness of capital regulations in the context of its banking sector. The outcomes of this study would be useful to formulate and enforce suitable policies and strategies for the betterment of Pakistan banking system. Furthermore, this study will contribute to the literature by providing empirical evidence on the importance of regulation in managing banks risks.

As for stakeholders of banks (i.e. depositors, bondholders, investors, shareholders, creditors), this study would be useful as it provides the influence of asset quality and portfolio optimization of income structure on insolvency risk in both conventional and Islamic banks of Pakistan. This information would count to be important to potential bank creditors and debtors as it could assist them in choosing appropriate banks with acceptable potential in dealing with insolvency risk to ensure safety of their deposits and high returns.

Moreover, this study is beneficial to researchers as it helps to promote further research on the area of insolvency risk, specifically for conventional and Islamic banks of Pakistan. The finding of this study will contribute new knowledge regarding insolvency risk and corporate governance of Pakistan Banking sector which is rarely been studied and discussed in banking literature.

Notwithstanding numerous literatures available on asset quality, income structure in relationship with insolvency risk, there are but very few on banking sector of Pakistan. The structure of income has not been taken as a variable of study before in context of Pakistan. The problem of nonperforming loans has taken as a variable in some previous studies in the context of Pakistan but it was mostly based on primary research. This will be the first study that used income structure and asset quality as explanatory variables of insolvency risk specifically in context of Pakistan. The relationships of income structure and asset quality with insolvency risk will be the original contribution to the literature in the case of Pakistan. This would add new knowledge for further deepening of studies in the banking literature.

Furthermore, there are numerous studies which have taken income structure as an independent variable. The new element is that this study has divided the interest income into two parts, one from traditional activities of interest income and other income from investments as well as fee, commission and brokerage income in the income structure. The detailed result would provide individual sub-category income structure influence on insolvency risk of the banks. This has not been documented before. The results would be very helpful for banks in developing better strategies optimization of bank's earning.

In addition, the previous studies have taken macroeconomic factors as explanatory variables of risks in banking sector. Some studies have highlighted that macroeconomic factors have significant power to explain the profitability and risk of the banking sector. This study instead, has taken macroeconomic factors as independent variables with structure of income and asset quality in which the empirical analysis will

assess the impact of these three categories of independent variables on insolvency risk. Since this is a new conceptual framework, it is expected to contribute meaningful understandings of the dynamics of these factors on insolvency risk of the banking sector of Pakistan.

Laws and regulations are made to moderate the environment in any case either for institutions or for general public. The prudential rules for capital management for banks in Pakistan are developed based on the guidelines of the Basel Committee. Since its implementation in the country's banking system. Capital regulation has never been taken as a moderator in previous studies specifically in relation to asset quality, income structure with insolvency risk. The study has taken capital regulation to moderate the impact of asset quality, income structure and macroeconomic factors on insolvency risk which would provide the necessary inputs for prudent policy formulation and corporate governance for Pakistan banking system.

1.10 Organization of the Study

The study is organized into seven (7) chapters. Chapter One presents the outline of the background of the study and highlights the issues related to the conventional and Islamic banks of Pakistan. Further, the chapter also describes research problem and research questions. Then, significance of study is presented in this chapter.

Chapter Two provides brief history of the banking system and economic development of Pakistan. The chapter highlights different eras of development of banking sector. It also provides the development of Islamic banking in Pakistan. Moreover, in chapter two, the brief history of economic growth and relevant issues in different regimes are presented.

Chapter Three provides review of the literature that is relevant to this study. It covers the risk and economic growth along with risk in banking sector. Further, chapter three discusses Islamic philosophy of risk and return, theoretical literature of asset quality, income structure and macroeconomic factors. This chapter also covers the related theories and prior empirical literature that are related to this current study.

Chapter four explains research design and methodology followed by this study. The chapter begins with the research framework, definitions and measurements of variables, data collection sources and process to collect data. Further, this chapter also explains development of hypotheses of each variable. In the end, the chapter defines the regression model and data analysis techniques to answer the research question in order to achieve the objectives of current study.

Next, chapter five provides descriptive statistics of both bank specific variables and macroeconomic factors for conventional and Islamic banks of Pakistan. The section 5.3 and 5.4 of chapter five provides regression assumptions and panel analysis for conventional banks. Chapter five also provides empirical results obtained by using multiple and hierarchical multiple regression models for conventional banks of Pakistan. Further chapter five also provides summary of hypothesis and discussion on the results of multiple and hierarchical multiple regression only for conventional banks of Pakistan.

Chapter six of the current study initially presents regression assumption and panel data testing for Islamic banks of Pakistan. Next the chapter provides empirical results of multiple and hierarchical multiple regression along with the summary of results for the dataset of Islamic banks. The section 6.6 and 6.9 of chapter six discusses

the results obtained by multiple and hierarchical multiple regression only for Islamic banks of Pakistan. The last section 6.10 of chapter six highlights the comparative evaluation of the results obtained by using multiple and hierarchical multiple regression for both conventional and Islamic banks of Pakistan.

Finally, the chapter seven first provides the recapitulation of the study. Next the chapter highlights the new finding, research setting and theoretical contribution of the study. Furthermore, the chapter also provides policy implication and practical implication. The last sections 7.5 and 7.6 of chapter seven presents the limitation of study and suggestion for future research respectively.

CHAPTER TWO

CRITICAL REVIEW OF

BANKING AND ECONOMIC ISSUES OF PAKISTAN

The banking sector of Pakistan has witnessed drastic changes over a period of sixty eight (68) years since its independence. Initially, it suffered from acute shortage of resources and uncertainty due to prevailing political and socioeconomic conditions. Further, the lack of trained human resource and professionals resulted into poor quality of products and services

2.1 Conventional Banking in Pakistan

The conventional banking sector of Pakistan has gone through many stages. The brief history of development of conventional banks in Pakistan is presented in the following subsection:

2.1.1 Establishment of Commercial Banking System (1947-1973)

Financial sector within Pakistan advanced extremely differently when compared to the other banks around the globe. Approximately, a year after the separation of Pakistan from united India, Pakistan possessed neither a central bank nor any other major reserve bank. Habib Bank which was established in 1941 eventually turned the tables initially until 1948, when the State Bank of Pakistan (SBP) was established under the “quasi-government ownership”. The part of domestic banks was lean at the time, accounting for only 25 large and small banks with total 195 bank branches in the country.

State Bank of Pakistan was established as the central bank on July 1, 1948 to control the financial sector. Subsequent amendments were made to extend the control and functions of SBP through State Bank of Pakistan Act 1956. SBP encourages the private sector to establish banks and financial institutions in the country. It resulted into unhealthy competition and unlawful practices due to bribe and corruption during the decades of 1950s and 1960s. It was reported that financial reforms and changes in governance have improved the performance of Pakistani banking sector over time (Burki & Niazi, 2003; Ahmad, Malik, & Humayoun, 2010).

Policies given by the State Bank of Pakistan motivated expansion of the already established banks. Furthermore, SBP supported creation of new banks and closing of such banks which were not sound enough to increase the pace of growth of the banking sector. These policies did not only help to establish new banks but enhanced the productivity of the already established banks. Therefore, as a consequence of these policies the following structure of banking system emerged:

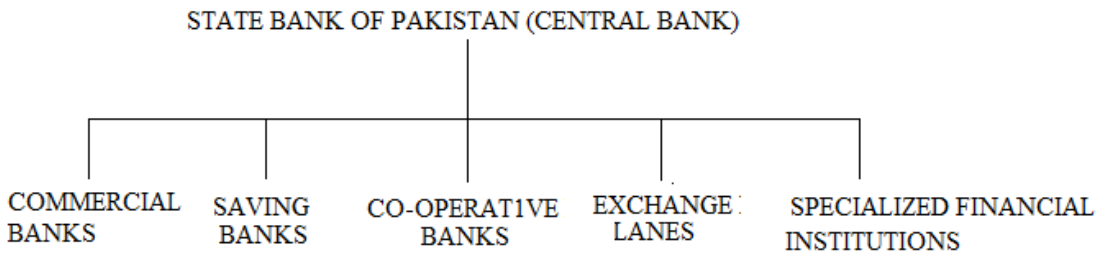


Figure 2. 1
Hierarchy of Banking System of Pakistan

Furthermore, two categories of commercial banks were established:

- Scheduled banks

- Non-scheduled banks

According to the 1956 act of State Bank of Pakistan, any bank which has a capital that is paid up and a reserve of 0.5 million Pakistani rupees and which fulfills other requirements can become scheduled bank under the State Bank of Pakistan. With the establishment of the State Bank of Pakistan and the enthusiastic engrossment that it took in the creation of the strong banking system in Pakistan even after the separation of the East and West Pakistan in year 1971 was seen in the sector. But commercial banking made a stupendous, immense and colossal progress which can be viewed from the below mentioned figures.

There were 14 banks in year 1948 with 195 branches, which grew to 3600 branches with 171 branches outside Pakistan by the year 1972. The total amount of deposit was 880 million Pakistan rupees in 1948, grown up to 19,000 million Pakistan rupees by the year 1972. In 1948 the total amount of advances was 200 million Pakistani rupees which went up to 12500 million Pakistan rupees by the year 1972. The following 14 banks were operative since year 1947 to 1972;

Table 2. 1
List of Banks in Year 1972

SR#	BANK Name	SR#	Bank Name
1	National Bank of Pakistan	8	Habib Bank Ltd
2	Habib Bank (Overseas) Ltd	9	United Bank Ltd
3	Muslim Commercial Bank Ltd	10	Commerce Bank Ltd
4	Australasia Bank Ltd	11	Standard Bank Ltd
5	Bank of Bahawalpur Ltd	12	Premier Bank Ltd
6	Pak Bank Ltd	13	Sarhad Bank Ltd
7	Lahore Commercial Bank Ltd	14	Punjab Provincial Co-operative Bank Ltd

Moreover, the role of SBP in the beginning was to build up a channel of commercial banks and to develop effective monetary policies to stabilize trade and commerce so that it could help in developing the newly born Pakistani State. Habib Bank, Allied Bank and National Bank were the initial banks to initiate their operations with the help of strong developed form the central bank named as State bank of Pakistan (Khalabat, 2011).

2.1.2 Public Control Legacy 1970 – 1980

In Pakistan, Commercial banking sprouted and progressed immensely until 1974 when nationalization took place under Zulfikar Ali Bhutto's regime in which 13 banks were nationalized and were amalgamated into five large scaled banks. The "Pakistan Banking Council" was established, which was mainly purposed to monitor nationalized banks. Hence, the enforcement of nationalization act reduced the role of SBP in the working of the established commercial banks. All these actions were made to enhance lending to top industries. Although, where lending increased tremendously during that time, alongside, these nationalization policies had a minute effect on the long term gains (Khalabat, 2011).

During the nationalization process, the feeble commercial banks were amalgamated with strong banks and overall five banking companies were formed.

1. NATIONAL BANK OF PAKISTAN
2. HABIB BANK LIMITED
3. UNITED BANK LIMITED
4. MUSLIM COMMERCIAL BANK LIMITED
5. ALLIED BANK OF PAKISTAN

Furthermore, Pakistan Banking Council was formed by the federal government in 1974 whose major function was to do audit of the matters related to organization and operations of banking system. Moreover, the role of State Bank was limited to formulate and give guidelines to commercial banks (Newart, 2016).

2.1.3 Privatization 1990 – 1997

In 1991, the nationalization policies related to banks were amended, and in total twenty three banks were awarded license out of which 10 banks had domestic license to commence their banking operations. In 1991, Muslim Commercial Bank was privatized and by 1993 the major portion of ownership of Allied Bank was rendered to its management. However, still there were 4 major banks which were owned by the State of Pakistan till the year 1997. Later on, these state owned banks faced intense rivalry from twenty one domestic and twenty seven foreign banks. The role of State Bank of Pakistan (SBP) was enhanced and control was increased to monitoring banking system. More importantly, the interest rate was streamlined, bank-wise credit ceiling was removed and a system of auctioning government securities was established. Moreover, forcing the government to borrow at market determined rates (Khalabat, 2011).

2.1.4 Ushering in the Reforms 1997 – 2006

Reforms related to the transformation of banking sector were launched after privatization. The central bank's regulatory powers were restored via amendments to the Banking Companies Ordinance (1962) and the State Bank of

Pakistan Act (1956). Subsequently, corporate governance, internal controls and bank supervision was strengthened substantially. Legal Impediments and delays in recovery of bad loans were streamlined in 2001. Furthermore, the scope of prudential framework set up in 1989 was enhanced, allowing banks to venture into traditional and nontraditional lines of business segments. Lending to small and medium enterprise had previously been neglected, were now given credits, whereas consumer and mortgage finance had not developed prior to the reforms (Khalabat, 2011).

2.1.5 Post Reform Era 2006 – Present

Buoyed by the spirit of liberalization, the banking sector has changed significantly. By year 2010, there were five public commercial banks, 25 domestic private banks, 6 foreign banks and 4 specialized banks. By the year 2011, there were 9,348 bank branches spread throughout the country, catering to the needs of some 28 million deposit account holders (Khalabat, 2011).

2.2 Islamic Banking in Pakistan

The creation of Pakistan was purely based on religion Islam and became an Islamic state in 1947. Therefore, the political leaders and religious scholars from the very first day of independence were demanding to introduce Islamic Banking in Pakistan to eliminate the Interest free banking system. It is also stated in the Constitution of Pakistan that the transections of financial institutions must be interest (Riba) free to follow the Islamic rules.

Unfortunately, the goal has not been achieved yet. The movement for elimination of Riba from economy by the Islamic scholars became strong during the period of 1947 to 1960; regrettably it was not fruitful because the steps taken was not solid to eradicate Riba and failed to provide the alternate solution.

2.2.1 The Era of 1979

The process of elimination of interest from the financial operations took place in 1979. The most popular mutual funds of government owned which are Investment Corporation of Pakistan (ICP) and National Investment Trust (NIT) started the removal of interest by refraining from the investing funds in the interest based securities. The ICP launched the new scheme which was based on profit and loss sharing with coalition of new investor in October 1980. The HBFC (House Building Finance Corporation) also removed interest based financing from their operations in July 1979.

2.2.2 Era of 1980 – 1981

- The new financing instrument was introduced by the corporate which is known as Participation Term Certificate (PTC).
- The concept of Modaraba was introduced and launched under the scheme of Two-Tier structure scheme. The main purpose of Modaraba was to introduce and promote the Sharia complaint business, for this purpose the Modaraba Companies and Modaraba Ordinance laws were formed.
- During the implementation phase of Sharia business many nationalized commercial banks started the separated counters to entertain the customers of

Sharia business in which the customer has an option of depositing their amounts on profit and loss sharing basis. This was the push to Islamic Financing in Pakistan.

2.2.3 Era of 1984 – 1985

- Seven main modifications in the Law were made with the name of "Banking & Financial Services Ordinance, 1984".
- In year 1984, the Banking Tribunals Ordinance was approved in which the recovery of non- interest based financed amount can be provided.
- BCD Circular No. 13 floated by SBP in 1984 clearly mentioned that the removal of Riba from the banking system is compulsory. So, on January 1985 it was directed to all Provincial & Federal Government, Public Sector Corporations and Joint Stock Companies became interest free.
- During the era of 1981-1985 the percentage of total deposits in PLS "profit and loss" escalated from 9.2% to 61.6% and this was all because of emerging trend of Islamic banking System.

All these efforts were taken to implement the Islamic banking in Pakistan. The implementation was not as smooth as imagined because the banks and financial institutions did not fully understand the Islamic system. Some of the products of Islamic Banking were challenged by The Federal Shariat Court as these products did not completely fulfill the Shariat Law. To resolve the issues the Supreme Court and Federal Shariat Court collectively worked on providing the guidelines to the Banks and financial institutions. As a result, in 2002 the first Islamic Bank in Pakistan was given the license to offer the complete range of Islamic products in the Bank.

2.2.4 Islamic Banking in Pakistan Present Era

The first Islamic Banking policy launched by State Bank of Pakistan in 2001 was the initial step over a long period of time. The policy clearly stated that the Conventional banking and Islamic banking should be promoted simultaneously. Therefore, the first bank was Al-Meezan investment bank to start working as licensed Islamic bank in Pakistan. The license was offered to all other conventional banks for starting Islamic branches or the subsidiary service of Islamic banking. As all the banking institutions are experimenting different line of businesses regarding Islamic banking, so at the moment it is quite difficult to say that which is the best Islamic Bank in Pakistan.

2.3 Economic History of Pakistan

The life of Pakistan began as an independent state with the problem of balance of payments and there was a foreign exchange of only 200 million Indian rupees in treasury. Furthermore, newly born Pakistan faced lack of infrastructure and wide spread problem of poverty. Different regimes of Pakistan provided different polices to uplift the economy of Pakistan. Some of the eras are described below.

2.3.1 The Regime of Ayub Khan (1958-1969)

To make the flow in the manufacturing sector, the government introduced the policy in which the large profit trades in raw cotton and jute were induced into manufacturing sector. The attempt was made with the help of a policy encouraging domestic production of consumer's goods by providing different level of protection to these manufacturers. The persuasion of this policy remained intact during the period of 1960.

The years of 1960s are thought to be the golden age of Pakistan because of higher growth rate of economy by giving subsidies and tariff protections to manufacturer. Furthermore, during the same years of 1960s an elite strategy for agriculture sector was introduced to uplift this sector. The magnitude of protection was provided in such manner by the government that local manufacturers were earning large rupee profits on the goods which were not price competitive as compared to international products. The ear of 1960 has seen rapid growth of economy but also has witnessed wide income inequalities between elite and lower class created political tension. This resulted in a movement against Ayub Khan in East and West Pakistan. The severe consequence of these tensions resulted in the emergence of east Pakistan as a new country Bangladesh (Hussain, 2004).

2.3.2 The Regime of Bhutto (1973-1977)

In year 1973 Mr. Z.A. Bhutto was driving a mass development against Ayub Khan unleashed the idle mainstream desires for a law governed society in view of value and equity. His alluring political crusade was to have a significant

and enduring impact on prominent awareness as the poor interestingly felt that they too mattered in history. By 1973, Pakistan People's Party (PPP) and its mass base took over the government. This set the phase for Prime Minister Z.A. Bhutto's administration to attempt monetary measures.

One of the most important initiatives taken by PPP government was to introduce nationalization act of 1972. By enforcing nationalization act of 1972, 43 large scale producers and intermediate good sectors for example chemical, engineering, oil refining, fertilizers and cement were nationalized. Furthermore, financial sector was nationalized and 14 banks were amalgamated into six government owned banks. The first wave of nationalization had impact on monopoly capitalist, while in 1976 the second term of nationalization hit medium and small sized organizations. The results of nationalization were never seen in terms of state intervention for greater equity. On the contrary, the nationalization act widened the resource base of regime to practice traditional form of power by using state owned multiple sectors.

Doing the regime of Z.A Bhutto, the total share of private sector investment as percentage of GDP reduced, which later was compensate by increasing public sector investments. Thus, during Z.A Bhutto's regime the overall total investment to GDP ratio rose to 15.5 percent, which was slightly higher than the preceding era. Yet there was an increase in total investment to GDP ratio but the growth of GDP declined. The growth of GDP from year 1960 to 1973 on average was 6.3 which declined to 5 percent during the period of 1973 to 1977. This indicated that the

investment was not efficient. The reason for this inefficiency of investments was due to two set of factors which are as follow;

First, the wider range of investment in unproductive sectors of defense and administration. Second, the political influence on investment decisions in public sector industries. The political influence was also seen in choice of technology, geographical location of investment and management of production.

The social outcomes of these nationalization related measures were to profoundly affect the political quality of the Bhutto administration. As the genuine earnings of white collar class family units were reduced. This increased the disregard amongst them that had taken after the nationalization of the little and medium enterprises handling units in 1976. The people who sided Bhutto in agitation against Ayub regime, once again joined the streets in year 1977 to agitate against Bhutto to separate him from power (Hussain, 2012).

2.3.3 The Regime of Zia (1977-1989)

The Zia-ul-Haq administration sought to institutionalize the military regime into the fabrication of Islamic ideology, in order to rule the country. Before Zia Ul Haq regime the society of Pakistan was historically characterized by democratic aspirations, cultural diversity and a religious prospect and universal spirituality of human brotherhood. While, the slogan raised by Zia ul Haq was total in contrast to the norms of society. Thus, this created a gap in ideology of people of Pakistan and the ruler.

The higher rate of growth of Zia regime was not supposed to maintain because of the poor performance of the following three factors.

1 The required rate of saving to GDP ratio was 20%, whereas the actual ratio of saving to GDP was below 10%.
2 The Exports of the country as percentage of GDP growth was below 10% and registered no substantial change as compared to Bhutto regime.
3 Inadequate investments in social and economic infrastructure. The reason was that in Zia regime the defense budget was increased and also debt servicing expenditure was increased. This is because most of the budgets related to Annual Development Program (ADP) was contracted.

It was not surprising when Afghan war ended in late 1990's, that the cushion of foreign loans and debt reliefs were withdrawn from Pakistan by western countries. Therefore, the pressure on GDP started to build again due to difficulty in debt servicing capacity, low saving rates, deficit in balance of payment; lower export growth and poor infrastructure pulled down the growth of economy and resulted in recession of 1990's (Kemal & Noman, 1991).

2.3.4 The regime of Democracy (1989-1999)

The decade of 1990's has seen democratic elected governments, those aimed to rule the country in an authoritarian form of power under the fabric of democratic order. There was a combined use of public resources for personal gains. The feature of these democratic governments started in 1990's and got worse by late 1990s' and threatened the state of Pakistan. The factors were as follow;

1 The economy was on the last brick of collapse.

2 There were threats to lives and private properties of dwellers due to increase in criminals and armed religious extremists.

3 Most of the institutions were politicized and were lacking effective governance.

During the decade of 1990, the GDP and private investments were severely affected by political instability, the rule of corruption in the system, worsened law and order situation in the country and natural disasters were the reasons. Another factor that was never been addressed since inception of Pakistan and contributed significantly in sharp decline of GDP was an immense increase in poverty, which reached a critical level in the decade of 1990s'. Therefore, the governments of these decades adopted structural Adjustment Program under the guidelines of IMF. The IMF directed the government of Pakistan to reduce public expenditure that sharply reduced development expenditures. The drop was recorded as; development expenditure of percentage of GDP reduced from 7.4 percent in 1970 to 3.5 percent by the years 1990. On the contrary, the unproductive expenditures of government in different sectors remained the same. Thus, this factor contributed in slowing down the growth of economy. Furthermore, the severe restriction on urgently needed public investment in infrastructure and poverty reduction projects simultaneously slowed down GDP growth and accentuated poverty (Qureshi, 1998).

2.3.4 The Regime of Mushraff (2000-2008)

In late 1990's the state of Pakistan reached at critical level due to multifaceted economic crisis, law and order situation and higher rate of inflation

and unemployment. This created a tension between military powers and political leadership and hence military leadership took over the government and ruled out the political leadership in 1990s. After military takeover, Musharraf was declared the president as well as joint chief of armed forces. President Musharraf government formulated a comprehensive plan to revive the economy of Pakistan and helped institutions to establish and improve governance. At the same time, many constitutional amendments were. Thus, new political government signified the role of military power along with a political structure to play an important role in the development of economy of Pakistan.

During the reign of President Musharraf there was a substantial improvement in macroeconomic indicators due to the comprehensive economic policies of Musharraf, even though there was an international pressure after the event 9/11. The growth of GDP accelerated to 6 percent in last three years of ruling, debt servicing burden of Pakistan become tolerable, the deficit of balance of payment and budget was reduced significantly and foreign reserves of State Bank of Pakistan rose up to the record levels. However, the State was still lacking policies to eradicate widespread poverty and there was also shortage of basic necessities (Hussain, 2012).

2.3.5 The Regime of Democratic Government (2008-2013)

The regime of democratic government took charge in year 2008 and they were expected to address the problems faced by the country of Pakistan. Instead, the new elected government was proved incompetent to address all the challenges. While, the rest of the world was taking corrective measure to grow and control food and fuel prices, government of Pakistan was putting themselves in political issues. The economic experts of the country were continuously indicating bad governance, fiscal indiscipline, and bad macroeconomic policies in their research columns.

This was Pakistan, where rapidly evolving political scenario was heading towards greater disaster in five years of democratic governments starting from 2008 to 2013. In year 2008 Pakistan economy was still robust enough to absorb extraordinary shocks but by the year 2013 the economy of Pakistan was at its worst conditions. The reason was that political government had no idea what kind of challenges the country was facing and how these challenges could be addressed (Khan, 2013).

2.4 Corruption in Pakistan

The economy of Pakistan is very much volatile and experienced very slow growth of economy in the last decade. Each year, the policy makers set up a target to obtain but are never able to achieve. For example, the desired target set by the policy maker in last eight years was 5.3% whereas the average growth of economy remains to 2.6% on average in last eight years. There are although numerous reasons which are

involved in this sluggish growth and affected the growth of Pakistan in which rise of corruption is the dominant factor involved in lower economic growth. The rise of corruption is due to weaker institutional settlement which plays an important role to impede economic growth (Farooq *et al.*, 2013).

The background history of Pakistan reveals that the most governance indicators for stability remained unchanged and it can be seen that corruptions almost penetrated in the gross root levels of public offices both in federal and provincial. In year 1995, corruption perception index (CPI) was 2.25 of Pakistan and the country was in the list of most corrupt nations. The CPI index since 1995 remains the same to the date. Some nominal efforts were made by the government of Pakistan for alleviation of corruption but the policies never implanted in full swing. There was a little improvement in 1998 when CPI score was 2.7 and in 1997 2.53 (TransparencyInternational, 2012). On the basis of CPI score Pakistan was ranked as37th, 50th 49th and 51th in year 2012, 2013, 2014 and 2015 respectively (TransparencyInternational, 2012, 2013, 2014, 2015)

According to various reports of i.e.(TransparencyInternational, 2012, 2013, 2014, 2015), the contributing factors of corruption in percent are as; accountability is 31.68%, monopoly of public and political persons is 16.43%, lower level of salaries 16.54%, lack of transparent information is 9.97%, discretionary powers influence 4.59%, redtapisim is about 4.28% and some other factors 4.9% (Chêne, 2008). In year 2009 Pakistan further declined in the ranking and was declared as 42nd most corrupt society.

The recent development of econometrics has made it possible to investigate the relationship between variable. The economy of Pakistan is very much volatile in nature

and corruption is one of the causes that is playing a role to impede the growth of economy. Moreover, there are only few studies done to find the relationship between economic growth and corruption in Pakistan. While none of the study has researched the impact of corruption on banking sector. Therefore, the study has undertaken the impact of corruption on banking sector of Pakistan to fill the research gap in literature.

2.5 Issues Prevailing in Pakistan

In respect to the history of economic condition of Pakistan, three challenges were confronting since inception of Pakistan, these are as follow;

1 Stable banking system to contribute in economy.

2 To shape an economic growth that has enough capacity to eradicate poverty.

3 The stable growth of GDP.

4 To establish the writ of Government by using democratic structure and cultural tolerance.

5 Control of corruption and development of sound institutions.

2.6 Summary of the Chapter

The chapter provides an overview of banking sector of Pakistan. The history of the banking sector starts before independence of Pakistan. Before independence there were only two Muslim banks namely Habib bank and Muslim Commercial bank. After independence in year 1948 State Bank of Pakistan was established to control and provide guidelines to banking sector of Pakistan. Banking sector has witnessed nationalization act of 1973 and privatization regime of 1992 and lastly consolidation

and liberalization of banking sector in year 2006. In Pakistan, the issue of Islamic banking started in 1980's, but final establishment of an Islamic bank was licensed in year 2002 under supervision of State Bank of Pakistan.

Moreover, Pakistan has also witnessed many regimes of political and military government since inception. There are three regimes of Marshal Law Administration starting from Ayub regime and ending at Musharaf regime. Although, there were many issues in these regimes but the economy of Pakistan sustained in these eras. Furthermore, the country has also witnessed six democratic governments' regimes but the economic condition remained worst in these eras due to political instability. In the last, the country is still lacking sustainable growth of GDP, reduction of Poverty and corruption and well established financial system. In addition, this chapter has highlighted the issue of corruption with its brief history since inception of Pakistan.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

The risk in Oxford English Dictionary is defined as “hazard” or a chance of bad occurrence. Although most of the time this term is discussed in negative connotation even though it is an equal opportunity to gain progress and earn larger benefits (McNeil, Frey, & Embrechts, 2015). Moreover, financial risk can be defined as, a risk which is associated with the portfolio of financial institutions such as market risk, credit risk, liquidity risk and default risk (McNeil, Frey, & Embrechts, 2015). In addition, the disruption in financial system and economic activities is produced because of those financial institutions which are in a condition of distress (FSB, 2011; Benoit *et al.*, 2013). Statistically risk can be defined as probability of a negative return. It is a variance or a standard deviation from the actual expected return against some investment, thus greater the deviation from the actual return; the greater will be the risk and there will be higher chances of failure of an investment (Sharpe, Alexander, & Y Bailey, 1995; Van Horne James, 2002; Vose, 2008).

Risk is an important factor which must be evaluated in the business to assess the input efforts and their returns. Risk can be defined as an exposure to uncertain consequences because the results are uncertain, these results can see volatility due to risk associated with a particular event (Cade, 1997; Nor Hayati, 2003). Whereas, higher risk is not always related to higher return, it may result in higher loss (Sinha, 1998). Risk affects the firm’s generation of future cash flows as it creates vulnerability and

variability in future business value (Talley, 1999). Risk is also negatively related to performance of the firms i.e. banks, mutual funds, insurance companies (Färe, Grosskopf, & Weber*, 2004). Hence, higher rate of risk increases the cost of operations of business correspondingly reduces profitability and eventually results in closure of business (Van Horne James, 2002; Barry, Lepetit, & Tarazi, 2011).

3.2 Risk and Economic Growth

The definition of financial growth has not yet been agreed by the researchers. The term itself is denoting the interaction between the perception of value and risk, also attitude of investor toward risk and constraints of financing, which eventually comes into booms followed by the bust cycles. The interaction of the term risk can increase the fluctuation in an economic cycle and can lead to the adverse financial crisis and economic disruptions. So, the definition is closely tied with the concept of pro cyclicality of financial system (Levine & Zervos, 1998; Borio, Furfine, & Lowe, 2001; Danıelsson, Shin, & Zigrand, 2004; Kashyap & Stein, 2004; Kashyap, Rajan, & Stein, 2008; Brunnermeier & Pedersen, 2009; Adrian & Shin, 2010).

The previous researchers such as King and Levine (1993a), King and Levine (1993b), Rajan and Zingales (1996), Levine (1997), Levine (1998), Levine and Zervos (1998), Demirgüç-Kunt and Maksimovic (1998) and Levine, Loayza, and Beck (2000), provide further argument that the improvement in the development of financial sector increases the contribution in the growth of economy. Similarly, the economic slowdown contributes substantially in banking crises while, a continuous slowdown of economic activities of a system is a preceding indicator to the financial crisis ((Hoggarth, Reis, & Saporta, 2002; Boyd, Kwak, & Bruce, 2005; Kroszner, Laeven, & Klingebiel, 2007;

Dell'Ariccia, Detragiache, & Rajan, 2008; Serwa, 2010). It may be because; the separation of banking sector and economic activities is not possible. However, the literature do not gives the clear picture that the banking sector is the main cause of economic slowdown or sluggish growth of economy causes banking sector crises (Demirgüç-Kunt & Maksimovic, 1998; Kaminsky & Reinhart, 1999; Demirgüç-Kunt & Detragiache, 2005; Hilbers *et al.*, 2005; Jokipii & Monnin, 2013).

The banks have to play a key role in the economic activities and have the ability to create systemic risk such as a risk in which failure of one bank will affect the function of another bank. This will affect the banking industry and the economic system. Moreover, banking system faces major challenges' in form of lower interest rate, higher competition, and change in structure of income, ownership, restructuring of financial system and many other macroeconomic factors (DeYoung & Torna, 2013; DeYoung *et al.*, 2015).

Furthermore, the studies of Bumann, Hermes, and Lensink (2013) and Komal and Abbas (2015) highlighted that a change in the channel of economic development is also due to urbanization and energy prices. These studies also highlighted that the development of financial sector is significanlty affected by the energy prices and its consumption through channel of economic growth. On the other hand, work by some previous researchers among are Rajan and Zingales (1996), Levine, Loayza, and Beck (2000), Claessens and Laeven (2003), Bekaert, Harvey, and Lundblad (2005) and Bruno and Hauswald (2013) has shown that the development of financial sector improves the quality of economic growth and output of real economy.

3.3 Risk in Banking Sector

Risk in banking is hypothesized as originating from the problem of asymmetric information and conflicts of interests between agents and principals, commonly attributed to Agency Theory pioneered by Jensen and Meckling (1976). Asymmetric information exists when the management (agent) has better information about the institution than the shareholders (principal). This creates incentives for moral hazard behavior (unethical) by bank management and it is difficult for outsider to evaluate bank activities and monitor bank behavior. Moral hazard is an important factor that induces high risk in banking sector (Kane, 1997; Bacha, 1998; Barth James, Caprio Gerard, & Ross, 2004). Furthermore, risks also arise from conflict of interest due to the differences in the desired goals between agents and principal (Eisenhardt, 1989).

The study of Bittencourt, Gupta, and Stander (2014) provided a theoretical model which defines that a lower level of development of financial sector and higher level inflation produces negative impact on the economy and vice versa. The findings were empirically tested with the econometric panel data of 150 countries for the period of 1980-2009 to generalize the results. Another study of Ali *et al.* (2014) argued that efficient employment of foreign debts attracts more foreign direct investment while, there is a significant impact of financial risk on foreign direct investment. The study used time series data for the period of 1982 -2011, in order to measure the risk of financial sector by using variables such as foreign debt servicing, foreign debt, current account and exchange rate.

Furthermore, the risk of failure of one bank is contagion in nature and possesses a potential threat to other banks in many ways. For example, the losses of interbank

deposits may cause other banks to suffer market risk, operational risk, credit risk, liquidity risk and insolvency risk (Wall, 2010).

Moreover, the total risk of the bank is negatively related with the performance of the bank (Chang, 2014). Berger, Hasan, and Zhou (2009) concluded with the empirical evidence that foreign ownership and domestic private ownership of banks in China, is positively related to the performance and therefore the banks are less exposed to risk. Hilscher and Raviv (2014) defined the role of contingent capital in reduction of risk, there are two ways to inject contingent capital, either by issuance of equity by bank itself or it may be designed as it must not affect the equity based compensation.

Monetary policies of the country also affect the risk prospects of banks. It is found that monetary policies of the country have negative relationship with risk behavior of the banks (Borio & Zhu, 2012). Therefore, risk incentives are badly affected by less managed monetary policies of the country (Valencia, 2014). Thus, market risk, credit risk, operational risk and insolvency risk are the important prospective of overall risk that must be addressed because the exposure to risk of any bank may lead to financial shock to the economy. The financial system of any country is mainly dependent on banking system. Thus, there is a need that risk measures taken by the banks must be addressed properly. Many of the previous authors have seen the behavior of the bank with ownership concentration, but this study is motivated to determine the influence of asset quality, income structure and macroeconomic factors on insolvency of the bank.

3.4 Islamic Philosophy of Risk

Islamic risk management is dated back since prophet Yusuf era whereby some versus in the Holy *Quran* actually instructed Muslim to manage risk by avoiding them, and some of verses are asking to diversify risk, whilst there are verses in the Holy *Quran* that suggests diversification of portfolio to manage risk; precautionary measures are also suggested in the Holy *Quran* to be taken as proactive steps to eliminate risk. Though some scholars in Islamic banking usually define risk as "*Gharar*" that does cover only a part of the meaning. The available literature defined, risk is limited only to the perspective of "*Gharar*", though risk in Islamic contract is much wider than just concept of "*Gharar*". This narrow the scope of definition leads to some ambiguities and it has inconsistency to interpret the definition of risk.

3.4.1 General Concept of Risk in Islam

The accession to the wealth in Islam is allowed only if there is involvement of economic enterprise that holds the components of risk *Al Ghunm bil Ghurm* (الغنم بالغرم) to earn the profit legally. It should be engaged in economic venture, according to the concept given in Islam. Moreover, a Muslim is prohibited to earn the profit without engaging in productive economic activity, *Kharaj bi-al-Daman* (الخراج بالضمان). It also means that the earning should be Halal only if it includes the chances of profit and loss. According to Tamiah (1451H) risk has been categorized in two kinds: Commercial risk and the other kind is the gambling risk. In the former kind of risk, an entity would be bought by someone in order to gain the profit by selling it and will reckon on Allah for the profit. In this kind, there might be chance of loss on anyone's side, but for merchants this is necessary as it is the nature of the trade. In the later type of risk the wealth is made for no reason (اكل المال بالباطل).

ALLAH and his Messenger Prophet Mohammad (Peace be upon him) forbade us for such type of risk and earning.

3.4.2 Specific Rule of Risk in Islamic Perspectives

Islam forbids the Muslim in involving into gambling as it causes the high level of skepticism *Gharar* in business relation called *Muamalat*. The reason for forbidding is just to keep away the abhorrence, abuses and to keep the harmony among the entities of the society. Furthermore, Game of chances or *Mysir* on other hand is strictly banned in Islam because that clearly defines to earn a profit with no working efforts. The reason for the prohibition of Wager or *Qimar* in Islam is prohibited due to nonproductive activity that is produced from the gambling, while the profit is gained by these activities is at the expenditure of other party.

يَسْأَلُونَكَ عَنِ الْخَمْرِ وَالْمَيْسِرِ قُلْ فِيهِمَا إِثْمٌ كَبِيرٌ وَمَنَافِعُ لِلنَّاسِ وَإِثْمُهُمَا أَكْبَرُ مِن نَّفْعِهِمَا وَيَسْأَلُونَكَ مَاذَا يُنفِقُونَ قُلِ
الْعَفْوَ كَذَٰلِكَ يُبَيِّنُ اللَّهُ لَكُمُ الْآيَاتِ لَعَلَّكُمْ تَتَفَكَّرُونَ
[2:219]

[Yusuf Ali 2:219] They ask thee concerning wine and gambling. Say: "In them is great sin, and some profit, for men; but the sin is greater than the profit." They ask thee how much they are to spend; Say: "What is beyond your needs." Thus doth Allah Make clear to you His Signs: In order that ye may consider.

يَا أَيُّهَا الَّذِينَ آمَنُوا إِنَّمَا الْخَمْرُ وَالْمَيْسِرُ وَالْأَنصَابُ وَالْأَزْلَامُ رِجْسٌ مِّنْ عَمَلِ الشَّيْطَانِ فَاجْتَنِبُوهُ لَعَلَّكُمْ تُفْلِحُونَ
[5:90]

[Pickthal 5:90] O ye who believe! Strong drink and games of chance and idols and divining arrows are only an infamy of Satan's handiwork. Leave it aside in order that ye may succeed.

إِنَّما يُرِيدُ الشَّيْطَانُ أَن يُوقِعَ بَيْنَكُمُ الْعَدَاوَةَ وَالْبَغْضَاءَ فِي الْخَمْرِ وَالْمَيْسِرِ وَيَصُدَّكُمْ عَن ذِكْرِ اللَّهِ وَعَنِ الصَّلَاةِ فَهَلْ أَنتُم مُّنتَهُونَ ¶

[91:5]

[Yusuf Ali 5:91] Satan's plan is (but) to excite enmity and hatred between you, with intoxicants and gambling, and hinder you from the remembrance of Allah, and from prayer: will ye not then abstain?

3.4.3 Authentic *Hadith* and Justification on Prohibition of *Gharar*

أَنَّ أَبَا سَعِيدٍ، الْخُدْرِيَّ قَالَ نَهَانَا رَسُولُ اللَّهِ صلى الله عليه وسلم عَنْ بَيْعَتَيْنِ وَلِبْسَتَيْنِ نَهَى عَنِ الْمُلاَمَسَةِ وَالْمُنَابَذَةِ فِي الْبَيْعِ . وَالْمُلاَمَسَةُ لَمْسُ الرَّجُلِ ثَوْبَ الآخَرِ بِيَدِهِ بِاللَّيْلِ أَوْ بِالنَّهَارِ وَلاَ يَقْلِبُهُ إِلاَّ بِذَلِكَ وَالْمُنَابَذَةُ أَنْ يَنْبِذَ الرَّجُلُ إِلَى الرَّجُلِ بِثَوْبِهِ وَيَنْبِذَ الآخَرُ إِلَيْهِ ثَوْبَهُ وَيَكُونُ ذَلِكَ بَيْعَهُمَا مِنْ غَيْرِ نَظَرٍ وَلاَ تَرَاضٍ . ¶

Sahih Muslim, Book 10, Number 3613:

Abu Sa'id al-Khudri (Allah be pleased with him) reported: Allah's Messenger Prophet Mohammad (May peace be upon him) forbade us (from), two types of business transactions and two ways of dressing. He forbade *Mulamasa* and *Munabadha* in transactions. *Mulamasa* means the touching of another's garment with his hand, whether at night or by day, without proper inspections on object of sales. *Munabadha* means that a man throws his garment to another and the other

عَنْ أَبِي هُرَيْرَةَ، قَالَ نَهَى رَسُولُ اللَّهِ صلى الله عليه وسلم عَنْ بَيْعِ الْحَصَاةِ وَعَنْ بَيْعِ الْغَرَرِ ¶

Sahih Muslim, Book 10, Number 3614.

throws his garment back, and thus confirming their contract without the inspection of mutual agreement. This *Hadith* has been narrated on the authority of Ibn Shihab through the same chain of transmitters.

Abu Huraira (Allah be pleased with him) reported that Allah's Messenger Prophet Mohammad (May peace be upon him) forbade a transaction determined by throwing stones, and the type which involves some uncertainty.

عَنِ ابْنِ عَبَّاسٍ قَالَ : قَالَ رَسُولُ اللَّهِ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ
"مَنِ ابْتَاعَ طَعَامًا ، فَلاَ يَبِعْهُ حَتَّى يَسْتَوْفِيَهُ"
Sahih Muslim, Book 10, Number 3640.

Ibn Abbas (Allah be pleased with them) reported Allah's Messenger Prophet Mohammad (May peace be upon him) as saying: He who buys food grain should not sell it until he has taken possession of it.

جَابِرَ بْنَ عَبْدِ اللَّهِ، يَقُولُ نَهَى رَسُولُ اللَّهِ صلى الله عليه وسلم عَنْ بَيْعِ الصُّبْرَةِ مِنَ التَّمْرِ لاَ يُعْلَمُ مَكِيلَتُهَا بِالْكَيْلِ
الْمُسَمَّى مِنَ التَّمْرِ .
Sahih Muslim, Book 10, Number 3654.

Jabir b. Abdullah (Allah be pleased with them) is reported to have said that Allah's Messenger Prophet Mohammad (may peace be upon him) forbade the sale of a heap of dates the weight of which is unknown in accordance with the known weight of dates.

عَنْ عَبْدِ اللَّهِ بْنِ دِينَارٍ ، أَنَّهُ سَمِعَ ابْنَ عُمَرَ يَقُولُ ذَكَرَ رَجُلٌ لِرَسُولِ اللَّهِ صلى الله عليه وسلم
أَنَّهُ يُخْدَعُ فِي الْبُيُوعِ فَقَالَ رَسُولُ اللَّهِ صلى الله عليه وسلم
" مَنْ بَايَعْتَ فَقُلْ لاَ خِلاَبَةَ "
فَكَانَ إِذَا بَايَعَ يَقُولُ لاَ خِيَابَةَ

Sahih Muslim, Book 10, Number 3663:

Abdullah b. Dinar narrated that he heard Ibn 'Umar (Allah be pleased with them) saying: A man mentioned to the Messenger of Allah Prophet Mohammad (May peace be upon him) that he was deceived in a business transaction, whereupon Allah's Messenger (May peace be upon him) said: When you enter into a transaction, say: There should be no attempt to deceive.

عَنِ ابْنِ عُمَرَ ، أَنَّ رَسُولَ اللَّهِ صلى الله عليه وسلم نَهَى عَنْ بَيْعِ الثَّمَرِ حَتَّى يَبْدُوَ صَلاَحُهَا نَهَى الْبَائِعَ وَالْمُبْتَاعَ

Sahih Muslim, Book 10, Number 3665.

Ibn 'Umar (Allah be pleased with them) reported that Allah's Messenger Prophet Mohammad (May peace be upon him) forbade the sale of fruits until they were clearly in good condition, he forbade it both to the seller and to the buyer.

3.5 Theoretical Literature of Risks in Islamic Perspectives

Islam defines risks as venture into hazard. In other words, bet or wager is also defined as risk that is clearly dependent on the luck without making any consideration of the human ability to deal with the results. Furthermore, there may be another definition of risk according to which any actions that may lead to suspicion. Muhammad Rawwas Qal'aji (1985) and Elgari (2003) defined the word *Khatar,* the word refers to honor and respect, *Khatar* also has the meaning of bitterness and

supervision over ruined; it can also be interpreted as an action that results into wager. In modern Arabic where this word is now equivalent to the English word “Risk”. According to Al-Zuhayly (1989), Islamic risk may be defined as a damage, party faces or a hazard or danger which has not been expected while making the contract. According to Al-Suwailem (2006), risk is a perspective of damage, in Islamic perspective it is purely undesirable in business transactions.

According to Elgari (2003), there lies a significant difference among the concept of risk and “*Gharar*”. In “*Gharar*” there is the suspicion in the exchange transactions based on the contracts whilst the contract hindered with *“Gharar”* is invalid according to *Shari'ah* point of view, the same rules lie for the risk except higher risk taking. Risk is being a natural thing that happens in almost every situation and one cannot keep it away. While, in “*Gharar*” the two parties take a special risk by making a specific arrangement for the contract. For instance, there is a risk to lend the money to a worthy individual (or selling him on *Murabaha* basis) having no credit but that is not included “*Gharar*”. On the other hand, sale of the object on two prices one for the cash and the other by leaving the matter on the customer how much can be paid by him, it is “*Gharar*”. This is invalid, but it cannot be very risky.

On the basis of Islamic risk there may exist many schools of thought. There is a difference in the thoughts based on interoperating of the risk by different *Mudzhab* and *Fiqah.* In this subsection *Gharar (Uncertainty)* is discussed.

3.5.1 Gharar (Uncertainty)

According to the Islam "*Gharar*" is also referred as risk or probability and in Arabic language that means risk, hazard and perils; nevertheless, in the terms of business it meant to take the hold of something without knowing or having no knowledge at all or to take risk oneself in a venture without a know-how of the exact results, or to make the hasty decisions by not calculating any hazard of the consequences.

Tracing back to the origin of "*Gharar*" and Islamic interpretation that according to *Hadith* as was recorded in Sahih Muslim stated that "*Gharar*" is involved in any undertaking that may lead to negative outcome and consequences, whereby if any party attempts to deceive another party through injustice and causes any doubt during negotiation of contract, thus such undertaking contain elements of "*Gharar*" or risk that will cause the contract to void (al-Hajjaj).

According to Ahmad (2002), "*Gharar*" implies the exposure of a person or person's property to damage without any awareness, moreover "*Gharar*" in Arabic language covers variety of negative elements such as deceit, cheating, hazard, perils and risk that can led to the damage or loss. Moreover, "*Gharar*" in transactions has often been used in the sense of risk, uncertainty and hazard which includes both unknowingly regarding to subject matter and uncertain in term of its availability and existence (Kamali, 1999).

According to Imam Tamiah (1451H) "*Gharar*" is involved in the business that one's deals with unknown about its existence. However, according to Rahman

(1979) "*Gharar*" can be classified in two types, the first type includes the risk that involves the uncertainty and probability, which is dominant, whilst in the second type risk is considered as the element of suspicion owing to the cheating or scam. The "*Gharar*" is not allowed in the case when the one has no clear idea of the subject matter, keeping and the rates. The risk that is forbidden and panelized in Islamic principles is any elements that occurred from within between parties involved while carrying out the transaction. Whereas, the business risks are approved providing the fact that the knowledge is sufficient on the matter of subject while entering into a venture. For avoiding the illegal risk the subject matter should be presented at the time of negotiation in order to prevent any dispute which can be raised at the end of the agreement. Nonetheless, in the practical world, there may be difference in the situation that happens of and on while making the contract i.e. there may be unavailability of the subject matter or sometimes it is not defined properly. Furthermore, there may be ambiguity in the payment of the goods at the time of the closing of the deal.

Furthermore, all kind transaction involving "*Gharar*" or the huge uncertainty that led the contract to disagreement, are strictly restricted in Islam. In different narration of the *Hadith* it is prohibited to perform any kind of transaction that involves an excessive uncertainty.

According to Dhareer, Research, and Institute (1997), the narration of "*Gharar"* has the literal meaning of risk or hazard "*Taghreer*" as it is the verbal noun of "*Gharar",* that means is to expose one's property or his self to the endangerment without knowing. According to Vogel and Hayes (1998) that the

Sunnah does not only tells about the gambling but the risk or "*Gharar*" as well, that refers to the majority of the transactions which has been characterized by risk or suspicious from their origin.

In Islam "Gharar is forbidden in Islam because Prophet Mohammad (PBUH) rejected "The sale of Gharar", there is the main Islamic order for the restriction is the command in the Holy *Quran* that if there is no mutual consent (*Taradin*) between the parties in the sale transaction, then all the sale will be illegal, whilst any kind of deception or fraud (*Al-Batil*) during the sale would be the cause of the potential dispute, abhorrence and animosity among the parties.

According to AL-SAATI (2003), the existence of *"Gharar"* is allowed if the skepticisms are endogenous or exogenous which is an adequate degree of "*Gharar*", that is purely based on Islamic legitimate epigram "Damage and benefit go together". As according to the saying of Prophet Mohammad (PBUH) "Revenue goes with liability".

From the literature review on *Gharar*, there are four categories in which the reasons for the prohibition could be categorized. First reason is the pure gambling, second reason is the uncertainty in the result, third reason is the unknown in terms of the future benefit, and fourth reason is the ambiguity. Thus, if there is the persistence of any of the above element during the contract of *Muamalat*, then the contract will be invalid according to *Shari'ah* principles.

3.6 Insolvency Risk

The definition insolvency states that a person or an institution is unable to pay their debts or obligations when they are due and payable. Most of the time a corporation or a company's balance sheet shows that assets are greater than the liabilities but they encounter net asset deficiency time to time. Therefore, there is always a risk of insolvency (Knoll, 1999). In banking system credit risk is routinely discussed, while credit risk is a risk where debt is not been paid. While, insolvency risk is a risk of not paying a debt as a result the person or an institution is insolvent (Knoll, 1999).

There are multiple indicators for calculating insolvency risk but one of the most widely used measures is Z-SCORE. The calculated value of Z-SCORE is inversely proportional to insolvency risk, indicates that the higher value of Z-SCORE define lower insolvency risk while, lower value of Z-SCORE shows higher insolvency risk (Maudos, 2017). The Z- SCORE is calculated as the sum of two ratios, CAE (capital to asset ratio) and ROA (return on assets) divided by standard deviation of ROA (return on assets) (Lepetit *et al.*, 2008a; Williams & Prather, 2010; Chen, Huang, & Zhang, 2016; Maudos, 2017).

According to the calculative definition of the bank insolvency risk which is measure by Z- SCORE, insolvency risk is a state where (CAR + ROA) ≤ 0, with CAR being the bank's capital-asset ratio and ROA its return on assets. Therefore, if ROA is a random variable with mean ROA and finite variance σ_{roa}^2 states the upper bound of the probability of insolvency (Boyd & Runkle, 1993).

The previous researchers among (Sun & Chang, 2011; Setiyono & Tarazi, 2014) investigates cost efficiency with risk in 8 different emerging markets of Asian markets. There were total eight measures of risk taken by the researchers but only four were considered in the end i.e. credit risk, market risk, operational risk and insolvency risk. The findings of the study suggest that insolvency risk effects both cost efficiency and variability of return.

Kabir and Worthington (2014) pointed some controversial results in terms of insolvency in Islamic banks. The authors highlighted that if distance to default DD method is used for stability of Islamic banks it seems more stable as compared if Z-SCORE model is used. Whereas, Bourkhis and Nabi (2013) argued that there is no significant difference between Islamic and conventional banks in terms of insolvency and credit risk. Small Islamic banks are more likely to become insolvent than large Islamic banks (Rahim, Hassan, & Zakaria, 2012; Abedifar, Molyneux, & Tarazi, 2013). The findings of Beck, Demirgüç-Kunt, and Merrouche (2013)and Pappas, Izzeldin, and Fuertes (2012) suggests that Islamic banks are overall more stable than conventional banks.

3.7 Asset Quality and Insolvency Risk

The provisions for losses are engaged as buffer for the credit losses, quality of credit variables are expected to be an important determinants for loan loss provision. Therefore, the previous researchers have used two variable of credit quality as proxy measure for Asset quality: one of them is nonperforming loans (NPL) as a ratio of NPL to gross loans/ total assets. The disbursed loans are considered as more risky than other bank's assets such as cash, reserves, bonds, so that a higher loan to asset ratio is

considered as lower credit quality. The second proxy widely used as a measure of asset quality is a ratio of loan loss provision to gross loans/ total assets. The loan loss provision is found positively associated with NPL (Nonperforming loans) and higher loans to asset ratio (Packer & Zhu, 2012).

3.7.1 Nonperforming Loans/ Financing to Gross Loans/ Financing

As per the definition of System of National Accounts 1993 SNA rev 1 and Banking Committee for Banking Supervision (BCBS) sound practice no 7 and 11, called impaired loans, a loan will be called non performing if principal amount remain due over 90 days or interest payment capitalize to 90 or more than 90 days (Bloem & Freeman, 2005). So, the factor that effect the credit problem must be sorted out for sustainable growth of the banking system and one of them is non-performing loans which can cause bank system crisis (Chaibi & Ftiti, 2015).

Banks often to increase their market share and lending goals expand credit to low quality borrower, thus that may result in nonperforming loan and contribute in credit and insolvency risk (Carlson, Shan, & Warusawitharana, 2013; Shim, 2013). So therefore, it was concluded by Jutasompakorn *et al.* (2014) that high level of nonperforming loans will ultimately result in high probability of the banking default risk. It is view of the fact that this is because of the less control of the regulatory body as the quality of loan is not monitored by the regulatory authority (Bertay, Demirgüç-Kunt, & Huizinga, 2015). Whereas, the banks are directed to keep the regulation intact otherwise in the days of financial distress they will be severely hit by the crisis, as nonperforming loans increase the level of bank risk by three fold (Leung, Taylor, & Evans, 2015).

The previous literature argue that there is a positive relationship of nonperforming loan to the probability of default as nonperforming loans decrease the quality of the assets i.e. (Wahlen, 1994; Kanagaretnam, Lobo, & YANG, 2004; Fonseca & Gonzalez, 2008; Jin, Kanagaretnam, & Lobo, 2011). The empirical study of Nkusu (2011) highlighted the link between nonperforming loans (NPL) and macroeconomic factors. The study used panel regression analysis and confirmed that adverse economic environment increase the percentage of nonperforming loans which contributes in insolvency risk. Furthermore, Maggi and Guida (2011) revealed that geographical disbursement of operation do matter and it has an effect in increment of risk, but holding nonperforming loans for a longer period increase the probability of failure as a function of cost effectiveness and efficiency.

The management quality of the bank used to play an important role to reduce the nonperforming loan in case of Chinese banking sector (Li et al. , 2007). Breuer (2006) investigated wide range of variable and defined that economic cycle has an effect on default of loans and insolvency risk. Similar to the previous study, Quagliariello (2007) highlighted that business cycle of Italian banks has an effect on non-performing loan and insolvency risk. In addition, Cifter, Yilmazer, and Cifter (2009), derived empirical evidences on nonperforming loan and industrial production of the country for Turkish banking system for the period of 2001-2007. The study highlighted that industrial production can reduce both nonperforming loans and insolvency risk. on the other hand, the macroeconomic environment has significant negative relationship with the servicing of loans but better the economic position of the an economy will reduce the cost of nonperforming loans and hence

insolvency risk (Bangia *et al.*, 2002; Carey, 2002; Salas & Saurina, 2002; Louzis, Vouldis, & Metaxas, 2012).

The empirical analysis for the period of financial crises in case of US banking system, the author Jin, Kanagaretnam, and Lobo (2011) segregated the banks in two categories failed bank during or after crisis and banks in crisis on the basis of profitability, nonperforming loans and balance sheet items. The author noted that the quality of loans have made significant contribution in bank failure and financial distresses. Furthermore, in the empirical study on central and Eastern Europe, the author Festić, Kavkler, and Repina (2011) revealed that banks play an important role in growth of economy but lower growth of economy accelerate the nonperforming loan and vice versa. This relationship also effects insolvency risk of the institutions.

The study of Espinoza and Prasad (2010) investigated the GCC (Gulf Cooperation Council), the study argued that nonperforming loans ratio to gross loan get worsens when there is higher interest rate and economic growth is lower in a country. This phenomenon further highlight that it also affects insolvency risk of the bank. In line with results to the (Espinoza & Prasad, 2010), Louzis, Vouldis, and Metaxas (2012) highlighted that the management quality, macroeconomic fundamentals and nonperforming loans have significant relationship with insolvency risk and there is a positive relationship between nonperforming loan and interest lending rate whereas the mortgage loan has very low relationship with growth of economy.

In contrast Pastor (1999), Pastor (2002); Pastor* and Serrano (2005) and Louzis, Vouldis, and Metaxas (2012) argued that it is difficult to calculate the efficiency of the bank with the help of nonperforming loans, further, categorically it is difficult to distinguish between the external and internal causes of nonperforming loan for Greek banking sector. Whereas to some extent the macroeconomic variables give a good reason to define nonperforming loan but mortgage loan has least relation with macroeconomic variables.

According to Foos, Norden, and Weber (2010) growth is an important indicator to represent riskiness of a bank. The author studies U.S, Canada, Japan and European banking system and reported that loan growth increases loan losses in subsequent years. This actually reduces interest rate, capital ratio and increases default risk. Furthermore, Demirguc-Kunt (1989), Berger and Udell (1994), Gorton and Rosen (1995), Shrieves and Dahl (2003) and Zhang *et al.* (2016) documented the similar results that increase in loan growth actually increases loan losses and ultimately increases risk of the bank.

On the other side, Bernanke and Gertler (1986) pointed out that increase in impaired loans force bank to change their behavior towards risk preference. Indeed, high level of nonperforming loans creates clear incentive for shareholders and managers to shift risk. moreover, Eisdorfer (2008) noted that the firms which are financially distressed have more incentive to shift their risk. the banks those are having more troubled loan portfolio have more incentive to take risk (Koudstaal & van Wijnbergen, 2012). Bruche and Llobet (2011). documented that when the firms

have threat of bankruptcy due to impaired loans they tend to roll over their impaired loans in order to increase chances of recovery.

In case of Islamic banks, they are equally vulnerable to credit risk. The risk weighted assets and size of total assets have significant impact on credit risk (Nor Hayati Ahmad & Ahmad, 2004). Moreover, Islamic banks are less involved in off balance sheet items and less responsive to interest rates as compared to conventional banks. So, due to in compliance with Sharia's it has improved their quality of assets (Abedifar, Molyneux, & Tarazi, 2013).

A comparative analysis of conventional and Islamic banks in terms insolvency risk highlighted that real estate lending is directly proportional to insolvency risk for conventional banks. Whereas, real estate lending is inversely proportional to insolvency risk for Islamic banks (Rahman, Ibrahim, & Meera, 2009). The Islamic banks of Pakistan are little involved in long term financing, this is because they tend to have better performance and solvency position as compared to conventional banks (Mansoor Khan, Ishaq Bhatti, & Siddiqui, 2008). Khediri, Charfeddine, and Youssef (2015) argued the Islamic banks are less involved in off balance sheet item that's why they have less credit and insolvency risk. Furthermore, Firmansyah (2015) used monthly data of Islamic bank for the period of 2010 to 2012. The author argued that size and efficiency does not affect efficiency while on the other hand GDP and inflation negatively affect efficiency of Islamic banks.

3.7.2 Loan Loss Provision to Gross Loans and Insolvency Risk

The accounting ratio of loan loss provision in the balance sheet is to give strength to the loan disburses and its portfolio, on average it can be observed that loan gives a significant proportion of banks asset. So therefore, loan loss provision is a critical determinant to obtain the health of the bank asset quality. The higher rate of loan loss provision gives an early warning to the manager about default of any loan and probability of failure as they have better information regarding loans and provisioning (Barth Mary E & R, 2010). So it is observed that the banks with higher capital see less debt problem of nonperforming loans and respond quickly to the adverse economic shock (Berger, 1995; Berger, Herring, & Szegö, 1995; Kim & Kross, 1998; Beltratti & Stulz, 2012). So therefore, provisioning for non-performing loans is negatively related to the failure of the banks. The study of Altunbas *et al.* (2000), examined the efficiency of risk in Japanese banking sector for the period of (1993-1996)`. The author revealed that loan loss provisions, capital finance and size of the bank have significant impact on efficiency and insolvency risk of the bank.

In examination of the ratio of loan loss provision to total loans as indication for asset quality and risk, for 181 large banks including private and public banks, it revealed that the asset quality, profitability and risk of public sector banks is less than other private banks but privates banks have greater chances of failure (Iannotta, Nocera, & Sironi, 2007). On the other hand, in case of Greek Commercial Banking system by using DEA (Data Enveloped Analysis) approach for the period of (2000-2004), it was found that loan loss provision increased the

efficiency of banks and reduces insolvency risk (Pasiouras, 2008). Whereas the capital regulations increased the motivation of bank to indulge more in riskier asset, even the bank has nonperforming loan problem to be sorted (Gonzalez, 2005). Similarly, the bank specific factors such as loan loss provision and other macro level factors such as interest rate, foreign exchange rate, growth of economy for Taiwanese banking sector revealed the supporting results to the former studies (Chiu & Chen, 2009; Sun & Chang, 2011).

In the wake of Asian financial crisis, the regime switched the striker rule of having provisioning against bad loan. The study conducted on Asian banks with sample of 240 banks for 12 countries by Packer and Zhu (2012), deduced that loan loss provision has not only leaned the activities of the banks but also affected the earning of the banks and their input to the growth of economy. The earliest study by Borio and Lowe (2001) noted for 10 OECD (Organization of economic co-operation and development), found negative relationship of loan loss provision and business cycle (Cavallo & Majnoni, 2002; Laeven & Majnoni, 2003; Bikker & Metzemakers, 2005; Craig, Davis, & Pascual, 2006; Bouvatier & Lepetit, 2008; Davis & Zhu, 2009; Packer & Zhu, 2012). This indicates that loan loss provision hinders economic activities of the bank and increases insolvency risk of the bank. Dash and Kabra (2010) examined a more elaborated view of this literature by breaking down NPL into business loans, consumer loan, and mortgage. In their study covering 9 largest banks of Greece during 2003 to 2009, highlighted that mortgage loans had more impact on insolvency risk.

In similar to the previous studies, the studies of Sinkey Jr and Greenawalt (1991) m, Sinkey Jr and Nash (1993) and Kashyap, Rajan, and Stein (2008) finds that the provision for losses are positively related to the probability of failure, especially the assets which are more securitized has significant impact on insolvency risk. So it is necessary for banks to disclose nonperforming loans which are due more than 90 days because nonperforming loans give an early warning to the probability of default (Liu & Ryan, 2006). The study of Foos, Norden, and Weber (2010) examined the relationship between growth of loans and risk of the individual bank. The study undertook more than 16,000 observations between years 1997-2007 and concluded, the growth of loan lead to increase nonperforming loan which ultimately increased loan loss provision. Whereas, the growth of loan and provision of loan has negative relationship with earning of the bank and positively related to the asset risk and insolvency risk of the bank.

In addition, many researchers found that there is a negative relationship between risk and profitability of the bank. The bank exposed to higher risky loan and they have higher level of nonperforming loan. Whereas loan losses affect profitability of the bank but there are some external factor such as interbank lending rate, inflation rate, GDP growth rate, taxation and other market variables that has positive relationship with profitability of the bank and hence negative relationship with insolvency risk (Bourke, 1989; Molyneux & Thornton, 1992; Demirgüç-Kunt & Huizinga, 1999; Athanasoglou, Brissimis, & Delis, 2008; Albertazzi & Gambacorta, 2009; Dietrich & Wanzenried, 2011). On contrary to the former research, the institutional characteristics of the banks in a country do matter, the study noted that the taxation on the banking sector reduces the profitability and

increase insolvency risk of the bank (Demirgüç-Kunt & Huizinga, 1999). Whereas, Albertazzi and Gambacorta (2009) concluded the burden of tax on banks is shifted toward the depositor and loans seekers so the profitability of the bank is not affected that much by the institutional setting and tax system of the country.

The loan loss provision forward looking technique was introduced by Bushman and Williams (2012). The author argued that forward looking loan loss provision gives a timely reflection for the recognition of future losses and helps to smooth the earning of the bank. The empirical finding suggests that market power of the bank reduces the risk of bad loans as well as the risk of probability of default. Moreover, capital regulations reduces the risk in general but market power is more effective to lower down the risk of bad loans and probability of default (Agoraki, Delis, & Pasiouras, 2011).

The empirical analysis with the help of Data enveloped analysis in Middle East and North African Countries (MENA) by Said (2013) between years 2006-2009. The finding noted that credit risk has negative relationship with efficiency and positive relationship with insolvency risk of Islamic banks. Whereas, liquid management in conventional banks is better than Islamic banks but quality of asset, solvency and performance of Islamic bank is better than conventional banks (Hanif *et al.*, 2012). Farook, Hassan, and Clinch (2014) found the relationship between profit distribution and loan loss provision for Islamic banks. The results of the study suggested that the relationship between management profit distributions is inversely related to loan loss provision. If profit is distributed to management of Islamic banks, loan loss provision will be increased.

In case of Islamic banks, it is found that loan loss provision is porcyclical in nature. The author Soedarmono, Pramono, and Tarazi (2017) argued that although expected loan loss is implement in Islamic bank is many countries but loan loss provision is procyclical. Moreover, Islamic banks use loan loss provisions for discretionary managerial actions especially related to management of capital in which loan loss provision is inflated when bank capitalization is reduced.

3.8 Income structure and Insolvency Risk

Banks adopted the new environment by diversifying their product and inducing innovations and positive strategies to retain their clients. The banks not only remained involved in traditional activities (interest spread) but also indulged in non-traditional activities like cash management, asset management and fee brokerage income (Lepetit *et al.*, 2008b). It was empirically deduced by previous researchers i.e. (DeYoung & Roland, 2001; Williams & Prather, 2010; DeYoung & Torna, 2013) that fee based income is more risky than interest margin income but it gives wider range of diversification. For example 1 dollar increase in revenue from non-traditional income will increase profitability by 11.6 cent but it gives an increment of 15.9 cent to insolvency risk (Apergis, 2014). Interest margin income of any bank is less sensitive to fluctuation and bank risk factors. Moreover, bank can diversify its portfolio of income with respect to risk otherwise noninterest income can lead to financial shock (Lin *et al.*, 2012). A study conducted by Rime and Stiroh (2003) took sample of Swiss banks from 1996-1999 and corroborated that those banks which were involved in variety of financial services (traditional and nontraditional services) have weak economy of scope and less improvement in performance.

Furthermore, the introduction of Gramm-Leach-Bliley (GLB) Act loosens the prudential rules which allow the banks to engage in underwriting of stock, diversification product with insurance and were allowed to take the advantage of diversification. The GLB allowed the activities which were previously were not in practice in banking sector (Lown *et al.*, 2000; Rime & Stiroh, 2003). The intent of financial services Modernization act 1999 (FSM) was introduced to strengthen the financial sector services, which allow the financial sector to diversify with industries in the scope of financial sector (Neale, Drake, & Clark, 2010).

Further,Laeven and Levine (2009) examined the international sample of 296 banks from 48 different countries and measured the insolvency risk (Z-SCORE) and earning volatility of stock. They argued that insolvency and volatility of earning is duly effected by the management quality at bank level.

The study of Rivard and Thomas (1997) highlighted that the banks which were operating interstate have higher level of profitability as compared to those working in intrastate banks during the period of 1988-1991 time span. Whereas, the study further argued that interstate banks have lower level of earnings volatility and bank insolvency risk. Furthermore, according to Apergis (2014), insolvency and proftiablity of a bank is posivtivley effected, if a bank is involved in nontradtitinal activities. The empirical results depends on a dataset that covers 1725 U.S with a period from 2000 to 2013 by using panel co-integration methodology.

The empirical study of Laeven and Levine (2007) examine a relation between the value of q of a bank and diversity of income variable that measures the closeness of non-interest income share to 0.5. By this kind of measurement, the bank firm has an

equal non-interest and interest income diversification. The study uses the data of 43 countries over the 1998-2002 and found that those banks have lower q-value which is diversified in nature as compared to those which are working on the same traditional lines of business.

Further, Fungáčová and Solanko (2009) argued that specialized firms and large size banks have higher insolvency risk than small banks, on the other side, foreign banks has higher insolvency risk as compared to domestic bank, whereas state owned banks are more stable. Moreover, the overall risk of the firm making deals with other firms is dependent on the size of the deal which actually produces negative impact on overall risk (Smith, Staikouras, & Wood, 2003; Elyasiani & Wang, 2008; Morales & Estrada, 2010; Onali, 2014; Elyasiani, Staikouras, & Dontis-Charitos, 2015).

The empirical results of Zhou (2014) find that there is no significant relationship between diversification of income and risk of the bank. The risk of bank decreases only if the interest income risk is reduced, while increase in the share of noninterest income increases the volatility and hence the increase in the insolvency risk. While in the same line of results, DeYoung and Roland (2001) argued on the bases of 472 large-scale commercial banks for the time period 1998-1995, that increase in commission income ultimately increases the volatility of banks' and risk, Similarly, Stiroh (2004b) and Stiroh (2004b), the noninterest income of banks in the United States and confirmed that noninterest income would not bring obvious diversification benefits. The same results were highlighted by Berger, Hasan, and Zhou (2010) that the diversification in the income of the bank does not increase profit but it increases the cost. The study results were based on the commercial banks of China for the time period of 1996-2006. In

contrast, Fang, Hasan, and Marton (2011) examined the performance effect by using asset portfolio and diversification of loan in developing economies, the study finds that loans diversification is negatively related to performance as diversification is positively related to the bank performance.

There is a conflict of results in previous researchers. There is no agreed relationship between diversification of income and performance of the bank. Although so many studies have been conducted by the researchers but, some are in favor of diversification while other researcher stated that there is no benefit of diversification for example the study of Zhou (2014).

As suggested by many previous studies based on accounting data that much reliance on non-interest or nontraditional activities actually increase the volatility of earnings without increasing the average profit. In contrast among researchers i.e. (DeYoung & Roland, 2001; Stiroh, 2004a, 2004b) found that diversified banks in US has little gain due to diversification in income. Similarly Stiroh and Rumble (2006) concluded that diversification exists in banking sector but the gain of diversification is much lower than the volatility it produces in earning as compared to interest based activities.

In contrast to the results, the study of Stiroh and Rumble (2006) argued that there is no link between diversification of income and earning of banks, but there was a significant positive relation between non-interest income and market returns. Baele, De Jonghe, and Vander Vennet (2007) Diversification performance in Israeli bank has placed positive impact on performance with optimal selection of portfolio (Landskroner, Ruthenberg, & Zaken, 2005). However, initially diversification gives

higher return but larger dependency on the diversification volatiles the income and increases the risk of the bank (Bhargava & Fraser, 1998).

The study of Berger *et al.* (2010) examined the effect of bank performance and diversifications in commercial banks of China during the period of 1996-2006. The author observed four dimensions: geography, loans assets and deposits. The author revealed that all the dimensions observed increase the cost of banks and reduce the profits.

3.8.1 Income from Advances/ Financing

Interest income of banking is generated by markup on the lending amount. In fact, this is the income banks earn from traditional activities taking deposit from one side and lend it to the loan seekers. The banks with moderate risk exposure show less threat of becoming insolvent as interest income increased the performance of the bank and reduced the probability of insolvency (Sanya & Wolfe, 2011; Hamadi & Awdeh, 2012).

In the wake of interest margin Ho and Saunders (1981) and McShane and Sharpe (1985), McShane and Sharpe (1985) and Allen and Santomero (1997) among some other previous researcher concluded that interest income is the function of interest rate risk and some other systematic institutional factors. In addition the study of Angbazo (1997) argued that the higher rate of interest rate urges the banks to achieve higher rate of interest income which reflect both interest risk and default risk. On the other hand, the cause of reduction in bank interest

income is due to market concentration and high form of competitions (Maudos & De Guevara, 2004; Maudos & Solís, 2009; Maudos, 2017).

Acharya, Hasan, and Saunders (2006) and Elyasiani, Staikouras, and Dontis-Charitos (2015) argued by examining the effect of portfolio diversification with in traditional lines of business for the time period of 1993-1999. The studies revealed that diversification of loans in different sector and industries do not improve and it does not reduce insolvency risk.

Moreover, interest income and noninterest income are related to each other. The higher rate of interest molds the bank to involve in nontraditional activities, whereas, the relationship between interest and non-interest income is negative (Nguyen & Van Dijk, 2012). The study of Li and An (2013) argue that, the change in noninterest income has no impact on interest margin, whereas decrease in interest income leads to increase in noninterest income and insolvency risk. The only benefit of noninterest income is persistence, whereas the major share in profitability is made through interest income and it also increases the market power of the bank (Battese & Van Der Westhuizen, 2013; Louzis & Vouldis, 2015). In case of Lebanese banking sector for the period from 1996-2009, indicated that the shape of return from interest income is different in local and foreign banks. The study further suggested that interest income has positive impact on growth of deposit, inflation, national savings while, it has negative impact on insolvency risk (Hamadi & Awdeh, 2012). Moreover, the more strict requirements of capital from regulatory authorities negatively impact the rate of interest income and positively impact the rate of default (Tsai & Lin, 2013).

Heffernan and Fu (2008) used economic value and added net interest margin to examine the determinants of performance for four different types of banks (state owned, joint-stock, city commercial and rural commercial banks). The empirical findings suggest that bank listing and efficiency exert significant and positive influence on bank performance and negative to insolvency risk. Real GDP growth rate and unemployment are found to be significantly related to bank profitability. There are no effects of bank size and off-balance-sheet activities on bank profitability (Tan & Floros, 2012).

The study of Baele, De Jonghe, and Vander Vennet (2007) examine the risk and return tradeoff in different strategies employed by the banks for a panel data during the period of 1989-2000. The authors argued that the diversification impacts the value of the bank positively while it also increases the systematic risk of the bank. In contrast a study, using a sample of 755 from European banks for the period of 1997-2003 didn't find the benefit obtained from diversification, while the performance of the banks increases with interest income. On the other hand, noninterest income has inverse relation with the performance. Further the diversification of income benefits does no exit due to lack of expertise in the area. The study of Mercieca, Schaeck, and Wolfe (2007) supporting the results of Villalonga (2004), highlights that the banks involved in nontraditional activities is firm destroying.

It was Black, Miller, and Posner (1978), who found that banks with non-banking conglomeration results not only increase in risk but also in social cost. According to Jensen and Meckling (1976) and Aggarwal and Samwick (2003),

managers tend to diversify the income of the bank in different ways in order to gain private benefits like job security. But they do not focus on improvement of performance or reduction in systematic risk. Therefore, the benefit of diversification results in agency problem. As in case of long distance geographically, especially cross border, mergers intensify the asymmetry of information and make it difficult for authorities to monitor the local managers. The factors are also highlighted by the previous researchers among (Berger *et al.*, 2005; Acharya, Hasan, & Saunders, 2006; Baele, De Jonghe, & Vander Vennet, 2007; Deng, Elyasiani, & Mao, 2007; Elyasiani, Staikouras, & Dontis-Charitos, 2015).

Moreover, there is no clear evidence in the past empirical literature about the benefit of diversification. Among many researchers such as (Grossman, 1994; Wheelock, 1995; Hughes *et al.*, 1996; Berger, Demsetz, & Strahan, 1999; Reichert & Wall, 2000; Campa & Kedia, 2002; Landskroner, Ruthenberg, & Zaken, 2005; Baele, De Jonghe, & Vander Vennet, 2007) found that increased involvement in interest and non-interest income increases the performance and stability of the bank, where as other researcher such as (DeYoung & Roland, 2001; Carlson, 2004; Stiroh, 2004a, 2004b; Acharya, Hasan, & Saunders, 2006; Stiroh & Rumble, 2006; Hirtle & Stiroh, 2007) find that larger dependency on non-interest income increases the probability of risk as compared to interest income of the bank. Froot and Stein (1998) produce an inference that benefit of both interest and non-interest income is a hedging technique against the occurrence of costly financial distress. Further the authors argued that involvement of both interest and non-interest income increases the profitability as well as operational efficiency of the bank and reduces insolvency risk. Whereas Landskroner, Ruthenberg, and Zaken (2005) defines that

the gains obtained from diversification actually depend on the portfolio of interest income developed by the banking institution. So therefore, bank will increase its cost of risk if it does not have an efficient portfolio. The finding are consistence with previous authors i.e. (Froot & Stein, 1998; Cebenoyan & Strahan, 2004).

The contrasting result seems like there is a branch of researcher who are in favor of diversification and vice versa actually define the selection of portfolio held by the bank. Furthermore, banks may increase their risk performance when banks try to involve in other industries as they have lack of expertise and may face higher competition. This will increase the inability of the bank to hold and monitor the loans effectively and there will be a dissolution of information between bank and the borrower (Carlson, 2004; Stiroh, 2004a, 2004b; Mercieca, Schaeck, & Wolfe, 2007). In addition to that if banks try to go beyond the benefit of diversification, will ultimately increase risk and damage the relationship between risk and diversification. When the banks become active in creating noninterest income they tend to increase the systematic shock while diversification decreases the vulnerability of the idiosyncratic shock (De Vries, 2005). For example, this is also highlighted in the study of Wheelock (1995) that the bank which have more branches during the recession period were having better performance whereas the banks of Bulgaria were more stable in recession because of their unit banking system. Further results argued by Carlson (2004) who suggest that it is not necessary that diversification will only increase risk, but it has seen that the banks with diverse geographical location had more stable deposits as compared to the bank which remained locally incorporated. This is consistent with the arguments of (John, Donal, & John, 2007) who find that only large union of credit were

benefited by the diversification. Whereas some other studies of (Mercieca, Schaeck, & Wolfe, 2007; Lepetit *et al.*, 2008b) reported that diversification has limited benefits for the small banks of Europe, the interest income is more stable in nature. This is the reason that small banks have higher proportion in banking industry of Europe (Acharya, Hasan, & Saunders, 2006; Sanya & Wolfe, 2011).

The income structure in Islamic banking has significant relationship with insolvency risk. Rahman (2010) and Rahman, Ibrahim, and Meera (2009), finds that income from advances helps to reduce risk in Islamic banks. But high involvement in investment activities increases the risk. The author also noted that in short term investment activities reduces risk but in long term it increases the risk of the Islamic banks. They also earn huge profit from stock market in case of bull-run and suffer badly in case of its crash. In 2008 the investment to deposit ratio of conventional banks in Pakistan were 23.85% as compared to 15.39% of Islamic Banks (Awan, 2009). This indicates that the banks are less involved in investment income and hence less vulnerable to insolvency risk.

3.8.2 Non Traditional Income

Banks which are engaged in nontraditional activities, not only introduce insolvency risk to nontraditional activities but also to the traditional lines of banking products (DeYoung & Torna, 2013). According to Apergis (2014), insolvency and proftiablity of a bank is posivtivley effected, if a bank is involved in nontradtitinal activities. Among many previous researchers the study of Stiroh (2004a), who argued that the share of noninterest income of US banks has effect on insolvency risk. Specifically, the study of Stiroh (2004b) highlighted that the

banks which have lower level of non-interest income activities has higher insolvency risk because a small exposure to nontraditional activities increase the level of insolvency risk.

The introduction of Gramm-Leach-Bliley Act of 1999 removed some of the function barriers from commercial bank to engage in other nontraditional activities, such as investment banking, underwriting, brokerage and some others (Apergis, 2014). So therefore as a result to involve in nontraditional activities it gave a rise to systematic risk and need of more influential regulation for banking (Cetorelli & Peristiani, 2012). Among previous authors i.e. (Cornett, Ors, & Tehranian, 2002; Deng, Elyasiani, & Mao, 2007) argued that involvement in nontraditional banking activities reduce the cost of whereas high economy of scale and benefit can be obtained by management of portfolio (Mester, 2010).

The study of Berger *et al.* (2010) studied the dataset of during the period of 1999-200 of Russian Banking sector and argued mixed results. The author found that the diversification strategy is related to the performance of the bank. Whereas, the performance of the bank is nonlinear associated with the traditional activities of the bank. There is certain threshold of nontraditional income generation where the profit will increase and risk will be decreased, crossing the threshold will increase the risk of the bank. The finding is consistent with other researcher such as, Baele, De Jonghe, and Vander Vennet (2007), they investigated the share of bank non-interest income and risk in stock return of the bank for the period of 1989-2004 of European banking sector. Similarly in addition, there is no guaranteed strategy of diversification that will produce increased performance and

reduction of risk. the results obtained from the observation of 105 Italian bank for time span of 1993-1999 and using the database of 963 German banks for the period of 1996-2002 (Acharya, Saunders, & Hasan, 2002; Craigwell *et al.*, 2006; Hayden, Porath, & Westernhagen, 2007).

Cybo-Ottone and Murgia (2000) investigated Mergers and Acquisitions (M&A) in European banking, the results revealed that banks which diversified their products in insurance obtained extra normal results. However, the banks merged with foreign institutions and securities firms did no gain any benefit. The study of Focarelli, Panetta, and Salleo (2002), using the data of Italian bank found that return on equity after the transaction of merger increases and the long term profitability of the bank. Sinkey Jr and Nash (1993) examined the lending of credit card for commercial banks and found that the earning is more volatile and increase the probability of failure for the banks with fundamental product mixes. The diversification of banks in mutual funds analyzed by Gallo, Apilado, and Kolari (1996) reports that it increase the profitability of the bank while there is a slight change in the risk of the bank. Stiroh and Rumble (2006) investigate the relationship between diversification of revenue and adjusted risk performance of US banking firms. The author reported that the diversification benefits are offset by the cost associated with the increase involvement in nontraditional activities and earning volatility. According to Boyd, Chang, and Smith (1998) and Boyd, Graham, and Hewitt (1993) in perspective of risk that the bank diversification of product with insurance products is a strategy likely to reduce the cost of bankruptcy as also cited by (Mercieca, Schaeck, & Wolfe, 2007).

The study of Li and Zhang (2013) focused on the Chinese banking industry and argued that there is a marginal benefit of non-interest income. The increase in reliance on noninterest income will increase the cost of risk as compared to the traditional interest income, even though noninterest income benefits the diversification. Further, income from nontraditional activities is more cyclic in nature as compared to interest income. It is defined in previous researches that noninterest income non only increase the profitability of the bank but also it's a hedge to stabilize the banks earning and reduces risk (Eisemann, 1976; Brewer, 1989). As canal (1993) remarked that the earning from new business units benefit and significantly improves the performance of the bank and reduces insolvency risk.

The study of Lepetit *et al.* (2008b) argued that there is a negative relationship between interest margin and noninterest income, the study concluded on 602 European banks for the period of 1996-2002. In contrast, Chiorazzo, Milani, and Salvini (2008) concluded that there is positive relationship between non-interest income and diversification of bank products in Italian banks for the period of 1993-2003. While the question is with standing that either noninterest income increases the stability of the bank of not. Whereas bank tends to involve in diversification with real estate firm likely to increase their risk (Rosen *et al.*, 1989). Similarly, DeYoung and Rice (2004) find that the increase reliance on noninterest income will further increase the risk and lower the earning of the bank.

The return on assets has negative relationship with transection fee and it increase both profitability and risk of the bank in Australian Credit Unions (Esho,

Kofman, & Sharpe, 2005). Stiroh and Rumble (2006) and Mercieca, Schaeck, and Wolfe (2007) explains that reliance on non-interest income negatively effects the stability of the banks measured by Z-SCORE. Baele, De Jonghe, and Vander Vennet (2007) find that exposure to non-interest income increases the risk of the bank; whereas non-interest income has higher expected return by using Tobin's Q. the study of Busch and Kick (2009) focus the German banks for the period of 1995 to 2007 for non-interest income and performance of the banking sector. The author concluded that the public banks has positive relation with fee and brokerage income but commercial banks has an opposite negative relationship with the fee and brokerage income. In perspective of portfolio theory, Zhou and Jing (2008) investigated the relationship between noninterest income and net operating profit of the commercial banks for the period of 1999-2006 and concluded that total earning volatility is negatively related to the net operating volatility while noninterest income is positively related to the total earning volatility. The study of Li and Zhang (2013) as cited in Vallascas and Hagendorff (2011) that European banks involved in noninterest income activities experience the increase in default risk. The study for the sample of 1334 bank from cross 101 countries in the reign of crises, concluded that diversification of bank based activities are destroying the value of the bank (Villalonga, 2004). The researches i.e. (Demirgüç-Kunt & Huizinga, 2010; Elyasiani, Staikouras, & Dontis-Charitos, 2015; Akhtar & Ahmad, 2016) suggested that increase involvement in noninterest income generating activities to some extent diversify risk but prominently relying on such activities are very risky like in banking sector of U.S.

3.9 Macroeconomic Factors and Insolvency Risk

The study has taken four macroeconomic factors which are GDP, inflation rate, interest rate and corruption perception index. The literature of all these four variables is discussed in the following subsections.

3.9.1 GDP Growth

One of the most important factors studied in recent research is GDP growth that has impact on business cycle and its sustainability. In recent past researches GDP is taken as an explanatory variable for the growth of business cycle and provision of expenses. The GDP growth has an impact on nonperforming loans as well as on the loan loss provision (Packer & Zhu, 2012).

The higher rate of economic growth has a positive impact on small and large scale incorporated bank. There is a positive relation between GDP growth and sustainability of banking sector (Berger, Hasan, & Klapper, 2004 b). On the other hand some of the previous researchers have concluded that strong banking system can observe the economic shocks of the country (DeYoung, Hunter, & Udell, 2004; Mercieca, Schaeck, & Wolfe, 2007). The study on Russian banks concluded that the loan quality of the banks is severally deteriorated by the external macro-economic conditions such as GDP (Pestova & Mamonov, 2013). For example, the quality of loan in both commercial and saving banks to GDP ratio in Spain (Salas & Saurina, 2002) has different sensitivity approach as compared to the problematic loans to GDP in Greece (Louzis, Vouldis, & Metaxas, 2012).

As the rate of economic growth goes up the income translation from the growth improves and so the debt capacity of the borrower improves. This leads to decrease in credit risk of banks. A similar relationship holds for the unemployment rate as it reflects both households and firm's income. Some researches include solvency indicators of individual economic agents: households, corporate sector (Salas & Saurina, 2002; Glogowski, 2008) or central government (Louzis, Vouldis, & Metaxas, 2012). Some authors include asset prices (approximated by inflation rate, house price growth and stock market growth) to take into account influence of collateral inflation, asset bubbles and wealth effect on banks' credit and insolvency risk (Quagliariello, 2007; Nkusu, 2011; Pestova & Mamonov, 2013).

The study of Castro (2013), using panel data of five countries for the period of 1997q1 to 2011q3 to examine the impact of risk which is affected by macroeconomics environment variable. The author concluded that risk is worsened when the economic growth goes down and rise in unemployment is there, whereas the risk is also impact by the exchange rate. The other authors i.e. (Kattai, 2010; Fainstein & Novikov, 2011), concluded the same remarks for the banking system of three Baltic States which are Estonia, Latvia and Lithuania, the results were in line that GDP growth and interest rates has significant impact on stability of banking system.

The previous literature shows that growth of GDP and lending interest rate has significant contribution in soundness of banking system. The studies of Salas and Saurina (2002) Jakubik (2007), highlights the findings on the banking sector of Span and Czech republic found that growth of GDP and interest rate has

significant impact on quality of loans and risk of the bank. By the use of logit model for the period of 1995 to 2009 on the banking sector of Australia the author Ali and Daly (2010) provides significant evidence that growth of economy, interest rate and total lending are indicator for prediction of default. While in comparison to the economy of USA, macroeconomic shock adversely affects USA banking system than Australia banking system.

In contrast to the literature, Louzis, Vouldis, and Metaxas (2012) finds that GDP growth , interest rate and unemployment has greater impact on credit and insolvency risk but there are some other explanatory variable involved such as performance and efficiency indicator have additional power to explain the relationship. The study of Festić, Kavkler, and Repina (2011) uses panel data technique for newly added EU (European Union) states Bulgaria, Estonia, Romania, Latvia, Lithuania, find the mix results of lower rate of GDP and credit growth. The study revealed that variables have impact on performance as they significantly impact on credit and insolvency risk.

The study of Osamwonyi and Michael (2014) found that there is a positive relationship between GDP growth and return on equity (ROE), while the impact of interest has negative relationship with ROE (return on equity). The author noted that there is no significant impact of inflation on ROE (return on equity). In line to the former studies Rasiah (2010) and Al-Tamimi and Hussein (2010), it was found that that there is a positive relationship between GDP and return on asset in banking sector of UAE, for the period of 1997-2008. The study of Pasiouras and Kosmidou (2007) noted that there is a positive relationship between condition of economy

and ROA (Return on assets), the study undertook foreign and domestic commercial banks of 15 European countries. The effective management of asset and growth of economy has established significant positive relationship with profitability measure (ROA and ROE). The higher rate of nonperforming loans and capitalization leads to decrement in profit (Ali, Akhtar, & Ahmed, 2011).

In a comparison of conventional and Islamic banks, Zeitun (2012) documented that in GCC countries both banking system are effected by internal and external factor. The external factors which affect more on profitability were GDP and inflation. The results of the author highlighted that GDP effects positively while inflation effects negatively to profitability. In other words, GDP is negatively related to insolvency risk where as inflation has a positive relationship with insolvency risk. Moreover, in a study of Zopounidis *et al.* (2017), the author interrogated the stability by using Z-SCORE for Islamic and conventional bank in Middle East and North Asian Countries (MENA). The results highlighted that both banking system has stability issues but risk is positively related to commercial banks profitability while it is negatively related in Islamic banks**.**

3.9.2 Inflation Rate

The Study of Davydenko (2010) the result pointed that ROA has positive relationship with gross domestic product (GDP) and inflation of banks in Ukraine hence inversely related to insolvency risk. Scott and Ovuefeyen (2014) studied the earnings of largest five banks in the United States. Their findings showed that GDP affects the profit levels of U.S. directly. Hoffmann (2011) researched on U.S. Banks using pooled OLS estimation approach and GMM and found the similar

result to the previous argument. In contrast, the study of Sharma and Mani (2012) carried out an empirical research on Commercial Banks of Indian between the years 2006 to 2011. The authors found insignificant relationship of gross domestic product (GDP) and inflation with ROA and inverse relationship to insolvency risk.

The study of Zeitun (2012) used macroeconomics factors for the banking sector of Gulf cooperation council countries, the results from cross sectional time series panel date observed that ROA and ROE has positive relationship with GDP whereas inflation has negative relationship with ROA, ROE and positive relationship with insolvency risk. The research of Khan *et al.* (2013) carried on the banking sector of Pakistan and for the year 2006-2009. The finding of the study revealed that consumer price index (CPI) and GDP growth rate has significant positive relationship with ROE and ROA. Also, Gul, Irshad, and Zaman (2011), analyzed 15 top Pakistani commercial Banks portability for the 2005 to 2009. The study found strong positive relationship between external variables and performance of bank indicators.

The finding on the banking sector of Nepal concluded that inflation rate and foreign exchange rate fluctuation has significant impact on the risk of the bank (Poudel, 2013). The study of Thiagarajan, Ayyappan, and Ramachandran (2011) investigated the results of current year and one year bank inflation with risk of the bank, the study noted that the current inflation has positive impact on risk in case of public sector bank, but no impact on private sector banks, where as one year lag inflation has no significant relationship with risk of the bank. In addition, the previous researches of i.e. (Rinaldi & Sanchis-Arellano, 2006; Gunsel, 2012)

investigated the results for North Cyprus and Euro zone countries and noted that there is a positive relationship between inflation and bank risk. In contrast, in case of Honkong, Romania and Tunisian Banking sector, there is a negative relationship between inflation and risk of the bank (Shu, 2002; Vogiazas & Nikolaidou, 2011b; Zribi & Boujelbène, 2011). On contrary to the previous researches the studies of (Aver, 2008; Bofondi & Ropele, 2011; Castro, 2013) on Slovenian, GIPSI and Italian banking system noted that there is no relationship between inflation and risk of the bank. Demirgüç-Kunt and Detragiache (1998), argued that weak macroeconomics environment has the reason to slow down the growth of economy and rise in inflation, whereas the growth of economy and CPI (Consumer price inflation) are positively related the profitability of the bank and negatively related to insolvency risk (Alexiou & Sofoklis, 2009).

On the other side the central banks to introduce policies to counter the higher level of inflation and the interaction with the financial sector the country, the adverse economic environment free resources so they transect in other form of risk with the economy (Tsatsaronis, 2005).

The study of Tan and Floros (2012) and Zhang *et al.* (2016) examine the empirical results there the profitability of banks is positively related to the factors such as efficiency of cost, development of banking sector and inflation in case of Chinese bank. The lower profitability can be associated to higher rate of taxation and involvement in nontraditional activities. In addition, the research of Boyd and Champ (2006) argued that the countries which have higher inflation rate and small banking and equity market and the bank do not tend to loan out in private sector of

the country. In case of determinant of profitability in EU (European Union Zone) the authors among (Molyneux & Thornton, 1992; Staikouras & Wood, 2003; Goddard, Molyneux, & Wilson, 2004) noted that the profitability of the banking sector of EU has macroeconomic determinants. The external macroeconomic factors influence the profitability of the banks. In addition to, the study on Australian banking system by Williams (2003) for the period of 1989-1993 suggests that, the GDP growth of foreign banks home country and share of noninterest income are positively related to the profitability of the bank.

The study of Scott and Ovuefeyen (2014) studied the commercial bank during the period of crises 2007 to 2010. The author suggests that inflation and size of the bank has significant impact on the profitability and risk of the bank. They further suggested that the trade openness and inflation has negative impact on the profitability of the bank.

In case of banking sector of Pakistan Akhtar, Ali, and Sadaqat (2011) and Abdullah, Parvez, and Ayreen (2014) examined the profitability pointers of the commercial banks of Pakistan both private and public for the year 2006-2009 using return on assets (ROA) and return on equity (ROE). The author investigated the impact of macroeconomic factor impact of profitability; the study noted that the macro economic factors have positive impact on ROA and ROE.

Boyd, Levine, and Smith (2001) and Umer. M (2014) found a non-linear significant negative relationship between inflation and banking sector stability. They attested the existence of the rapid diminishing trend on banking lending activities as inflation increases marginally that leads to a discrete drop in the

financial sector performance. The stud of Rahman and Serletis (2009) studied that the effect of inflation uncertainty on real economic activities using data from four industrialized countries. Their result indicated differential impact of inflation on output growth in different countries studied. They argue that the effect depend on the structure and financial pattern in different countries. Namazi and Salehi (2010) found a direct correlation between inflation and decrease of absorbed deposit and loans given in relation to the capacities of banks. Therefore, any raise in the rate of inflation will lead to a corresponding decrease in banking system performance and reduce the stability of banking system.

The study of Bukhari and Qudous (2012) takes into account a larger set of variables such as size of the bank, Advances, Deposits, non-interest income, quality of credit, interest income, quality of management, interest rates, import and exports and consumer price index (Consumer Price Index). The author suggested that internal variables have impact on the bank profitability and risk whereas external variables do not affect the profitability and risk of the bank. In contrast, Buyinza (2010) argued that banks profitability is associated with higher capitalization, whereas inflation and GDP show mixed effect on the profitability of the bank.

The key motive of the study of Ali and Daly (2010) is to compare the impact of macroeconomic shock on the economy of US and Australian banking sector. The finding revealed that Australian banking sector is much immune to the adverse economic shock as compared to the US banking sector. The default rate in US is

more than the default rate of Australian banks as an impact of macroeconomic variables.

Thus, the impact of inflation on the banking sector of any country is harmful and also it is adversely impact the economy. Inflation reduces the purchasing power of the consumer, exchange rate of the bank, opportunity cost of future currency holding, and deteriorates the quality of assets. Whereas it is also a source of improvement in bank performance, if banks can anticipate the future cost of holding (Umer. M, 2014).

The studies on financial stability have gained much importance in the policy building specifically with macroeconomics factors for developed countries. The global crisis of 2008 has gone diverted the research study on managing risk with macroeconomics variables especially for the banking sector. In Islamic banks, inflation has a negative correlation with profitability of the bank but the relationship is insignificant (Chun & Razak, 2015).

3.9.3 Interest Rate

The interest rate for lending is an important measure of risk that affects the debt burden of the bank. The effect of interest rate on risk is said to be positive. In fact, the increase in interest rate will ultimate lead to increase rate of nonperforming loan of banks as the debt servicing capacity of borrowers declined (Aver, 2008; Nkusu, 2011; Louzis & Vouldis, 2015). An increase in the market rate of interest will increase the return of bank, but it will also increase the rate of nonperforming

loans. As suggested by the theory of asymmetric information, higher interest rate is positively related to higher rate of nonperforming loans.

In the recent past the line of research has focused on interest rate in the banking system since the mid of 2000s. The low interest rate has increased the risk of bank as to manage the portfolio the banks tend to disburse low quality credits. Empirical evidence on risk of banks is limited. The recent study of Delis and Kouretas (2011) on the area of euro zone bank with approximately 18000 observation for the period of 2001-2008 presented a strong empirical evidence that lower rate of interest has increased the risk of bank substantially. Among previous researchers i.e. (Brissimis & Delis, 2010; Jiménez, Lopez, & Saurina, 2013; Ioannidou, Ongena, & Peydró, 2015), worked on the channel of monetary policy and bank risk to manage the monetary policy implemented by regulatory authorities for the banks. The study of Jiménez, Lopez, and Saurina (2013), worked in the area of Spanish banking system for longer period and explains that monetary policy for lower interest rate is associated with higher risks for the banks. Whereas, the study of Brissimis and Delis (2010) on Bolivian banks sector sorted out the same results.

The study of Cebula (1999) examined the relationship of interest rate on treasurer notes minus inflation and noted there is a negative relationship between interest rate and risk of the bank. In contrast, the Fofack (2005) argued in case of sub Saharan Africa and revealed that there is a positive relationship between interest rate and risk of the banks. The author further argued that this will increase the cost of deposit and will reduce the profit of the bank. On another hand, the

study of Jesus and Gabriel (2006) used interbank lending rate to check the impact of interest rate and nonperforming loans. The author noted that interest rate and nonperforming loans are positively related to each other.

The previous literature shows that growth of GDP and lending interest rate has significant contribution in soundness of banking system. The studies of Salas and Saurina (2002) and Jakubik (2007), highlights the findings on the banking sector of Span and Czech republic found that growth of GDP and interest rate has significant impact on quality of loans and risk of the bank. By the use of logit model for the period of 1995 to 2009 on the banking sector of Australia by Ali and Daly (2010) provides significant evidence that growth of economy, interest rate and total lending are indicator for prediction of default.

It was observed by Andrei (2014) that the most significant impact is produced by the interest rate and rate of unemployment in risk of the bank. The role of GDP is less effective in case of Romania. The study on the banking sector of Greek analyzed the role of lending rated with NPL (nonperforming loans), the study argued that there is a strong positive relationship between nonperforming loans and lending rate of the country, quality of management and higher rate of operating expense (Louzis, Vouldis, & Metaxas, 2012; Louzis & Vouldis, 2015). Furthermore, the same results were obtained by Espinoza and Prasad (2010). In addition to the previous research argued, the role of interest rate risk is somewhat more significant as compared to other factors involved in risk, the higher rate of interest can lower down the profit by 50% in first year and in third year the ratio of decline will be 100% (Drehmann, Sorensen, & Stringa, 2010). The study of Jarrow

and Turnbull (2000) was the first in nature who introduce the integration of interest rate with risk, the study concluded that interest rate has significant impact on risks especially on asset quality (e.g. see (Carling *et al.*, 2007)).

The financing structure of Islamic banks is mostly on non-profit and loss sharing. The nonprofit and loss sharing based financing were 91% of the portfolio between years 1976 to 2004 in Islamic banks. The financing based on equity changed sum was increased to 11.3% but remaining income of the Islamic portfolios is still non profit and loss basis (IslamicDevelopmentBank, 2004, 2007). Therefore, Islamic banks should be regulated similarly as conventional banks as most of the portfolio is non profit and loss basis (Chong & Liu, 2009). There are two sources of financing available in Islamic banks asset based financing and debt based financing. The reason why Islamic banks are more involved in asset based financing is the lack of secured rate and collateral. Therefore Islamic banks are using debt based financing more than asset based financing similar to conventional banks and using same interest rate as bench mark for earning (Shahari, Zakaria, & Rahman, 2015).

3.9.4 Corruption Index

The use of public offices for own personal gain is generally defined as corruption (Bardhan, 1997). The main form of corruption is bribe which is received by the public officials, the embezzlement of public resources by the selected administrators entrusted to exploit resources in right way, manipulation of information, extortion, use of public resources for personal use and favoritism (Andvig *et al.*, 2001; Swaleheen, 2011; Nguyen & Van Dijk, 2012). The notion

corruption is widely understood as “the acts in which the power of public office is used for personal gain in a manner that contravene the rules of the game’’ (Jain, 2001).

There are five basic reasons of corruption defined by the economists behind a corrupt society, illegal gathering of wealth and corruption in an economic environment. The first reason of corruption is vice versa in nature that a corrupt government is a product of corrupt society and elected candidate carries corrupt government (Aburime, 2010). The second major source of corruption comes from the illegal collection of wealth from public resources by the political government is a major cause of corruption. Third reason is the set of transactions and incentives taken by the officials especially in developing countries to encourage corruption in transactions. The imperative transactions and are such wide spread in society that creates materialism, higher inequalities in income, poverty, persuasion of illegal accumulation of general public wealth, low and irregular salary structure for government officials with which they have to bring up their families (Frisch, 1997; Aburime, 2010). Fourth reason of corruption is done by the illegal summation of wealth from government resources, which pursue other individual of the same society to ask for means of corruption. The means of corruptions pursue an individual to involve in money laundering, controlling the administrative process and have some foreign accounts for money (Aburime, 2010). The fifth and the final reason of corruption is law and order and justice prevailing in the society, when if there is no fear of punishment the giant of corruption spreads rapidly. In the developing countries the law governing bodies of taxation system have many

flaws in collection of money which enable the individual to exploit the public money and also the tracking of that money is not possible (Aburime, 2010).

The empirical analysis of Bai *et al.* (2013), by using survey methods with 13000 respondent for data collection in Vietnam between the years 2006-2010. The purpose of the study was to find a relationship between growth of industry and provinces. The finding of the study was that the growth of the firms inversely affected by the bribe extraction. The finding is true for the firms which has multiple offices in various areas of the country. The finding of the study further revealed that the developing countries can only subside the corruption by economic growth with good institutions.

Among the previous researcher (as in, e.g., (Svensson, 2003)) did the first study to provide the evidence on corruption impact on economic growth. The study suggests that the increase in the growth of corruption will reduce the culture of bribery, this way can subside corruption. It is not necessary that rooting out the corruption from the economy will entice the growth of the economy but corruption might reduce the country growth. The previous studies suggest that improving the quality of institutions in both politically and economically ultimately reduce the embezzlement of bureaucratic corruption (Acemoglu & Johnson, 2003; Glaeser *et al.*, 2004; Acemoglu, Johnson, & Robinson, 2005; Glaeser & Saks, 2006). The property rights for the firms are factors that affect both growth and corruption of the firms and it has been studies widely in the previous literature. The property rights do give the economic benefit to the firm and strong evidence theoretically and empirically exist between property rights, growth of the firm and domestic

investments (North, 1991; De Long & Shleifer, 1993; Weingast, 1995; Olson, 2000; Acemoglu & Johnson, 2003; Jones, 2003; Acemoglu, Johnson, & Robinson, 2005; Goldstein & Udry, 2008).

The institutions of any country matters, when the institutions are not well developed corruption may trigger the economic growth. The study of De Vaal and Ebben (2011) defines the contrary setting that if institution are not well developed corruption impedes economic growth. Further, it was highlighted in the study that corruption can be studied without studying the proper setting of the institutions theoretically and empirically. In support to the former argument, removing corruption completely from the economy may affect it adversely. The recent literature is in support with the argument that complete removal of the corruption from the economy affect negatively; the notion is missing in the previous studies while studying corruption with economic growth (e.g. (Méndez & Sepúlveda, 2006; Heckelman & Powell, 2010)).

The effect of corruption is no linear with the growth and per capita income, but corruption has significant impact on growth and per capita income (Swaleheen, 2011). The study investigated the direct impact of corruption and economic growth on real per capita income and it has a non-linear effect. The study of Kaufmann (1998) and Kaufmann and Wei (1999) finds that in an economic system where bribe are more and people has to pay much amount for work, in that particular system manager given more time in collection of money than doing productive work. The reach of corruption is not has significant probability on lower levels where as it escalates at higher level of management which is due to stable growth

(Rose-Ackerman, 1997). Indeed among previous researcher Kaufmann (1998) and Méon and Sekkat (2005) used a different methodology as have been used by some other researcher. The author used corruption as an interaction term for quality of government. The author further suggested that corruption is another form of distortion which is added to the poor quality of governance.

The study of Méon and Sekkat (2005) uncover the finding that poor quality of governance increases corruption and reduce the economic growth. As the quality of governance improves there is a reduction in corruption. The only problem defined by the author is that corruption and quality of governance should be treated in an unrelated way because the two part are integrated in the system of corruption and possibly increase distortion (Bardhan, 1997).

The empirical study on Vietnam's private sector argued that corruption impedes the economic growth of private sector whereas it do no produce any impact on state owned institutions. The finding were on the basis of a survey of 741 private and 133 state owned enterprises to measure the severity of corruption (Nguyen & Van Dijk, 2012). The people involved in corruption are mostly from public office and politician who have power to control government resources.

The previous literature also document that the consequence of corruption, like it has a strong negative impact on the development level of human growth (Mo, 2001). The empirical study of Ahlin and Pang (2008) revealed that corruption reduces the level of growth of an economy by 0.72%, the study documented the results on the basis of 71 countries, and the control of corruption will improve the quality of economic growth. Méndez and Sepúlveda (2006) studied the long run

impact of corruption on economic growth. The author argued that there is non-monotonic relationship between corruption and economic growth in politically free countries. On the other side, for economic sustainability, the lower level of corruption is needed while higher level of corruption is detrimental for growth.

The empirical studies on corruption are mostly on the level of country whereas are there are very few countries those are on firm or on sector level of any country. There are only few studies performed on firm level, among which are Fisman and Svensson (2007) and Tarp and Rand (2012). The study on the Ugandan firms revealed that the corruption works like the deduction of taxes from the income statement. If one point increment in bribery is there it will follow three point of reduction in growth percentage of the firm (Fisman & Svensson, 2007). The study of Tarp and Rand (2012) on the incidence of corruption in Vietnamese is associated with different firm level characteristics such as visibility of firm, ability to pay and interaction with public officials. The finding suggests that the growth of the firm is negatively related to the bribe payments. The examination of corruption on the success of policies in a simulation developed for Southern Italy suggests that the corruption has negative impact on growth of economy, private investment and government expenditure for public investment in Italy (Del Monte & Papagni, 2001). In contrast, there is weak relation of corruption with economic development in US states, reveal by the study of (Glaeser & Saks, 2006).

The empirical analysis of Mo (2001) by using least squares estimation techniques concluded the results that 1% increase in corruption reduces the growth of economy by 0.72% or may be defined as one unit increase in corruption

perception index reduces the growth of economy by 0.545 unit percentage. The most important channel to impact the economic growth is political instability which almost contributes 53% of the total effects. Another empirical study reveals that units increase in level of corruption decrease the growth of GDP and per capita income between 0.75 to 0.9 percentage points in GDP and 0.39 to 0.41 in per capita income per year. Further Gyimah-Brempong (2002) argued income inequality is positively related with the corruption in African countries. The effect of corruption is negative with the growth of income and positive with inequality. Corruption ultimately affects poor more than rich. The only study on the economic growth of Pakistan revealed that the economic growth is slower down by the corruption whereas financial development, trade openness increases the growth of economy (Farooq *et al.*, 2013).

The use of GMM estimation for 38 different countries to check the impact of corruption on economic development, the finding of study revealed that the corruption impedes economic growth of the country (Ahmad & Ali, 2010). The study of Ali and Daly (2010) examined the relationship of corruption and growth of economy. The author argued that lower level economic growth in industrialized economies is due to higher level of corruption, whereas there is no relationship determined between growth of economy and corruption in non-Asian countries. The author further noted that in Asian countries there is a positive relationship between growth of economy and corruption.

In support to the former studies, the empirical study on the Bangladesh, Paksha Paul (2010), concluded that there is a negative relationship between growth of economy and corruption with the rise of economy of Bangladesh.

A brief empirical study of Uğur and Dasgupta (2011) on a cross country analysis done on both poor and higher income countries. The author reports a negative relationship between economic growth and corruptions both in lower and higher income countries. The effect of corruption in lower income countries is significantly negative which 0.07% . The indirect impact of corruption through other channel such as public finance and human bases is significantly higher which are -0.23% and -0.29%. Hence the precision effect is -0.59%. So therefore in low income countries 1% increase in corruption will lead to 0.59% decline in economic growth. The corresponding effect of both lower and higher income countries is -0.86%. Therefore gain in economic development can only be done with the help of anticorruption intervention and strict policies.

Most of the previous researcher concluded that corruption is harmful in development of economic growth, Ajie and Wokekoro (2012) noted the same results for Nigerian economy. The political not only reduces the growth of economy but it also increase unemployment and poverty as well (Egharevba & Chiazor, 2013). The private sector of any country is not only affected directly by corruption but also indirectly by the taxes imposed, the increase in corruption forces the government to increase the taxes which discourage the private sector and private investment (Dissou & Yakautsava, 2012). The use of polynomial regression to calculate the impact of corruption on economic growth the author

Saha and Gounder (2013), performed analysis by using data of 100 developed and underdeveloped countries. The author noted the findings that the economic growth has an inverse relationship with corruption and there is a dire need to implement a strong economic development policy to reduce corruption. The empirical finding of Ugur (2014) revealed the same result that corruption and economic development has negative relationship. In case of Tunisia Dridi (2013), the finding reported that corruption adversely affect economic growth and destabilize the political stability.

All the previous literature suggests that corruption impedes economic growth while growth of economy increases debt servicing capacity of borrower and it helps to reduce insolvency in the firm. Moreover, some studies also suggest that corruption slows down the growth and development of the firm. Therefore, on the basis of previous literature, it can be argued that corruption slow down the growth of firm and increases the operational risk, credit risk, liquidity risk and insolvency risk. Hence, the current study is motivated to empirically examine the direction relationship of corruption on insolvency risk of Islamic and conventional banks of Pakistan.

3.10 Capital Regulation

Capital ratio. The provisioning of capital is to build a greater cushion against reserves and to counter the problem of capital depletion. In the past the studies of studies (Craig, Davis, & Pascual, 2006; Davis & Zhu, 2009), finds there is less evidence on constraints of capital and provisioning. In regard of the studies they argued that capital ratio can be taken as an explanatory variable. Whereas in contrast some finds that there is no effect of capital on provisioning (Packer & Zhu, 2012).

The purpose of capital requirement was introduced by Basel Committee on Banking Supervision (BCBS) in Basel I, Basel II and Basel III is to ensure that a financial institution have sufficient capital to absorb any unexpected loss (InvestoPedia, 2015). In accordance to the Basel Accord, financial institution has to meet capital requirement. Gauthier, Lehar, and Souissi (2012) concluded that macro prudential rule reduces the default probability as well as systematic risk probability by 25%. Francis and Osborne (2012) suggested that bank tends to adjust their capital as per need of regulator, they tend to adjust their capital ratio depends on the gap of actual and desired target ratio, which make it difficult to assess the risk involved. It is also evident that if the regulatory requirement is tightened it will negatively affect efficiency and increase the cost of risk (Barth *et al.*, 2009).

Capital adequacy regulation is the capital index developed by Barth James, Caprio Gerard, and Ross (2004) to calculate the strictness of capital requirement for each country, so as the it is the pillar of Basel pillar 1 (Bushman & Williams, 2012). The aim for development of macro prudential rule is to curtail the systematic risk, reducing the impact of financial crisis on economy and increasing the immune system of financial system (Angelini, Neri, & Panetta, 2014). Furthermore, Bukhari and Qudous (2012) suggested that capital adequacy ratio has positive relationship with profitability of the bank including some other macroeconomic factors also such as growth of GDP, supply of money, which have positive impact on profitability of bank

The studies of Acharya *et al.* (2011) and Onali (2014) empirically deduce the impact of capital regulation on dividend policies during the period of financial crises, whereas the relationship between dividend and risk of the bank is positive. Furthermore,

banks which are close to maintain minimum capital requirement have significant low level of dividend ratios.

In the view of nontraditional activities by the bank there is an increment in systematic risk of the firm. Capital regulation reduces the risk of the bank but the banks involved in diversification has increased their risk as compared to those who did not participated in diversification of their portfolio (Neale, Drake, & Clark, 2010).

The prior empirical studies in relation to the capital regulation and risk have certain following results. For example Laeven and Levine (2009) argued that the relationship of capital regulation, policies of insurance deposits and restriction on bank activities depend significantly on structure of ownership. Whereas, Agoraki, Delis, and Pasiouras (2011) noted that capital regulation and management power are the effective devices to monitor the risk of the bank to calculate the equity to capital ratio in order to decrease the risk. Further they concluded that restriction on baking sector do not have any countervailing positive impact on bank sector activities.

In addition concluded by previous researcher Ofoeda, Abor, and Adjasi (2012) that restriction implementation by capital regulation on banking activities increases the risk of the banking sector. The higher rate of minimum capital requirement increase the risk measure of the bank because the higher capital requirement will force bank to limit its activities and it also decrease the charter value of the bank (Hellmann, Murdock, & Stiglitz, 2000). The study of Gordon and Li (2009), argued that unhealthy banking sector increase the cost of agency, the managers tend to behave in their personal way rather to reduce risk of the bank. There is a dual impact of capital regulation on risk and

risk impact on capital regulation, Jacques and Nigro (1997) find it in accordance to the Basel accord.

The role of supervisory control and capital requirement woks as monitoring device against risk, as they tend to increase equity to capital ratio and decrease risk (Agoraki, Delis, & Pasiouras, 2011). The involvement of bank in insurance activities positively impacts the level of banking activities given that the institutions are well developed. On contrary, the most hypotheses of the study were inconclusive of which argued that risk based capital regulation of banks are actually to prevent from excessive risk taking by the bank (Repullo, 2004). Whereas the Basel accord did not allow banks to take extra risk, the Basel guide line approves the reduction of risk on risk of bank portfolio (Sheldon, 1996). Similarly, the restriction of capital regulation leads banks to develop a stricter criteria for disbursement of loans (Bolt & Tieman, 2004). In contrast to the former study Hellmann, Murdock, and Stiglitz (2000), those argued that additional requirement for mitigation of risk will devalue the franchise and encourages gabling.

Abdul Wahab, Rosly, and Masih (2014) suggests that in terms of capital adequacy ratio the managers of Islamic banks follow the same practices as in conventional bank. Karim *et al.* (2014) noted that there is significant relationship between capital adequacy requirement and on deposit and loan growth in Islamic banks in Organization of Islamic Conference (OIC) between the years 1990-2009.

The study of Pastory and Mutaju (2013) uses panel data of 33 banks for the period of 2003-2011 and using linear regression model for finding in order to test the relationship between capital ratio with nonperforming loans and loss provision. The

results suggest that capital adequacy ratio has greater influence on asset quality. Increase in capital adequacy ratio directly influence asset quality and reduces its productivity, in most of the cases the level of nonperforming loans and loans loss provision increases as there is an increment in capital ratio. Büyüksalvarci and Abdioglu (2011) investigated the capital adequacy determinants for banking sector of Turkey, the finding suggested that there is a positive relationship between capital adequacy and asset quality.

In view of the previous literature, there are very few studies to find the impact of capital regulation on banking sector of Pakistan. The current study is motivated to determine the moderating role of capital regulation between bank specific and macroeconomic factor on insolvency risk in banking sector of Pakistan.

3.11 Related Theories

The subsection discusses four underlying related theories to the study. The theories related are Financial Intermediation Theory, Agency Theory, Modern Portfolio theory and Islamic banking theory. The Agency Theory is relevant to the lending of banks which involves excessive lending and personal biasness which is also a form of corruption. Financial Intermediation theory is applicable to the study because it defines the functions of the banks and its operations. The third theory is Modern Portfolio Theory that gives the brief introduction to the structure of income which the bank is earning from either by lending loans/ advances to customer or investing in different projects as investment and maintaining their earning portfolio. Agency theory and Modern Portfolio Theory both explains the relationship between income structure, asset

quality on insolvency and also the moderating effect of capital regulation (Abdul Rahman, 2012). The Islamic banking theory discusses the concepts of banking in Islam.

3.11.1 Financial Intermediation Theory

Theory of Financial Intermediation has four point regarding function of the bank as financial intermediaries, such as rendering of financial services, specialist of information, delegation of monitoring services and payment as well as finance provider (Scholes, Benston, & Smith, 1976; Campbel & Kracaw, 1980; Diamond, 1984; Allen & Santomero, 1997). Under financial intermediation function, banks have a basic role as an intermediary between lender and borrower. Banks take deposits from depositors and give loans to economic agents requiring capital and in return banks make profit from the interest spreads. Pagano (2001) indicates that the intermediary functions help to capture the value associated with resolving information asymmetries and reduced transactional costs between borrowers and lenders. This function becomes more crucial with the increase in the complexity of financial products and modernization of the banking system. However, Ciancanelli and Reyes-Gonzalez (2000) noted that in carrying out the intermediary functions, banks might behave in a self-interest behavior by extending loans to risky borrowers in order to benefit from high returns. The problem gets more severe when managers of banks try to achieve their own goal and putting a large number of shareholder to get involved in more risky activities to maximize their return on creditor and depositor expense (Pinteris, 2002). As an information specialist, Scholes, Benston, and Smith (1976) indicate that banks are in a position to obtain confidential information and access privileged information about their customers

(lender and borrower). The pool of information about banks customers enables banks to become information specialist and producers. However, according to Campbel and Kracaw (1980), in delivering services banks also play a role of a delegated monitor for banks creditors. Banks act as an agent, who has delegated the authority to invest in financial assets on behalf of the creditors.

Diamond (1984) discussed the financial intermediary functions of banks based on minimizing the cost of monitoring information which he claimed as useful for resolving incentive problems between borrowers and lenders. Based on Delegated Monitoring Theory which he developed, Diamond (1984) describes banks as delegated monitors on behalf of their creditors and added that banks act on behalf of the creditors in order to overcome problem of asymmetry information. Banks play a role in investigating and monitoring the activities of their existing and potential borrowers to ensure that their creditors' interests are protected and the banking business is conducted soundly. Hence, in achieving this objective, banks have to conduct their business efficiently and diligently by allocating creditors money to profitable and productive investments with acceptable risk. By doing so, bank could ensure high liquidity and safety to borrowers at all times (Nor Hayati, 2003). Likewise, if banks do not monitor their activities as delegated agent, agency problems might arise. For instance, if banks invest customers' deposits in high risk projects or assets, agency problem occurs. If banks do not constantly monitor the investments the signs of risks prevail. The payment system and financial services of banks have given them a dominant position in most financial markets (Macey & O'hara, 2003) especially in developing countries (Nam, 2004).

The payment system functions enable banks to transfer money in a form of cash or cash substitutes such as electronic transfer, cheque, drafts and letter of credit from one party to another party. As a financial service provider, banks provide services such as receive deposits, extend loans, transferring money, currency exchange and any other activities related to finance as prescribed by the central bank of any country. Hence, the banks are playing an important role in financial market, it is important for banks to have a good bank management. This is because good management will increase banks efficiency and thus will stimulate productivity growth and the prosperity of the whole economy. On the other hand, bad management of banks could create banking crisis which might affect the economic, political and social situation of a nation. The management of banks is influenced by their ownership structure (Nam, 2004). The existence of large shareholders affects decision making in banks and are associated with self-serving behavior whereby the decision taken by the bank is to benefit, that could benefit large shareholder on the expense of creditor. In banking, this decision is highly related to risk taking of banks (Pinteris, 2002).

Financial intermediation theory is concerned about the functions of the banks. The current study is working on banking sector of Pakistan. The theory is consistent with the study as it covers the banking function, mode of transmission of information, decision making process as an intermediary between loan seeker and depositor. The theory is much relevant to the study to cover the sector of study.

3.11.2 Agency Theory

The origin of Agency Theory defines that the control should be separated from ownership (Berle & Means, 1991). In Agency Theory there is actually a delegation of power from one party called the principal to another party defined as the agent, the agent who performs work instead of the principal. Jensen and Meckling (1976) define Agency Theory as *"a contract under which one or more persons (principal) engage another person (agent) to perform some service on their behalf which involves delegating some decision making authority to the agent. If both parties of the relationships are utility maximizer's, there is a good reason to believe that the agent will not always act in the best interests of the principal"*. Agency Theory set rules for the problem those resulting from the conflict of interest between the principal and the agent. It is impossible to have a complete contract due to the high transaction costs of determining the future contingencies that are unobservable. The study of Eisenhardt (1989) claim that agency problem arises when there is a conflict of interest between the principal and the agent. The conflict arises because of information asymmetry where the desired goals for principal are not achieved by the agent. The conflict of asymmetric information arises because the agent has more information as compared to the principal. This may result in agents pursuing self – serving behavior at the expense of the principals. The conflicts between principals and agents can be related to effort, horizon, risk preferences and asset use. Table 3.1 defined the agency problems.

Table 3. 1
Definition of Agency Theory

Agency Problem	Definition

Effort	Agents working may exert less effort as expected by the principals
Horizon	Agents seeks for shorter return as compared to the principals
Differential risk preferences	Agents are more risk averse as compared to the principals as they are more knowledgeable to the variability's.
Asset Use	Agents have access to miss use the assets lie with the corporate for their personal benefit as they do not follow the cost of their actions

Fama (1980) contends that agency problem provides more rationale for the existence of corporate governance. This is based on the notion that governance structure is essential to align the interests of principals and agents. One way of aligning the interest of principal and agents is through effective internal corporate governance mechanisms such as increase independent directors on the board, avoid dual function of directors (for example chairman is also the chief executive director), high transparency and increase agent's capital in the firm (in this case the bank). Other than that, by providing equity ownership to managers, the interest between shareholders and managers could be aligned. Many previous researchers argued that even in crises the bank tend to lend more, which upraise the conflict between banks and savers (Gertler & Kiyotaki, 2010; Gertler & Karadi, 2011; Gertler, Kiyotaki, & Queralto, 2012). Among many researchers i.e. (Crespí–Cladera & Gispert, 2003; Mengistae & Xu, 2004; Gomez-Mejia, Wiseman, & Dykes, 2005; Firth, Fung, & Rui, 2006; Doucouliagos, Haman, & Askary, 2007; Zhou *et al.*, 2011) argued that the conflict arises because of the asymmetry of information between owner and control. Agency cost with the bureaucracy can result in weak managerial incentive, which allows a tradeoff between internal and allotted efficiency (Sapienza, 2004). Moreover, the diversification of banks asset increase the insider lending and reduces the quality of loan, which ultimately intensify the agency problem (Goetz, Laeven, & Levine, 2013). The true disclosure

of information reduces the agency problem and lessens the conflict between mangers and outsider investor (Glosten & Milgrom, 1985; Diamond & Verrecchia, 1991; Meek, Roberts, & Gray, 1995; Healy & Palepu, 2001; Liu, Uchida, & Yang, 2012). The study of Jesus and Gabriel (2006) attributed that increase of loans that herd behavior which encourage managers to lend excessively during the financial crises (Messai & Jouini, 2013). On the other side the loan officer which is working on performance based incentives try to lend more and try to influence the lending decision (Cole, Kanz, & Klapper, 2015).

According to Zhang *et al.* (2016), nonperforming loans can be an important determinant in order to find the out bank behavior. Higher rate of nonperforming loans force a bank to behave differently. On the other hand, higher presence of nonperforming loan is a useful indicator to identify moral hazard problem.

The Agency theory is covering most part of the frame of current study. The agency theory is relevant to the variable of asset quality which is proxied by nonperforming loans and loan loss provision. The theory suggests the personal goals of the manager against the collective goals of the firm and shareholder. One result due to biased disbursement of loans is nonperforming loan, so therefore this theory is relevant to the study. The second variable intact with the study is income structure which is a proxy of diversification of portfolio. Previous researchers argued that in case of diversification, if management quality is not good then they tend to deploy the resources of the firm as their own will and favoritism. The capital regulation in current study is to moderate the relationship between independent variables and insolvency of the bank. The capital regulation as per previous

researcher is to mitigate the risk factor, but it has been deduced by the previous literature that managers tend to tamper the items of balance sheet as per their own needs. The tampering of balance sheet items makes it difficult for researcher to counter the exact measure of risk from accounting statement. Therefore, due to variables such as income structure, asset quality, capital regulations, the study is taking agency theory as an umbrella for independent and dependent variables.

3.11.3 Modern Portfolio Theory

The return from an investment is desirable for the investor and variance in the returns is undesirable. Investor try to maximize their returns and uncertainty can be lowered with the help of diversified portfolio. In addition, the selection of portfolio should be consistent with the market imperfection Markowitz (1952). The theory of modern portfolio is different from economic theories and it does not define manufacturing and consumer. It is workable for investor by and large (Markowitz, 1991). In accordance with the modern portfolio theory, the best diversification can be achieved by those assets, which are negatively correlated with earning, means one asset may give lesser earning and the other may give higher then expectation (Markowitz, 1959; Lubatkin, 1983). A basic implication that exists in modern portfolio theory is that the development of portfolio actually reduces the variance of return of different financial assets. As an application in banking sector, diversification of portfolio can reduce probably the chances of failure. The diversification of borrower projects may also reduce the cost of monitoring of borrower and payments to the depositors (Diamond, 1984; Demsetz & Strahan, 1997). The modern portfolio theory suggests that if the covariance

between the growth of noninterest income and the growth of net interest income is negative, then the volatality in the growth of revenue from operations can be lessened directly. Furthermore, if there is a positive covariance, the standard deviation of the revenue from operations will be fewer then the weighted average, sum of non interest income and netinterest income given that the covarience is not equal to one (Li & Zhang, 2013).

There are two basic assumptions of the theory

1. The expected return on the portfolios is weighted average of the expected returns on individual securities.
2. The variance of return on the portfolio is a particular function of the variances of, and the covariance between, securities and their weights in the portfolio (Markowitz, 1999).

Further, the study of Andrieş (2008) highlighted that diversification does not eliminate risk of the investment but it only reduces the risk by distributing it among different investments. The applicability of modern portfolio theory extends to the firms which are engaged in multiple investment opportunities, reduce the overall corporate risk, which reduces the dependency on single investment(Lubatkin & Chatterjee, 1994). Some researchers argue that if the diversification is cross country, the control of the parent office declines and portfolio benefit becomes non-beneficial to the investor (A. Asongu, 2014).

The main methodological innovation of the CISS (Composite Indicator of Systemic Stress) is the application of basic portfolio theory to the aggregation of

five market-specific sub-indices created from a total of 15 individual financial stress measures. The aggregation accordingly considers the time-varying cross-correlations between the sub-indices. As a result, the CISS puts relatively more weight on situations in which stress prevails in several market segments at the same time, capturing the idea that financial stress is more systemic and thus more dangerous for the economy as a whole if financial instability spreads more widely across the whole financial system (Hollo, Kremer, & Lo Duca, 2012).

The modern banking institutions are following the mode of modern portfolio theory as they are changing their business lines. The banks are now a day's not only depend on interest margin but are involved in other activities such as trading activities, investment, business fee income, consumer loans, real estate loans, SME loans and other nontraditional lines of business (Uzhegova, 2010; Olweny & Shipho, 2011; DeYoung *et al.*, 2015). In addition, some researchers argued that banks are also involved in hedge funding, private equity, trading of goods and foreign exchange which is risk management and is logically built on modern portfolio theory (Beyhaghi & Hawley, 2013). The default risk of the bank becomes systematic even when the investor has diversified their investment because of the failure of one bank (Fiordelisi & Marqués-Ibañez, 2013).

Modern portfolio theory suggests that volatility of earning can be reduced by diversification in joint underwriting of risk (Boot & Schmeits, 2000; Demirgüç-Kunt & Huizinga, 2010; Elyasiani, Staikouras, & Dontis-Charitos, 2015). However, the optimal size of portfolio depends on the specific technologies of finance and severe agency problem with the particular institution if they become

complex (Jensen & Meckling, 1976). Hence, to harvest the personal benefits by the insider it will support the diversification as long as the private goals are achieved. Whereas, the theory suggests that diversification after optimal point may not benefit the firm in risk and return tradeoff. Another argument in terms of asset quality is that, the asset mix could impact asset quality and it will enhance the opportunities for manager to harvest personal benefits against the interest of the bank (Myers & Rajan, 1995). Thus, it can be argued that diversifying the activities of the bank in more liquid asset, nontraditional activities such as fee & brokerage, trading which earns noninterest income will end up by increasing fragility of bank and negatively impact the overall performance of the bank. (Baele, De Jonghe, & Vander Vennet, 2007). The empirical study of Laeven and Levine (2007) finds the impact of diversification in conglomerates financial mergers across 43 countries. The study concluded that the diversification impact is negative as it intensify the problem of agency and it badly effect the market value of conglomerate. From the perspective of risk, modern portfolio theory argued that the cash flows generated from non-correlated sources of income should stabilize the overall earning, such as securities trading and insurance which have potential to reduce the risk of conglomerate, but still it is dependent of the type of diversification activities undertaken by the banks (Kwan & Laderman, 1999).

Modern portfolio theory is about the benefits of diversification, as it suggests that the firms can reduce the volatility of earning by diversification. The variance of combined cash flows can be reduced by investing in multiple assets. The current study has taken income structure and asset quality as explanatory variable. The modern portfolio theory explains the management of portfolio in loan

disbursement and also it suggests that the nontraditional activities such as fee & brokerage and trading, has some optimal point of earning. The further investment after optimal point will increase the risk of the bank. The current study has taken much explanation from modern portfolio theory as it is more relevant to it.

3.11.4 Islamic Banking Theory

According to Mustafa Omar and Syahidawati (2013) Islamic banks in theories should comply to the purpose Islamic law or *Maqasid Al-Shari'ah* that derived from the holy *Al-Quran* and *Al-Sunnah* on the basis of human nature *al-fitrah* that constitute of five elements of necessities namely Life *al-hayah*, intellectual/mind *al-aql*, wealth *al-mal* and dignity *al-maru'ah* whilst the Islamic banking principle based on economic activities *Muamalat*. The Islamic banks should operate on the basis of permissible trade and should avoid engaging restricted usury *Riba*, uncertainty *Gharar*, gambling *Maisir*, coercion *Ikrah*, fraud *Ghabn* and lack of knowledge *Jahala (assemtry information)*. According to Ismail (2010), the aims of *Maqasid Al-Shari'ah* are to create a fair and equitable distribution of economic resources such as wealth and income, full-employment and maximum rate of economic growth that enhance socio-economic justice.

According to Siddiqi (2006) Islamic banking replace interest or *usury* with profit and loss sharing which would literally transform intermediation roles as fund owner and banks as capital provider sharing profit and loss in the business ventures. Moreover, the success of implementing profit and loss sharing required restructuring in the financial system to accommodate this unique contractual relationship between borrower and lender, which goes beyond conventional

approach of banking business. Johnson (2013) shows that Islamic banks grow rapidly in Muslim populated areas while they continue to grow in the non-Muslim population region at slower pace. Hence, Islamic banking activities contribute to economic development through just and equitable of wealth by eliminating inefficiency in the economy that arises from speculation activities replacing interest or *usury* with profit and loss sharing mechanism. Thus, contribute to higher productivity that generate from real economic activities while minimizing risk through profit and loss sharing mechanism between capital provider and banks.

The current study has also taken Islamic banks of Pakistan as sample of the study. Therefore, Islamic banking theory is also relevant to the current in order to discuss the nature business of Islamic banks is Pakistan.

3.12 Theoretical Framework

The term financial intermediation simply means a business that deals with two types of individuals and institutions. The first type consists of deficit spreading individuals and institutions which are facing current expenditures and consumption more than their income and need to raise funds externally through borrowing. The second one consist of the surplus spending individuals and institutions, whose current income exceeds their consumptions and expenditures, so they have surplus money to save or invest (Peter S Rose, 2002). Moreover, the ability of banks to gather and analyze financial information has given another view of existence of bank in modern society. This is in accordance to the financial intermediation and delegated monitory theory (Diamond, 1984). According to Financial Intermediation and Delegated Monitoring (Diamond, 1984), financial intermediary is also risk neutral as it takes deposits from

depositor and lend it to entrepreneurs and perform the task of delegated monitoring of entrepreneur's project on behalf of depositors in order to reduce cost of bankruptcy. Whereas on contrary, in order to increase market share, banks often lend to low credit borrowers and increase bankruptcy cost (Carlson, Shan, & Warusawitharana, 2013; Shim, 2013). Moreover, Peter S Rose (2002) states that the bank being an agent between lender and depositor has more information than borrower and depositor. This uneven distribution of information and the talent to analyze and interpret information is known as asymmetric information which is also explained in financial intermediation and delegated monitoring theory (Diamond, 1984; Peter S Rose, 2002). In addition, the theory also states that diversification proves to be beneficial when everyone in the system is risk neutral. On the contrary, the banks are liberalizing their products in traditional and nontraditional income that is increasing insolvency risk of the bank (Maudos, 2017). Furthermore, other than bank lending and diversification of income, the theory states that some other factors such as GNP, interest rate, inflation rate etc also affect bank's overall risk profile (Diamond, 1984).

According to Financial Intermediation and Delegated Monitoring , banks as agent should be risk neutral (Diamond, 1984), while, managers of the banks have more incentive to take more risk in lending after optimal level of risk (Zhang *et al.*, 2016). According to Jensen and Meckling (1976) there are two kind of moral hazard problems that generate such behavior. One is rent seeking of managers, when they seek to peruse private benefits by investing more in low worthy creditor or inefficient monitoring of loans. The other arises from conflict of interest between shareholders and creditors. Moreover, these moral hazard problem leads to higher growth of loans and a larger number of nonperforming loans (Jensen & Meckling, 1976; Zhang *et al.*, 2016). The

problem of moral hazard can increase risk taking of the bank and hence reduces asset quality, which eventually may cause the institution to fail (Zhang *et al.*, 2016). Furthermore, increase in loan losses not only increase insolvency risk of the bank but also reduces capital ratio of the bank (Barr, Seiford, & Siems, 1994; Gorton & Rosen, 1995; Shrieves & Dahl, 2003; Foos, Norden, & Weber, 2010). However, Bruche and Llobet (2011) argued that in order to increase the chances of recovery, the banks tend to rollover nonperforming loans. This actually increases the threat to the solvency position of the bank. Thus, on the basis of previous literature, Agency Theory define the relationship between asset quality and insolvency risk of the bank.

In order to reduce risk, the spreading of bank's credit accounts and deposits among wide variety of customers, including large and small account and in differentiated industries is diversification (Diamond, 1984; Peter S Rose, 2002). Bank risk is generated from two sources, one is external and other is internal source. This is in accordance to Capital Asset Theory (CAP), which postulates that risk is categorized into systematic (external) and unsystematic (internal) source (Sharpe, 1964) . Furthermore, the theory states that risk from external sources cannot be diversified. On the other hand, unsystematic (internal) risk can be diversified with portfolio diversification. According to Modern Portfolio Theory, the best diversification can be obtained from those assets, which are negatively correlated to earning (Markowitz, 1952). Furthermore, according to Baltensperger (1980), banks in reality hold a variety of different types of earning. One way to explain asset diversification by a bank in terms of risk and return considerations is along the lines of portfolio theory. Furthermore, portfolio theory suggests that if the covariance between interest and noninterest income is negative than overall risk of the bank can be reduced (Li & Zhang, 2013). In addition,

most of the previous authors including Lepetit *et al.* (2008b), Apergis (2014) and Maudos (2017) argued that increase in the share of non interest or nontraditional income increases insolvency risk. Therefore, on the basis of previous literature, modern portfolio theory defines the relationship between income structure and insolvency risk of this study.

3.13 Summary

The chapter gives an overview of the previous literature, review of related theories and empirical finding by the previous researchers. The literature highlights the review of asset quality, income structure and macroeconomic factors with insolvency risk of the bank. It also involves the moderating effect of capital regulation between independent and dependent variable on banking sector of Pakistan. The study also defines the impact of agency problem with the help of agency theory to the nonperforming loans and structure of income. It also highlights the management of portfolio in the banking sector with the help of modern portfolio theory. Further, the chapter defines the theoretical framework on the basis of related theories. The resultants of this chapter will be helpful to construct the hypotheses between asset quality, income structure and macroeconomics factors on insolvency risk of banking sector of Pakistan either conventional or Islamic bank, with the moderating effect of capital regulation.

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

This chapter explains the research design and methodology of the present study. The chapter explains the whole process carried out by the researcher to meet the objectives of the study. These includes research framework, development of hypotheses, operational definitions and the measurement of variables, data sources and data collection process. At the end of the chapter, model and methods used to analyze the data are described.

4.2 Research Framework

Research framework is displayed in Figure 4.1, which is developed on recent literature review related to the conventional and Islamic banking based. The research framework is based on Financial Intermediation Theory, Agency Theory and Modern Portfolio Theory. The research framework variables include such as asset quality, income structure and macroeconomic factors as independent variables, while insolvency risk as a dependent variable with the moderating role of capital regulation. There are three (3) main independent variables that are Asset Quality, Income Structure and Macroeconomic Factors. Each of these variables is measured using financial ratios as proxies. The moderating variable is Capital regulation, which is measured by capital adequacy ratio. Capital adequacy ratio is regulatory requirement which is implementing by State Bank of Pakistan in relative to capital regulations. Moreover, moderator is a variable that change the property of direction of relationship and/or it strengthens the

relationship between dependent and independent variables (Baron & Kenny, 1986). With respect to this study, the moderating variable is capital regulation which is postulated to strengthen the relationship between the asset quality, income structure, and macroeconomic factors with insolvency risk of conventional and Islamic banks of Pakistan. It is supposed to reduce the effect of variation in asset quality, income structure, and macroeconomic factors on insolvency risk. The research framework of the study is presented in Figure 4.1;

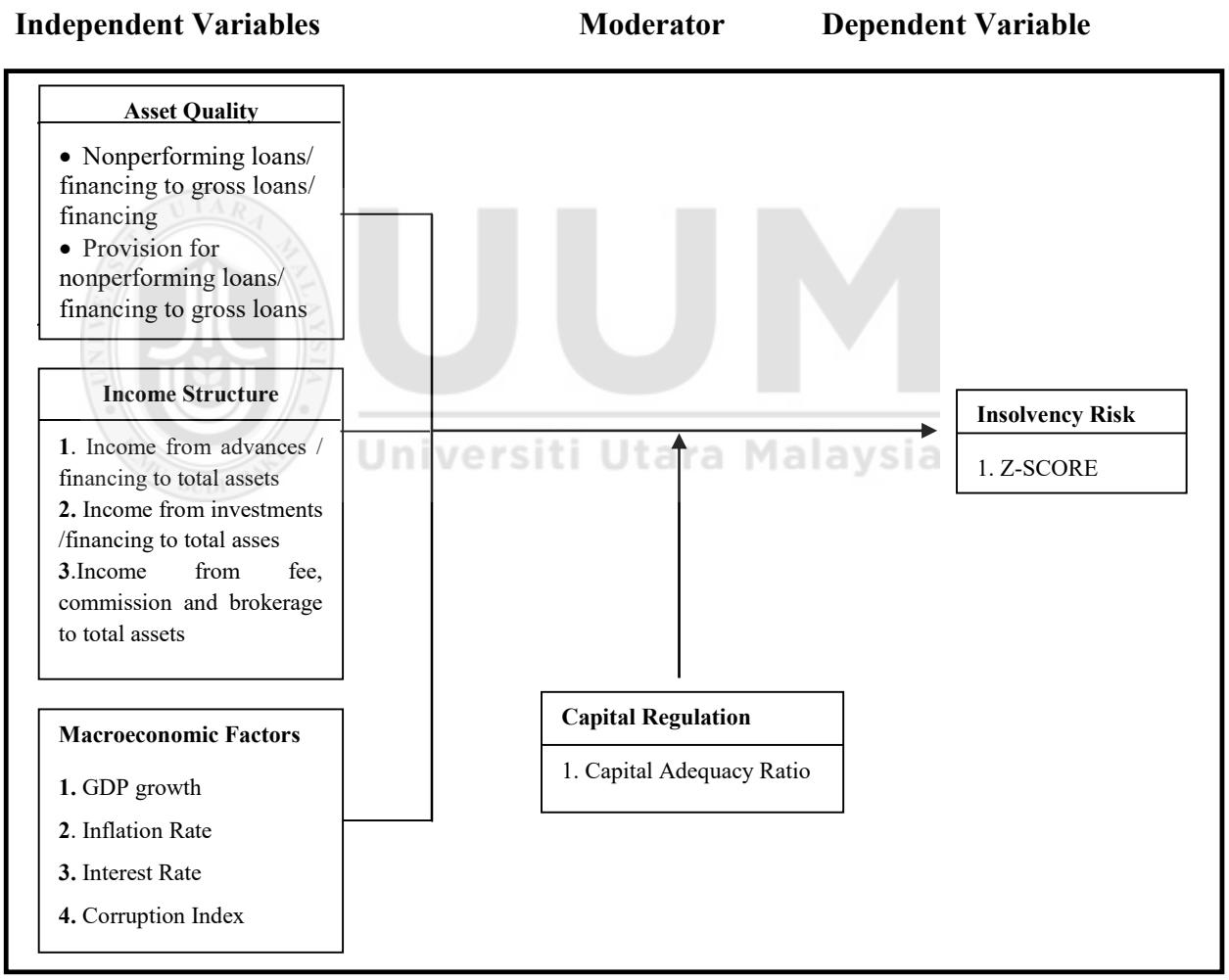


Figure 4.1
Research Frame Work

4.3 Research Design

This study follows the quantitative techniques as a research design. The research design directs attention to the research framework for the researcher to determine certain method for managing and conducting research. In addition, research design provides proper guideline to the researcher in selecting data collection and analysis of data. The research design for the current study developed from the existing literature review. Literature review has acknowledged the research gaps and insufficiency in the previous research. Furthermore, literature review in the study has managed useful information in relation with methodologies, variables measurement and techniques for data analysis applied in the current study.

4.4 Variable Definition and Measurement

As shown in Figure 4.1, the research framework, the numbers of variables which are involved in this study consist of one measure of dependent variable and nine measures of independent variable and a moderator variable.

4.4.1 Dependent variable (Insolvency Risk)

The dependent variable of this study is insolvency risk. Insolvency risk is the degree of losses or probability of failure of banks. The measure is important as it provides early warning signal of a bank's financial condition or stability. Small deviation on return on asset does not necessarily mean that bank is stable. Thus, volatility of banks' return indicates the financial or risk conditions of banks. The current study is using Z-SCORE as measurement of insolvency risk. A lower value of Z-SCORE implies high probability of failure or a riskier bank and a higher Z-

SCORE denotes the lower probability of failure or bank stability is good. Z-SCORE is measured as ROA (Pretax return on Assets) Plus CAR (equity capital to asset ratio) then divided by SDROA (the standard deviation of ROA), (Z= (ROA+CAR)/SDROA). As argued by Lepetit and Strobel (2013) that the Z-SCORE using deviation of ROA is the most effective in calculating insolvency of the bank. The insolvency risk is also widely used by previous researchers to measure risk which includes i.e. (Laeven & Levine, 2009; Angkinand & Wihlborg, 2010; Barry, Lepetit, & Tarazi, 2011; Hassan & Grassa, 2012; DeYoung & Torna, 2013; Fiordelisi & Marqués-Ibañez, 2013; Apergis, 2014; Lee, Hsieh, & Yang, 2014; Bian, Wang, & Sun, 2015; Farook & Hassan, 2015; Chen, Huang, & Zhang, 2016; Maudos, 2017). The measurement of Z-SCORE is presented in Table 4.1 for both conventional and Islamic banks.

Table 4. 1
Measurement of Insolvency Risk

Variables	Measurements	Sources
Insolvency Risk	Z_{CB}=(ROA+CAR)/SDROA Z_{IB}=(ROA+CAR)/SDROA ROA= Pretax return on assets (earnings before taxes and securities gains/losses divide by average assets) CAP =Equity capital to asset ratio SDROA = Standard Deviation of ROA	(Lepetit *et al.*, 2008a; Barry, Lepetit, & Tarazi, 2011; DeYoung & Torna, 2013; Fiordelisi & Marqués-Ibañez, 2013; Apergis, 2014; Bian, Wang, & Sun, 2015; Farook & Hassan, 2015; Chen, Huang, & Zhang, 2016; Maudos, 2017)

4.4.2 Independent variables

Independent variables are also known as predictors, which are the variables that influence the dependent variable, the variables which are the main focus of interest of the study, in either a positive relation or negative relationship with dependent variable. The independent variables which are defined in this study are income structure, asset quality and macroeconomics factors.

4.4.2.1 Asset Quality

Asset quality in this study has two dimensions. The dimensions of asset quality are nonperforming loan/financing to gross loans/ financing and provision for nonperforming loans/ financing to gross loans/ financing.

Nonperforming loan has been widely used by the previous researchers. According to him Shim (2013) and Carlson, Shan, and Warusawitharana (2013), nonperforming loans are prior indicators to financial distress. The higher level of nonperforming loan is an early indicator for probability of default. Among many researchers following are the researchers those used nonperforming loans to gross loans as independent variable are (Wahlen, 1994; Kanagaretnam, Lobo, & YANG, 2004; Fonseca & Gonzalez, 2008; Büyüksalvarci & Abdioglu, 2011; Jin, Kanagaretnam, & Lobo, 2011; Pastory & Mutaju, 2013; Bertay, Demirgüç-Kunt, & Huizinga, 2015; Leung, Taylor, & Evans, 2015). The definition of the variable is also presented in Table 4.2.

The provision for loan losses is a cushion for safety against probability of credit default and default risk. Moreover, higher provisioning effects the

efficiency of the banking sector (Altunbas *et al.*, 2000) because higher provisions for nonperforming loans slowdowns the activities of banks. Among many researcher those defined loan loss provision to gross loans/ financing in their studies are (Borio, Furfine, & Lowe, 2001; Cavallo & Majnoni, 2002; Laeven & Majnoni, 2003; Bikker & Metzemakers, 2005; Craig, Davis, & Pascual, 2006; Bouvatier & Lepetit, 2008; Davis & Zhu, 2009; Barth Mary E & R, 2010; Dash & Kabra, 2010; Packer & Zhu, 2012). Table 4.2 also provides the definition of provision for nonperforming loans to gross loans/ financing.

Table 4. 2
Measurment of Independent Variables of Asset Qualtiy

Variables	Measurements	Sources
Nonperforming loans/ financing to gross loans/ financing	NPL Ratio = nonperforming loans/ financing to gross loans/financing	(Kanagaretnam, Lobo, & YANG, 2004; Fonseca & Gonzalez, 2008; Jin, Kanagaretnam, & Lobo, 2011; Pastory & Mutaju, 2013)
Provision for nonperforming loans/ financing to total loans/ financing	PNPL = provision for nonperforming loans/ financing to gross loans/financing	(Iannotta, Nocera, & Sironi, 2007; Pasiouras, 2008; Chiu & Chen, 2009; Sun & Chang, 2011; Packer & Zhu, 2012; Pastory & Mutaju, 2013)

4.4.2.2 Income Structure

According to previous researchers accounting measure can be used as proxy of performance or risk, so in accordance to portfolio theory, among many researcher Weston and Mansinghka (1971), Mason and Goudzwaard (1976) and Melicher and Nielsen (1977) used accounting measures.

Therefore, Income structure of this study comprises of three accounting ratios which are income from advances/ financing, income from investment and fee & brokerage income. Interest income from advances/ financing and interest

income from investment are two types of interest margin. The ratio of these variables can be calculated by two separate denominators;

1.Total assets
2.Shareholder's equity

The two above mentioned dimensions are defined by Williams and Prather (2010). Interest income to total asset includes income from advances defined by Zhou (2014), which also incorporated investment income as noninterest income. A composite of interest margin from advances and securities to total asset is defined by some researchers. Among them some are (English, 2002; Lin *et al.*, 2012). Furthermore, Stiroh (2006) studied net interest margin (before provision for loan losses/ financing) to total asset. Doyran (2013) studied net interest income as sum of both interest income from loans and interest income from investments to total assets. The difference of average deposit and average loans studied and defined as interest margin by Mamun, Meier, and Wilson (2015). They defined income as asset utilization by adding bank noninterest expenses to interest income divided by total assets. Stiroh (2004a) and Lee, Hsieh, and Yang (2014) defined interest income to total operating income. Cheng, Zhao, and Zhang (2014) defined interest income to total asset. Interest margin is defined as net interest/ profit income divided by total assets by (Busch & Kick, 2009; Jaffar, Mabwe, & Webb, 2014). A study by Lozano-Vivas and Pasiouras (2010) considered loans as earning asset by taking its natural log. Thus, the current study has taken total assets as denominator. So, therefore the accounting ratios are income from advances/ financing to total assets and income from investments to total assets as two proxies of interest income. The definition of income from

advances to total assets and income from investments to total assets is presented in Table 4.3.

Noninterest income is the income generated by the bank from different sources other than traditional lending based generation of income. Non-interest income primarily generates from fee commission and brokerage income. The study calculates noninterest income to total asset as already used by some previous researcher such as (Stiroh & Rumble, 2006; Williams & Prather, 2010). Noninterest income, which is primarily, based on commission, foreign currency trading, brokerages to total asset as defined by (Zhou, 2014). Brighi and Venturelli (2014) segregated each portion of noninterest income such as operating revenue, nontraditional revenue, market trading and asset management fee and third party services of operations. Noninterest income from commission was studied by (Lepetit *et al.*, 2008a). DeYoung and Rice (2004) defined four ratio of noninterest income to total assets, which are total non-interest income, service charges, total non-interest income minus service charges, total noninterest income minus service charges and trading activities. The previous authors i.e. (Stiroh (2004a); Stiroh, 2004b; Lepetit *et al.*, 2008a; Köhler, 2014; Lee, Yang, & Chang, 2014), defined non-interest income to operating income and commission income to operating income. Certain types of nontraditional bank income studied by previous researcher which include among others like asset backed securities collateralized obligation and some others, unfortunately data on these variables is not available in Pakistan. Furthermore, the nontraditional income generated by US banks is mostly from fee-for services and brokerage of securities (DeYoung & Torna, 2013), the author defined fee based

revenue in product mix in other study (DeYoung & Roland, 2001). Cheng, Zhao, and Zhang (2014) defined that most nontraditional income come from fee and brokerage of securities. Meslier, Tacneng, and Tarazi (2014) highlighted that fee based income , trading income and others income as nontraditional income. Lozano-Vivas and Pasiouras (2010) studied noninterest income by defining it with its natural logarithm. Thus, current study has taken fee, commission and brokerage income to total assets as proxy of noninterest income or nontraditional income as displayed in Table 4.3.

Table 4. 3
Measurment of income structure

Variables	Measurements	Sources
Income from Advances/ financing	Income from advances/ financing divide by total assets	(Chiorazzo, Milani, & Salvini, 2008; Busch & Kick, 2009; Lin *et al.*, 2012; Cheng, Zhao, & Zhang, 2014; Jaffar, Mabwe, & Webb, 2014)
Income from Investment	Income from investment divide by total assets	
Income from Fee & Brokerage	Nontraditional income from fee and brokerage divided by total assets	(DeYoung & Rice, 2004; Stiroh, 2006; Chiorazzo, Milani, & Salvini, 2008; Williams & Prather, 2010; Maudos, 2017)

4.4.2.3 Macroeconomic Factors

Macroeconomics factors included in this study comprises of GDP growth, inflation (Consumer price index), interest rate (interbank offer rate) and corruption perception index.

GDP growth refers to the country per year growth of gross domestic product. The study incorporates GDP as percentage growth per year, the growth of GDP of Pakistan is taken from year 2007 to 2015 as displayed in Table 4.4.

The GDP growth is widely used by number of researcher in their studies. Among many previous, those who used annual GDP growth are (Cantor & Packer, 1996; Jesus & Gabriel, 2006; Ali & Daly, 2010; Drehmann, Sorensen, & Stringa, 2010; Espinoza & Prasad, 2010; Ali, Akhtar, & Ahmed, 2011; Nkusu, 2011; Louzis, Vouldis, & Metaxas, 2012; Castro, 2013; Osamwonyi & Michael, 2014). Boubakri *et al.* (2005), Jokipii and Monnin (2013) and (Andrei, 2014), defined GDP growth of per quarter in their studies. The studies of Boubakri *et al.* (2005), Fonseca and Gonzalez (2008), Doyran (2013), Washington (2014), Elahi, Mehmood, and Hussain Awan (2014), and Weiß, Bostandzic, and Neumann (2014) took GDP per capita growth rate . Whereas, Stiroh (2004a), Poudel (2013) and Komal and Abbas (2015) defined GDP in billion rupees. The variable defined by Cecchetti and Kharroubi (2012) as percentage consumption of GDP by Government. Moreover, this study has taken GDP growth rate per year as an independent variable in order to estimate the impact of GDP on insolvency risk.

Inflation of the country is measured in consumer price index. This is the rate of change of consumer price and affordability per year. The studies of previous researchers such as (Espinoza & Prasad, 2010; Ali, Akhtar, & Ahmed, 2011; Nkusu, 2011; Cecchetti & Kharroubi, 2012; Castro, 2013; Doyran, 2013; Nazir, Naqvi, & Nawaz, 2013; Pestova & Mamonov, 2013; Poudel, 2013; Abdullah, Parvez, & Ayreen, 2014; Ampudia & Ehrmann, 2014; Elahi, Mehmood, & Hussain Awan, 2014; Osamwonyi & Michael, 2014; Washington, 2014; Weiß, Bostandzic, & Neumann, 2014) took inflation as consumer price index per year. Jokipii and Monnin (2013) defined inflation per quarter. A study

conducted by Sheriff and Amoako (2014) defined inflation rate on monthly basis. The study of Thiagarajan, Ayyappan, and Ramachandran (2011) defined current year and one year lag inflation to investigate the relationship with risk of the bank. Therefore, the current study has also taken one year lag inflation. The definition of variable is also displayed in Table 4.4.

Interest rate is lending rate comprises of interbank lending rate and consumer lending rate. The study defines it as the rate charged between interbank lending per year for T-bill of Pakistan from year 2007 to 2015. Interest rate define by previous researchers who used per year interbank lending rate are (Boubakri *et al.*, 2005; Souto, Tabak, & Vazquez, 2009; Drehmann, Sorensen, & Stringa, 2010; Espinoza & Prasad, 2010; Nkusu, 2011; Lin *et al.*, 2012; Castro, 2013; Poudel, 2013; Ampudia & Ehrmann, 2014; Andrei, 2014; Elahi, Mehmood, & Hussain Awan, 2014; Osamwonyi & Michael, 2014; Washington, 2014; Weiß, Bostandzic, & Neumann, 2014) defined interest rate as inter banking lending rate . Real interest rate was defined by Jesus and Gabriel (2006) as interbank lending rate minus inflation rate of particular period. Interest rate spread defined by Sheriff and Amoako (2014) is the difference between lending and deposit rate. Furthermore, the current study has defined interest rate as interbank offer rate of commercial banks in Pakistan (see Table 4.4).

The use of public office for private gain is called corruption, which can be in any form like sale of public property to privet for personal gain, or may be miss use of public powers and resources (Reinikka & Svensson, 2005). In past literature corruption is mostly defined by corruption perception index by

Transparency International with some other previous researchers those who used corruption by using the data given by Transparency International on corruption perception index are (Mo, 2001; Gyimah-Brempong, 2002; Swaleheen, 2011; Nguyen & Van Dijk, 2012; Park, 2012; Bai *et al.*, 2013; Farooq *et al.*, 2013). Moreover, it seems that depletion of money because of corruption effect the next year estimation and expenses. Therefore, the current study has also taken one year lag corruption perception index for Pakistan from Transparency International as displayed in Table 4.4.

Table 4. 4
Measurment of macroeconomic factors (GDP, Inflation rate, Interest rate, Corruption index

Variables	Measurements	Sources
GDP	Annual growth of gross domestic product in percentage	(Drehmann, Sorensen, & Stringa, 2010; Ali, Akhtar, & Ahmed, 2011; Nkusu, 2011; Castro, 2013; Osamwonyi & Michael, 2014)
Inflation	Annual rate of consumer price index in percentage	(Ali, Akhtar, & Ahmed, 2011; Castro, 2013; Osamwonyi & Michael, 2014; Weiß, Bostandzic, & Neumann, 2014)
Interest	Interbank lending rate KIBOR (Karachi interbank offer rate) annual bid.	(Souto, Tabak, & Vazquez, 2009; Drehmann, Sorensen, & Stringa, 2010; Nkusu, 2011; Osamwonyi & Michael, 2014; Washington, 2014)
Corruption	Corruption perception index from Transparency International	(Mo, 2001; Gyimah-Brempong, 2002; Swaleheen, 2011; Nguyen & Van Dijk, 2012; Park, 2012; Bai *et al.*, 2013; Farooq *et al.*, 2013)

4.4.3 Moderating Variable

The moderating variable of this study is capital regulation which is proxied by capital adequacy ratio. Even though Basel II was implemented in banking sector of Pakistan in year 2006 (BusinessRecorder, 2006) and Basel III is on its way to

implementation but banks in Pakistan are still calculating CAR in accordance to Basel II (Ali, 2013). So, to remain consistent regarding capital adequacy ratio, Basel II CAR is used in this study. Capital requirement is measured as total capital to risk weighted assets, in which risk weighted assets, refers to credit risk weighted assets.

Rime (2001) highlighted that the measure of capital adequacy ratio is a popular measure among researchers, since the introduction of risk weighted capital standards. This measure is widely used by Jacques and Nigro (1997), Rime (2001), Laeven and Levine (2009) and Shehzad, de Haan, and Scholtens (2010). Capital adequacy ratio consists of Tier 1 and Tier 2 capital. Total capital consists of Tier 1 (capital) called core capital and Tier 2 Capital called supplementary capital. While, the risk weighted assets are measured as balance sheet items multiply by risk weights in corresponding to risky assets. Capital adequacy ratio has been used as a moderator with different independent and dependent variables by previous researcher as like (Leventis, Dimitropoulos, & Anandarajan, 2011; Azureen, 2012).

4.4.4 Control Variables

This study uses bank size as a control variable which is a proxy of total assets. As banks of Pakistan consist of various sizes, this study controls the effects of size in order to analyze the relationship between the independent variables and the dependent variable. Bank size refers to total assets of bank i in year t and is measured as natural log of total assets. This proxy has been widely used by researchers such as Wiwattanakantang (2001), Rime (2001), Nor Hayati (2003),

Gonzalez (2005), Lepetit *et al.* (2008a), Azureen (2012), to control the effect of size on bank insolvency risk, and they have found bank size to be significant with insolvency risk.

4.5 Data collection Sources

In order to investigate the relationships among variables in the research framework, secondary data composed of financial ratios which is extracted from annual reports of 5 public sector banks, 17 private commercial banks, 1 specialized and 5 Islamic banks of Pakistan over the period from 2007 to 2015 (SBP(QuaterlayCompendium), 2013, 2015; SBP, 2016). The annual reports were obtained from the individual bank, library of State bank of Pakistan, and from different economic websites (see Annexure-I, Annexure-II). A data set is then has been constituted based on selected balance sheet, income statement items, notes to the financial statement and economic survey report. The dataset further was converted to a panel, which is composed of cross sections data and is used in this study. Hsiao (2003) highlighted that panel data gives larger number of data points, increased degree of freedom and reduces the multicollinearity problem between explanatory variables. Hence, this increases the effectiveness of an econometric model.

In this study accounting measure are used instead of measures based on the market data because most of the Islamic banks are incorporated in year 2006 and 2007.Moreover, Rivard and Thomas (1997) indicated that the use of accounting measure is common in the studies on banking sectors. They also noted that the data which is reported by the banks or regulatory authorities is less problematic as compared to other industries because of the uniform implementation of prudential rules regarding

reporting of data by the regulatory authorities. Agusman *et al.* (2008) highlighted that market measure and accounting measure are important as they are mostly used by the regulatory bodies to assess the financial health of the banking system. Pettway and Sinkey (1980) highlighted that the use of both market measures and accounting measures gives an early warning of a distressed institution. The use of accounting measures are significant in indicating of distressed institution even though market measures are also capable to find problematic institutions.

The current study is based on the entire banking sector of Pakistan. The bank which is commercially, publicly or on Islamic basis is incorporated in Pakistan is taken as unit of analysis. The banks of Pakistan are selected as single unit of analysis because the banks of Pakistan are the financial intermediators, which are providing maximum banking products and services to the ultimate consumer. The study has incorporate any bank which is either foreign based or locally incorporated (conventional or Islamic) in Pakistan on or before year 2007. The sources of data for variables are displayed in Table 4.5.

Table 4. 5
Data Sources

Variable	Data Source	Duration
Insolvency risk	Annual Reports of Bank, Published Reports of State Bank of Pakistan	2007-2015
Nonperforming loans/ financing to gross loans/ financing	Annual Reports of Banks and Notes to Financial Statements	2007-2015
Provision for nonperforming loans/ financing to gross loans/financing	Annual Reports of Banks and Notes to Financial Statements	2007-2015
Income from Advances/ Financing to total assets	Annual Reports of Banks and Notes to Financial Statements	2007-2015
Income from Investments to total assets	Annual Reports of Banks and Notes to Financial Statements, Publications of State Bank of Pakistan	2007-2015
Fee and brokerage Income to total assets	Annual Reports of Banks and Notes to Financial Statements, Publications of State Bank of Pakistan	2007-2015
GDP Growth	Economic Survey of Pakistan, World Bank Web Site, The Economist Web Site	2007-2015
Inflation	Economic Survey of Pakistan, World Bank Web Site, The Economist Web Site	2007-2015
Interest Rate	Economic Survey of Pakistan, World Bank Web Site, The Economist Web Site, Stat Bank KIBOR annual publications	2007-2015
Corruption Perception Index	Transparency International Website, and other different web sources	2007-2015

4.6 Hypotheses Development

The hypotheses of this study are development mainly based on Agency Theory and Modern Portfolio Theory framework. According to agency theory, problem exists in a firm when there is a conflict in desired goals of principal and agents. Furthermore, when the asymmetric information constraints the desired goals of principal from verifying the agent's behavior (Eisenhardt, 1989)**.** This certain situation creates agency problem between agents and principal.

In accordance to modern portfolio theory, Investor try to maximize their returns and uncertainty with the help of diversified portfolio. In addition, the selection of portfolio should be consistent with the market imperfections (Markowitz, 1952). As an application in banking sector, diversification of income portfolio can reduce probably the chances of failure. The diversification of borrower projects may also reduce the cost of monitoring of borrower and payments to the depositors (Diamond, 1984; Diamond & Verrecchia, 1991; Demsetz & Strahan, 1997). Thus, the hyposthesis of income structure are developed in accordance to Modren Portfolio Theory.

4.6.1 Asset Quality and Insolvency Risk

Loans are riskier than other kind of assets like cash, bond or any other. Nonperforming loans are part of loans which lower asset quality and produce higher risk for bank. Higher rate of nonperforming loans to gross loans/financing reduce credit quality and increase the chances of credit default and insolvency risk (Carlson, Shan, & Warusawitharana, 2013; Shim, 2013). So therefore, asset quality has significant relationship with insolvency risk. Based on the previous studies, this study derives the following hypotheses.

H1a: There is a significant relationship between nonperforming loans/ financing to gross loans/ financing and insolvency risk in conventional banks of Pakistan.

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

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

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

4.6.2 Income Structure and Insolvency Risk

The researchers have concluded that the relationship between income diversification and insolvency risk is inconsistent (Mercieca, Schaeck, & Wolfe, 2007; Zhou, 2014). However, if diversification in portfolio is made in cross industry, the effect of diversification is still contagion in nature. On contrary, Sanya and Wolfe (2011), the diversification in both interest and non-interest income produces positive impact on both profitability and on insolvency risk.

In addition, there is a significant relationship between income from fee and brokerage with insolvency risk (Williams & Prather, 2010; DeYoung & Torna, 2013). Further, Apergis (2014) concluded that if fee and brokerage income add 11.6 cents in profitability, it also produces 15.9 cents in insolvency risk. Non-interest income is a tool to diversify the portfolio but it can also produce financial shock to bank (Stiroh, 2004a; Stiroh & Rumble, 2006; Lin *et al.*, 2012).

Based on the previous literature discussed above the relationship between income structure and insolvency risk is significant, hence the current study formulates the following hypotheses,

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

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

H4a: There is a significant relationship between income from investment and insolvency risk in conventional banks of Pakistan.

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

H5a: There is a significant relationship between fee, commission and brokerage income and insolvency risk in conventional banks of Pakistan.

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

4.6.3 Macroeconomics factors

The increase in GDP produces a positive impact on income production which ultimate increase debt service capacity and results in low probability of failure of

banks (Louzis, Vouldis, & Metaxas, 2012). On contrary, the adverse GDP increase failure of banks and vice versa. Aver (2008), Fainstein and Novikov (2011) and Louzis, Vouldis, and Metaxas (2012) highlighted the same conclusion that macroeconomic environment variable including GDP produces negative impact on insolvency risk. In US economy adverse macroeconomic environment produces strong negative impact on default risk (Ali & Daly, 2010). Osamwonyi and Michael (2014) suggests that GDP has positive relationship with ROE, which means that GDP has negative relation with insolvency risk. Based on the previous literature the study has come up with the following hypotheses,

H6a: There is a significant relationship between GDP Growth and insolvency risk in conventional banks of Pakistan.

H6b: There is a significant relationship between GDP Growth and insolvency risk in Islamic banks of Pakistan.

Zeitun (2012) argued that there is a negative relationship between inflation and ROA. On the other side Thiagarajan, Ayyappan, and Ramachandran (2011) provided that inflation has positive relationship with insolvency risk (Rinaldi & Sanchis-Arellano, 2006; Gunsel, 2012). The study of Buyinza (2010) argued that inflation has mixed result with profitability and insolvency risk. Previous studies of i.e. (Boyd, Levine, & Smith, 2001; Namazi & Salehi, 2010; Syafri, 2012; Umer. M, 2014) argued that inflation has adverse impact on banking profitability, which means that it produces positive impact on insolvency risk. Based on the previous findings, inflation rate produces a positive and negative impact on bank insolvency risk. Moreover, ThiagarajanThiagarajan, Ayyappan, and Ramachandran (2011)

argued that current year inflaiton has positive relationship with risk while lag year inflaiton has no relationship with risk. Therefore, on the basis of previous mixed finding, following are the hypothesis of current study,

H7a: There is a significant relationship between inflation rate and insolvency risk in conventional banks of Pakistan.

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

Interest rate risk produces significant positive impact on risk (Drehmann, Sorensen, & Stringa, 2010). Aver (2008), Bofondi and Ropele (2011) and Castro (2013) found that there is a positive relationship between interest rate and insolvency risk. A rise in interest rate increases the profit ratio of the bank but on the other side it results in increase in insolvency risk. So therefore, interest rate has positive significant impact on insolvency risk (Aver, 2008; Nkusu, 2011; Louzis, Vouldis, & Metaxas, 2012). Jesus and Gabriel (2006) suggested that interest rate has positive significant relationship with problematic loans, which therefore result in a positive relationship between interest rate and insolvency risk. In view of the previous findings the following hypotheses are developed,

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

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

Strong institutions play an important part in the growth of country. If they are governed with good governance, this tends to reduce the growth of corruption. The GDP growth rate suggests that a higher rate of growth of an economy improves the quality of politics and curbs corruption. Svensson (2003) and Galiani and Schargrodsky (2010) highlighted that power and fairness of the market reduces corruption. This finding is further supported by Di Tella, Galiani, and Schargrodsky (2007), they also revealed that number of working hours and competition among the bureaucratic machinery can reduce corruption. Swaleheen (2011) shows that corruption not only produces impact on growth but it also reduces the per capita income. On the basis of previous researches i.e. (Di Tella, Galiani, & Schargrodsky, 2007; Galiani & Schargrodsky, 2010; Swaleheen, 2011) it can be seen that there is a significant relationship between corruption and growth of a country. On the other hand GDP growth has significant relationship with insolvency risk (Aver, 2008; Kattai, 2010; Fainstein & Novikov, 2011; Osamwonyi & Michael, 2014). So therefore, corruption could have a significant relationship with insolvency risk of the banks. Hence, the following hypotheses are Proposed;

H9a: There is a significant relationship between corruption and insolvency risk in conventional banks of Pakistan.

H9b: There is a significant relationship between corruption and insolvency risk in Islamic banks of Pakistan.

4.6.4 The Moderating Effect of Capital Adequacy Requirement

Bank regulation is imposed to the banking industry with an objective of protecting creditors' interests and the economy as a whole. Under Agency theory, expanding resources to alter the opportunity that the owner has for capturing the company benefits can increase agency problems (Jensen & Meckling, 1976; Eisenhardt, 1989; Mercado-Mendez & Willey, 1995; Ciancanelli & Reyes-Gonzalez, 2000; Arun & Turner, 2004; Alexander, 2006). Ciancanelli and Reyes-Gonzalez (2000) and Alexander (2006) indicated that banking prudential rules provide some general law and guidelines on how regulators can produce a balance interest among stake holders, owners and managers in a particular social society. Although there are many prudential rules made by the regulatory bodies but capital regulation is the most important regulation to lower down the risk factor of banks (Santos, 2001).

The capital requirement of the banks has been increased due to the increase in their risk exposure. The increase in capital will ultimately increase the bank immune system to absorb maximum losses and it also reduces the risk of the bank which is mostly expected by the shareholders. Ciancanelli and Reyes-Gonzalez (2000) highlighted that the capital requirement hinders to avoid any expropriation problem among creditors and shareholders. The larger part of the losses is ultimately absorbed by the shareholders due to this reason capital regulation avoids higher risks in the banks (Porta, Lopez-de-Silanes, & Shleifer, 1999; Rime, 2001). In support with the findings, Mercado-Mendez and Willey (1995) highlighted that higher capital requirement is much needed as low capital might allow shareholder

to accept higher risk activities. Konishi and Yasuda (2004) corroborated in their study that enforcement of capital regulation lessens the risk by 0.28 percent, which shows the negative relationship between capital regulation and insolvency risk of the bank. So therefore, it can be deduced that implementation of capital regulation is much important for the reduction of risk of the bank. Hence, on the basis previous literature, the hypotheses are proposed are as follow:

H10a: Capital Regulation (capital adequacy ratio) moderates the relationship between asset quality (nonperforming loans/ financing to gross loans/ financing, provision for nonperforming loans/ financing to gross loans/ financing) and insolvency risk in conventional banks of Pakistan.

H10b: Capital Regulation (capital adequacy ratio) moderates the relationship between asset quality (nonperforming loans/ financing to gross loans/ financing, provision for nonperforming loans/ financing to gross loans/ financing) and insolvency risk in Islamic banks of Pakistan.

H11a: Capital Regulation (capital adequacy ratio) moderates the relationship between income structure (income from advances/ financing, income from investments, fee and brokerage income) and insolvency risk in conventional banks of Pakistan.

H11b: Capital Regulation (capital adequacy ratio) moderates the relationship between income structure (income from advances/ financing, income from investments, fee and brokerage income) and insolvency risk in Islamic banks of Pakistan.

H12a: Capital Regulation (capital adequacy ratio) moderates the relationship between macroeconomic factors (GDP growth, inflation rate, interest rate and corruption index) and insolvency risk in conventional banks of Pakistan.

H12b: Capital Regulation (capital adequacy ratio) moderates the relationship between macroeconomic factors (GDP growth, inflation rate, interest rate and corruption index) and insolvency risk in Islamic banks of Pakistan.

4.7 Model

To test the hypothesis of the study, two regression models have been developed. The first model is multiple regression between independent variables and dependent variable i.e. the impact of asset quality, income structure and macroeconomic factors on insolvency risk for both conventional and Islamic banks of Pakistan, while the second model is hierarchical multiple regression model to test the moderating effect of capital regulation (capital adequacy ratio) on the relationship between asset quality, income structure macroeconomic factors and insolvency risk is used to test for both conventional and Islamic banks of Pakistan.

4.7.1 Multiple Regression Model

The objective of multiple regression model is to predict the change in the dependent variable (insolvency risk) caused by the independent variables (asset quality, income structure, macroeconomic factor). The equatorial model for the study is as follow;

$$ZSCORE_{it(CB)} = \alpha_0 + \beta_1 NPL_{it} + \beta_2 PNPL_{it} + \beta_3 IATA_{it} + \beta_4 IITA_{it} + \beta_5 FBTA_{it} + \beta_6 GDP_t + \beta_7 INF_{t-1} + \beta_8 INT_t + \beta_9 CUR_{t-1} + \beta_{10} \ln(SIZE)_{it} + \in) \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$ZSCORE_{it(IB)} = \alpha_0 + \beta_1 NPL_{it} + \beta_2 PNPL_{it} + \beta_3 IATA_{it} + \beta_4 IITA_{it} + \beta_5 FBTA_{it} + \beta_6 GDP_t + \beta_7 INF_{t-1} + \beta_8 INT_t + \beta_9 CUR_{t-1} + \beta_{10} \ln(SIZE)_{it} + \in \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where;

ZSCORE= insolvency risk proximate by Z-SCORE

CB= Conventional Banks

IB= Islamic Banks

i= bank

t= time period

NPL= nonperforming loans/ financing to gross loans/ advances

PNPL= provision for nonperforming loans/ financing to gross loans/ financing

IATA= income from advances/ financing

IITA= income from investments

FBTA = fee, commission and brokerage income

GDP= GDP growth

INF= inflation rate

INT= interest rate

CUR = Corruption Perception Index

SIZE= natural log of total assets

$\in$ = Standard Error

In order to test the impact of asset quality, income structure and macroeconomic factors on insolvency risk in conventional and Islamic banks of Pakistan multiple regression analysis is performed using E-view 8.0, the results of conventional banks of Pakistan are displayed in Table 5.10 of chapter 5. For Islamic banks of Pakistan, the results of multiple regression analysis results are displayed in Table 6.7 of chapter 6.

4.7.2 Hierarchical Multiple Regression Model

Hierarchical multiple regression model is minor extension form of classical linear multiple regression (Hair *et al.*, 2006). Hierarchical multiple regressions allow another variable between independent and dependent variable to depend on the level of another independent variable. (i.e. the moderator) (Bisbe & Otley, 2004). It is an appropriate method for detecting the effects of moderating variables (Aguinis, 1995; Hartmann & Moers, 2003; Villa *et al.*, 2003; Cohen *et al.*, 2013). This method improves the attempts of ordinary linear regression estimation by adding a third variable in the model.

In the current study, the moderating effect of capital adequacy ratio as a moderator is examined to identify its effect on the relationship between asset quality, income structure and macroeconomic factors (independent variables) on insolvency risk (dependent variable) in conventional and Islamic banks of Pakistan. In order to test the moderating effect of capital adequacy ratio, the model of Baron and Kenny (1986) is used. This model is also used by previous studies such as Sharma, Durand, and Gur-Arie (1981), Anderson (1986), Aguinis (1995), Hartmann and Moers (2003), Villa *et al.* (2003), Bisbe and Otley (2004), Laeven and Levine (2009), Barry, Lepetit, and Tarazi (2011). The model for the moderating effect is displayed in figure 4.2, which is as follow:

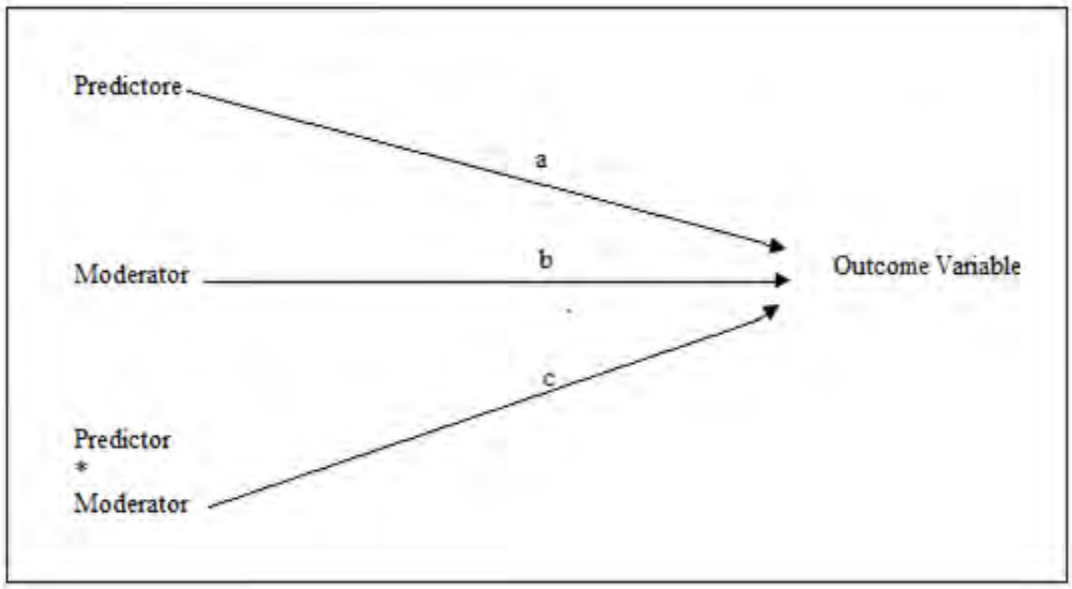


Figure 4. 2 *Moderating Effects Model*
Source: Baron and Kenny (1986)

According to Baron and Kenny (1986), the model as diagrammed in Figure 4.2 has three causal paths that affect the outcome variable. Path a, is the direct impact of predictor variable (independent variable) on outcome variable, path b defines the direct impact of moderator on outcome variable, while path c, is the interaction/ multiplicative product of predictor and moderator variables. The moderator hypothesis is accepted or rejected on the basis, if outcome of interaction term is significant or insignificant. Baron and Kenny (1986) also highlighted that there may be direct significant relationship between path a and path b with outcome variable, but these paths are not conceptually not relevant to test the moderating effect. The linear model of moderated relationship define by Hair *et al.* (2006) is as follow:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 \quad \text{.....(3)}$$

Where:

$\beta_0 = \text{Intercept}$

$\beta_1 X_1 = \text{Linear effect of } X_1$

$\beta_2 X_2 = \text{Linear effect of X2}$

$\beta_3 X_1 X_2$= Moderating effect of X_2 on X_1

Thus, following Sharma, Durand, and Gur-Arie (1981), Baron and Kenny (1986), Aguinis (1995), Hartmann and Moers (2003), Villa *et al.* (2003), Bisbe and Otley (2004) and Hair *et al.* (2006) the equations for the moderating model for this study are as follows:

$$ZSCORE_{it(CB)} = \alpha_0 + \beta_1 NPL_{it} + \beta_2 PNPL_{it} + \beta_3 IATA_{it} + \beta_4 IITA_{it} + \beta_5 FBTA_{it} + \beta_6 GDP_t + \beta_7 INF_{t-1} + \beta_8 INT_t + \beta_9 CUR_{t-1} + \beta_{10} CAR_{it} + \beta_{11} NPL_{it} \times CAR_{it} + \beta_{12} PNPL_{it} \times CAR_{it} + \beta_{13} IATA_{it} \times CAR_{it} + \beta_{14} IITA_{it} \times CAR_{it} + \beta_{15} FBTA_{it} \times CAR_{it} + \beta_{16} GDPG_t \times CAR_{it} + \beta_{17} INF_{t-1} \times CAR_{it} + \beta_{18} INT_t \times CAR_{it} + \beta_{19} CUR_{t-1} \times CAR_{it} + \in \quad \text{.....(4)}$$

$$ZSCORE_{it(IB)} = \alpha_0 + \beta_1 NPL_{it} + \beta_2 PNPL_{it} + \beta_3 IATA_{it} + \beta_4 IITA_{it} + \beta_5 FBTA_{it} + \beta_6 GDP_t + \beta_7 INF_{t-1} + \beta_8 INT_t + \beta_9 CUR_{t-1} + \beta_{10} CAR_{it} + \beta_{11} NPL_{it} \times CAR_{it} + \beta_{12} PNPL_{it} \times CAR_{it} + \beta_{13} IATA_{it} \times CAR_{it} + \beta_{14} IITA_{it} \times CAR_{it} + \beta_{15} FBTA_{it} \times CAR_{it} + \beta_{16} GDPG_t \times CAR_{it} + \beta_{17} INF_{t-1} \times CAR_{it} + \beta_{18} INT_t \times CAR_{it} + \beta_{19} CUR_{t-1} \times CAR_{it} + \in \quad \text{.....(5)}$$

Where;

CAR= Capital Adequacy Ratio

NPL*CAR

PNPL*CAR

IATA*CAR
IITA*CAR
FBTA*CAR
GDP*CAR
INF*CAR
INT*CAR
CUR * CAR

= interaction terms

In order to obtain result of hierarchical multiple regressions, the estimation is performed separately for both conventional banks and Islamic banks of Pakistan. As for moderating effect of capital adequacy ratio on the relationship between asset quality, income structure and macroeconomic factors with insolvency risk, multiple models are estimated for conventional banks of Pakistan.

Anderson (1986) highlighted that if there is a significant result found between moderator and predictor variables, additional useful information can be obtained by plotting graph of regression line. The graphical representation of results provides additional information how moderator effects the relationships. This method of graphical representation have previously widely used by researchers such as Sharma, Durand, and Gur-Arie (1981), Anderson (1986), Aguinis (1995), Hartmann and Moers (2003), Villa *et al.* (2003), Bisbe and Otley (2004).

4.7.2.1 Hierarchical Estimation of Asset Quality and Insolvency Risk: Model 1 to 4 (Conventional and Islamic Banks)

To estimate the moderating effect of capital regulation (CAR) on the relationship between asset quality and insolvency risk in conventional and

Islamic banks of Pakistan, the equation 5 and equation 6 are subdivided. The subdivided equations are as follow;

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 NPL_{it} + \beta_2 PNPL_{it} + \in \quad \ldots\ldots\ldots\ldots\ldots(6)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 NPL_{it} + \beta_2 PNPL_{it} + \beta_3 CAR_{it} + \in \quad \ldots\ldots\ldots\ldots\ldots(7)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 NPL_{it} + \beta_2 PNPL_{it} + \beta_3 CAR_{it} + \beta_4 NPL_{it} \times CAR_{it} + \in \quad \ldots\ldots\ldots\ldots\ldots(8)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 NPL_{it} + \beta_2 PNPL_{it} + \beta_3 CAR_{it} + \beta_4 PNPL_{it} \times CAR_{it} + \in \quad \ldots\ldots\ldots\ldots\ldots(9)$$

In order to obtain results of capital regulation affect on the relationship between asset quality and insolvency risk, four models have been tested for conventional banks, as displayed in Table 5.12 of chapter 5, The model 1 tests the relationship between NPL and PNPL on insolvency risk. Model 2 estimates the results of independent variables (NPL, PNPL) and moderator (CAR) on insolvency risk (Z-SCORE). Model 3 estimates the results of NPL, PNPL, CAR and an interaction term of CAR×NPL. The last model is model 4 estimates the results of independent variables (NPL, PNPL), moderator (CAR) and interaction of PNPL×CAR.

Similar to conventional banks of Pakistan, for Islamic bank multiple models have been estimated to obtain the impact of capital regulation on the relationship between asset quality, income structure and macroeconomic factors with insolvency risk. In order to determine the moderating effect of capital regulation on the relationship between asset quality and insolvency risk in Islamic banks, four models have been estimated, as displayed in Table 6.9 of chapter 6. Model 1, test the direct relationship of NPL and PNPL with insolvency risk (Z-SCORE); model 2 includes CAR as moderator with

independent variables NPL, PNPL, to test them with Z-SCORE; model 3, estimates the relationships of NPL, PNPL, moderator (CAR) and interaction term of CAR*NPL with insolvency risk (Z-SCORE); model 4, estimates the results of NPL, PNL, CAR and interaction of PNPL*CAR.

4.7.2.2 Hierarchical Estimation of Income Structure and Insolvency Risk: Model 1 to 5 (Conventional and Islamic Banks)

To estimate the interacting effect of capital regulation (CAR) on the relationship between income structure and insolvency risk in conventional and Islamic banks of Pakistan, the equation 5 and equation 6 are subdivided. The subdivided equations are as follow;

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 IATA_{it} + \beta_2 IITA_{it} + \beta_3 FBTA_{it} + \in \quad \ldots\ldots\ldots\ldots(10)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 IATA_{it} + \beta_2 IITA_{it} + \beta_3 FBTA_{it} + \beta_4 CAR_{it} + \in \quad \ldots\ldots\ldots\ldots(11)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 IATA_{it} + \beta_2 IITA_{it} + \beta_3 FBTA_{it} + \beta_4 CAR_{it} + \beta_5 IATA_{it} \times CAR_{it} + \in \quad \ldots\ldots\ldots\ldots(12)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 IATA_{it} + \beta_2 IITA_{it} + \beta_3 FBTA_{it} + \beta_4 CAR_{it} + \beta_5 IITA_{it} \times CAR_{it} + \in \quad \ldots\ldots\ldots\ldots(13)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 IATA_{it} + \beta_2 IITA_{it} + \beta_3 FBTA_{it} + \beta_4 CAR_{it} + \beta_5 FBTA_{it} \times CAR_{it} + \in \quad \ldots\ldots\ldots\ldots(14)$$

To investigate the impact of capital regulation on the relationship between income structure and insolvency risk in conventional banks, five models have been estimated as shown in Table 5.13 of chapter 5. Model 1, tests the relationship of IATA, IITA and FBTA on Z-SCORE; Model 2, test the relationship of IATA, IITA, FBTA and moderator (CAR) on Z-SCORE; Model 3, estimates the results of IATA,IITA, FBTA, moderator(CAR) and interaction

of IATA*CAR; Model 4, test the results of IATA, IITA, FBTA, moderator(CAR) and an interaction term of IITA*CAR; In model 5, IATA, IITA, FBTA, moderator(CAR) and interaction of FBTA*CAR have been tested.

The moderating impact of capital regulation on the relationship between income structure and insolvency risk in Islamic Banks is displayed in chapter 6, Table 6.10. To obtain results five (5) models have been tested. Model 1 presents the direct relationship of IATA, IITA, FBTA with insolvency risk; model 2, test the relationship of IATA, IITA, FBTA and moderator (CAR) with insolvency risk (Z-SCORE); model 3, estimates the relationship of independent variable IATA, IITA, FBTA, moderator(CAR) and interaction of IATA*CAR with Z-SCORE; model 4, test the relationship of IATA, IITA, FBTA, CAR(moderator) and interaction term of IITA*CAR with Z-SCORE; model 5, finds the results of interaction term(CAR*FBTA), IATA, IITA,FBTA and CAR(moderator) with Z-SCORE (insolvency risk).

4.7.2.3 Hierarchical Estimation of Macroeconomic factors and Insolvency Risk: Model 1 to 6 (Conventional and Islamic Banks)

To estimate the interacting effect of capital regulation (CAR) on the relationship between macroeconomic factors and insolvency risk in conventional and Islamic banks of Pakistan, the equation 5 and equation 6 are subdivided. The subdivided equations are as follow;

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 GDP_t + \beta_2 INF_{t-1} + \beta_3 INT_t + \beta_4 CUR_{t-1} + \in \text{ ……..(15)}$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 GDP_t + \beta_2 INF_{t-1} + \beta_3 INT_t + \beta_4 CUR_{t-1} + \beta_5 CAR_{it} + \in \text{ ……..……(16)}$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 GDP_t + \beta_2 INF_{t-1} + \beta_3 INT_t + \beta_4 CUR_{t-1} + \beta_5 CAR_{it} + \beta_6 GDPG_t \times CAR_{it} + \in \quad \ldots\ldots(17)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 GDP_t + \beta_2 INF_{t-1} + \beta_3 INT_t + \beta_4 CUR_{t-1} + \beta_5 CAR_{it} + \beta_6 INF_{t-1} \times CAR_{it} + \in \quad \ldots\ldots(18)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 GDP_t + \beta_2 INF_{t-1} + \beta_3 INT_t + \beta_4 CUR_{t-1} + \beta_5 CAR_{it} + \beta_6 INT_t \times CAR_{it} + \in \quad \ldots\ldots(19)$$

$$ZSCORE_{it(CB,IB)} = \alpha_0 + \beta_1 GDP_t + \beta_2 INF_{t-1} + \beta_3 INT_t + \beta_4 CUR_{t-1} + \beta_5 CAR_{it} + \beta_6 CUR_{t-1} \times CAR_{it} + \in \quad \ldots\ldots(20)$$

In order to examine the impact of capital regulation on the relationship between macroeconomic factors, six models have been estimated as presented in Table 5.14 of chapter 5. Model 1, test the relationship between macroeconomic factors(GDP, INF, INT,CUR) and insolvency risk (Z-SCORE); model 2, macroeconomic factors (GDP, INF, INT,CUR) and moderator(CAR) with insolvency risk (Z-SCORE); model 3, test the relationship among macroeconomic factors (GDP, INF, INT,CUR), moderator (CAR) and interaction of GDP*CAR with Z-SCORE; model 4, it takes macroeconomic factors (GDP, INF, INT,CUR), CAR and interaction of INF*CAR; model 5, estimates the relationship among macroeconomic factors (GDP, INF, INT,CUR), moderator CAR and interaction of INT*CAR; model 6, test the relationship of macroeconomic factors (GDP, INF, INT,CUR), moderator(CAR) and interaction of CUR*CAR.

In chapter 6, Table 6.11, it presents six models on the moderating effect of capital regulating on the relationship between macroeconomic factors and insolvency in Islamic banks of Pakistan. Model 1, shows the test results of direct relationship of GDP, INF, INT and CUR with Z-SCORE (insolvency risk); model 2, estimates the independent variable (GDP, INF, INT, CUR) and

moderator (CAR) with insolvency risk (Z-SCORE). Model 3, test the relationship of GDP,INF, INT, CUR, CAR(moderator) and CAR*GDP with Z-SCORE model 4, estimates the effect of interaction term CAR*INF on the relationship between GDP, INF,INT, CUR and Z-SCORE; model 5; test the relationship of macroeconomic factors (GDP,INF,INT,CUR), moderator (CAR) with Z-SCORE; model 6, estimates the relationship of independent variables GDP, INF, INT, CUR, interaction term(CAR*CUR) with Z-SCORE.

4.8 Data Analysis Methods

The serial protocol of data analysis consists of two parts. The first part deals with descriptive and diagnostic tests performed to run regression analysis. While, the second part deals with regression model estimated for selection of appropriate model for panel analysis. The sequential process for data analysis of conventional and Islamic banks of Pakistan is displayed in Figure 4.3 and Figure 4.4 respectively.

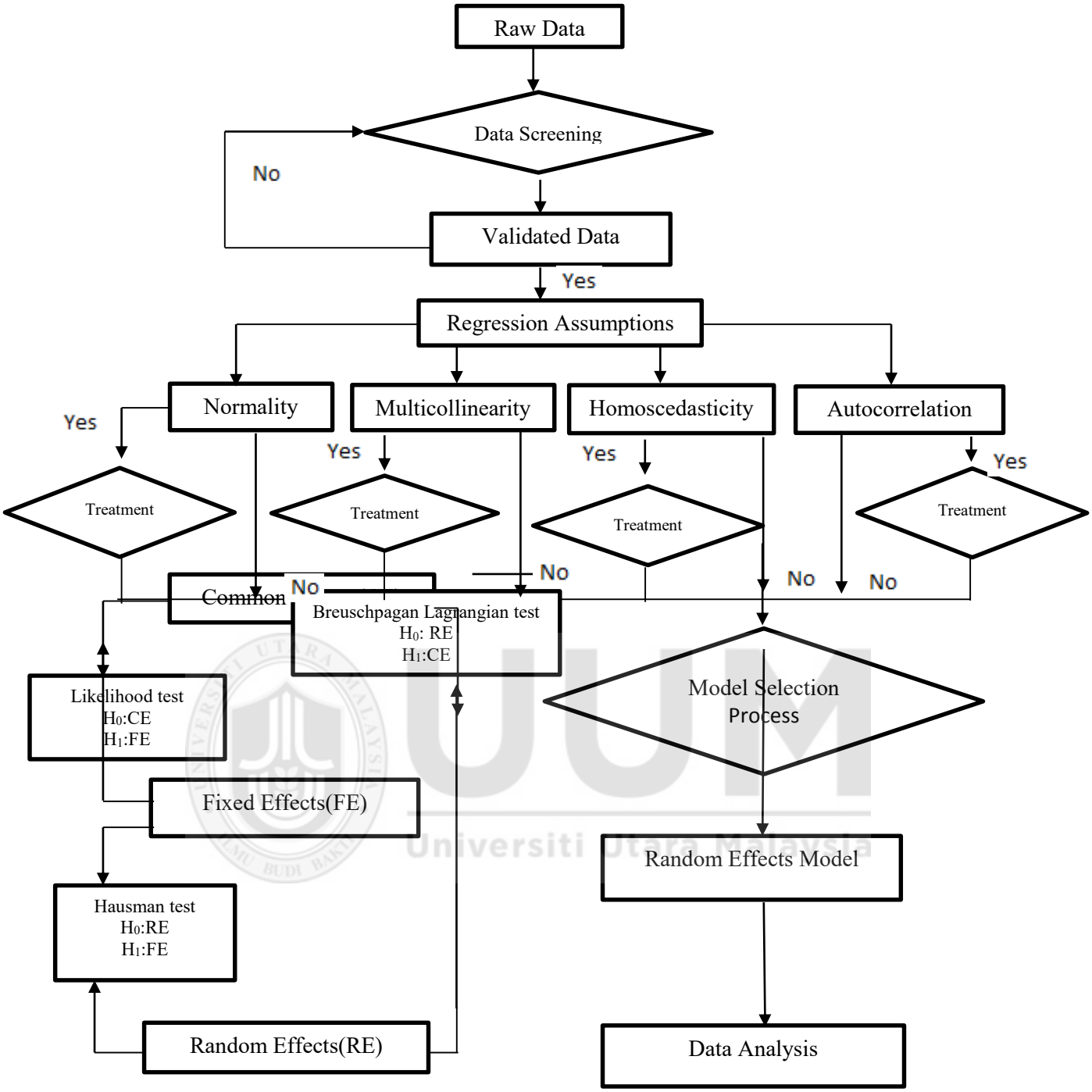
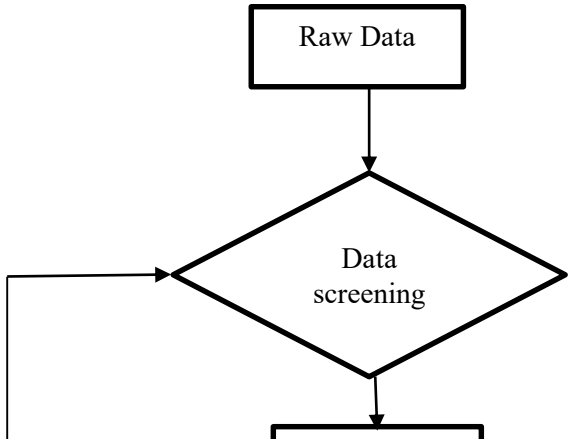


Figure 4. 3
Sequential Process for Data Analysis for Conventional Banks



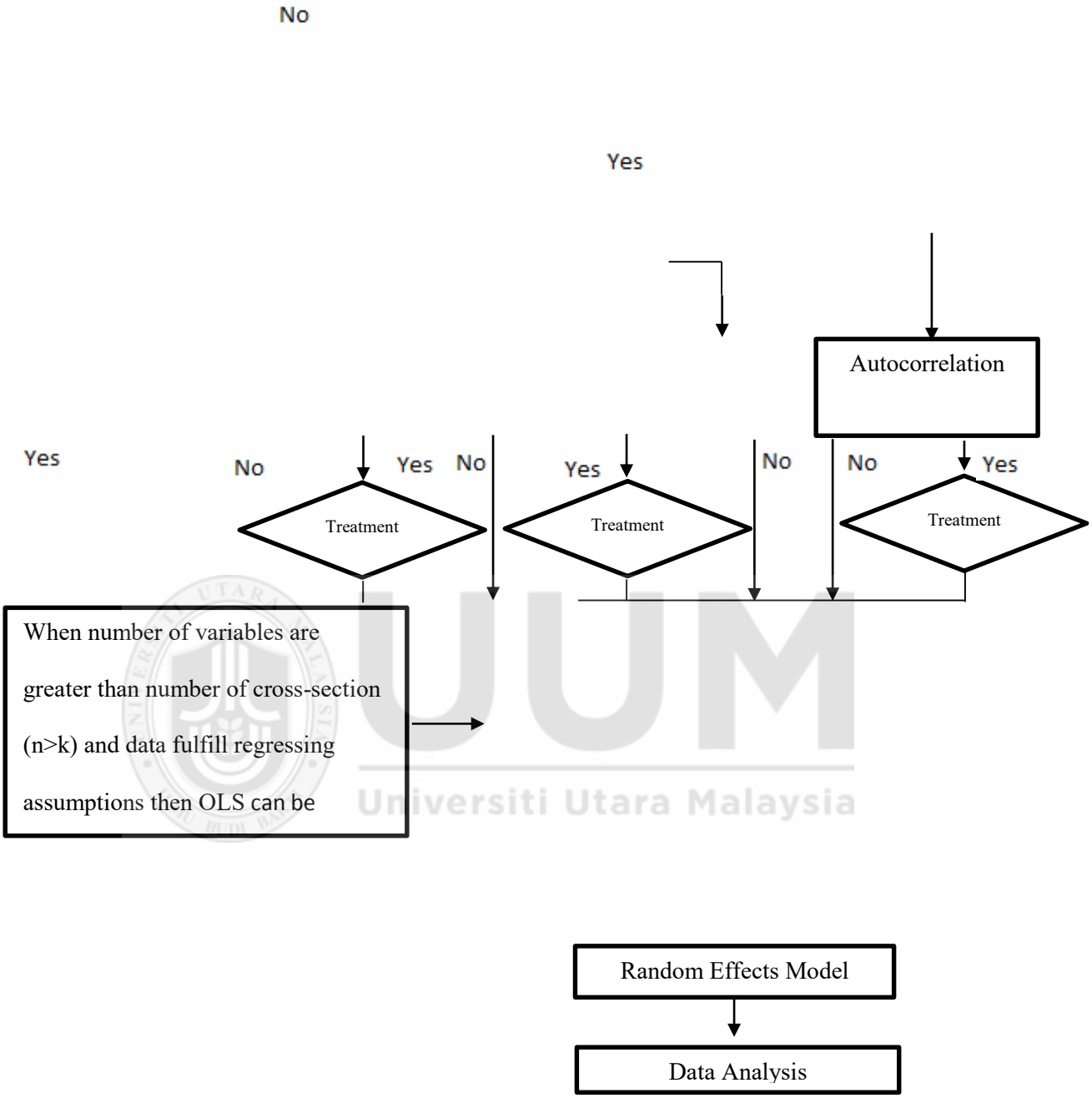


Figure 4. 4
Sequential Process for Data Analysis for Islamic Banks

4.8.1 Descriptive Analysis

For the purpose of the descriptive analysis, various statistical techniques are employed to initially quantitatively summarize the data. The descriptive statistic analyzed in this study are the mean, median, standard deviation, maximum value and minimum value of dependent, independent variables and moderator which are displayed in section 5.1 of chapter 5.

4.8.2 Diagnostic Test

The data for the present study is analyzed by using the E-Views Software 8.0. However, the data has observed serial protocol before regression in is performed. First, that data is summarized and initially analyzed through descriptive statistics. Second, before regression analysis is conducted, several tests such as, normality, multicollinearity, homoscedasticity and auto-correlation are carried out. These tests are conducted to ensure that model is said to achieve BLUE (best unbiased linear estimator), if the variance is minimum and the value expected is a true value (Greene, 2003; Gujarati, 2003; Asteriou & Hall, 2007). As this study uses panel data, a panel data tests are conducted in order to ensure an appropriate model to be used in the regression test. Once the appropriate panel data model has been identified, regression analysis is performed.

4.8.3 Hypotheses Testing Using Regression Analysis

To test the hypotheses of the study, Multiple Regression Analysis is used. Multiple regression analysis is used to test for the significance of the relationship

between two or more independent variables and one dependent variable (Hair *et al.*, 2006). There are four main assumptions that should be met prior to conduct the regression analysis. These assumptions are: normality; multicollinearity, homoscedasticity and autocorrelation (Hair *et al.*, 2006). According to Hair *et al.* (2006), sample size has a direct impact on the power of the multiple regression. However, there has been no hard rule to determine the observation independent variable ratio. To ensure valid and reliable results, some researchers claim that ideally there should be 15 to 20 observations for each independent variable. The coefficient of determination, R^2, is the measure of the goodness of the model where it indicates the variance of the dependent variable that was accounted for by the independent variables (Hair *et al.*, 2006).

4.8.4 Normality Test

In multivariate analysis this test is the fundamental assumption for multivariate analysis. The test calculates the degree of normal distribution of the sample data. As suggested by Hair *et al.* (2006), residual plots (the difference between the observed and predicted values for dependent variable) and statistical tests are used to examine the normality of the data. According to Yazici and Yolacan (2007), the testing of normality is basics in theoretical and empirical finding of research. So, there are many tests to assess normality for example, Kolmogorove and Smirnov, Shapiro and Wilk's Test. Further, Hair *et al.* (2006) and Tabachnick and Fidell (2007) suggested to perform Skewness and Kurtosis tests for normality of data. Therefore, statistical test which is used to check the normality in this study are Kolmogorov-Smirnov test and Skewness and Kurtosis

test for both conventional and Islamic banks of Pakistan (Tabachnick & Fidell, 2007).

4.8.5 Multicollinearity Test

The use of regression in linear equation is to find out the effect of dependency, the purpose is not to find out an interdependency of relationships. Multicollinearity effect both specification and effective estimation of linear relationship among dependent and independent relationship (Farrar & Glauber, 1967). The primary objective of this test is to measure the correlation among several independent variables. In order to detect the existence of multicollinearity in a model, multicollinearity statistics such as tolerance statistics and variance-inflation factor (VIF) is calculated. Tolerance value indicates the variability of the specified independent variable that is not explained by the other independent variables in the model. Tolerance value that is less than 0.10 imply multicollinearity problem (multiple correlation with other variables is high). VIF value on the other hand is the inverse of the tolerance value, whereby VIF values above 10 indicates multicollinearity problem (Farrar & Glauber, 1967; O'Brien, 2007; Pallant, 2007). Following Pallant (2007), O'Brien (2007) and Farrar and Glauber (1967), the study has estimated VIF and correlation matrix to detect multicollinearity for both datasets i.e. conventional and Islamic banks.

4.8.6 Homoscedasticity Test

When variance of error terms (ε) appears constant over a range of independent variables, the data is said to be homoscedastic (Hair *et al.*, 2006). The fundamental linear regression model postulates that error-term in the regression function is homoscedastic or equal variance over all periods and locations. However, if the variance is not equal or constant, then heteroscedasticity problem exists. This study have used Breusch-Pagan-Godfrey and White Tests to detect the existence of heteroscedasticity problem in the model (White, 1980; Ongena & Smith, 2000; Watson & Teelucksingh, 2002; Baum, Schaffer, & Stillman, 2003; Berger, Klapper, & Turk-Ariss, 2009). Gujarati (2003) noted that Breusch-Pagan-Godfrey is appropriate for large sample test and it is not sensitive to the data that it is not normally distributed. If the result of the test is significant, null hypothesis of homoscedasticity will be rejected, and the problem of heteroscedasticity is identified. The current study has used Breusch-Pagan-Godfrey and White Tests to detect the existence of heteroscedasticity for both conventional and Islamic banks of Pakistan.

4.8.7 Auto-correlation Test

Auto-correlation refers to correlation between members of series of observations ordered in time (as in time series data) or space (as in cross sectional data) (Gujarati, 2003). In detecting the existence of auto-correlation in the model, Breusch Godfrey Serial correlations LM test is performed for both datasets of study i.e. conventional and Islamic banks (Bikker & Metzemakers, 2005; Plaza, 2011). Bikker and Metzemakers (2005) indicate that Breusch Godfrey serial correlation

LM test is the most useful tests for detecting auto-correlation problem in small and large sample data.

4.8.8 Panel Data Tests

As this study is using panel data, an analysis to choose the most appropriate panel data model for the study has been conducted. Following Gujarati (2003) and Greene (2003), two most prominent panel data models which are Fixed Effects Model (FEM) and Random Effects Model (REM) can used for data analysis. In order to choose between Common Effects and Fixed Effects Model Redundant Fixed Effects Test[4] is used. To further select between Fixed Effects and Random Effects Model[5] Hausman Test is conducted (Hausman, 1978). The null hypothesis underlying the Hausman test is that Fixed Effects Model and Random Effects model estimators do not differ substantially. Thus, if the null hypothesis is rejected, the conclusion is that Random Effects Model is not appropriate and Fixed Effects Model should be used. Whereas, the appropriate model for this study based on the basis results of Husman Test is Random Effects Model.

To further confirm the selection of an appropriate model, Breush and Pagan Lagrangian Multiplier Test for Random Effects Model is performed. The criteria for selection of model is p-value<0.05. The NULL hypothesis of Breush and Pagan

[4] Output of Redundant Fixed Effects Test can be seen in Appendix III
[5] The output of Hausman Test is presented in Appendix III

Lagrangian Multiplier test[6] is for Common Effects Model and alternate hypothesis is for Random Effects Model (Torres-Reyna, 2007). This test has also confirmed that Random Effects Model is more appropriate for this study.

Moreover, according to Watson and Teelucksingh (2002), OLS estimation is possible when n>k; it defines that the number of observations should be greater than the number of cofficients.Wang and Akabay (1994) argued that simple OLS estimation is good if it fulfills the assumptions of autocorelation, homoscedasticity and multicolinearity. Hence, the dataset of Islamic banks have no serious issues such as multicollinearity, heteroscedasticity and autocorrelation. Therefore, OLS is an appropriate model for estimation of results (Wang & Akabay, 1994; Watson & Teelucksingh, 2002; Greene, 2003).

4.8.8.1 Fixed Effects Model

Fixed Effects Model takes into account the individuality of each cross sectional unit. It lets the intercept to vary for each firm but still assumes that the slope coefficients are constant across firms. The estimation of Fixed Effects Model, which is an extension of the general regression equation, is as follows:

The general regression estimation:

[6] The output of Breush and Pagan Lagrangian Multiplier Test is placed in Appendix III

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_{it} \quad \text{.....(21)}$$

Where

i= i^{th} cross- sectional unit

t= t^{th} time period

the Fixed Effects Model estimation:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_{it} \quad \text{.....(22)}$$

Where

i= intercept term

The subscript i on the intercept suggest that the intercepts of the individual firms may be different. The differences could be due to the special features of each firm such as managerial style, policies or strategies. However, although the intercept across individual firm may differ but each individual's intercept does not vary over time (time invariant), and this is represent by β_{1i} The term "Fixed Effect" itself refer to the time invariant in the model (Gujarati, 2003).

4.8.8.2 Random Effects Model / Error Components Model

This approach treats intercept among individual differently than the Fixed Effects Model. Instead of treating intercept (β_{1i}) as fixed, this approach assume that it is random variable with a mean value of β_1 (without subscript i). The approach contend that the firms included as sample are drawing from a much larger universe of such companies and that they have a common mean value for the intercept (=β_1) and the individual differences in the intercept values of each company are reflected in the error term (ε_i) (Gujarati, 2003).

Thus, estimation random effects model is as follows:

$$Yit = \beta_1 + \beta_2 X2it + \beta_3 X3it + \varepsilon_i + \mu_{it}$$
$$= \beta_1 + \beta_2 X2it + \beta_3 Xit + w_{it} \quad \text{.....(23)}$$

Where

$w_{it} = \varepsilon + \mu it$

ε_i = cross-section or individual specific error component

μ_{it} = the combined time series and cross-section error component

In summary, a Fixed Effects Model has its own (fixed) intercept (β_{1i}) value, whereby in Random Effects Model, the intercept (β_1) represents the mean value of all the (cross-sectional) intercepts and the error component (ε_i) represents the (random) deviation of individual intercept from this mean value

4.9 Summary of Chapter

This chapter gives an overview of the research frame work, definition of variables including dependent variable Z-SCORE and independent variable which are asset quality, income structure, and macroeconomic factors. Moreover, the chapter also presents the definition of moderating variable which is capital regulations and Size as control variable. After the definition of variables, the chapter provides data collection sources and panel of study data for the years 2007 to 2015. There are two datasets which are used for analysis. The first dataset comprises of conventional banks which have twenty three (23) conventional banks of Pakistan and total numbers of observation are 161 for data analysis. The second dataset which consists of Islamic dataset have five (5) Islamic banks and 35 numbers of observations for analysis. Furthermore, this study investigates the influence of asset quality, income structure and macroeconomic factors on insolvency risk in conventional and Islamic banks and also examines the moderating

role of capital regulations. Therefore, twelve hypotheses are developed, where nine hypotheses are to test the direct relationships between asset quality, income structure and macroeconomic variable with insolvency risk. While three hypotheses generated to test the moderating effect of capital regulation on the relationship between predictors and insolvency risk. Hypothesis of current study are tested using two regression methods; first is standard multiple regression method and second is hierarchical multiple regression model. The two regression models are tested using Random Effects model for the data set of conventional banks of Pakistan. Whereas, the data set of Islamic banks is tested using Common Effects Model. The standard regression method is used to test the direct relationship between asset quality, income structure and macroeconomic factors with insolvency risk. While, hierarchical multiple regression method is used to test the moderating effect of capital regulation on the relationships between asset quality, income structure and macroeconomic factors with insolvency risk. The analysis of data is performed using E-view 8.0 Software.

CHAPTER FIVE

ANALYSIS OF RESULTS AND DISCUSSION OF CONVENTIONAL BANKS

5.1 Introduction

This chapter presents the results and finding on the relationship between asset quality, income structure, macroeconomic factors and insolvency risk in conventional banks of Pakistan. The chapter also provides empirical evidences on the influence of capital regulation on the relationship between asset quality, income structure, macroeconomic factors and insolvency risk. The chapter starts with descriptive statistics of the variables (both conventional and Islamic banks) in section 5.2. The next section 5.3 provides regression assumptions estimation for conventional banks of Pakistan. Next section 5.5 and 5.7 of the chapter presents multiple regression results and discussion respectively. The section 5.8 highlights the results on the moderating role of capital regulation. In the last, the chapter provides discussion on the influence of capital regulation as moderator on the relationship between dependent and independent variables in section 5.10.

5.2 Descriptive Statistics of Variables

Descriptive statistics of data is used to define the basic features of data used for the study. The aim of the descriptive statistics is to define and summarize the data set. So, for descriptive statistics of data, the current study has taken two datasets which are used for the analysis. The first dataset is from conventional banks of Pakistan, while the second dataset contains data from Islamic banks of Pakistan. The descriptive

analysis provides the mean, median, standard deviation, minimum and maximum values of all the variables used in the conceptual frame work.

5.2.1Bank Specific Factors (Conventional Bank)

The first dataset is composed of 23 conventional banks including public, private, foreign and specialized banks operating in Pakistan. Tables 5.1 display the results of descriptive statistics of bank specific variables which are used in the current study for conventional banks of Pakistan.

Table 5. 1
Descriptive Statistics of Bank Specific Variables (Conventional Banks)

Variables	Mean	Median	Std. Dev.	Minimum	Maximum
ZSCORE	31.205	17.072	42.738	9.326	328.322
NPL	0.177	0.141	0.144	0.013	0.718
PNPL	0.122	0.096	0.124	0.002	0.676
IATA	0.046	0.047	0.018	0.002	0.092
IITA	0.031	0.030	0.013	0.000	0.070
FBTA	0.004	0.000	0.005	0.000	0.010
SIZE	385.927	249.810	422.163	5.300	2218.420
CAR	0.201	0.149	0.162	-0.037	0.892

Note: N=161. ZSCORE is insolvency risk measure which define the probability of bank failure, NPL is nonperforming loans to gross loans ratio, PNPL is provision for nonperforming loans to gross loan ratio, IATA is income from advances to total assets ratio, IITA is income from investment to total asset ratio, FBTA is fee, commission and brokerage income to total asset ratio, SIZE is amount of total asset in billion Rs, CAR is capital adequacy ratio is total capital to risk weighted asset assets of bank.

Table 5.1 shows the descriptive statistics of dependent and independent variables used in the current study. The dependent variable of this study is Z-SCORE, while the bank specific independent variables are NPL, PNPL, IATA, IITA and FBTA. Whereas, CAR is taken as a moderating variable between dependent and independent variable and SIZE is defined as a control variable for this study.

It can be seen from Table 5.1 that SIZE has the mean value of 385.9278 billion rupees and the mean value of Z-SCORE which is 31.205. The higher mean value of Z-SCORE indicates the lower insolvency risk or lower probability of failure for the period of 2007 to 2015 for conventional banks of Pakistan.

Table 5.1 also shows the descriptive statistics of independent variables of the study which are NPL, PNPL, IATA, IITA and FBTA. The mean value of NPL is 0.177 (17.77%), which indicates on average nonperforming loans to gross loans is 17%. The higher value of NPL ratio was largely contributed by high NPL of Pakistan conventional banks for 2007 to 2015 period. The mean value of PNPL is 0.122 (12.23%), which is also correspondingly high for conventional banks of Pakistan. The high mean values of NPL and PNPL indicates that the asset quality of conventional banks of Pakistan is low during the study period.

The other three bank specific independent variables i.e. IATA, IITA, FBTA constitutes the income structure of conventional banks of Pakistan. The data set is from year 2007 to 2015. The average value of IATA is 0.046(4.6%). The value indicates that on average, a bank earns 4.6% of its total revenues against assets from advances income. The second independent variable of the income structure IITA has a mean value of 0.0317 (3.17%). This value suggests that on average, a bank earns 3.17% from its investment activities against assets. The third independent variable of the income structure is FBTA, which is an income generated from fee, commission and brokerage income. This type of income is often named as non-interest or nontraditional income. The mean value of FBTA is

0.004(.4%). The value indicates that conventional banks of Pakistan are not much involved in generating noninterest income or nontraditional income.

Table 5.1 also shows the standard deviation, minimum and maximum values of dependent variable. The standard deviation of Z-SCORE is 42.738. The higher value of Z-SCORE poses that Pakistan conventional banks, on average are not prone to insolvency risk. However, high value of standard deviation between the banks' Z-SCORE ranging from -9.326 (minimum) to 325.322 (maximum) does suggest that there are banks in the sample which are highly risky in term of insolvency. On the other hand, the standard deviation values of NPL and PNPL are 0.144 and 0.096 respectively. This statistic also reflects the large variability in NPL and PNPL among the banks specific variables for the period 2007 to 2015. Furthermore, the minimum value of NPL is 0.013 and the maximum value is 0.718, while, the minimum value of PNPL is 0.002 and the maximum value is 0.676 during the study period of 2007 to 2015.

The first variable of income structure is IATA, which has a standard deviation of 0.018. The minimum value of IATA is 0.002 and the maximum value is 0.676 as reported in Table 5.1. This indicates that income from advances of these banks is stable due to lower value of standard deviation. The standard deviation for IITA is 0.030 during the period of 2007 to 2015. The minimum and the maximum values of IITA during the period 2007 and 2015 are 0.00 to 0.070 respectively. Thus, the lower value of standard deviation of IITA suggests a stable return. Furthermore, the standard deviation of FBTA is 0.005. The minimum value of FBTA is 0.000 and the maximum value is 0.010 for the period 2007 to 2015, as

presented in Table 5.1. Therefore, on the basis of standard deviation, minimum and maximum value, it can be seen that income from FBTA is also stable.

The standard deviation of SIZE is 422.163 billion rupees while, minimum and the maximum values of SIZE are 5.3 billion rupees and 2218.42 billion rupees respectively. The capital adequacy ratio (CAR) is total capital to risk weighted capital. According to the directive of State bank of Pakistan, a bank requires to maintain CAR 8% (Malik, 2005, 2014). The average CAR in conventional banks of Pakistan is 0.201 (20.18), this is higher than the minimum required CAR for conventional banks of Pakistan. The higher value of CAR indicates that conventional banks of Pakistan have adequate capital to absorb potential losses due to credit risk, market risk and operational risk. The standard deviation of CAR is 0.162, minimum value is -0.037 while the maximum value of CAR observed in Table 5.1 is 0.892 for the period from year 2007 to 2015.

5.2.2 Islamic banking system

Table 5.2 presents the descriptive statistics of second dataset comprising of Islamic banks of Pakistan. The dataset of Islamic banks of Pakistan has 5 Islamic banks for the period of 2007 to 2015. The total number of observations were 45, which were reduced to 35 because of standard deviation of ROA (Return on Assets) used to calculate Z-SCORE.

Table 5. 2
Descriptive Statistics of Bank Specific Variables (Islamic Banks)

Variables	Mean	Median	Std. Dev.	Minimum	Maximum
ZSCORE	19.789	16.588	16.888	3.980	85.286
NPL	0.075	0.071	0.049	0.008	0.221
PNPL	0.044	0.041	0.025	0.004	0.099
IATA	0.045	0.042	0.017	0.014	0.093
IITA	0.025	0.022	0.011	0.005	0.050
FBTA	0.003	0.003	0.001	0.001	0.008
SIZE	111.011	73.869	117.015	13.066	531.850
CAR	0.183	0.160	0.087	0.110	0.510

Note: N=161. ZSCORE is insolvency risk measure which define the probability of bank failure, NPL is nonperforming loans to gross loans ratio, PNPL is provision for nonperforming loans to gross loan ratio, IATA is income from advances to total assets ratio, IITA is income from investment to total asset ratio, FBTA is fee, commission and brokerage income to total asset ratio, SIZE is amount of total asset in billion Rs, CAR is capital adequacy ratio is total capital to risk weighted asset assets of bank.

Table 5.2 displays the descriptive statistics of bank specific variables including dependent variable of Z-SCORE and independent variables NPL, PNPL, IATA, IITA, and FBTA. CAR is the moderating variable while SIZE is a control variable. The mean value of Z-SCORE is 19.789 which defines that Islamic banks in Pakistan were stable during the study period of 2007 to 2015. The Z-SCORE value of Islamic banks is higher than critical value (critical value < 2) but less than the Z-SCORE mean value of 31.205(see Table 5.1) of conventional banks of Pakistan from year 2007 to 2015. The average value of NPL in Islamic banks is 0.075(7.5%), but less than the mean value of NPL of conventional banks of Pakistan which is 0.177 (see Table 5.1). The provisions for loan losses PNPL in Islamic banks during the period of 2007 to 2015 is 0.044 (4.4%) while, the value of PNPL in conventional banks for the same period is 0.122. The higher PNPL in conventional banks was justified as the NPL of conventional banks is higher than the one of Islamic banks of Pakistan.

Table 5.2 also presents the descriptive statistics of independent variable income structure i.e. IATA, IITA, and FBTA. The mean value of IATA is 0.045 (4.50%) for the period 2007 to 2015. The value of IATA in Islamic banks is not much different to the value of 0.046 of conventional banks as highlighted in Table 5.1. This indicates that the earning structure of IATA for both conventional and Islamic banks is similar. The mean value of IITA is 0.025 (2.51%) as displayed in Table 5.2. This is however less than the value of 0.031 of conventional banks for the period of 2007 to 2015, as displayed in Table 5.1 respectively. FBTA is the third independent variable of income structure having mean value of 0.003 (0.3%). The value is slight smaller than the value of FBTA of conventional banks which is 0.004 as displayed in Table 5.1. SIZE in Table 5.2 highlights the total asset of Islamic banks in Pakistan. The average value of SIZE for the period of 2007 to 2015 remained 111.011 billion rupees, which is approximate one third of the mean value of SIZE for conventional banks of Pakistan.

Table 5.2 highlights the value of standard deviation, minimum and the maximum value of Z-SCORE, NPL, PNPL, IATA, IITA and FBTA. The standard deviation of Z-SCORE is 16.888 and the minimum value is 3.980 while the maximum value of Z-SCORE is 85.286. The Table 5.2 also displays the standard deviation of NPL which is 0.008 and minimum value of 0.004. The maximum value of NPL is 0.221 as presented in Table 5.2. The PNPL has a standard deviation of 0.025, while minimum and maximum values are 0.004 and 0.099 respectively for the period of 2007 to 2015.

The minimum value of IATA as shown in Table 5.2 is 0.014 and maximum value is 0.093 with a standard deviation of 0.017. Furthermore, the standard deviation of IITA is 0.011 and the minimum value is 0.005. The maximum of IITA is 0.050 for the period from 2007 to 2015. For the same period, the minimum value of FBTA is 0.001 and the maximum value is 0.008, while the standard deviation of FBTA is 0.001. Among all three variables of income structure the maximum standard deviation of income is seen in IATA while FBTA has the least standard deviation. During the period of 2007 to 2015, the minimum assets (SIZE) of an Islamic bank hold worth is 13.066 billion rupees and the maximum assets (SIZE) value of an Islamic bank has 531.85 billion rupees. The standard deviation of assets (SIZE) of Islamic banks is 117.015 billion rupees.

According to Malik (2014) and TBP (2014), minimum of 8% CAR is required to maintain by Islamic banks of Pakistan. The mean value of CAR in Islamic banks is 0.183, while the standard deviation of CAR is 0.087 as shown in Table 5.2. The mean value of CAR shows that Islamic banks are stable over period of time starting from 2007 to 2015. The standard deviation of CAR in Islamic banks (0.087) is also less than the standard deviation of CAR of conventional banks which is 0.162 (see Table 5.1). This probes that Islamic banks were more stable than conventional banks of Pakistan for period 2007 to 2015. Table 5.2 also shows the minimum and maximum values of CAR of Islamic banks, which are 0.110 and 0.510 respectively.

5.2.3 Macroeconomic Factors

Table 5.3 illustrates the descriptive statistics of four macroeconomic and other external factors comprising GDP, INF, INT and CUR. The descriptive statistics of GDP, INF, INT and CUR is presented in Table 5.3.

Table 5. 3
Descriptive Statistics of Macroeconomic Variables

Variables	Mean	Median	Std. Dev.	Minimum	Maximum
GDP	0.034	0.035	0.010	0.016	0.047
INF	0.120	0.119	0.041	0.072	0.203
INT	0.125	0.140	0.025	0.070	0.150
CUR	0.258	0.250	0.020	0.230	0.290

GDP is gross domestic product growth rate of Pakistan, INF is inflation which is the rate of consumer price index, INT is domestic interbank bank lending rate, and CUR is Pakistan corruption perception index on Transparency international

The average GDP of Pakistan, for the period of 2007 to 2015 is 0.034 (3.4%). This value highlights that Pakistan is one of the less growing economies compared to other developing economies. The lower economic growth affect the banking sector (Kattai, 2010; Fainstein & Novikov, 2011). The second macroeconomic variable of the study is inflation, measured by consumer price index. The mean value inflation for Pakistan during the study period 2007 to 2015 is 0.120(12.0%). The value of inflation is quite high which makes Pakistan as one of the countries with high inflation during the period of 2007 to 2015. The higher rate of inflation has a significant relationship with risk (Poudel, 2013).

The third independent variable of macroeconomic factors is “interest rate” denoted as INF, and as presented in Table 5.3. The interest rate used in this study is interbank offer rate. The mean value for the interest rate is 0.1257 (12.57%). The value highlights that interest rate for the period of 2007 to 2015 was very high. The

higher rates of interest make it difficult for servicing of loans (Aver, 2008; Nkusu, 2011; Louzis, Vouldis, & Metaxas, 2012). Another macroeconomic factor that impedes the economic growth is corruption (Oni & Awe, 2012). According to TransparencyInternational (2015), Pakistan is 51th corrupt nation among nations of the world[7]. Furthermore, as displayed in Table 5.3 the mean score of Pakistan on corruption index for the study period of 2007 to 2015 was 0.258 (25.8). The value defines that on average Pakistan has obtained 25 score in Transparency International surveys for clean countries.

Table 5.3 also displays the minimum value, the maximum value and standard deviation of GDP, INF, INT and CUR. The standard deviation of GDP is 0.010 while minimum and maximum values are 0.0161 and 0.0470 respectively. During the period from 2007 to 2015, the standard deviation of INF is 0.042 and the minimum and maximum values are 0.072 and 0.203 respectively as illustrated by in Table 5.3. Similarly, for INT, Table 5.3 shows a standard deviation of 0.025. The maximum value of INT is 0.150 and the minimum value is 0.070. The standard deviation of CUR for Pakistan during the period 2007 to 2015 is 0.020. This indicates that Pakistan has not shown any improvement in eradication of corruption. Moreover, the maximum value for CUR is 0.290 and the minimum value is 0.230 as presented in Table 5.3.

[7] See Transparency International report year 2015 at www.transparency.org.

5.3 Regression Assumptions for BLUE

The Gaussian, standard, classical linear model (CLRM), has certain assumptions for regression. The assumptions include normality, homoscedasticity, no autocorrelation and no perfect multicollinearity. If a model holding these properties is considered as best linear unbiased estimator (BLUE) (Gujarati, 2003). Therefore, before proceeding to the regression analysis, the regression assumptions have to be met. The subsequent section presents the results on the normality, homoscedasticity, autocorrelation and multicollinearity of the dataset of conventional banks of Pakistan.

5.3.1 Normality in Conventional Banking

Table 5.4 presents the results obtained from Kolmogorov-Smirnov test for conventional banks of Pakistan. According to Yazici and Yolacan (2007), Kolmogorov-Smirnov test is more apporpriate for small sample data but it can also handle large set of observations. The result of test is as follow:

Table 5. 4
Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Variables	Statistic	df	Sig.	Statistic	df	Sig.
ZSCORE	.068	161	.067	.955	161	.000
NPL	.079	161	.016	.962	161	.000
PNPL	.115	161	.000	.902	161	.000
IATA	.153	161	.000	.763	161	.000
IITA	.180	161	.000	.819	161	.000
FBTA	.155	161	.000	.771	161	.000
GDP	.205	161	.000	.831	161	.000
INF	.161	161	.000	.895	161	.000
INT	.323	161	.000	.669	161	.000
CUR	.223	161	.000	.894	161	.000
CAR	.141	161	.000	.905	161	.000
SIZE	.089	161	.003	.947	161	.000

The normality assumption is followed when significant value is greater than 0.1 or NULL hypothesis is not rejected. So, if significant value is not less than 0.1 than alternate hypothesis is accepted, which define that distribution of data is not normal. Hence, as displayed in Table 5.4, the significance values for both Kolmogorov-Smirnov and Shapiro-Wilk tests are less than 0.05; this is evident that the dataset of convention banks of Pakistan is not normal.

To further asses the assumption of normality, Hair *et al.* (2006) and Tabachnick and Fidell (2007) are followed and Skewness and Kurtosis tests are estimated for normality of data for conventional banks of Pakistan. The results of test Skewness and Kurtosis are presented in Table 5.5.

Table 5. 5
Skewness and Kurtosis test

	Skewness			Kurtosis		
Variables	Statistics	Std.Error	Z-Value	Statistics	Std.Error	Z-Value
ZSCORE	-.099	.191	-0.519	2.689	.380	7.071
NPL	-.345	.191	-1.803	1.154	.380	3.034
PNPL	-1.116	.191	-5.836	3.324	.380	8.740
IATA	-2.521	.191	-13.177	8.286	.380	21.787
IITA	-1.888	.191	-9.871	4.010	.380	10.543
FBTA	-2.351	.191	-12.291	6.979	.380	18.349
GDP	-.889	.191	-4.650	-0.252	.380	-0.663
INF	.189	.191	0.986	-0.975	.380	-2.563
INT	-1.639	.191	-8.567	1.310	.380	3.445
CUR	.118	.191	0.619	-1.323	.380	-3.478
CAR	.811	.191	4.239	2.234	.380	5.874
SIZE	-.680	.191	-3.557	-0.251	.380	-0.659

Note: Z-value (skewness) = skewness/std. error skewness; Z-value (kurtosis) = kurtosis/std. error kurtosis

Table 5.5 presents Z value of each variable used in the current study. The Z-value is calculated for both Skewness and Kurtosis to compare with critical values of Z. The most common critical values at significance level 0.01 are ±2.58 and at significant level of 0.05 are ±1.96 (Hair *et al.*, 2006; Tabachnick & Fidell,

2007; Azureen, 2012). It can be seen in Table 5.5, the Z value of Z-SCORE, NPL, INF and CUR comes under significance level of 0.05 in Skewness test while, in Kurtosis, the values of GDP, INF and SIZE are showing significant at significance level of 0.05. The rest of the variables in Skewness and Kurtosis are showing values above critical value of Z value thus indicating that data is not normal. The result of Skewness and Kurtosis test is consistent with Kolmogorov-Smirnov test. Thus, the data of conventional banks of Pakistan is not normal.

Hair *et al.* (2006), Pallant (2007) and Tabachnick and Fidell (2007) highlighted that violation of normality assumption should not cause any major problem. This is because normality will not affect the many of the results obtained in multiple regression analysis and their generalizability (Greene, 2003). Gujarati (2003) argued that if sample of data is large, than normality assumption does not play critical role and may be relaxed. Furthermore, Pallant (2007) and Hair *et al.* (2006) defined large sample size as more than 30 observations whereas Gujarati (2003) defined large sample size as more than 100 observations. Moreover, the sample size of current study for conventional bank is large (N=161), therefore violation of normality assumption might not be a problem in estimation of results. Hence, based on the definition of a large sample, the current study incorporated large sample for conventional banks of Pakistan and normality assumption can be relaxed.

5.3.2 Multicollinearity in Conventional Banks

The Table 5.6 displays the results of VIF test for diagnostic of multicollinearity for the data of conventional banks of Pakistan. Hair *et al.* (2006) and O'Brien (2007) noted that the rule of thumb to detect multicollinearity is that if the value of VIF exceeds the value of 10. As it can be seen in Table 5.6, the values of VIF are less than 10. This indicates that multicollinearity does not exist in the dataset of conventional banks. As shown in Table 5.6, there is no evidence of multicollinearity among independent variables. The highest value of VIF documented is 5.8 of CUR.

Table 5. 6
Multicollinearity Diagnostic Test

Variable	Tolerance Value	VIF
NPL	0.314	3.178
PNPL	0.189	5.288
IATA	0.275	3.633
IITA	0.717	1.392
FBTA	0.620	1.610
GDP	0.337	2.965
INF	0.268	3.726
INT	0.281	3.554
CUR	0.172	5.805
CAR	0.657	1.521
SIZE	0.511	1.954

The next test to detect multicollinearity is correlation analysis. The test is used to find out the existence of multicollinearity among independent variables, which may affect the relationship between independent variables and dependent variable (Pallant, 2007). The results of correlation matrix are displayed in Table 5.7.

Table 5. 7
Correlation Matrix

Variables	ZSCORE	NPL	PNPL	IATA	IITA	FBTA	GDP	INF	INT	CUR	CAR	SIZE
ZSCORE	1											
NPL	-0.375	1										
PNPL	-0.307	0.651	1									
IATA	-0.217	0.220	0.650	1								
IITA	0.118	-0.121	0.041	-0.191	1							
FBTA	0.035	-0.231	-0.204	-0.333	0.326	1						
GDP	0.201	-0.114	-0.008	-0.236	0.157	0.025	1					
INF	-0.231	0.119	-0.015	0.269	-0.157	-0.032	-0.669	1				
INT	-0.103	0.127	-0.004	0.267	-0.091	-0.018	-0.504	0.773	1			
CUR	0.142	-0.158	-0.014	-0.268	0.064	0.039	0.772	-0.802	-0.783	1		
CAR	0.248	0.042	0.141	0.088	-0.115	-0.379	0.055	-0.088	-0.058	0.039	1	
SIZE	0.386	-0.444	-0.422	-0.375	0.175	0.452	0.156	-0.194	-0.166	0.165	-0.447	1

The correlation estimates indicate that there is no sign of multicollinearity among independent variables, moderator and control variable. The highest value of correlation is between CUR and INF which is -0.802 while, the second highest correlation value is -0.783 between CUR and INT. Moreover, NPL and PNP are positively correlated with each other up to 0.651. However, the critical value use to indicate the existence of multicollinearity is 0.90 (Pallant, 2007). So the values displayed in Table 5.7 are less than the critical value. Hence, it is evident from Table 5.7 that there is no existence of multicollinearity among variables.

5.3.3 Homoscedasticity in Conventional Banking

To assess the existence of heteroscedasticity in the data of conventional banks of Pakistan, Breuch Pagan Godfrey and White Test are performed (Ongena & Smith, 2000; Watson & Teelucksingh, 2002; Baum, Schaffer, & Stillman, 2003; Berger, Klapper, & Turk-Ariss, 2009). In the results of Table 5.8, If the value of p is greater than 0.05 ($p>0.05$) than it shows no evidence of heteroscedasticity, but if p value is less than 0.05 ($p<0.05$), this indicates the existence of heteroscedasticity. The results of Breusch Pagan Godfrey and White Test are displayed in Table 5.8. It is evident from Table 5.8 that the dataset of conventional banks of Pakistan violate the assumption of homoscedasticity.

Table 5. 8
Test for Heteroscedasticity (Conventional Banks)

Test Name	p-Value
Breusch-Pagan-Godfrey	0.082
White	0.000

5.3.4 Autocorrelation in Conventional Banking

The result of Breush Godfrey Serial Correlation LM Test indicates that autocorrelation exists in the dataset of conventional banks of Pakistan. The result of Breush Godfery Serial Correlation LM Test is presented in Table 5.9.

Table 5. 9
Test of Autocorrelation (Conventional banks)

Breusch-Godfrey Serial Correlation LM Test	
F-statistic	24.178
Obs*R-squared	22.476
p-Value	0.000

5.4 Panel Analysis

In order to select an appropriate model for analysis of data for conventional banks of Pakistan, multiple tests are performed among Common Effects, Fixed Effects and Random Effects. So, to select a model between Common and Fixed Effects, Redundant Fixed Effects Test is performed. The criteria to decide is p-value<0.05. NULL hypothesis of Redundant Fixed Effects Test defines Common Effects Model while, the alternate hypothesis define Fixed Effects model (Gujarati, 2003). Thus, the results of Redundant Fixed Effects Test do not accept NULL hypothesis and the alternate hypothesis is accepted for dataset of conventional banks of Pakistan.

Next, to select an appropriate model between Fixed and Random Effects models, Hausman Test is estimated. The criteria to determine is p-value <0.05. The NULL hypothesis of Hausman test is Random Effects Model, while alternate hypothesis defines Fixed Effects Model. The result of Hausman Test does not reject NULL hypothesis, but it rejects alternate hypothesis. Therefore, the result of Hausman

Test defines that Random Effects model is more appropriate for data analysis of conventional banks (Gujarati, 2003). To further confirm the selection of an appropriate model, Breush and Pagan Lagrangian Multiplier Test for Random Effects Model is extimated. The criteria for selection of model is p-value<0.05. The NULL hypothesis of Breush and Pagan Lagrangian Multiplier test is for Common Effects Model and alternate hypothesis is for Random Effects Model (Torres-Reyna, 2007). The results indicate that NULL hypothesis is not accepted and while the alternate is accepted. Hence, to analyze the dataset of conventional banks of Pakistan, Random Effects Model is more appropriate.

5.5 Multiple Regression analysis

The problems of normality, heteroscedasticity and autocorrelation are identified in the dataset of conventional banks of Pakistan. Therefore, the regression analysis for current study is conducted by applying GLS. GLS is more appropriate as it make the data consistent if the data has problems of normality, autocorrelation and heteroscedasticity (Watson & Teelucksingh, 2002; Greene, 2003; Gujarati, 2003; Kennedy, 2003). GLS is a transformed form of OLS model and is more appropriate for non-normal (Greene, 2003; Gujarati, 2003; Kennedy, 2003).

In order to estimate results for conventional banks, Random Effects Model is more appropriate for this study which is determined after multiple tests. The dependent variable of this study is insolvency risk of banks which is measured by Z-SCORE. Therefore, multiple regression analysis is conducted for dependent variable. The results of multiple regression model for dataset of conventional banks of Pakistan is presented

in next subsection 5.4.1, while discussion and explanation on results in relation to previous literature and theory are presented in section 5.6.

5.5.1 The Regression Results of Asset Quality, Income Structure and Macroeconomic Factors on insolvency risk in Conventional Banks of Pakistan

The estimated regression results of asset quality, income structure and macroeconomic factors on insolvency risk are presented in Table 5.10. The first column shows the variables, while the second column is estimation of beta coefficient (β). The value of beta coefficient (β) illustrates the contributing unit of each independent variable in dependent variable. The sign (-, +) of beta coefficient (β) defines the direction of effect of independent variable to dependent variable. The third column of table 5.10 presents the t-statistics of each independent variable. The t-statistics is calculated by dividing the coefficient (β) with standard error, while standard error is estimation of standard deviation of each coefficient. The fourth column of Table 5.10 documents p-value, which is used for decision, to accept an alternative hypothesis or to reject an alternative hypothesis.

Table 5. 10

Asset Quality, Income Structure and Macroeconomic variables on Insolvency Risk (conventional Banks of Pakistan)

Variables	Coefficient Beta	t-statistic	P-Value
NPL	-0.231	-1.838	0.067*
PNPL	-0.124	-1.082	0.280
IATA	0.131	0.745	0.457
IITA	0.132	1.672	0.096*
FBTA	-0.134	-2.848	0.005***
GDP	12.574	2.750	0.006***
INF	-5.125	-6.04	0.000***
INT	2.879	1.170	0.243
CUR	-6.168	-2.035	0.043**
SIZE	0.125	1.205	0.2300
F-statistic	4.089		
Probability (F-statistic)	0.000		
Durbin-Watson stat	1.322		
N	161		

ZSCORE is insolvency risk measure which define the probability of bank failure, NPL is nonperforming loans to gross loans ratio, PNPL is provision for nonperforming loans to gross loan ratio, IATA is income from advances to total assets ratio, IITA is income from investment to total asset ratio, FBTA is fee, commission and brokerage income to total asset ratio, GDP is Economic growth, INF is inflation, INT is interest rate and CUR is corruption, SIZE is natural log of assets, N=161, *p<.1, **p<0.05, ***p<0.01.

It can be seen in Table 5.10 that F-statistics and probability of F-statistics is significant, which explains that the overall model is significant. The result of F-statistics indicates that there is a relationship between set of independent variables and dependent variable. As it can be seen in Table 5.10 that NPL, IITA, FBTA, GDP, INF and CUR has significant relationship with Z-SCORE in conventional banks of Pakistan, while PNPL, IATA and INT are showing insignificant relationship with Z-SCORE.

The negative β coefficient of NPL indicates that there is a negative relation between NPL and Z-SCORE. Once unit change in NPL can reduce value of Z-SCORE by -0.231 units and will increase insolvency risk. The relationship of IITA is positive with Z-SCORE as it can be seen Table in 5.10. The unit change in IITA can increase the value of Z-SCORE by 0.132 units, and this indicates that increase

in IITA will increase Z-SCORE value and help the bank to reduce insolvency risk. In addition, FBTA is showing a negative direction of relationship with Z-SCORE. Thus, Increase in FBTA will reduce the value of Z-SCORE by 0.134 unit and increase insolvency risk.

Furthermore, as it is displayed in Table 5.10 that among GDP, INF, INT, and CUR, only INT is showing an insignificant relationship with Z-SCORE, while GDP, INF and CUR are highly significant with Z-SCORE. GDP has the highest β coefficient and a positive direction of relationship. It explains that increase in growth of GDP will increase the value of Z-SCORE by 12.574 units and hence, reduces insolvency risk. Moreover, the relationships of INF and CUR are highly significant with Z-SCORE. The β coefficients of INF and CUR indicate negative direction of effect on Z-SCORE. This illustrates that increase in INF and CUR will decrease Z-SCORE by 5.125 and 6.168 units respectively. The lower in value of Z-SCORE indicates a riskier or an unstable bank.

The effect of SIZE in conventional banks of Pakistan is insignificant but, the coefficient β is showing a positive relationship, which indicates that as the bank grows in size; it might increase the value of Z-SCORE. Moreover, PNPL, IATA and INT are showing insignificant relationship with Z-SCORE. The direction of effect of PNPL is negative, the direction illustrates that PNPL can reduce the value of Z-SCORE and may increase insolvency risk. Whereas, IATA and INT have positive direction of effect, this explains that IATA and INT can increase the value of Z-SCORE and might reduce insolvency risk of banks.

5.6 Summary Results of Hypothesis

The results of the influence of asset quality, income structure and macroeconomic factors on insolvency risk in conventional banks of Pakistan are displayed in Table 5.10. The results indicate that NPL, IITA, FBTA, GDP, INF and CUR have significant relationship with Z-SCORE in conventional banks of Pakistan. The direction effect of NPL, FBTA, INF and CUR is negative while, IITA and GDP are showing positive direction of relationship. Moreover, the independent variable such as PNPL, IATA and INT does not show any significant relationship with Z-SCORE. The direction effect of PNPL is negative but the direction impact of IATA and INT is positive. Furthermore, the SIZE effect of bank is insignificant but the direction of effect is positive in conventional banks of Pakistan.

The summary of the hypothesis decisions of the influence of asset quality, income structure and macroeconomic factors on insolvency risk are presented in Table 5.11. The Table 5.11 also show list of hypotheses and the decision of acceptance and rejection of these hypotheses.

Table 5. 11
Summary results of hypothesis

Hypotheses	Decision
H1a: There is a significant relationship between nonperforming loans/ financing to gross loans/ financing and insolvency risk of conventional banks in Pakistan.	Supported
H2a: There is a significant relationship between provision for nonperforming loans/ financing to gross loans/ financing and insolvency risk of conventional banks in Pakistan.	Not Supported
H3a: There is a significant relationship between income from advances/ financing and insolvency risk of conventional banks in Pakistan.	Not Supported
H4a: There is a significant relationship between income from investment and insolvency risk of conventional banks in Pakistan.	Supported
H5a: There is a significant relationship between fee, commission and brokerage income and insolvency risk of conventional banks in Pakistan.	Supported
H6a: There is a significant relationship between GDP Growth and insolvency risk of conventional banks in Pakistan.	Supported
H7a: There is a significant relationship between inflation rate and insolvency risk of conventional banks in Pakistan.	Supported
H8a: There is a significant relationship between interest rate and insolvency risk of conventional banks in Pakistan.	Not Supported
H9a: There is a significant relationship between corruption and insolvency risk of conventional banks in Pakistan.	Supported

5.7 Discussion Results among Asset Quality, Income Structure Macroeconomic Factors and Insolvency Risk in Conventional Banks

This section provides discussion on the results between asset quality, income structure and macroeconomic factors and insolvency risk in conventional banks of Pakistan. Moreover, discussion on the hypotheses which are showing significant relationship is presented in this section while the discussion of hypotheses which are insignificant to dependent variable is provided in Appendix V[8]. The discussion of significant hypothesis is as follow;

[8] The discussion on the Hypotheses H2a, H3a and H8a is presented in Appendix V

H1a: There is a significant relationship between nonperforming loans/ financing to gross loans/ financing and insolvency risk of conventional banks in Pakistan.

The multiple regression results show that there is a negative significant relationship between nonperforming loans (NPL) and insolvency risk (Z-SCORE). The result suggests that an increase in NPL will decrease the value of Z-SCORE and hence will increase insolvency risk of the bank. The plausible reason for this could be that, increase in NPL will reduce income from advances and it will also increase provision for losses. The reduction in income and enhancement of provision for loan losses will reduce earnings before interest and tax. A decrease or fluctuation in earning will reduce the ratio of ROA, and consequently increases the insolvency risk of the banks. Another reason for the inverse relationship could be that the increase cost of funding, as the banks sought additional funds from the market to cover shortfall in income or tight liquidity. In such situations, the bank has to charge higher interest to the borrowers or engage in riskier lending to get a higher return to compensate for the higher cost of fund. Hence, this discourages to engage safer borrower, and bank induce riskier lending. Riskier lending has greater probability of default if the higher risks are not managed adequately. Thus, the higher default rate will increase volume of nonperforming loans and reduces financial stability and increases insolvency risk of banks (Berger, Klapper, & Turk-Ariss, 2009). Moreover, the riskier lending by a bank disturbs the portfolio of lending and hence violates the portfolio theory. The results of the study are in line with many previous studies i.e (Yang, 2003; Konishi & Yasuda, 2004; Berger, Klapper, & Turk-Ariss, 2009; Louzis, Vouldis, & Metaxas, 2012).

H4a: There is a significant relationship between income from investment and insolvency risk of conventional banks in Pakistan.

The study hypothesized a significant relationship between income from investment (IITA) and insolvency risk (Z-SCORE) in conventional banks of Pakistan. The estimated result indicates that there is a significant relationship between IITA and Z-SCORE. The effect of the relationship is positive, which probes that increase in income from investments will lead to increase in Z-SCORE and hence reduces insolvency risk. The plausible reason could be increase in Government borrowing from scheduled banks. It is evident from EconomicSurvey (2015) and EconomicSurvey (2016), government borrowing from scheduled banks has been increased from 250 billion rupees to 1500 billion rupees since year 2009 to 2015 .

In addition, according to portfolio theory, diversification of financial products must rise efficiency and manage risk (Klein & Saidenberg, 1998). Moreover, the results of the study are in line with Smith, Staikouras, and Wood (2003), who argues that noninterest income such as investments, securitization and trading can help to reduce insolvency risk of banks. Furthermore, as highlighted by Meslier, Tacneng, and Tarazi (2014) that increase investment in securities portfolio help to increase profitability and that increase the value of Z-SCORE and hence it reduces insolvency risk.

H5a: There is a significant relationship between fee, commission and brokerage income and insolvency risk of conventional banks in Pakistan.

The regression result of this study shows that fee, commission and brokerage income (FBTA) has significant relationship with insolvency risk (Z-SCORE). Based

on the regression results, the hypothesis of a significant relationship of fee, commission and brokerage income (FBTA) with insolvency risk (Z-SCORE) is accepted. The results also indicate that FBTA has a negative relationship with Z-SCORE. This explains that increase in FBTA will reduce the value of Z-SCORE and thus increase insolvency risk of the bank.

According to Apergis (2014), the activities such as securitization, investment, fee, commission and brokerage income are totally different line of business from traditional lending income source. Thus, higher level of diversification in these noninterest income activities may result in higher insolvency risk. Moreover, the other reason could be larger fluctuation in nontraditional income, it may increase the cost of earing for example to hire additional staff which increase the operational cost or it can be from regulatory requirement as non-interest income do not need to hold capital, which may increase volatility (Stiroh, 2004a; Lepetit *et al.*, 2008a). Thus, higher volatility of earning increases the deviation of ROA, and results in lower value of Z-SCORE or in other words increases in insolvency risk.

H6a: There is a significant relationship between GDP Growth and insolvency risk of conventional banks in Pakistan.

The hypothesis of the study is to determine a significant relationship between GDP growth and insolvency risk (Z-SCORE) in banking sector of Pakistan. The regression result shows that there is a significant relationship between GDP and insolvency risk and the direction of relationship is positive. This indicates that increase in GDP will increase value of Z-SCORE and reduce insolvency risk in conventional banks of Pakistan. The plausible reason could be the relationship between debt

servicing capacity of borrower and GDP. According to Nkusu (2011), there is a significant positive relationship between debt servicing capacity and GDP. This explains that increase in GDP reduce growth of nonperforming loans, because growth of economy increases the debt servicing capacity of borrower. Therefore, if borrower's debt servicing capacity is increased, it helps them to better service their obligations and it reduces nonperforming loans of banks and increase the stability of income. Thus, stable income increases the value of Z-SCORE and may reduce insolvency risk of the banks

H7a: There is a significant relationship between inflation rate and insolvency risk of conventional banks in Pakistan.

The regression results of relationship between inflation (INF) and insolvency risk (Z-SCORE) in conventional banks of Pakistan hypothesize that a significant relationship exists between INF and Z-SCORE. The direction of relationship is negative, which means that increase in inflation will decrease the value of Z-SCORE and this could make a bank riskier. The reason could be that higher rate of inflation decrease the real value of future investment return, this could result in higher earnings volatility of income. Therefore, higher earnings volatility can make a bank riskier. The other reason could be that increase in inflation actually reduces the value of currency. In such situation, it becomes difficult for borrowers to payback their debts and thus may result in nonperforming loans. Moreover, the efficiency of an earning portfolio of the bank starts to diminish with an increase in inflation rate of the country (Gospodinov & Ng, 2013; Mallick & Sousa, 2013; Sargent, 2013). Hence increase in inflation can increase insolvency risk of the banks. Furthermore, the results of current relationship

are supportive to previous authors such as Boyd, Levine, and Smith (2001), Boyd and Champ (2006).

On the other hand, it is observed that higher rate of inflation also creates asymmetric information problem between lender and borrower. A business boom cycle is created in higher rate of inflation and it is considered as an environment where over investments are made and asset price bubbles are created (Honohan, 2000; Issing, 2003). Thus, it can be the reason that higher inflation may increase the count of future bad loans and result in higher insolvency risk.

H9a: There is a significant relationship between corruption and insolvency risk of conventional banks in Pakistan.

The hypothesis of the study is to find out a significant relationship between corruption (CUR) and insolvency risk (Z-SCORE) in conventional banks of Pakistan. The regression result indicates that there is a significant relationship between variables (CUR and Z-SCORE) but the direction of significance is negative. The direction defines that increase in corruption will decrease the value of Z-SCORE and will increase insolvency risk. The reasons could be increased competition, political influence in loan distribution, corruption, political ties that could increase lending corruption and creates room for bank manager's incentives in risk taking. Further, CUR also creates information asymmetric problem between both lender and borrowers for personal gains. Due to issue of asymmetric information, lenders and borrowers have different information. This creates a gap for bribery and hence it affects the profitability of firms. Another motive in information asymmetric between lender and borrowers is the discretionary power of the lender which also help the lending officer to create room for

bribe and lend to and unsafe borrowers (Beck, Demirgüç-Kunt, & Levine, 2006; Barth *et al.*, 2009). Furthermore, another reason could be that, increase in corruption erodes money in an economic system which can create liquidity problem in the economic system. The liquidity problem in the economy will influence liquidity of the overall financial system. Hence, liquidity problem of the system can cause loan defaults and could result into insolvency risk for banks, as the banks are the main financial intermediators of an economy.

5.8 Hierarchical Moderating Regression Analysis

In order to test the moderating effect of capital regulation (CAR) on the relationship between asset quality, income structure and macroeconomic variables with insolvency risk in conventional banks of Pakistan, hierarchical moderated multiple regression analysis with Random Effects Model is estimated. To make data consistent with heteroscedasticity and autocorrelation, transformed GLS is performed for the data of conventional banks (Greene, 2003; Kennedy, 2003; Asteriou & Hall, 2007). According to Baron and Kenny (1986), a change in direction and/or strength of the interaction terms (independent variable × moderator) are also examined in order to verify the existence of moderating effects on the relationship between independent and dependent variable. The results of moderating effect of CAR on the relationship of asset quality, income structure and macroeconomic factors on insolvency risk are presented in the following subsection.

5.8.1 The Moderating Effect of CAR on the Relationship of Asset Quality and Insolvency Risk in Conventional Banks

To test the moderating effect of CAR on the relationship between asset quality (NPL, PNPL) and insolvency risk (Z-SCORE) in conventional banks of Pakistan, four steps or four models have been estimated. The model 1 tests the relationship between NPL, PNPL and insolvency risk (Z-SCORE). Model 2 estimates the influence of independent variables (NPL, PNPL) and moderator (CAR) on insolvency risk (Z-SCORE). Model 3 investigates the effect of NPL, PNPL, CAR and an interaction term of CAR×NPL on Z-SCORE. The last model is model 4; it examines the impact of independent variables (NPL, PNPL), moderator (CAR) and interaction of PNPL×CAR on Z-SCORE. The results are displayed in table 5.12.

Table 5. 12
The moderating effect of CAR on the relationships between NPL, PNPL and Z-SCORE (Conventional banks)

.	Model 1		Model 2		Model 3 (CAR*NPL)		Model 4 (CAR* PNPL)	
	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value
NPL	-0.231	0.067*	-0.322	0.040**	-1.340	0.022**	-0.381	0.008***
PNPL	-0.124	0.280	-0.061	0.621	-0.059	0.610	-0.867	0.027**
CAR?			0.604	0.000***	0.928	0.000***	0.999	0.000***
CAR*NPL					0.296	0.090*		
CAR*PNL							0.250	0.012**

Note: NPL= nonperforming loans to gross loans, PNPL= provision for nonperforming loans to gross loans; CAR =moderating variable; Interaction terms=NPL*CAR and PNPL*CAR: *p<.1, **p<0.05, ***p<0.01; N=161

It can be seen in Table 5.12 model 1 that the relationship of NPL is significant while PNPL is showing an insignificant relationship with Z-SCORE. The direction of both independent variables i.e. NPL and PNPL is negative with Z-SCORE. In model 2, CAR has been added as moderator. The relationship of

CAR with Z-SCORE is highly significant and the direction of relationship is positive. In model 2 Table 5.12, NPL shows a significant relationship while PNPL remains insignificant. The inclusion of CAR in the model 2 did not affect the relationships and direction of effect of NPL and PNPL with Z-SCORE, which remains the same as of model 1.

In model 3, along with independent variables NPL, PNPL, moderator CAR and an interaction term CAR*NPL was added in the estimation. The relationship of NPL remains significant with Z-SCORE while PNPL remains insignificant as in model 1 and model 2. The direction of relationship of NPL and PNPL is negative. In model 3, CAR also has a significant positive relationship with Z-SCORE. Furthermore, the effect of interaction was observed. The interaction term of CAR*NPL not only has a significant relationship with Z-SCORE but it also changes the direction of relationship from negative to positive. This indicates that CAR moderates the relationship between NPL and Z-SCORE. The result of interaction NPL*CAR in model 3 illustrates that capital regulation reduces the negative impact of NPL on Z-SCORE. As the Table 5.12 highlights, increase in the interaction term of CAR*NPL will increase the value of Z-SCORE and hence will reduce probability of failure.

Model 4 presents the results of NPL, PNPL, CAR and interaction of CAR*PNPL with Z-SCORE. In model 4, NPL has a negative significant relationship with Z-SCORE, following the similar results of model 1, model 2 and model 3. Moreover, the relationship of PNPL with Z-SCORE becomes significant but the direction of effect remains negative. Whereas, PNPL has an insignificant

relationship with Z-SCORE in model 1, model 2 and model 3. Furthermore, in model 4, CAR has significant positive relationship with Z-SORE like the CAR has significant positive relationship in model 2 and model 3. In addition, as it can be seen in Table 5.12, the interaction term of CAR*PNPL not only has a significant relationship with Z-SCORE but it also changes the direction of relationship of PNPL from negative to positive with Z-SCORE. This illustrates that CAR moderates the relationship between PNPL and Z-SCORE. This explains that one unit increase in CAR*PNPL will increase the value of Z-SCORE by 0.2506 and thus reduces insolvency risk.

5.8.1.1 Nonperforming loans and Z-SCORE

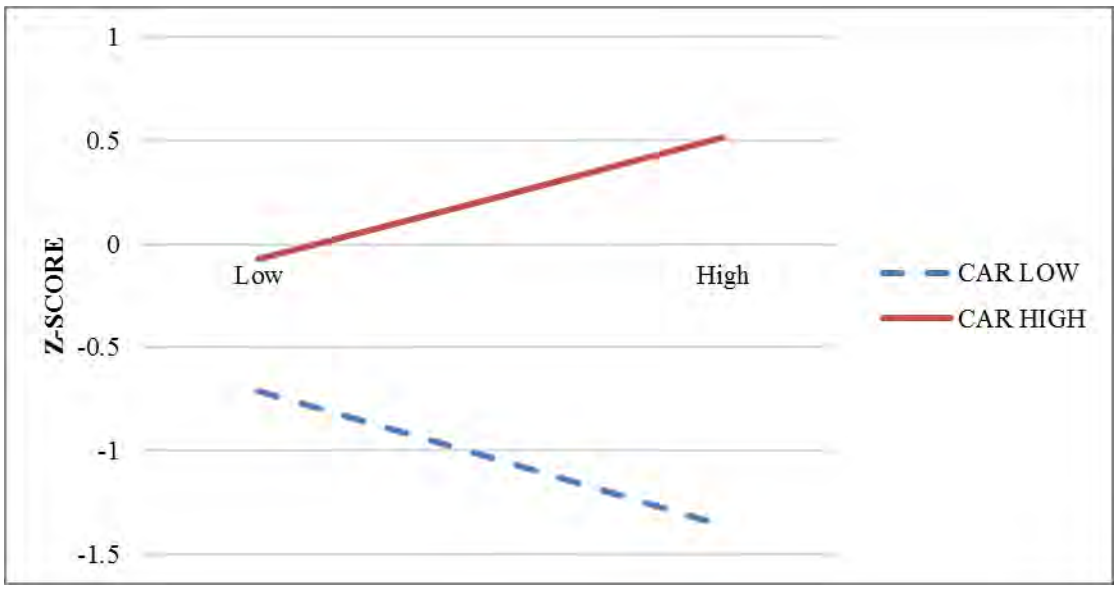


Figure 5. 1
Nonperforming loans to gross loans (NPL) and Z-SCORE

As shown in Figure 5.1, the impact of NPL on Z-SCORE in different when CAR is low and when CAR is high the direction of effect changes, hence moderates the relationship between NPL and Z-SCORE. Figure 5.1 presents that Increase in NPL tends to reduce the value of Z-SCORE when CAR is low. The lower value of Z-SCORE indicates higher insolvency risk. The direction of negative effect can be seen by a downward slopping linear line in Figure 5.1. The upward slopping line in Figure 5.1 indicates that when CAR is high, the effect of nonperforming loans turn to positive with Z-SCORE. This indicates that increase in CAR*NPL will increase the value of Z-SCORE and hence reduce insolvency risk.

5.8.1.2 Provision for nonperforming loans and Z-SCORE

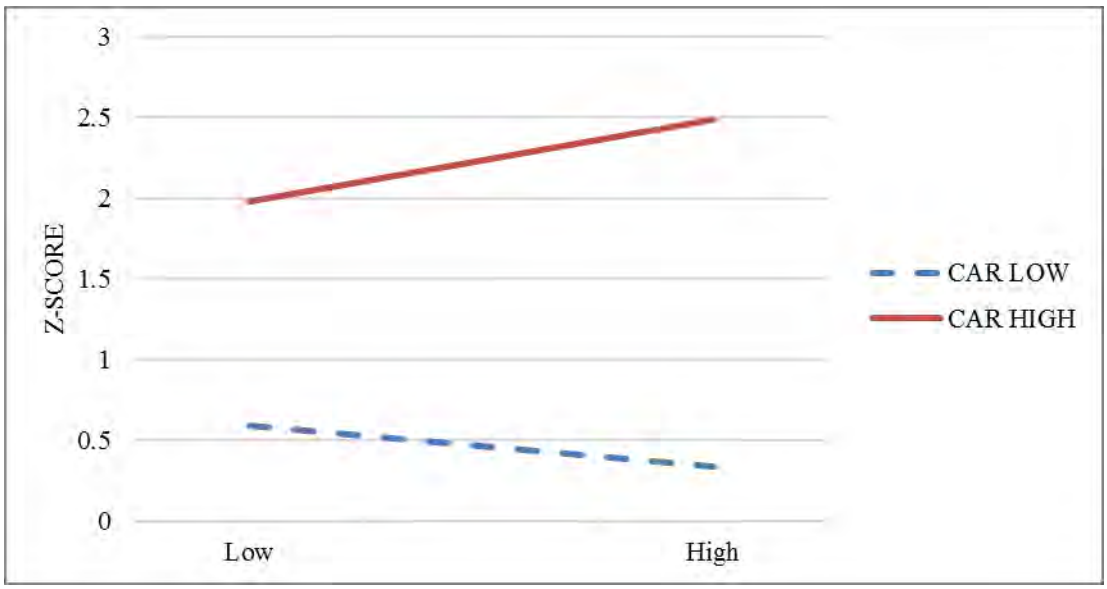


Figure 5. 2
Provision for nonperforming loans to gross loans (PNPL) and Z-SCORE

The relationship between PNPL and Z-SCORE is negative and insignificant when CAR is low. The direction of effect of PNPL with Z-SCORE is negative as depicted in Figure 5.2 by downward sloping linear line. This indicates that higher PNPL will reduce the value of Z-SCORE. The Upward sloping linear line of Figure 5.2 specifies the application of CAR on the relationship between PNPL and Z-SCORE. It defines that increase in CAR*PNPL will reduce insolvency risk. Thus, CAR moderates the relationship between PNPL and Z-SCORE.

5.8.2 The Moderating Effect of CAR on the Relationship of Income Structure and Insolvency Risk in Conventional Banks

In order to estimate the effect of income structure (IATA, IITA, and FBTA) on insolvency risk (Z-SCORE) five models have been tested. Model 1, tests the relationship of IATA, IITA and FBTA on Z-SCORE; Model 2, test the relationship

of IATA, IITA, FBTA and moderator (CAR) on Z-SCORE; Model 3, estimates the results of IATA, IITA, FBTA, moderator(CAR) and interaction of IATA*CAR with Z-SCORE; Model 4, test the results of IATA, IITA, FBTA, moderator (CAR) and an interaction term of IITA*CAR with Z-SCORE; In model 5, IATA, IITA, FBTA, moderator(CAR) and interaction of FBTA*CAR have been tested with Z-SCORE. The results of these models are shown in table 5.13.

Table 5. 13

The moderating effect of CAR on the relationships between IATA, IITA, FBTA and Z-SCORE (Conventional Banks)

Variables	Model 1		Model 2		Model 3 CAR*IATA		Model 4 CAR*IITA		Model 5 CAR*FBTA	
	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value
IATA	0.131	0.457	-0.208	0.254	0.102	0.921	-0.216	0.232	-0.221	0.213
IITA	0.132	0.096*	0.150	0.007***	0.154	0.007***	-0.255	0.394	0.147	0.004**
FBTA	-0.134	0.005***	0.084	0.028**	0.085	0.025**	0.087	0.016**	0.470	0.575
CAR			0.640	0.000***	0.383	0.651	1.151	0.044**	-0.057	0.971
CAR*IATA					-0.093	0.724				
CAR*IITA							0.117	0.196		
CAR*FBTA									-0.1130	0.644

Note: IATA= income from advances to total assets; IITA= income from investments to total assets; FBTA= fee, commission and brokerage income to total assets; CAR= moderating variable; Interaction terms=IATA*CAR, IITA*CAR, FBTA*CAR; *p<.1, **p<0.05, ***p<0.01; N=161

In Table 5.13 model 1, the relationship of IATA is insignificant, while IITA and FBTA are significant with Z-SCORE. The direction of relationship of IATA and IITA are positive while the direction of FBTA is negative. In model 2 of Table 5.13, the results illustrate that CAR has positive significant relationship with Z-SCORE. Furthermore, IITA and FBTA have significant positive relationship with Z-SCORE. On the other hand, IATA shows an insignificant relationship with Z-SCORE. The beta coefficients of IITA and FBTA show negative and positive direction of effect respectively. It is also evident from Table 5.13 that when CAR is added in model 2, the direction effect of IATA changes from positive to negative and FBTA direction also changes from negative to positive.

In model 3 it includes independent variables IATA, IITA, FBTA, CAR and an interaction (CAR*IATA). The results illustrate that IATA has insignificant relationship with Z-SCORE and follows the same direction of effect as in model 1. Furthermore, IATA and FBTA show significant relationship with Z-SCORE. The direction effect of IITA and FBTA on Z-SCORE is positive as in model 2 while the FBTA shows a negative direction of effect in model 1. In model 3, CAR shows an insignificant relationship with Z-SCORE, which is significant in model 2. Furthermore, the result of interaction CAR*IATA is insignificant because the moderator CAR has also an insignificant relationship with Z-SCORE in model 3. Moreover, it can be seen in Table 5.13 that CAR changes the direction of relationship from positive to negative of IATA with Z-SCORE

Model 4 of Table 5.13, shows only FBTA and CAR have significant positive relationship with Z-SCORE, the direction of relationship follows model 2

and model 3. The relationship of IATA and IITA is insignificant. The direction of effect of IATA on Z-SCORE is negative as in model 2, while IITA showing direction of effect on contrary to model 1, model 2 and model3 changes the direction from positive to negative. As it can be seen in Table 5.13 model 4, CAR has insignificant relationship. Therefore, interaction term of CAR*IITA has also insignificant relationship with Z-SCORE. However, the direction effect of CAR*IITA is positive. Thus, based on results displayed in Table 5.13, CAR does not moderate the relationship between IITA and Z-SCORE.

The results of model 4 in Table 5.13 indicate that IATA, FBTA and CAR have insignificant relationship with Z-SCORE, while IITA has significant positive relationship with Z-SCORE. IATA follows the same direction of effect as in model 2 and model 4. The direction effect of FBTA is negative which is consistent with model 2, model 3 and model 4. On the other CAR show a negative direction of effect with Z-SCORE which is on contrary to model 2, model 3 and model 4. As the relationship of CAR is in model 5 is insignificant. Therefore, interaction term of CAR*FBTA is insignificant and it shows a negative direction with Z-SCORE. Hence, CAR does not moderate the relationship between FBTA and Z-SCORE.

5.8.3 The Moderating Effect of CAR on the Relationship of Macroeconomic Factor and Insolvency Risk in Conventional Banks

To test the moderating effect of CAR on the relationship between macroeconomic factors and insolvency risk, six models have been estimated. Model 1, test the relationship between macroeconomic factors(GDP, INF, INT,CUR) and insolvency risk(Z-SCORE); model 2, macroeconomic factors (GDP, INF, INT,CUR) and moderator (CAR) with insolvency risk (Z-SCORE); model 3, test the relationship among macroeconomic factors (GDP, INF, INT,CUR), moderator (CAR) and interaction of GDP*CAR with Z-SCORE; model 4, takes macroeconomic factors (GDP, INF, INT,CUR), CAR and interaction of INF*CAR with Z-SCORE; model 5, estimates the relationship among macroeconomic factors (GDP, INF, INT,CUR), moderator CAR and interaction of INT*CAR with Z-SCORE; model 6, test the relationship of macroeconomic factors (GDP, INF, INT,CUR), moderator(CAR) and interaction of CUR*CAR with insolvency risk (Z-SCORE). The results of all six models are displayed in Table 5.14.

In model 1 of Table 5.14, the relationship between GDP, INF and CUR are significant with Z-SCORE, while INT shows an insignificant positive relationship with Z-SCORE. The direction of relationship of GDP is positive while the direction of INF and CUR is negative. The model 2 estimates the results of independent variables GDP, INF, INT and CUR with moderator CAR. The results of model 2 highlights that GDP, INF, CUR and CAR has significant relationship with Z-SCORE but the INT has insignificant relationship with Z-SCORE. The direction

of GDP, INT and CAR are positive whereas direction of INF and CUR is negative with Z-SCORE.

In model 3 of Table 5.14, it can be seen that GDP, INT and CAR has insignificant relationship with Z-SCORE. The direction of effect of GDP is on contrary to model 1 and model 2 while INT and CAR follows the same direction of effect as of model 2. Moreover, INF and CUR are showing negative significant relationship with Z-SCORE. Furthermore, the interaction term of CAR*GDP is insignificant and positive but it can be seen in Table 5.14, model 3 that interaction of CAR*GDP reduced the value of beta coefficient from12.574 to 5.315. As the interaction term is insignificant therefore CAR does not moderate the relationship between GDP and Z-SCORE.

Model 4 of Table 5.14 presents the result of GDP, INF, INT, CUR, CAR, CAR*INF with Z-SCORE. The independent variables GDP and INF are showing significant relationship with Z-SCORE while INT, CUR and CAR have insignificant relationship with Z-SCORE. Furthermore, GDP and INF follow the same direction of effect of model 1and model 2. Similarly, INT and CUR shows the same direction of effect as in model 1, model 2 and model 3 while, on contrary to model 2 and model 3, CAR has a negative direction of effect. Moreover, interaction term of CAR*INF is significant and direction of relationship is positive, which is opposite to the direction of model 1. This indicates that increase in CAR*INF will increase the value of Z-SCORE and will reduce insolvency risk. Thus, CAR moderates the relationship between INF and Z-SCORE.

The results of model 5 Table 5.14 highlight that GDP, CUR and INF has significant relationship with Z-SCORE, while INT and CAR are insignificant to Z-SCORE. The direction of effect of GDP and INF are the same as of model 1, model 2 and model 4. The direction effect of INT is negative which is contrary to model 1, model 2, model 3 and model 4. Moreover, CUR follows the same direction effect of model 1, model 2, model 3 and model 4 while CAR follows the direction effect of model 4. Furthermore, the interaction term of CAR*INT is insignificant and positive therefore, CAR is unable to moderate the relationship between INT and Z-SCORE.

Similar to model 5, in model 6 of Table 5.14, GDP and INF have significant relationship with Z-SCORE while INT, CUR, CAR have insignificant relationship with Z-SCORE. The beta coefficients of GDP and INF show positive and negative direction of relationships with Z-SCORE. Furthermore, INT changes the direction from negative to positive as in model 5 to model 6 while CUR follows the same direction of effect of model 1, 2, 3, 4 and 5. Moreover, CAR follows the direction effect of model 2 and model 3. As it can be seen in Table 5.14, the interaction term of CAR*CUR is insignificant and positive. This indicates that CAR has changed the direction effect of CUR from negative to positive but the relationship is insignificant therefore, CAR does not moderate the relationship between CUR and Z-SCORE as displayed in model 6, Table 5.14.

Table 5. 14

The moderating effect of CAR on the relationships between GDP, INF, INT, CUR and Z-SCORE (Conventional Banks)

Variables	Model 1		Model 2		Model 3 CAR*GDP		Model 4 CAR*INF		Model 5 CAR*INT		Model 6 CAR*CUR	
	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value
GDP	12.574	0.006***	14.680	0.000***	-2.699	0.951	14.847	0.000***	14.558	0.000***	14.741	0.000***
INF	-5.125	0.000***	-4.803	0.000***	-4.783	0.000***	-19.717	0.002***	-4.704	0.000***	-4.802	0.000***
INT	2.879	0.243	2.435	0.277	2.387	0.277	2.336	0.274	-11.902	0.326	2.430	0.277
CUR	-6.168	0.043**	-5.624	0.051**	-5.770	0.035**	-5.233	0.045	-5.472	0.051*	-8.616	0.638
CAR			0.531	0.001***	0.369	0.403	-0.153	0.688	-0.041	0.915	0.306	0.847
CAR*GDP					5.315	0.688						
CAR*INF							4.586	0.026**				
CAR*INT									4.282	0.188		
CAR*CUR											0.887	0.884

Note: GDP= GDP Growth, INF= Inflation, INT= Interest, CUR= Corruption; Interaction terms=GDP*CAR, INF*CAR, INT*CAR, CUR*CAR; *p<.1, **p<0.05, ***p<0.01; N=161

5.8.3.1 Inflation and Z-SCORE

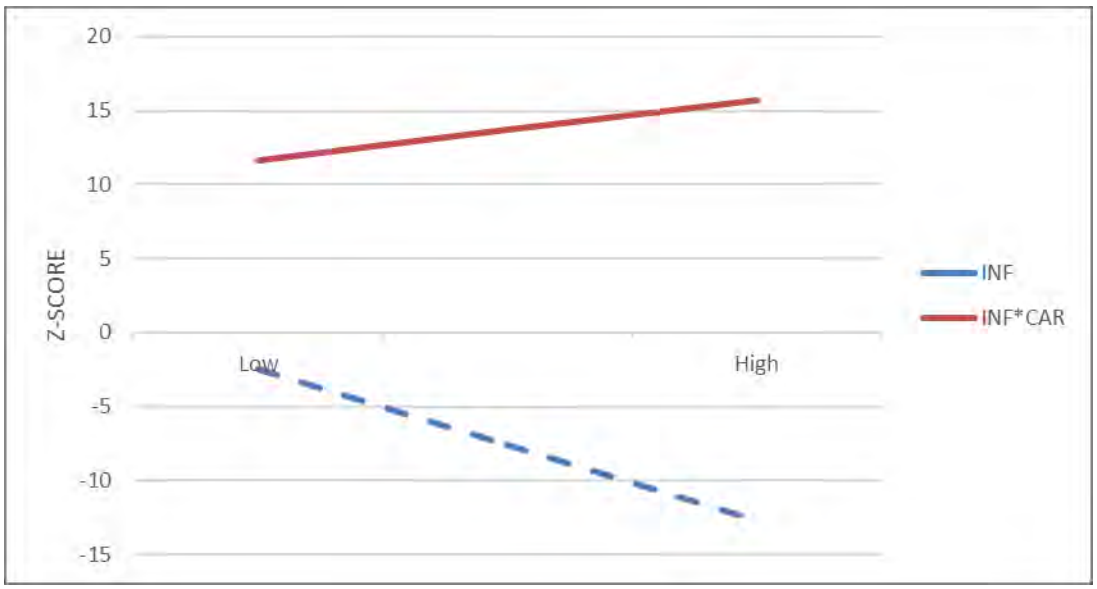


Figure 5. 3
Inflation (INF) and Z-SCORE

The increase in INF reduces the value of Z-SCORE and increases insolvency risk when CAR is low. The effect of INF on Z-SCORE can be seen by a downward sloping line in Figure 5.3. When CAR is added as a moderator on the relationship between INF and Z-SCORE, the relationship is significant and direction becomes positive. The upward slopping line of Figure 5.3 indicates that increase in INF will increase the value of Z-SCORE, and hence reduce insolvency risk.

5.9 Summary Results of Hypotheses of Hierarchical Multiple Regression

Table 5.12, Table 5.13 and Table 5.14 presents the results on the moderating effect of capital regulation on the relationship between asset quality, income structure, macroeconomic factors and insolvency risk. Capital regulation moderate the relationships between nonperforming loans to gross loans, provision for nonperforming

loan to gross loans and inflation with insolvency risk. Therefore, based on the results displayed in Tables 5.12, 5.13 and 5.14 the hypotheses are accepted and rejected. The summary of the hypotheses is shown as in the following Table 5.15:

Table 5. 15
Summary of Results of moderating effect of CAR on the relationship between NPL, PNPL, IATA, IITA, FBTA, GDP, INF, INT, CUR and Z-SCORE (Conventional Banks of Pakistan)

Hypothesis	Decision
H10a1: Capital adequacy ratio moderates the relationship between nonperforming loans/ financing to gross loans/ financing and insolvency risk in conventional banks of Pakistan	Supported
H10a2: Capital adequacy ratio moderates the relationship between provision for nonperforming loans/ financing to gross loans/ financing) and insolvency risk in conventional banks of Pakistan	Supported
H11a1: Capital adequacy ratio moderates the relationship between income from advances/ financing and insolvency risk in conventional banks of Pakistan.	Not Supported
H11a2: Capital adequacy ratio moderates the relationship between income from investments and insolvency risk in conventional banks of Pakistan.	Not Supported
H11a3: Capital adequacy ratio moderates the relationship between income from fee, commission and brokerage income) and insolvency risk in conventional banks of Pakistan.	Not Supported
H12a1: Capital adequacy ratio moderates the relationship between GDP growth and insolvency risk in conventional banks of Pakistan.	No Supported
H12a2: Capital adequacy ratio moderates the relationship between inflation rate and insolvency risk in conventional banks of Pakistan.	Supported
H12a3: Capital adequacy ratio moderates the relationship between interest rate, and insolvency risk in conventional banks of Pakistan.	Not Supported
H12a4: Capital adequacy ratio moderates the relationship between macroeconomic factors (corruption index) and insolvency risk in conventional banks of Pakistan.	Not Supported

5.10 Discussion on the Influence of Capital Regulation on the Relationship between Asset Quality, Income Structure, Macroeconomic Factors and Insolvency Risk in Conventional Banks

The results show that CAR has moderating effect on the relationship between bank specific as well as macroeconomic factors with insolvency risk. The two bank specific variables which are NPL, PNPL and one macroeconomic factor which is INF

that interacts with CAR in the dataset of conventional banks of Pakistan. The discussion of theses significant hypotheses is presented in this section: On the other hand, the discussion on the hypotheses which are showing insignificant relationship is presented in Appendix V[9].

H10a1: Capital adequacy ratio moderates the relationship between nonperforming loans/ financing to gross loans/ financing and insolvency risk in conventional banks of Pakistan

The hypothesis developed by this study is that CAR moderates the relationship between nonperforming loans (NPL) and insolvency risk (Z-SCORE) in conventional banks of Pakistan. The regression results of direct relationship indicate that relationship between NPL and Z-SCORE risk is significant and negative, which indicates that increase in NPL will decreases the value of Z-SCORE and increase insolvency risk. But, when CAR is high, the direction of relationship is changed to positive and the relationship is significant. This result indicates that in presence of CAR, the nonperforming loans have positive impact on Z-SCORE and reduces the effect of NPL on insolvency risk. The plausible reason could be the directive of State bank of Pakistan. As per the directive of State bank of Pakistan, all banks and DFI's has to increase minimum capital requirement (net of losses) form 5 billion rupees to 23 billion between years 2008 to 2013 (Malik, 2014). Moreover, minimum capital requirement is part of

[9] The discussion on the hypotheses H11a1, H11a2, H11a3, H12a1, H12a3 and H12a4 is presented in Appendix V

Tier 1 Capital for calculating CAR, so it allows banks to produce better cushion for nonperforming loans. Thus, CAR moderates the effect of nonperforming loans (NPL) on insolvency risk(Z-SCORE) in conventional banks of Pakistan (Inayat Hussain & Ali, 2011).

In addition, increase in nonperforming loans increases the risk of bank to become insolvent. Nonperforming loans in a bank deteriorate the asset quality. Moreover, increase in nonperforming loans reduces the income of the banks. So, the interaction results of CAR*NPL also indicates that regulation of State bank of Pakistan has influence on the relationship between nonperforming loans and insolvency. The State bank of Pakistan is applying certain regulation in accordance to Basel committee. While if, regulation of State banks is not applied to the relationship it becomes negative, this also places the agency problem and disturbance in loan portfolio. Thus, when introduction of regulation CAR is applied the relationship becomes positive.

H10a2: Capital adequacy ratio moderates the relationship between provision for nonperforming loans/ financing to gross loans/ financing and insolvency risk in conventional banks of Pakistan

The regression results suggest that there is an insignificant relationship between provision for nonperforming loans (PNPL) and insolvency risk (Z-SCORE) when CAR is low. When CAR is high the relationship between PNPL and Z-SCORE become significant. The results indicate that one unit change in PNPL*CAR will increase Z-SCORE by 0.2505 units and will reduce insolvency risk in conventional banks of Pakistan. The application of regulations implemented by State bank of Pakistan is playing a positive role to reduce impact of provision for nonperforming loan (PNPL)

on Z-SCORE. According to the prudential regulations of State Bank of Pakistan (Inayat Hussain & Ali, 2011), banks are directed to maintain minimum capital requirement net off losses and in addition general provision are added to tier 2 capital of capital adequacy ratio. Hence, it could be the reason that the CAR moderates the relationship between PNPL and Z-SCORE and changes the direction of effect from negative to positive.

H12a2: Capital adequacy ratio moderates the relationship between inflation rate and insolvency risk in conventional banks of Pakistan.

The regression result was indicating that increase in inflation will decrease the value of Z-SCORE and increase insolvency risk when CAR is low. So, when CAR is applied to the relationship, the result of regression indicates that increase in inflation will increase value of Z-SCORE and reduce insolvency risk. It means that one unit increase in inflation will increase 4.586 units in Z-SCORE. According to Fabling and Grimes (2005), who suggested that inflation has positive effect on asset side of balance sheet, which is reflected in asset revaluation. The revaluation of assets increases the reserves which is part of CAR and hence reduces insolvency risk. This could be a reason that CAR moderates the relationship between INF and Z-SCORE. The reason could be further justifiable because increase in inflation increase the profitability income(Tan & Floros, 2012). So, this will increase the return on asset and increase the numerator part of Z-SCORE and thus make a bank less risky.

5.11 Summary of the Chapter

The chapter starts with descriptive statistics of conventional and Islamic banks of Pakistan. It defines the basic features of data that includes mean, median, standard deviation, minimum value and maximum value for the study period 2007 to 2015. It also defines the statistics of macroeconomic factors such as GDP, INF, INT and CUR. Before performing multiple regression, assumptions for BLUE (best linear unbiased estimation) are met. The dataset of conventional banks of Pakistan shows problem of normality, heteroscedasticity and autocorrelation. Moreover, in order to make data consistent with heteroscedasticity and autocorrelation GLS is performed. Therefore, by using GLS the results on the relationship between asset quality, income structure, macroeconomic factors and insolvency risk are obtained. The results revealed that there is a significant relationship between NPL, IITA, FBTA, GDP, INF, CUR and Insolvency risk (Z-SCORE) while, PNPL, IATA and INT are insignificant to Z-SCORE. The SIZE effect in conventional banks of Pakistan during study period 2007 to 2015 is also insignificant to Z-SCORE. Furthermore, the direction of relationship of NPL, FBTA, INF and CUR is negative to Z-SCORE. The direction of relationship of IITA and GDP is positive to Z-SCORE. On the other hand, PNPL is showing negative but IATA and INT are showing positive direction of effect to Z-SCORE. Therefore, based on the results the hypotheses of NPL, IITA, FBTA, GDP, INF and CUR are accepted while the hypotheses of PNPL, IATA and INT are not accepted. The section 5.7 provides the hierarchical multiple regression results on the influence of capital regulation (CAR) on the relationship between asset quality (NPL, PNPL), income structure (IATA, IITA, FBTA), macroeconomic factors (GDP, INF, INT, CUR) and insolvency risk (Z-SCORE). The results of hierarchical multiple regressions presented

in section 5.7 shows that CAR moderate the relationship between NPL, PNPL, INF and Z-SCORE. In addition, CAR does not moderate the relationship between IATA, IITA, FBTA, GDP, INT, CUR and Z-SCORE. Moreover, in relation to the results of hierarchical multiple regression, the hypotheses of NPL, PNPL and INF are accepted and the hypotheses of IATA, IITA, FBTA, GDP, INT and CUR are not accepted.

CHAPTER SIX

ANALYSIS OF RESULTS AND DISCUSSION OF ISLAMIC BANKS

6.1 Introduction

The chapter starts with regression assumption for Islamic banks of Pakistan. After multiple regression assumptions, section 6.4 provides empirical results on the relationship between asset quality, income structure, macroeconomic factors and insolvency risk in Islamic banks of Pakistan. The following section 6.6 provides discussion on multiple regression results. The chapter also shares results on the influence of capital regulation on the relationship between asset quality, income structure, macroeconomic factors and insolvency risk of Islamic banks in section 6.7. Moreover, sections 6.9 and 6.10 respectively presents discussion on the hierarchical moderated regression results and comparative evaluation of regression and hierarchical multiple regression results of conventional and Islamic banks of Pakistan.

6.2 Regression Assumption for BLUE

Similar to the conventional banks of Pakistan, before proceeding to the regression analysis for Islamic banks of Pakistan, the regression assumptions have to be fulfilled. According to classical linear model (CLRM), the assumption of regression includes normality, homoscedasticity, no autocorrelation and no perfect multicollinearity. Moreover If a model follows all these assumptions, it is called best linear unbiased estimation (BLUE) (Gujarati, 2003). Therefore, the current study has performed estimations for regression assumptions also for the data set of Islamic banks of Pakistan. The results of these estimations are discussed in following subsections.

6.2.1 Normality in Islamic Bank

Table 6.1 displays the tests of Kolmogorov-Smirnov and Shapiro- Wilk tests for normality assessment of data for Islamic banks in Pakistan. According to Yazici and Yolacan (2007), Kolmogorov-Smirnov and Sharipo-Wilk tests are more apporpriate for small sample data. The results of Kolmogorov-Smirnov and Shapiro-Wilk tests are as follows:

Table 6. 1
Test of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ZSCORE	.106	35	.200*	.974	35	.550
NPL	.123	35	.198	.969	35	.421
PNPL	.117	35	.200*	.932	35	.031
IATA	.120	35	.200*	.969	35	.406
IITA	.100	35	.200*	.967	35	.366
FBTA	.147	35	.053	.938	35	.047
GDP	.202	35	.001	.834	35	.000
INF	.158	35	.026	.898	35	.003
INT	.323	35	.000	.673	35	.000
CUR	.222	35	.000	.896	35	.003
CAR	.168	35	.013	.859	35	.000
SIZE	.107	35	.200*	.980	35	.752

As shown in Table 6.1, the value of ZSCORE, NPL, PNPL, IATA, IITA and SIZE are insignificant, which indicates that the series of these variables are normal. Whereas, FBTA, GDP, INF, INT, CUR and CAR are showing significant results, hence the data of these series is not normal.

To further asses the normality assumption, following Hair *et al.* (2006) and Tabachnick and Fidell (2007), Skewness and Kurtosis Tests are conducted. Table 6.2 displays the results of Skewness and Kurtosis Test.

Table 6. 2
Skewness and Kurtosis test

	Skewness			Kurtosis		
Variables	Statistics	Std.Error	Z-Value	Statistics	Std.Error	Z-Value
ZSCORE	.139	.398	0.350	-.436	.778	-0.560
NPL	-.430	.398	-1.081	.867	.778	1.115
PNPL	-.743	.398	-1.869	.440	.778	0.566
IATA	-.170	.398	-0.426	1.164	.778	1.496
IITA	-.561	.398	-1.411	-.143	.778	-0.184
FBTA	-.569	.398	-1.431	-.366	.778	-0.470
GDP	-.921	.398	-2.316	-.133	.778	-0.171
INF	.195	.398	0.491	-.945	.778	-1.214
INT	-1.697	.398	-4.267	1.622	.778	2.085
CUR	.123	.398	0.308	-1.336	.778	-1.717
CAR	1.495	.398	3.759	2.575	.778	3.310
SIZE	.374	.398	0.939	.050	.778	0.064

Note: Z-value (skewness) = skewness/std. error skewness; Z-value (kurtosis) = kurtosis/std. error kurtosis

Table 6.2 also shows the calculated values of Z. The value Z, if is between ±2.58, the significant level is 0.01, while if it is between ±1.96, the significant level is 0.05 (Hair *et al.*, 2006; Tabachnick & Fidell, 2007; Azureen, 2012). The test results in Table 6.2 show that most of the variables have fulfilled normality assumption except INT and CAR. Therefore, in case of the data of Islamic banks of Pakistan, the normality assumption is partially fulfilled. Moreover, the normality assumption can be relaxed if sample size of data is large. According to Pallant (2007) and Hair *et al.* (2006) the sample size if greater than 30, is defined as large sample. Since, the sample size of Islamic banks has 35 observations which is by definition is a large sample. Hence, the normality assumption can also be relaxed for Islamic banks of Pakistan.

6.2.2 Multicollinearity Islamic Banking

The values of VIF in Islamic banking system are also less than 10 as displayed in Table 6.3, which is less than the rule of thumb defined by Hair *et al.* (2006) and O'Brien (2007). The highest value of VIF is 8.93 of CUR which is less than 10. Hence, VIF test did not produce any evidence of multicollinearity in the dataset of Islamic banks.

Table 6. 3
Multicollinearity Diagnostic Test

Variable	Variance	VIF
NPL	0.241	4.144
PNPL	0.312	3.200
IATA	0.423	2.363
IITA	0.225	4.434
FBTA	0.312	3.199
GDP	0.145	6.859
INF	0.200	5.001
INT	0.264	3.780
CUR	0.112	8.931
CAR	0.286	3.495
SIZE	0.197	5.076

To further analyze the existence of multicollinearity in the dataset of Islamic banks, correlation matrix is estimated for Islamic banks of Pakistan. The correlation matrix of the dataset of Islamic banks is displayed in Table 6.4. The highest value of correlation is between CUR and INF which is -0.783. The second highest value in Table 6.4 is -0.780, which is between CAR and SIZE of the banks. These highest values are less than 0.9 (Pallant, 2007) which is an indication of multicollinearity. Hence, based on the correlation analysis of Table 6.4, there is no evidence of multicollinearity in Islamic banks dataset.

Table 6. 4
Correlation Matrix

Variables	ZSCORE	NPL	PNPL	IATA	IITA	FBTA	GDP	INF	INT	CUR	CAR	SIZE
ZSCORE	1											
NPL	-0.169	1										
PNPL	-0.098	0.749	1									
IATA	-0.101	0.228	0.070	1								
IITA	0.017	0.314	0.279	0.060	1							
FBTA	0.290	-0.337	-0.191	0.247	-.223	1						
GDP	0.117	-0.232	-0.045	-0.056	0.268	0.453	1					
INF	-0.222	0.034	-0.181	-0.030	-0.107	-0.386	-0.669	1				
INT	-0.295	0.031	-0.089	0.038	0.167	-0.296	-0.504	0.773	1			
CUR	0.254	-0.183	-0.022	-0.082	-0.147	0.436	0.772	-0.802	-0.783	1		
CAR	-0.257	0.254	0.068	0.361	-0.012	-0.475	-0.369	0.419	0.376	-0.413	1	
SIZE	0.560	-0.215	0.095	-0.413	0.251	0.324	0.392	-0.491	-0.379	0.381	-0.780	1

6.2.3. Homoscedasticity in Islamic Banking

In order to assess heteroscedasticity in the dataset of Islamic banks of Pakistan, Breuch Pagan Godfrey and White Test are performed (Ongena & Smith, 2000; Watson & Teelucksingh, 2002; Baum, Schaffer, & Stillman, 2003; Berger, Klapper, & Turk-Ariss, 2009). It can be seen in Table 6.5 that there is no evidence of heteroscedasticity in data of Islamic banks of Pakistan. Hence, the data is homoscedastic and fulfill the assumption of BLUE.

Table 6. 5
Test for Heteroscedasticity (Islamic Banks)

Test	P-Value
Breusch-Pagan-Godfrey	0.999
White	0.947

6.2.4 Autocorrelation in Islamic Banking

To assess the existence of autocorrelation in Islamic banks of Pakistan, Bruesch Godfrey Serial Correlation LM test is applied. The result indicates that there is no existence of auto correlation, as shown in Table 6.6.

Table 6. 6
Test of Autocorrelation (Islamic banks)

Breusch-Godfrey Serial Correlation LM Test:	
F-statistic	0.1782
Obs*R-squared	0.268
p-Value	0.604

6.3 Panel Analysis

In order to analyze the dataset of Islamic banks of Pakistan, first BLUE assumptions for regression are estimated. The data shows partial problem of normality, while it has not indicated any existence of multicollinearity, heteroscedasticity and autocorrelation. Furthermore, the assumption of normality can be relaxed if numbers of observations are more than 30 (Hair *et al.*, 2006; Pallant, 2007). Moreover, according to Watson and Teelucksingh (2002), OLS estimation is possible when n>k; it defines that the number of observations should be greater than the number of cofficients.Wang and Akabay (1994) argued that simple OLS estimation is good if it fulfills the assumptions of autocorelation, homoscedasticity and multicolinearity. Hence, the dataset of Islamic banks have no serious issues such as multicollinearity, heteroscedasticity and autocorrelation. Therefore, OLS is an appropriate model for estimation of results (Wang & Akabay, 1994; Watson & Teelucksingh, 2002; Greene, 2003).

6.4 Multiple Regression Analysis

To estimate the results of Islamic banks of Pakistan, simple OLS model is applied as normality assumption can be relaxed and there is no evidence of multicollinearity, heteroscedasticity and autocorrelation. Therefore, to obtain the results of Islamic banks of Pakistan, multiple regression model is estimated by using Common Effects Model for dependent variable Z-SCORE (proxy of insolvency risk). The results of multiple regression model for Islamic banks of Pakistan is displayed in the following subsection 6.3.1 and discussion on results is presented in section 6.5.

6.4.1 The Regression Results of Asset Quality, Income Structure and Macroeconomic Factors on Insolvency Risk in Islamic Banks

Table 6.7 presents the multiple regression analysis on the relationship between asset quality, income structure and macroeconomic factors with insolvency risk in Islamic banking system of Pakistan. The first column of Table 6.7 defines variables; the second column shows the beta coefficient (β) coefficient; third column shows the value of t-statistics and fourth column presents p-value. The p-value is used to determine the existence of a relationship between an independent and dependent variable on the basis, if p-value is significant else there is no relationship between independent and dependent variable if p-value is insignificant.

Table 6. 7
Asset Quality, Income Structure and Macroeconomic variables on Insolvency Risk (Islamic Banks)

Variables	Coefficient	t-Statistic	p-Value
NPL	-0.034	-0.109	0.913
PNPL	-0.141	-0.521	0.606
IATA	0.252	0.592	0.559
IITA	0.450	1.208	0.238
FBTA	0.265	0.851	0.402
GDP	-1.323	-1.821	0.080*
INF	1.063	1.541	0.135
INT	-0.501	-0.578	0.568
CUR	7.258	2.833	0.009***
SIZE	0.500	2.579	0.016**
Durbin-Watson stat	1.277		

Note: N=35. ZSCORE is insolvency risk measure which define the probability of bank failure, NPL is nonperforming loans to gross loans ratio, PNPL is provision for nonperforming loans to gross loan ratio, IATA is income from advances to total assets ratio, IITA is income from investment to total asset ratio, FBTA is fee, commission and brokerage income to total asset ratio, GDP is Economic growth, INF is inflation, INT is interest rate and CUR is corruption, SIZE is natural log of assets; *p<.1, **p<0.05, ***p<0.01

The result presented in Table 6.7 indicates that only GDP and CUR are found to be significant with Z-SCORE, while NPL, PNPL, IATA, IITA, FBTA,

INF and INF are showing an insignificant relationship with Z-SCORE. The relationship of GDP with insolvency risk is significant and the direction of relationship is negative, which is opposite to the direction of relationship of GDP with Z-SCORE in conventional banks of Pakistan (see Table 5.10, chapter 5). Moreover, one unit change in GDP can reduce the value of Z-SCORE by -1.323 units, and will increase insolvency risk of a bank.

The second variable which is found to be significant is CUR. The direction of the relationship between CUR and Z-SCORE is positive as shown in Table 6.7, while the direction of relationship of CUR with Z-SCORE in conventional banks of Pakistan is negative as displayed in table 5.10. The β coefficient of CUR indicates that increase in CUR will increase the value of Z-SCORE in Islamic banks by 7.258 units. The increase in value of Z-SCORE by CUR will decrease the probability of failure of a bank. Furthermore, other than GDP and CUR, SIZE effect does matter in Islamic banks. The relationship of SIZE with Z-SCORE in Islamic banks is significant and positive. The value of beta coefficient (β) indicates that a unit change in SIZE will increase Z-SCORE value by 0.500 units. This explains that as Islamic bank grows, they become more stable.

Table 6.7 further displays the independent variables which show insignificant relationships with Z-SCORE. The independent variables NPL and PNPL are show insignificant relationship but the direction of effect is negative, which is similar to conventional banks of Pakistan (Table 5.10, chapter 5). Furthermore, IATA, IITA and FBTA are show positive direction of relationship.

In addition, INF shows positive while INT has negative direction of relationship with Z-SCORE.

6.5 Summary Results of Hypothesis

For Islamic banks of Pakistan, the result of multiple regression model on the influence of asset quality, income structure and macroeconomic factors on insolvency risk is presented in Table 6.7. The results indicate that GDP and CUR have a significant relationship with Z-SCOER while, the other independent variables, NPL, PNPL, IATA, IITA, FBTA, INF and INT have no significant relationship with Z-SCORE, as shown in Table 6.7. The effect of SIZE in Islamic banks is significant and shows positive relationship with Z-SCORE in Islamic banks of Pakistan. The summary result of the hypothesis on the relationship between asset quality, income structure and macroeconomic factors with insolvency risk is presented in Table 6.8.

Table 6. 8
Summary of hypothesis results

Hypotheses	Decision
H1b: There is a significant relationship between nonperforming loans/ financing to gross loans/ financing and insolvency risk of Islamic banks in Pakistan.	Not supported
H2b: There is a significant relationship between provision for nonperforming loans/ financing to gross loans/ financing and insolvency risk of Islamic banks in Pakistan.	Not supported
H3b: There is a significant relationship between income from advances/ financing and insolvency risk of Islamic banks in Pakistan.	Not supported
H4b: There is a significant relationship between income from investment and insolvency risk of Islamic banks in Pakistan.	Not supported
H5b: There is a significant relationship between fee, commission and brokerage income and insolvency risk of Islamic banks in Pakistan.	Not supported
H6b: There is a significant relationship between GDP Growth and insolvency risk of Islamic banks in Pakistan.	Supported
H7b: There is a significant relationship between inflation rate and insolvency risk of Islamic banks in Pakistan.	Not supported
H8b: There is a significant relationship between profit rate and insolvency risk of Islamic banks in Pakistan.	Not supported
H9b: There is a significant relationship between corruption and insolvency risk of Islamic banks in Pakistan.	Supported

6.6 Discussion on Results among Asset Quality, Income Structure and Macroeconomic Factors on Insolvency Risk

Discussion on the results obtained from multiple regression model and implication of theory on the relationship between asset quality, income structure, and macroeconomic factors on insolvency risk in Islamic banks are presented in this section. It only discusses the hypotheses which are accepted while the discussion on the rejected hypotheses is presented in Appendix V[10]. The discussion is presented as follow;

[10] The discussion on the hypothesis H1b, H2b, H3b, H4b, H5b, H7b and H8b is presented in Appendix V.

H6b: There is a significant relationship between GDP Growth and insolvency risk of Islamic banks in Pakistan.

The regression result of the study reveals that there is a negative significant relationship between GDP and insolvency risk (Z-SCORE) in Islamic banks of Pakistan. So, the study does not accept NULL hypothesis and accept alternate hypothesis. The results indicate that increase in GDP growth will decrease the value of Z-SCORE and increase insolvency risk of Islamic banks. The results are on contrary to many previous researcher such as Čihák and Hesse (2008), Furqani and Mulyany (2009), Srairi (2010), Al-Tamimi and Hussein (2010), Weill (2011), those highlighted that increase in GDP growth enhance the development of Islamic banks, and vice versa. One of the reasons of contrary result could be the less no of observations and cross sections of the data on Islamic banks of Pakistan. The possible explanation for this finding could be that Islamic banks' performance is not much influenced by economic factors since Islamic banking products are not interest but equity based and backed by real assets (Hasan & Dridi, 2010). Moreover, according to Obaidullah (2005), Islamic banks are in their infancy phase. Therefore, it could be a reason that increase in GDP increases opportunity for Islamic bank but due to limitations of Sharia compliance products, limited investment portfolio and small customer base may force Islamic banks to enter in low quality contract of earning. Hence, it may result in lower Z-SCORE and increase in insolvency risk.

H9b: There is a significant relationship between corruption and insolvency risk of Islamic banks in Pakistan.

The relationship of corruption (CUR) with insolvency risk (Z-SCORE) is positive in Islamic banks and the result is on contrary to conventional banks as there is negative relationship between corruption (CUR) and insolvency (Z-SCORE). The relationship of CUR and Z-SCORE in Islamic banks define that increase in CUR will increase the value of Z-SCORE. The stable value of Z-SCORE indicates that the bank is stable and less risky. According to Houston (2007), when protection in a system is weak, corruption can play a significant role in development of an institution. Corruption allows the firms/ institution to get things done in an economic environment where bad law and bureaucratic hold up are strong (Svensson, 2005; Chinn & Ito, 2006). The fact is prevailing in many underdeveloped and developing countries where corruption is said to be in daily life (Bayley, 1966). Some authors' also argue that corruption could be second best option to enhance growth of an institution, because it works like grease to expedite the contract between contractor and acceptor (Lash, 2004; Blackburn, Bose, & Haque, 2006). Furthermore, Islamic banks are in their infancy phase (Obaidullah, 2005), so the focus of the banks may be more on growth rather than full implementation of Sharia regulatory compliance (DawnReport, 2015; Hassan, 2016). Therefore, it could be a reason that CUR has negative relationship with Z-SCORE.

6.7 Hierarchical Moderating Regression Analysis

To analyze the dataset of Islamic banks of Pakistan, OLS is estimated because the data did not show any evidence of autocorrelation, heteroscedasticity and multicollinearity(Wang & Akabay, 1994; Watson & Teelucksingh, 2002; Gujarati, 2003). In order to assess the effect of moderator Baron and Kenny (1986) has been followed. According to Baron and Kenny (1986), a change in direction and/or strength

of the interaction terms (independent variable × moderator) are also examined in order to verify the existence of moderating effects on the relationship between independent and dependent variable. The results of moderating effect of CAR on the relationship between asset quality, income structure and macroeconomic factors and insolvency risk in Islamic banks of Pakistan are presented in next section 6.6.

6.7.1 The Moderating Effect of CAR on the Relationship of Asset Quality and Insolvency Risk in Islamic Banks

To test the moderating effect of CAR on the relationship between asset quality and insolvency risk in Islamic banks of Pakistan, four models have been tested. Model 1, test the direct relationship of NPL and PNPL with insolvency risk (Z-SCORE); model 2 includes CAR as moderator with independent variables NPL, PNPL, to test them with Z-SCORE; model 3, estimates the relationships of NPL, PNPL, moderator (CAR) and interaction term of CAR*NPL with insolvency risk (Z-SCORE); model 4, estimates the results of NPL, PNL, CAR and interaction of PNPL*CAR. The results are shown in Table 6.9.

Table 6. 9
The moderating effect of CAR on the relationships between NPL, PNPL and Z-SCORE (Islamic banks)

Variables	Model 1		Model 2		Model 3 CAR*NPL		Model 4 CAR*PNPL	
	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value
NPL	-0.034	0.913	-0.202	0.593	1.303	0.029**	-0.242	0.443
PNPL	-0.141	0.606	0.187	0.600	0.102	0.745	2.480	0.000*
CAR			0.976	0.000***	1.083	0.000*	1.080	0.000*
CAR*NPL					-0.552	0.002***		
CAR*PNL							-0.850	0.000***

Note: NPL= nonperforming loans to gross loans, PNPL= provision for nonperforming loans to gross loans; CAR =moderating variable; Interaction terms=NPL*CAR and PNPL*CAR: *p<.1, **p<0.05, ***p<0.01; N=35

It can be seen in model 1 Table 6.9, that the relationship of NPL and PNPL with Z-SCORE is insignificant and direction of relationship is negative. When CAR is added with independent variables in model 2, NPL shows an insignificant relationship and follows the same direction of effect as in model 1, while, the direction of PNPL changes to positive from negative. Moreover, CAR shows a positive significant relationship with Z-SCORE in model 1.

The interaction of CAR*NPL is performed in model 3 along with independent variables NPL, PNL and CAR (moderator). NPL shows a significant relationship and direction changes to positive, which is contrary to model 1 and model 2. The direction of effect of PNPL follows the direction of model 2. Furthermore, CAR is showing a significant positive relationship with Z-SCORE. In addition, the interaction of CAR*NPL is significant and negative with Z-SCORE. This indicates that CAR*NPL strengthens the relationship of NPL with Z-SCORE but direction of relationship remains the same (negative) as in model 1 and model 2. The beta coefficient (β) of CAR*NPL indicates that one unit increase in CAR*NPL will reduce the value of Z-SCORE by 0.552 units and will increase

insolvency risk. Thus, the capital regulation is strengthening the relationship between NPL and Z-SCORE but unable to moderate the impact of nonperforming loans on insolvency risk.

In model 4, NPL shows an insignificant negative relationship with Z-SCORE, following model 1 and model 2. The relationship of PNPL become significant in model 4 but direction of relationship follows the same direction of model 2 and model 3. Table 6.9 also highlights that in model 4, CAR has a positive significant relationship with Z-SCORE, while the interaction term of CAR*PNPL has significant negative relationship with Z-SCORE. This indicates that one unit increase in CAR*PNPL will reduce the value of Z-SCORE by 0.850 units and increases insolvency risk. Hence, based on the results of Table 6.9 model 4, CAR only strengthens the relationship between PNPL and Z-SCORE and unable to reduce insolvency risk posed by PNPL.

6.7.1.1 Nonperforming loans and Z-SCORE

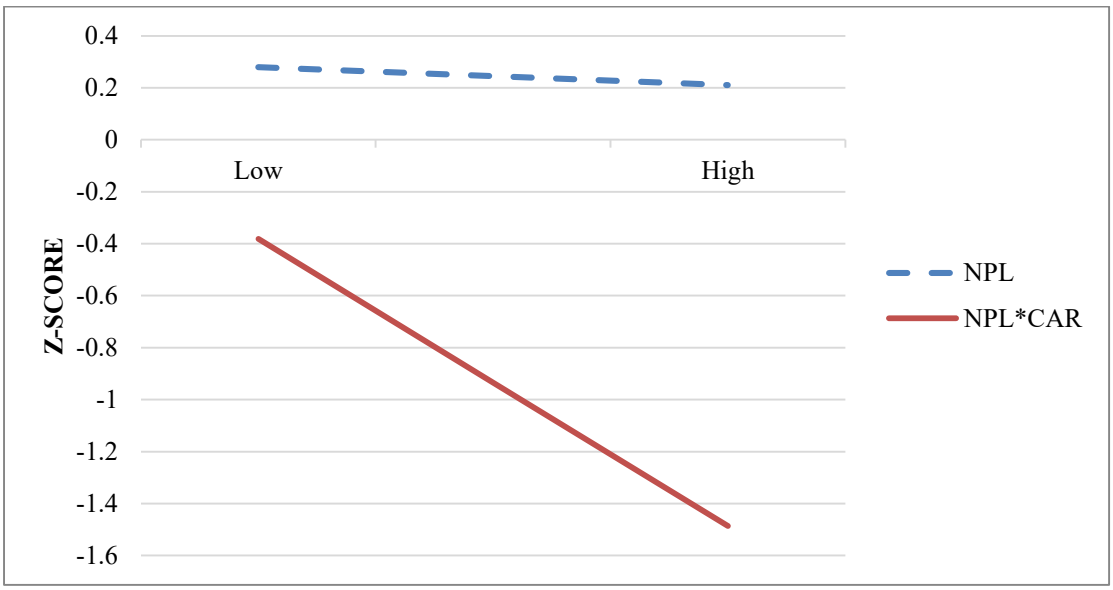


Figure 6. 1
Nonperforming loans to gross loans (NPL) and Z-SCORE

The relationship between NPL and Z-SCORE is insignificant, when CAR is low, in Islamic banks. The downward slopping line of Figure 6.1 indicates that the effect of NPL on Z-SCORE in Islamic banks is weak or insignificant. When CAR is high, the relationship between NPL and Z-SCORE become significant. The direction of relationship between NPL and Z-SCORE remains negative, which can be seen by a steep downward slopping line in Figure 6.1. Therefore, on the basis of graphical results, it can be argued that CAR strengthens the relationship between NPL and Z-SCORE and it also increases the insolvency risk in Islamic banks.

6.7.1.2 Provision for nonperforming loans and Z-SCORE

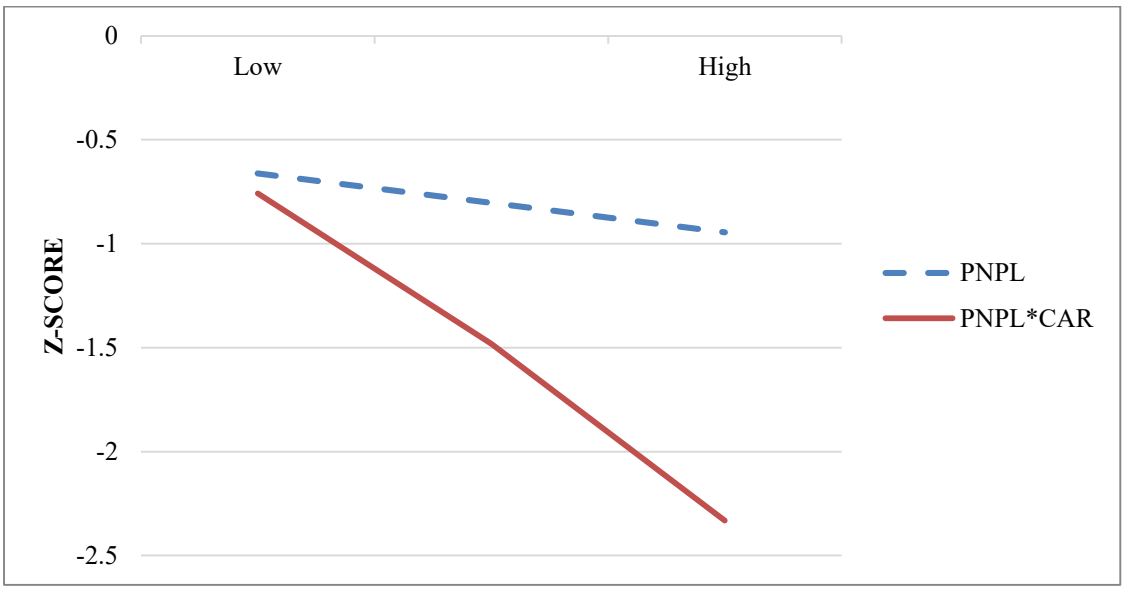


Figure 6. 2
Provision for nonperforming loans to gross loans (PNPL) and Z-SCORE

The relationship between provision for nonperforming (PNPL) and Z-SCORE is insignificant when CAR is low as it can be seen by the downward sloping line of Figure 6.2. When CAR is high, it strengthens the relationship between PNPL and Z-SCORE. The steep downward sloping line of Figure 6.2 indicates that increase in CAR*PNPL will decrease the value of Z-SCORE and increase insolvency risk. Thus, higher CAR*PNPL poses higher insolvency risk in Islamic banks of Pakistan.

6.7.2 The Moderating Effect of CAR on the Relationship between Income Structure and Insolvency Risk in Islamic Banks

To test the moderating effect of CAR on relationship between income structure (IATA, IITA, and FBTA) and insolvency risk (Z-SCORE), five linear regression models have been estimated. Model 1 presents the direct relationship of IATA, IITA, FBTA with insolvency risk (Z-SCORE); model 2, test the relationship

of IATA, IITA, FBTA and moderator (CAR) with insolvency risk (Z-SCORE); model 3, estimates the relationship of independent variables IATA, IITA, FBTA, moderator(CAR) and interaction of IATA*CAR with Z-SCORE; model 4, test the relationship of IATA, IITA, FBTA, CAR(moderator) and interaction term of IITA*CAR with Z-SCORE; model 5, finds the results of interaction term(CAR*FBTA) along with variables IATA, IITA,FBTA and CAR(moderator) with Z-SCORE (insolvency risk). The results are presented in Table 6.10.

Table 6. 10

The moderating effect of CAR on the relationships between IATA, IITA, FBTA and Z-SCORE (Islamic Banks)

Variables	Model 1		Model 2		Model 3 CAR*IATA		Model 4 CAR*IITA		Model 5 CAR*FBTA	
	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value
IATA	0.252	0.559	-0.473	0.369	2.066	0.034**	-0.518	0.287	-0.587	0.224
IITA	0.450	0.238	0.396	0.188	0.146	0.594	3.597	0.009***	0.198	0.478
FBTA	0.265	0.402	0.783	0.036**	0.516	0.124	0.580	0.097*	-1.456	0.105
CAR			1.365	0.000***	1.334	0.000***	1.413	0.000***	1.415	0.000***
CAR*IATA					-0.875	0.003***				
CAR*IITA							-1.244	0.016**		
CAR*FBTA									0.697	0.009***

Note: IATA= income from advances to total assets; IITA= income from investments to total assets; FBTA= fee, commission and brokerage income to total assets; CAR= moderating variable; Interaction terms=IATA*CAR, IITA*CAR, FBTA*CAR; *p<.1, **p<0.05, ***p<0.01; N=35.

It can be seen in model 1 Table 6.10 that there is no significant relationship between income structure variables (IATA, IITA, FBTA) and Z-SCORE while the direction of effect is positive for all three variables IATA, IITA and FBTA. In model 2, IATA has insignificant negative relationship with Z-SCORE but direction is opposite to the direction of model 1. Furthermore, IITA and FBTA have positive direction of effect but only FBTA has significant relationship with Z-SCORE. Moreover, the CAR shows a significant relationship with Z-SCORE and direction of relationship is positive similar to the direction CAR shows in conventional banks of Pakistan (see Chapter 5, Table 5.13, and Model 2).

The interaction of CAR*IATA is applied in model 3. The result shows that IATA and CAR has significant relationship with Z-SCORE while IITA and FBTA have insignificant relationship in model 3. The direction of relationships of IATA, CAR, IITA and FBTA are positive. Furthermore, the interaction term CAR*IATA has also significant relationship and the direction of relationship is negative. This indicates that the interaction term of CAR*IATA changes the direction of effect of IATA from positive to negative, which is on contrary to the direction of model 1. This explains that one unit increase in CAR*IATA will reduce the value of Z-SCORE by -0.875 and hence increases insolvency risk. Therefore, if comparing model 1 and model 3 of Table 6.10, CAR moderates (strengthens) the relationship between IATA and Z-SCORE.

In model 4 of Table 6.10, IITA, FBTA, CAR and interaction of CAR*IITA are significant while IATA is insignificant. IITA and FBTA follows the same direction of relationship as in model 1, model 2 and model 3 while, CAR follows

the direction of model 2 and model 3. The direction of relationship of IATA is negative as in model 2. Moreover, the direction of relationship of the interaction term CAR*IITA is negative. Correspondingly, CAR not only changes the direction of relationship between IITA and Z-SCORE (positive to negative) but it also strengthens the relationship. This indicates that CAR moderates the relationship between IITA and Z-SCORE, Furthermore, once unit change in CAR*IITA will reduce the value of Z-SCORE by 1.244 unit and increase insolvency risk. Thus, as displayed in model 4 of Table 6.10, CAR moderates the relationship between IITA and Z-SCORE but also increases insolvency risk.

The result of the interaction term FBTA*CAR is displayed in Table 6.10 model 5. The results indicate that CAR and interaction term of CAR*FBTA are significant with Z-SCORE while, IATA, IITA and FBTA are insignificant. CAR follows the same direction of effect as in model 2, model 3 and model 4. The direction of the interaction term CAR*FBTA is positive. This phenomenon explains that the interaction term of CAR*FBTA strengthens the relationship with Z-SCORE. The beta coefficient (β) value of the interaction term CAR*FBTA indicates that one unit increase in the beta will increase the value of Z-SCORE by 0.697 units. Hence, the higher Z-SCORE value explains a stable bank. Table 6.10 models 5 also highlights that IATA follows the direction of effect as in model 2 and model 4, while IITA follows the same direction of effect as in model 1, model 2, model 3 and model 4. On the other hand, FBTA show the negative direction of effect in model 5 which is contrary to model 1, 2, 3 and 4 as shown in Table 6.10.

6.7.2.1 Income from Financing and Z-SCORE

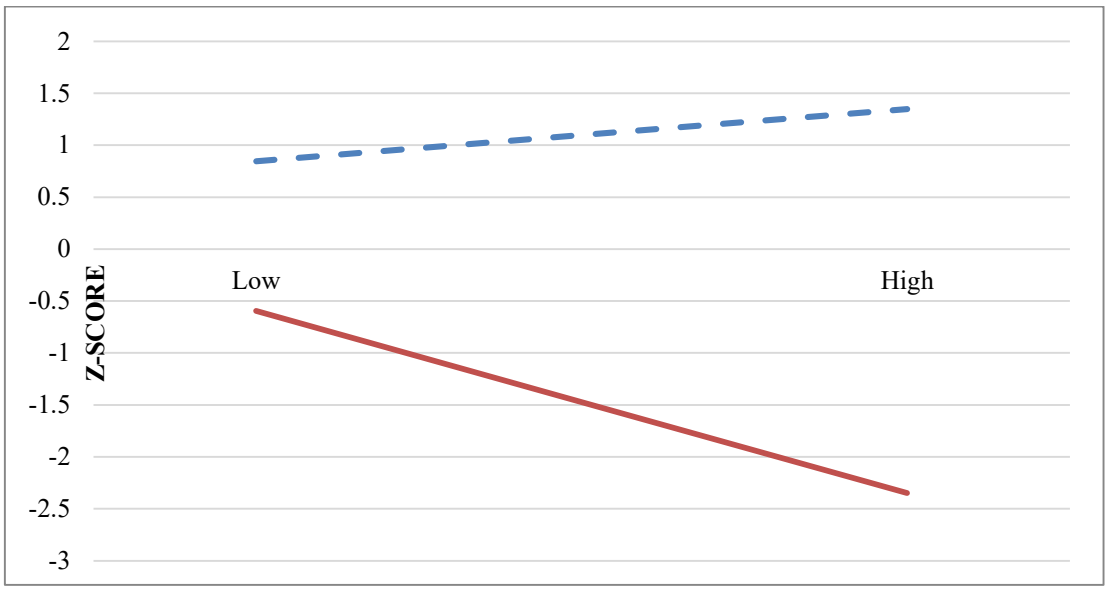


Figure 6. 3
Income from financing to total assets (IATA) and Z-SCORE

There is an insignificant relationship between IATA and Z-SCORE when CAR is low but the direction of relationship is positive as presented by upward sloping line of Figure 5.6. When CAR is high in the relationship between IATA and Z-SCORE, the relationship become significant and the direction of effect becomes negative as shown by linear downward sloping line of Figure 6.3. This indicates that the increase in the requirement of CAR will reduce the value of Z-SCORE and increase insolvency risk of Islamic banks.

6.7.2.2 Income from Investment and Z-SCORE

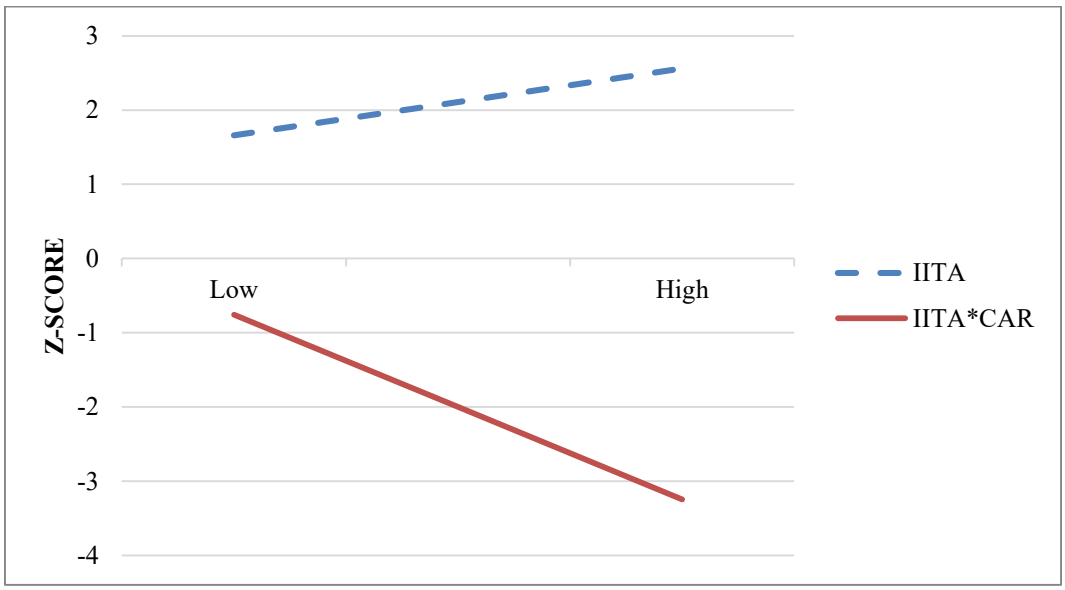


Figure 6. 4
Income for investment to total assets (IITA) to Z-SCORE

There is a positive insignificant relationship between IITA and Z-SCORE when CAR is not added as a moderator to the relationship between IITA and Z-SCORE. This relationship is presented by the upward sloping line of Figure 6.4. When CAR is added to a relationship, the relationship becomes significant and direction changes from positive to negative, as shown by the downward sloping line of Figure 6.4. This phenomenon explains that higher CAR reduces the value of Z-SCORE and increases the insolvency risk in Islamic banks.

6.7.2.3 Income from fee, commission and brokerage and Z-SCORE

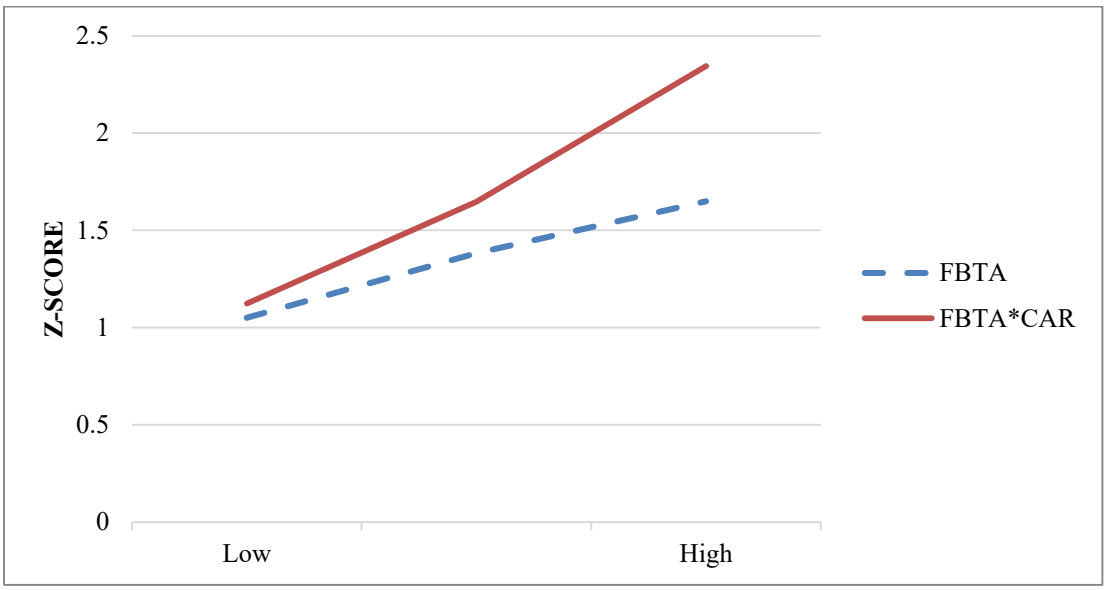


Figure 6. 5
Income from fee, commission and brokerage (FBTA) and Z-SCORE

It can be seen in Figure 6.5 that, CAR strengthens the positive significant relationship between FBTA and Z-SCORE. The effect can be seen by steep upward slopping line of Figure 6.5. On the other hand, when CAR is low, the relationship between FBTA and Z-SCORE is insignificant but direction of relationship is positive, as shown by upward sloping line of Figure 6.5. The moderating role of CAR indicates that increase in FBTA will increase the value of Z-SCORE. Thus, it reduces insolvency risk in Islamic banks of Pakistan. Moreover, in the existence of higher requirement of CAR; FBTA reduces insolvency risk of the bank.

6.7.3 The Moderating Effect of CAR on the Relationship between Macroeconomic Factor and Insolvency Risk in Islamic Banks

Table 6.11 presents the results regarding the moderating effect of CAR on the relationship between macroeconomic factors and insolvency risk (Z-SCORE). To obtain the results of moderation, six models are tested. Model 1, shows the test results of direct relationship of GDP, INF, INT and CUR with Z-SCORE (insolvency risk); model 2, estimates the independent variable (GDP, INF, INT, CUR) and moderator (CAR) with insolvency risk (Z-SCORE).

Model 3, tests the relationship of GDP,INF, INT, CUR, CAR(moderator) and CAR*GDP with Z-SCORE ; model 4, estimates the effect of interaction term CAR*INF on the relationship between GDP, INF, INT, CUR and Z-SCORE; model 5 tests the relationship of macroeconomic factors (GDP,INF,INT,CUR), moderator(CAR) and interaction of CAR*INT with Z-SCORE; model 6, estimates the relationship of independent variables GDP, INF, INT, CUR,CAR interaction term (CAR*CUR) with Z-SCORE. The results of all these six models are presented in Table 6.11.

In model 1 Table 6.11, it can be seen that only GDP and CUR has significant relationship with Z-SCORE, while INF and INT has insignificant relationship. CUR has positive direction of effect while, GDP has negative direction of relationship with Z-SCORE. Similarly, INF have positive but INT has negative direction of effect on Z-SCORE. In model 2 of Table 6.11, the effect of CAR on Z-SCORE along with GDP, INF, INT and CUR is insignificant. GDP and INT follow the same direction of relationship as in model 1, while INF and CUR direction of effect is positive which is contrary to model 1. Furthermore, CAR has

insignificant negative relationship with Z-SCORE as displayed in Table 6.11 model 2.

In model 3 of Table 6.11, GDP, INF, INT, CUR, CAR and interaction term of CAR*GDP are showing insignificant influence on Z-SCORE. GDP follows the direction of relationship as in model 1 and model 2, while INF follows the direction of model 1. Furthermore, the direction effect of INT is the same as in model 1 and model 2 but CUR follows direction of model 1. In addition, CAR changes the direction to positive which is contrary to model 2. Moreover, the direction effect of the interaction term CAR*GDP is positive which is contrary to the direction of GDP as in model 1. The results of Table 6.11, model 3 further indicates that CAR does not moderate the relationship between GDP and Z-SCORE.

The model 4 of Table 6.11 presents the relationship results of GDP, INF, INT, CUR, CAR and interaction of INF *CAR with Z-SCORE. The results highlight that all the relationships between independent variables, interaction variable with Z-SCORE are insignificant. Furthermore, GDP and INT follows the same direction of effect as of model 1, model 2 and model 3 while, INF follows direction of effect of model 2. Moreover, CUR follows model 1 and model 3 direction of effect with Z-SCORE. In addition, the direction of effect of CAR is positive as in model 3. Lastly, the result of the interaction term CAR*INF indicates that CAR does not moderate the relationship between INF and Z-SCORE although the direction of effect is positive.

The model 5 of Table 6.11 highlights that GDP, INF, INT, CUR, CAR and interaction term of CAR*INT are showing insignificant relationship with Z-

SCORE. The sign of beta coefficient (β) of GDP, INF indicates that GDP has negative and INF has positive direction of effect with Z-SCORE respectively. The direction effect of INT is negative while CUR has positive direction of relationship with Z-SCORE. Furthermore, the direction relationship of CUR follows model 1, model 3 and model 4. In addition, the interaction term of CAR*INT has the positive direction of effect. Moreover, the relationship is negative and insignificant between CAR*INT and Z-SCORE. Therefore, CAR does not moderate the relationship between INT and Z-SCORE.

In model 6, Table 6.11, the independent variables and interaction term has insignificant relationship with Z-SCORE. The independent variable GDP follows the negative direction of relationship as it follows in model 1, 2, 3, and 4 while, INF follows positive effect of relationship like in model 3 and model 5. The direction of INT is also positive but it is contrary to the direction effects of model 1, model 2, model 3 and model 4. CUR is also showing negative direction of relationship as it shows in model 2. Moreover, CAR direction of effect is positive following model 3 and model 4. The direction of effect of the interaction term CAR*CUR is positive and is same as the direction of the relationship of CUR with Z-SCORE in model 1 but, the value of beta coefficient (β) is reduced from 7.2587 to 0.5715. The reduced value of beta coefficient of CAR*CUR cannot produce corresponding unit change in Z-SCORE due to an insignificant relationship. Thus, CAR is unable to moderate the relationship between CUR and Z-SCORE in Islamic banks of Pakistan.

Table 6. 11

The moderating effect of CAR on the relationships between GDP, INF, INT, CUR and Z-SCORE (Islamic Banks)

Variables	Model 1		Model 2		Model 3 CAR*GDP		Model 4 CAR*INF		Model 5 CAR*INT		Model 6 CAR*CUR	
	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value
GDP	-1.323	0.080*	-0.255	0.678	-1.460	0.431	-0.445	0.473	-0.397	0.525	-0.308	0.629
INF	1.063	0.135	-0.077	0.907	0.084*	0.905	-3.113	0.169	0.129	0.850	0.036	0.960
INT	-0.501	0.568	-0.992	0.232	-0.647	0.504	-0.095	0.925	-3.434	0.141	-0.807	0.400
CUR	7.258	0.009***	-0.411	0.827	1.869	0.623	2.854	0.336	3.003	0.398	-0.761	0.718
CAR			-0.347	0.393	0.970	0.618	1.770	0.255	1.963	0.346	0.423	0.831
CAR*GDP					0.378	0.489						
CAR*INF							1.135	0.161				
CAR*INF									1.196	0.260		
CAR*CUR											0.571	0.693

Note: GDP= GDP Growth, INF= Inflation, INT= Interest, CUR= Corruption; Interaction terms=GDP*CAR, INF*CAR, INT*CAR, CUR*CAR; *p<.1, **p<0.05, ***p<0.01; N= 35.

6.8 Summary of Results

In Islamic bank, CAR strengthens the relationship between NPL, PNPL and Z-SCORE. Further, CAR has both positive and negative moderating affect on the relationship between IATA, IITA and FBTA with Z-SCORE. Moreover, CAR does not play moderating effect on the relationships of GDP, INF, INT and CUR with Z-SCORE in Islamic banks. The summary of accepted and rejected hypotheses on the basis of hierarchical multiple regression estimation is presented in Table 6.12.

Table 6. 12
Summary of Results of moderating effect of CAR on the relationship between NPL, PNPL, IATA, IITA, FBTA, GDP, INF, INT, CUR and Z-SCORE (Islamic Banks of Pakistan)

Hypotheses	Decision
H10b1: Capital adequacy ratio moderates the relationship between nonperforming loans/ financing to gross loans/ financing) and insolvency risk in Islamic banks of Pakistan	Supported
H10b2: Capital adequacy ratio moderates the relationship between asset quality (provision for nonperforming loans/ financing to gross loans/ financing) and insolvency risk in Islamic banks of Pakistan.	Supported
H11 b1: Capital adequacy ratio moderates the relationship between income from advances/ financing and insolvency risk in Islamic banks of Pakistan.	Supported
H11 b2: Capital adequacy ratio moderates the relationship between income from investments and insolvency risk in Islamic banks of Pakistan.	Supported
H11 b3: Capital adequacy ratio moderates the relationship between income from fee and brokerage income) and insolvency risk in Islamic banks of Pakistan.	Supported
H12b1: Capital adequacy ratio moderates the relationship between GDP growth and insolvency risk in Islamic banks of Pakistan.	Not Supported
H12b2: Capital adequacy ratio moderates the relationship between inflation rate and insolvency risk in Islamic banks of Pakistan.	Not Supported
H12b3: Capital adequacy ratio moderates the relationship interest rate and insolvency risk in Islamic banks of Pakistan.	Not Supported
H12b4: Capital adequacy ratio moderates the relationship between corruption index and insolvency risk in Islamic banks of Pakistan.	Not Supported

6.9 Discussion on the Influence of Capital Regulation on the Relationship between Asset Quality, Income Structure, Macroeconomic Factors and Insolvency Risk

The results show that CAR has moderating affect on the relationship between bank specific variables and insolvency risk. The five bank specific variables which are NPL, PNPL, IATA, IITA and FBTA interact with CAR in the dataset of Islamic banks of Pakistan. The discussion of theses hypotheses is presented in this section: Moreover, the discussion on hypotheses which are not accepted is presented in Appendix V[11].

6.9.1 To Examine the Moderating Effect of Capital Regulations (Capital Adequacy Ratio (CAR)) on the Relationship between Asset Quality, Income Structure, Macroeconomic Factors and Insolvency Risk of Conventional Banks of Pakistan

The results of hierarchical multiple regressions show that CAR has moderating effect on the relationship between bank specific variable and insolvency risk in Islamic banks of Pakistan. CAR interacts with five independent variables which are NPL, PNPL, IATA, IITA and FBTA. The discussion of these hypotheses on the relationship among NPL, PNPL, IATA, IITA and FBTA with Z-SCORE is presented in the following subsection. Moreover, the subsection also provides the discussion on the relationship between macroeconomic factors and insolvency risk in Islamic banks of Pakistan.

[11] The discussion of hypotheses H12b1, H12b2, H12b3 and H12b4 is presented in Appendix V

H10b1: Capital adequacy ratio moderates the relationship between nonperforming loans/ financing to gross loans/ financing and insolvency risk in Islamic banks of Pakistan.

The regression results indicate that there is an insignificant relationship between non-performing loans (PNPL) and insolvency risk (Z-SCORE), when CAR is not applied on the relationship. When CAR is high, the results describes that increase in nonperforming loans (NPL) will decrease the value of Z-SCORE and enhance the risk of insolvency. One unit change in NPL will increase insolvency by 0.5525. According to Zaman (2014) and TBP (2014), State Bank of Pakistan directed Islamic banks of Pakistan to maintain 10 billion rupees as minimum capital requirement(net of losses) and maintain CAR ratio of 10%. This indicates that CAR only strengthens the relationship but does not fully moderate the relationship in Islamic banks. This phenomenon also indicates that higher CAR is exposed to higher risk in order to achieve the higher expected return from financing. Hence, CAR is unable to reduce the effect of Agency problem and disturbance in financing portfolio. In fact, CAR may be forcing bank towards aggressive lending to maintain minimum capital requirement directed by the State bank of Pakistan (Zaman, 2014).

H10b2: Capital adequacy ratio moderates the relationship between provision for nonperforming loans/ financing to gross loans/ financing and insolvency risk in Islamic banks of Pakistan.

When CAR is low in the relationship between PNPL and Z-SCORE, the relationship is insignificant, while when CAR is high, the relationship between

PNPL and Z-SCORE becomes significant. The direction of relationship indicates that increase in the interaction term CAR*PNPL will decrease the value of Z-SCORE and increase insolvency risk. As per the directive of State bank of Pakistan (Inayat Hussain & Ali, 2011), Islamic banks are directed to increase minimum capital requirement (net of losses). Furthermore, general provisioning for loan losses is part of tier-2 capital of CAR. So, the reason could be that the capital regulation is partially moderating the relationship between PNPL and Z-SCORE in conventional banks but may not be able to reduce the impact of PNPL on Z-SCORE because of complexities of PLS System and dynamic provisioning in Islamic banks. Therefore, higher CAR may be exposing banks to more risk in terms of insolvency. The only effect of CAR is strengthening of the relationship between PNPL and Z-SCORE.

H11b1: Capital adequacy ratio moderates the relationship between income from advances/ financing and insolvency risk in Islamic banks of Pakistan

The regression results show that there is an insignificant relationship between IATA and insolvency risk (Z-SCORE) when CAR is low, while when CAR is high, the relationship between IATA and insolvency risk (Z-SCORE) become significant. As a result, the effect of relationship between IATA with Z-SCORE converts to negative. The higher CAR may force bank to perform aggressive financing which may result in higher volatility of income due to risk of default of financing or lower rent income. So, this volatility of income may reduce income before tax and finance cost and hence reduce the value of Z-SCORE. Moreover, the higher CAR may influence the portfolio of financing and may

produce shock to bank stability. Furthermore, The result of this study are on contrary to previous authors (i.e. Obaidullah (2005), Čihák and Hesse (2008), Khan, A. K. (2010)) who argued that Islamic bank financing is less risky. But in Islamic banks of Pakistan, the requirement of CAR has forced Islamic banks to increase financing in order to meet minimum capital requirement. Hence, it may increase insolvency risk due to inefficient portfolio of financing.

H11b2: Capital adequacy ratio moderates the relationship between income from investments and insolvency risk in Islamic banks of Pakistan.

The regression result shows that when CAR is low between IITA and insolvency risk (Z-SCORE), the result is insignificant. When CAR is high, the relationship between IITA and Z-SCORE become significant. The negative direction of beta coefficient explains that increase in IITA*CAR will reduce the value of Z-SCORE and increase insolvency risk. As explained by Beck, Demirgüç-Kunt, and Merrouche (2013) and Zaman (2015), the number of options for investment for Islamic banks are restricted because banks tend to remain in compliance to Sharia. So, having less options for diversification of portfolio in limited sector can produce shocks to the income. Furthermore, according to modern portfolio theory, small diversification income does not reduce risk (Acharya, Saunders, & Hasan, 2002). The reason could be that a smaller shock to a small diversified portfolio can produce greater volatility to the income and can increase destabilization of income structure. The higher volatility of income increases the SDROA (standard deviation of return on asset) and hence can be a

cause to reduce Z-SCORE because a smaller value of Z-SCORE shows an instable or risky bank.

H11b3: Capital adequacy ratio moderates the relationship between income from fee, commission and brokerage and insolvency risk in Islamic banks of Pakistan.

Capital adequacy ratio moderates the relationship between FBTA and Z-SCORE. When CAR is low the relationship, it is insignificant and the direction of relationship is positive. While, in higher CAR, the relationship between FTBA and Z-SCORE is strengthened by CAR. The direction of beta coefficient (β) indicates that increase in FBTA will increase the value of Z-SCORE and reduce insolvency risk. The reason could be that the income generated through FBTA does not need capital requirement and has no role to play in calculating CAR. Therefore, FBTA increase the total income and increase the value of returns, the value of return may increase ROA and hence can increase the value of Z-SCORE, which notifies a bank is stable and less risky. According to DeYoung and Torna (2013), there are certain components of noninterest income. These components are fee, commission, brokerage and trading. Among these items fee and commission income does not reduce the value of bank but it helps reduces insolvency risk. Thus, this can be a reason that fee, commission and brokerage income helps to diversify portfolio and reduces insolvency risk in relation to portfolio theory. Similarly, Maudos and Solís (2009) also argues that noninterest income has negative relationship with insolvency in diversified banks.

6.10 Comparative Evaluation of Results between Conventional and Islamic Banks of Pakistan

The subsections 6.9.1, 6.9.2 and 6.9.3 provide the comparison of multiple regression results between conventional and Islamic banks of Pakistan. Moreover, the subsections 6.9.4, 6.9.5 and 6.9.6 provide the comparison of results of hierarchical multiple regressions between conventional and Islamic banks in Pakistan.

6.10.1 Asset Quality and Insolvency Risk in Islamic Banks of Pakistan

Table 6.13 presents the results of the relationship between asset quality and insolvency risk in conventional and Islamic banks of Pakistan. The proxies of asset quality are NPL, PNPL while the proxy of insolvency risk is Z-SCORE. The results in Table 6.13 highlights that NPL has significant relationship with Z-SCORE in conventional banks but the proxy is showing an insignificant relationship in Islamic banks. However, the direction of the relationship of NPL with Z-SCORE in both conventional and Islamic banks is negative. This indicates that the effect of nonperforming loans on insolvency risk is positive in both conventional and Islamic banks. Furthermore, the effect is more severe in conventional banks. Table 6.13 also displays the results on the relationship between PNPL and Z-SCORE. The effect of PNPL in both conventional and Islamic banks is negative and the relationship is insignificant. This reveals that even the relationship of PNPL with Z-SCORE in conventional and Islamic is insignificant but effect on insolvency risk is positive. Table 6.14 provide the overall summary of results for both conventional and Islamic banks of Pakistan.

Table 6. 13

Summary of empirical results on determination of relationship NPL, PNPL and Z-SCORE in Conventional and Islamic banks of Pakistan

Variable	Conventional Bank (Z-SCORE) β	Islamic Banks (Z-SCORE) β
NPL	-0.231	-0.034
	(0.067)*	(0.913)
PNPL	-0.124	-0.141
	(0.280)	(0.606)

Note: NPL=nonperforming loans to gross loans, provision for nonperforming loans to gross loans, *p<.1, **p<0.05, ***p<0.01

Table 6. 14

Summary of results on determination of relationship between Asset Quality and Insolvency risk for Conventional and Islamic banks of Pakistan

Objective	Conventional Banks	Islamic Banks
OBJECTIVE 1. To determine the relationship between asset quality which is based on nonperforming loans/financing ratio and provision for non-performing loans/financing ratio with insolvency risk of conventional and Islamic banks of Pakistan.	NPL-> **Significant, Positive** PNPL-> Insignificant, Positive	NPL-> Insignificant, Positive PNPL->Insignificant, Positive

6.10.2 Income Structure and Insolvency Risk in Conventional and Islamic Banks of Pakistan

This subsection provides the results on the effect of income structure and insolvency risk in conventional and Islamic banks of Pakistan. Income structure is proxies by IATA, IITA and FBTA. Table 6.15 highlights that IATA has insignificant relationship with Z-SCORE in both conventional and Islamic bank but the direction of relationship is positive. This reveals that IATA can help to reduce insolvency risk in both Islamic and Conventional Banks of Pakistan. Furthermore, IITA has significant relationship with Z-SCORE in conventional banks while, it is showing an insignificant relationship in Islamic banks of Pakistan. The direction of effect of IITA with Z-SCORE in both conventional and Islamic banks is positive. This indicates that IITA helps to reduce insolvency risk more in conventional banks because the relationship is significant but it might reduce insolvency risk in Islamic banks as the relationship is insignificant.

In addition to IATA and IITA, FBTA has significant relationship with Z-SCORE in conventional bank but it is showing an insignificant relationship with Z-SCORE in Islamic banks. The beta coefficient (β) of FBTA in conventional is showing negative direction of effect, while, the direction of effect between FBTA and Z-SCORE in Islamic banks is positive. This phenomenon indicates that FBTA increase insolvency risk in conventional banks but it may reduce insolvency risk in Islamic banks of Pakistan. This fact is due to the significant and insignificant relationship between FBTA and Z-SCORE in conventional and Islamic banks

respectively. Moreover, Table 6.16 highlights the summary of results in correspondence to the objective derived in chapter one (1).

Table 6. 15
Summary of empirical results, empirical investigation of relationship IATA, IITA, FBTA and Z-SCORE in Conventional and Islamic Banks of Pakistan

Variable	Conventional Bank (Z-SCORE) β	Islamic Banks (Z-SCORE) β
IATA	0.131 (0.457)	0.252 (0.559)
IITA	0.132 (0.096)*	0.450 (0.238)
FBTA	-0.134 (0.005)***	0.265 (0.402)

Note: IATA=income from advances to total assets, IITA= income from investment to total asset, FBTA= Fee, commission and brokerage income to total assets,*p<.1, **p<0.05, ***p<0.01

Table 6. 16
Summary of empirical results, investigation of relationship between Income structure and insolvency risk

Objective	Conventional Banks	Islamic Banks
OBJECTIVE 2. To investigate the empirical relationship of income structure (income from advances, income from investment, fee and brokerage income) with insolvency risk of conventional and Islamic banks of Pakistan.	IATA-> Insignificant, Negative IITA-> **Significant, Negative** FBTA-> **Significant, Positive**	IATA->Insignificant Negative IITA->Insignificant, Negative FBTA>Insignificant, Negative

6.10.3 Macroeconomic factors and Insolvency risk in conventional and Islamic banks of Pakistan

The study has taken four macroeconomic factors which are GDP, inflation rate, interest rate and corruption perception index. In both conventional and Islamic banks, GDP has significant relationship with Z-SCORE. Moreover, the direction of effect of GDP in conventional is positive while in Islamic it is negative as displayed in Table 6.17. This indicates that increase in GDP reduces

insolvency risk in conventional banks but increases insolvency risk in Islamic banks. GDP is working as a source to increase insolvency risk. Moreover, inflation is significantly effecting Z-SCORE in conventional banks but insignificant in Islamic banks. The direction of effect in conventional is negative and it is positive in Islamic banks. This reveals that inflation increase insolvency risk in conventional banks but it might reduce insolvency risk in Islamic bank. Table 6.17 also highlights that INT has insignificant relationship with Z-SCORE both in conventional and Islamic banks. Although the relationship is insignificant but the direction of relationship is positive and negative respectively in conventional and Islamic banks of Pakistan. Furthermore, corruption is also playing significant role in conventional and Islamic banks of Pakistan. It can be seen in Table 6.17 that increase in corruption reduces the value of Z-SCORE in conventional banks whereas, increase in corruption increase the value of Z-SCORE in Islamic banks. In other words, increase in corruption increases insolvency risk in conventional banks but on contrary in Islamic bank, increase in corruption reduces insolvency risk. The fact can be seen in Table 6.17. As per the objective defined in chapter one (1), the overall summary of results of objective three (3) is highlighted in Table 6.18.

Table 6. 17
Summary of empirical results of GDP, INF, INT, CUR and Z-SCORE in Conventional and Islamic Banks of Pakistan

Variable	Conventional Bank (Z-SCORE) β	Islamic Banks (Z-SCORE) β
GDP	12.574 (0.006)***	-1.323 (0.080)*
INF	-5.125 (0.000)***	1.063 (0.135)
INT	2.879 (0.243)	-0.501 (0.568)
CUR	-6.168 (0.043)**	7.258 (0.009)***

Note: GDP= gross domestic product growth rate, INF= Inflation rate, INT= Interest Rate, CUR= Corruption perception index score, *p<.1, **p<0.05, ***p<0.01

Table 6. 18
Summary of results of Macroeconomic factors effect on Insolvency risk

Objective	Conventional Banks	Islamic Banks
OBJECTIVE 3.To identify which macroeconomic factor (GDP growth, inflation, interest rate, corruption) significantly influencing the insolvency risk of conventional and Islamic banks of Pakistan.	GDP-> **Significant, Negative** INF-> **Significant, Positive** INT->insignificant, Negative CUR-> **Significant, Positive**	GDP->**Significant, Positive** INF-> Insignificant, positive INT-> Insignificant, negative Cur->**Significant, Negative**

6.10.4 The Moderating Role of CAR on the Relationship between Asset Quality and Insolvency Risk in Conventional and Islamic Banks of Pakistan

The moderating role of CAR on the relationship between NPL and PNPL is different in conventional and Islamic banks. In conventional banks, the interaction term of CAR*NPL moderates the relationship between NPL and Z-SCORE. The relation is significant and the direction of relationship is positive. This indicates that in presence of CAR the relationship between NPL and Z-SCORE will reduce insolvency risk. On the other hand in Islamic banks, the interaction term CAR*NPL strengthens the relationship between NPL and Z-

SCORE but it is unable to reduce the positive impact of NPL on insolvency risk. In other words, increase in CAR in the relationship between NPL and Z-SCORE will increase insolvency risk. The summary of regression results are displayed in Table 6.19.

Furthermore, CAR also moderates the relationship between PNPL and Z-SCORE in conventional banks of Pakistan. The interaction term of CAR*PNPL has a positive significant relationship with Z-SCORE as displayed in Table 6.19. This defines that increase of CAR in the relationship between PNPL and Z-SCORE will reduce insolvency risk. Moreover, in Islamic banks, the interaction term of CAR*PNPL is showing a negative significant relationship with Z-SCORE. The negative direction of relationship between CAR*PNPL and Z-SCORE indicates that CAR increase insolvency risk in Islamic banks of Pakistan.

Table 6. 19
Summary of empirical results of moderating effect of CAR on relationship between NPL, PNPL and Z-SCORE in Conventional and Islamic Banks of Pakistan

Variables		Conventional Banks (Z-SCORE) β		Islamic Banks (Z-SCORE) β	
		Model 1 CAR*NPL	Model 2 CAR*PNPL	Model 1 CAR*NPL	Model 2 CAR*PNPL
Asset Quality	NPL	1.340	-0.381	1.303	-0.242
		(0.029)**	-0.008***	(0.029)**	-0.443
	PNPL	0.059	-0.867	0.102	2.480
		-0.745	(0.027)**	-0.745	(0.000)***
Capital Regulation	CAR	0.928	0.999	1.083	1.080
		(0.000)***	(0.000)***	(0.000)***	(0.000)***
Interaction Effects	NPL*CAR	0.296		-0.552	
		(0.090)*		(0.002)***	
	PNPL*CAR		0.250		-0.850
			(0.012)**		(0.000)***

Note: Asset Quality= NPL, PNPL; moderating variable=CAR; Interaction terms=NPL*CAR, PNPL*CAR, *p<.1, **p<0.05, ***p<0.01

Table 6.20 presents the summary of results of sub objective 4A which is about the moderating role of capital regulation on the relationship between asset quality and insolvency risk in conventional and Islamic banks of Pakistan.

Table 6. 20
Summary of results of moderating effect of CAR on relationship between asset quality and insolvency risk

Objective	Conventional Banks	Islamic Banks
OBJECTIVE 4A.To examine the moderating effect of capital regulations (capital adequacy ratio (CAR)) on the relationship between asset quality and insolvency risk of conventional and Islamic banks of Pakistan.	CAR*NPL-> **Moderated ->Significant, Negative** CAR*PNPL -> **Moderated ->Significant, Negative**	CAR*NPL-> **Partial Moderation ->Significant Positive** CAR*PNPL-> **Partial Moderation ->Significant, Positive**

6.10.5 The Moderating Role of CAR on the relationship between Income Structure and Insolvency Risk

Table 6.21 presents the interaction results of CAR*IATA, CAR*IITA and CAR*FBTA. It can be seen that CAR strengthens the relationship between IATA, IITA and FBTA only in Islamic banks of Pakistan. The interaction term of CAR*IATA is significant in Islamic banks but it is insignificant in conventional banks of Pakistan. The direction of relationship of the term CAR*IATA is negative in both conventional and Islamic banks of Pakistan. The phenomenon highlights that earning from advances in presence of CAR increase insolvency risk in Islamic bank. Whereas, the interaction term CAR*IATA may increase insolvency risk in conventional banks because the relationship is insignificant and negative.

Furthermore, the interaction term of CAR*IITA has a significant relationship with Z-SCORE in Islamic banks while, it is showing an insignificant relationship in conventional banks of Pakistan. The direction of relationship is negative in Islamic banks but it is positive in conventional banks of Pakistan. The results presented in Table 6.21 highlights that the income from investment (IITA) increase risk in Islamic banks, when CAR is high while, it could reduce insolvency risk in conventional banks of Pakistan.

Moreover, CAR strengthens the relationship between FBTA and Z-SCORE in Islamic banks but it does not moderate this relationship in conventional bank. The direction of relationship of the interaction term CAR*FBTA is positive in Islamic banks but it is negative in conventional banks of Pakistan. Therefore, the results displayed in Table 6.21 indicate that CAR*FBTA reduces insolvency risk in Islamic banks but it might increase insolvency risk in conventional banks.

Table 6. 21

Summary of empirical results of moderating effect of CAR on the relationship IATA, IITA, FBTA and Z-SCORE in Conventional and Islamic Banks of Pakistan

	Variables	Conventional Banks (Z-SCORE)			Islamic Banks (Z-SCORE)		
		Model3 CAR*IATA	Model 4 CAR*IITA	Model5 CAR*FBTA	Model 3 CAR*IATA	Model 4 CAR*IITA	Model 5 CAR*FBTA
Income Structure	IATA	0.102	-0.216	-0.221	2.066	-0.518	-0.587
		-0.921	-0.232	-0.213	(0.034)**	-0.287	-0.224
	IITA	0.154	-0.255	0.147	0.146	3.597	0.198
		(0.007)***	-0.394	(0.004)***	-0.594	(0.009)***	-0.478
	FBTA	0.085	0.087	0.470	0.515	0.580	-1.456
		(0.025)**	(0.016)**	-0.575	-0.124	(0.097)*	-0.105
Capital Regulation		0.383	1.151	-0.057	1.334	1.413	1.415
		-0.651	-0.044	-0.971	(0.000)***	(0.000)***	(0.000)***
Interaction Effects	IATA*CAR	-0.093			-0.875		
		-0.724			(0.003)***		
	IITA*CAR		0.117			-1.24	
			0.196			(0.016)**	
	FBTA*CAR			-0.113			0.697
				0.644			(0.009)***

Note: Income Structure= IATA, IITA, FBTA; moderating variable=CAR; Interaction terms=IATA*CAR, IITA*CAR, FBTA*CAR *p<.1, **p<0.05, ***p<0.01

The summary of results of sub objective 4B are presented in Table 6.22. The summary of results defines the moderating role of capital regulation on the relationship between income structure variables and insolvency risk in conventional and Islamic banks of Pakistan

Table 6. 22
Summary of results of moderating effect of CAR on the relationship between income structure and insolvency risk

Objective	Conventional Banks	Islamic Banks
OBJECTIVE 4B.To examine the moderating effect of capital regulations (capital adequacy ratio (CAR)) on the relationship between income structure and insolvency risk of conventional and Islamic banks of Pakistan.	CAR*IATA -> No Moderation ->Insignificant, Positive CAR*IITA -> No Moderation -> Insignificant Negative CAR*FBTA -> No Moderation ->Insignificant, Positive	CAR*IATA -> **Moderated ->Significant, Positive** CAR*IITA-> **Moderated -> Significant, Positive** CAR*FBTA-> **Partial Moderation ->Significant, Negative**

6.10.6 The Moderating Role of CAR on the Relationship between Macroeconomic Factors and Insolvency Risk

Table 6.18 presents the results of the influence of CAR on the relationship between GDP, INF, INT, CUR and Z-SCORE. As it can be seen in Table 6.23, the interaction term of CAR*GDP is insignificant and the direction of relationship is positive in both conventional and Islamic banks of Pakistan. This indicates that it could reduce insolvency risk in both types of banks in Pakistan. Moreover, the direction of relationship of the interaction term CAR*INF is positive in both conventional and Islamic banks of Pakistan but the term is showing significant relationship with Z-SCORE only in conventional banks of Pakistan. This indicates that CAR moderates the relationship between INF and Z-SCORE and reduces

insolvency risk in conventional banks but it does not moderate the relationship in Islamic banks of Pakistan.

Table 6.23 also presents the results of the interaction terms CAR*INT and CAR*CUR for both conventional and Islamic banks of Pakistan. The interaction term CAR*INT is insignificant and positive in both types of banking system in Pakistan. The positive direction of effect of the interaction term CAR*INT highlights that the term might reduce insolvency risk subject to a significant relationship in the conventional and Islamic banks. On the other hand, the interaction term of CAR*CUR is also positive and insignificant in conventional and Islamic banks of Pakistan. The results presented in Table 6.23 indicate that the role of CAR on the relationship between CUR and Z-SCORE is similar in both conventional and Islamic banks of Pakistan. In addition, as per objective, the summary of results on the moderating role of capital regulation on the relationship between macroeconomic factors and insolvency risk are presented in Table 6.24.

Table 6. 23

Summary of moderating effect of CAR on the relationship between GDP, INF, INT, CUR and Z-SCORE in Conventional and Islamic Banks of Pakistan

Variables		Conventional Banks (Z-SCORE)				Islamic Banks (Z-SCORE)			
		Model 3 CAR*GDP	Model 4 CAR*INF	Model 5 CAR*INT	Model 6 CAR*CUR	Model 3 CAR*GDP	Model 4 CAR*INF	Model 5 CAR*INT	Model 6 CAR*CUR
Macroeconomic variable	GDP	-2.699	14.847	14.558	14.741	-1.460	-0.445	-0.397	-0.307
		-0.951	(0.000)***	(0.000)***	(0.000)***	-0.431	-0.473	-0.525	-0.629
	INF	-4.783	-19.717	-4.704	-4.802	0.084	-3.113	0.129	0.036
		(0.000)***	(0.002)***	(0.000)***	(0.000)***	-0.905	-0.169	-0.850	-0.960
	INT	2.387	2.336	-11.903	2.430	-0.647	-0.095	-3.434	-0.807
		-0.277	-0.274	-0.326	-0.277	-0.504	-0.925	-0.141	-0.400
	CUR	-5.770	-5.233	-5.472	-8.616	1.869	2.854	3.003	-0.761
		(0.035)**	-0.045	(0.051)*	-0.638	-0.623	-0.336	-0.398	-0.718
Capital Regulation	CAR	0.369	-0.153	-0.041	0.305	0.970	1.770	1.963	0.423
		-0.403	-0.688	-0.915	-0.847	-0.618	-0.255	-0.346	-0.831
Interaction Effects	GDP*CAR	5.315				0.378			
		(0.688)				(0.489)			
	INF*CAR		4.586				1.135		
			(0.026)**				(0.161)		
	INT*CAR			4.282				1.196	
				(0.188)				(0.260)	
	CUR*CAR				0.887				0.571
					(0.884)				(-\0.693)

Note: Macroeconomic factors= GDP, INF, INT, CUR; moderating variable=CAR; Interaction terms=GDP*CAR, INF*CAR, INT*CAR,CUR*CAR. *p<.1, **p<0.05, ***p<0.01

Table 6. 24
Summary of moderating implication of CAR on the relationship between macroeconomic factors (GDP, INF, INT, CUR) and insolvency risk (Z-SCORE)

Objective	Conventional Banks	Islamic Banks
OBJECTIVE 4C. To examine the moderating effect of capital regulations (capital adequacy ratio (CAR)) on the relationship between macroeconomic factors and insolvency risk of conventional and Islamic banks of Pakistan.	CAR*GDP-> No Moderation ->Insignificant, Negative CAR*INF-> **Moderated ->Significant, Negative** CAR*INT-> No Moderation >Insignificant, Negative CAR*CUR-> No Moderation -> Insignificant, Negative	CAR*GDP-> No Moderation ->Insignificant, Negative CAR*INF-> No Moderation ->Insignificant, Negative CAR*INT-> No Moderation ->Insignificant, Negative CAR*CUR-> No Moderation ->Insignificant, Negative

6.11 Summary of the Chapter

The chapter provides regression assumptions of classic linear regression model (CLRM) in order to achieve best linear unbiased estimation (BLUE) for Islamic banks of Pakistan. The results of regression assumption highlights that the data of Islamic banks fulfill the regression assumptions of multicollinearity, homoscedasticity and no autocorrelation during the study period 2007 to 2015. Therefore, to estimate multiple regressions for the dataset Common Effects Model is performed to obtained results. The results of multiple regression highlight that only GDP and CUR shows significant relationship with Z-SCORE, while NPL, PNPL, IATA, IITA, FBTA, INF and INT are insignificant to Z-SCORE. The direction of relationship of GDP is negative whereas, the direction of CUR is positive. Therefore, the hypothesis of GDP and CUR are accepted. Moreover, the chapter also provides hierarchical multiple regression results. The results provide empirical evidence that CAR does not moderate the relationship between GDP, INF, INT, CUR and Z-SCORE. Moreover, the results further indicate that CAR strengthens the relationship between NPL, PNPL and Z-SCORE as the

direction of relationship remains negative. This indicates that in case of Islamic banks of Pakistan CAR increase insolvency risk. Furthermore, CAR shows mix moderating results on the relationship between IATA, IITA, FBTA and Z-SCORE. CAR strengthen the relationship between IATA, IITA and Z-SCORE and the direction of relationship of interaction term CAR*IATA and CAR*IITA remains negative. This indicates that higher requirement of CAR increase risk in Islamic banks of Pakistan. On the other hand, moderates the relationship between FBTA and Z-SCORE. The results of interaction term CAR*FBTA highlights that increase in the FBTA in presence of CAR will increase the value of Z-SCORE and hence reduce insolvency risk. Thus, on the basis of results of the hypotheses of NPL, PNPL, IATA, IITA and FBTA are accepted. Lastly, the chapter highlights that the results of multiple and hierarchical multiple regression result of conventional and Islamic banks of Pakistan shows mix results in term of insolvency risk.

CHAPTER 7

CONCLUSION AND RECOMMENDATION

7.1 Conclusion

Insolvency risk, which is measured by the Z-SCORE value, denotes the state of stability of banks' performance. Managing insolvency risk is an on-going quest for banks' management in order to ensure their banks remain stable that is to be far from being insolvent. However, the current rapid volatility in the economic factors and the presence of corruption exert significant influence on insolvency risk, albeit the financial stability of banks particularly in developing economies such as Pakistan. Hence, this study examines the insolvency risk of both Conventional and Islamic banks in Pakistan in relation to the influence of bank specific factors, economic factors and corruption. This chapter presents recapitulation of major findings of this study, research implications and recommendation for further study, based on the objectives of the study.

7.2 Recapitulation of Findings

To recapitulate, the major findings are presented according to the objectives of the study.

Objective 1: To determine the relationship between asset quality which is based on non- performing loans/financing ratio and provision for non-performing

loans/financing ratio on insolvency risk of conventional and Islamic banks of Pakistan.

For conventional banks, the regression results of NPL and PNP are both negative but differ in terms of significance level. NPL is negatively and significantly related with Z-SCORE; which suggests that an increase in NPL will decrease Z-SCORE due to the volatility and reduction of income resulting from the increase in NPL. A lower Z-SCORE indicates an increase insolvency risk. On the other hand, PNPL, exerted the same negative influence but insignificant with Z-SCORE. This is probably due to an inefficient management in determining loan loss provisioning or biased valuation of the loan default rate (Liu, Ryan, & Wahlen, 1997; Kanagaretnam, Lobo, & YANG, 2004; Syed, 2007; Inayat Hussain & Ali, 2011; Zaman, 2015).

For Islamic banks of Pakistan, both NPL and PNPL have insignificant and negative relationships with Z-SCORE. The reason could be due to the use of PLS financing used by Islamic banks. PLS gives Islamic banks an extra cushion of bearing risks since profit and loss is being shared between the counterparties involved. In addition, stronger compliance to Islamic teachings by the Muslim population in terms of fulfilling their debt or financing obligations could be a factor for these insignificant relationships of NPL and PNPL with Z-SCORE. This result is similar to those reported by Hilary and Hui (2009), Boulila Taktak, Ben Slama Zouari, and Boudriga (2010), Hasan and Dridi (2010) and Abedifar, Molyneux, and Tarazi (2013). The finding for both conventional and Islamic banks shows some mixed results which are presented in Table 6.13 of Chapter 6.

Objective 2: To investigate the empirical relationship of income structure (income from advances/ financing, income from investment, fee, commission and brokerage income) on insolvency risk of conventional and Islamic banks of Pakistan

The regression results of income structure indicate some mixed results for conventional banks, while for Islamic banks of Pakistan, the results are showing that income structure is insignificantly related with insolvency risk of the banks. In conventional banks, IATA has insignificant while, IITA and FBTA have significant relationships with Z-SCORE respectively. IITA shows positive and significant relationship with Z-SCORE which indicates that an increase in IITA will increase the value of Z-SCORE. The reason could be that IITA may produce less volatility in the interest income because of efficient loan and investment portfolio management, (lower standard deviation of ROA) and hence increase the value of Z-SCORE. This supports the findings of Klein and Saidenberg (1998), Smith, Staikouras, and Wood (2003) and Meslier, Tacneng, and Tarazi (2014). In the case of FBTA, the significant negative relationship with Z-SCORE indicates that an increase in FBTA will decrease the value of Z-SCORE, hence increase insolvency risk. The plausible reason for this result could be due to fluctuations in income generated from fee based activities and additional costs associated with FBTA (Stiroh, 2004a, 2004b; Lepetit *et al.*, 2008a; Apergis, 2014). The income fluctuation and cost increase causes higher standard deviation in ROA and thus increase insolvency risk.

In the case of Islamic banks of Pakistan, the findings show that IATA, IITA and FBTA has insignificant relationship with Z-SCORE. The reason could be that IATA

involves PLS in the relationship between customers and the banks. This may stream line the source of income and reduce standard deviation of ROA resulting in an increase in the value of Z-SCORE, which is an indication of a stable bank (Čihák & Hesse, 2008; Abedifar, Molyneux, & Tarazi, 2013; Beck, Demirgüç-Kunt, & Merrouche, 2013). In addition, IITA does not produce volatility of income due to relatively smaller size of investment portfolio; the reason could be that the concentration on a smaller portfolio can master the managers in the field. This actually helps them to reduce volatility in income. (Beck, Demirgüç-Kunt, & Merrouche, 2013). The insignificant relationship between IITA and Z-SCORE is contrary to the results of (Beck, Demirgüç-Kunt, & Merrouche, 2013). Moreover, FBTA is insignificant but positively related to the Z-SCORE. The insignificant result could be because the fees, commissions and brokerage is pre-agreed between Islamic bank and a customer at the time of initiation of an Islamic contract (Obaidullah, 2005; Čihák & Hesse, 2008). Moreover, the findings of current study are on contrary to the finding of previous researchers such as (Čihák & Hesse, 2008; Beck, Demirgüç-Kunt, & Merrouche, 2013) The summary of results for both conventional and Islamic banks is presented in Table 6.14.

Objective 3: To identify which macroeconomic factors (GDP growth, inflation, interest rate, corruption) significantly influencing the insolvency risk of conventional and Islamic banks of Pakistan.

The results in Table 6.14 provide evidence that in case of the conventional banks, GDP, INF and CUR are significantly related to Z-SCORE, while INT has no significant relationship with Z-SCORE. GDP has a significant positive impact on Z-SCORE, whereas, INF and CUR are negatively associated to Z-SCORE. The positive

effect of GDP could be due to the reason that GDP growth contributes to income growth and this improves debt servicing capacity of borrowers (Nkusu, 2011). Consequently, the lending banks have lower NPL, higher quality assets and higher interest income as the debt service capacity of the borrowers improves. The improved bank performance allows the banks to have lower insolvency risk in good economic conditions. In contrast, INF has a negative significant relationship with Z-SCORE. The reason could be that higher inflation reduces the value of currency and borrowers face difficulty to pay the borrowed amount (Gospodinov & Ng, 2013; Mallick & Sousa, 2013). This results in high NPL for banks, resulting in high standard deviation in ROA, causing lower Z-SCORE indicating higher insolvency risk.

This study also shows that corruption (CUR) has a negative result with Z-SCORE. The result highlights that an increase in CUR will reduce the value of Z-SCORE or increase insolvency risk for banks. An explanation for this inverse relationship could be that corruption could increase information asymmetry between a lender and a borrower, which may contribute to adverse selection problems for banks in their credit assessments (Beck, Demirgüç-Kunt, & Levine, 2006; Barth *et al.*, 2009). Hence, problematic loans would have a negative effect on banks' income resulting in lower Z-SCORE or high insolvency risk. Moreover, the insignificant but positive relationship between INT and Z-SCORE indicates that high interest rate raises loan pricing, resulting in higher interest income and profitability of banks in a good economy (Hellwig, 1994; Uhde & Heimeshoff, 2009).

Summarizing the results of conventional banks, GDP has positive relationship but INF and CUR are in negative relationship with Z-SCORE. The positive relation of

GDP with Z-SCORE reduces insolvency risk, while the negative relationships of INF and CUR reduces value of Z-SCORE and increases insolvency risk.

For Islamic banks of Pakistan, the results in Table 6.14 shows that GDP and CUR are significantly related with Z-SCORE, while INF and INT are showing insignificant relationship. GDP has negative relationship, whereas CUR has positive relationship with Z-SCORE. The inverse relationship between GDP and Z-SCORE is in contrast to that of conventional banks. The possible explanation for this finding could be that Islamic banks' performance is not much influenced by economic factors since Islamic banking products are not interest but equity based and backed by real assets (Hasan & Dridi, 2010). Hence, Islamic banks are more stable during bad economy. On the other hand, Islamic banks in Pakistan are in infancy stage and do not have many Shariah compliant investment products (Obaidullah, 2005). With better liquidity and income during good economy, customers have better alternatives and better returns to invest in other investment products than Islamic banking products. The smaller business volume experienced by Pakistan Islamic banks consequently exposes them to lower Z-SCORE and higher insolvency risk.

Moreover, CUR has a positive and significant relationship with Z-SCORE of Islamic banks in Pakistan during the study period 2007 to 2015. This unexpected result presents a fresh finding for Islamic banking studies whereby corruption is shown to reduce insolvency risk of Islamic banks. The possible explanation for the result could be that there was less effective regulatory protection for Islamic banks of Pakistan during the study period (DawnReport, 2015; Hassan, 2016). This void could allow for

corruption practices to take place in Pakistan Islamic banks whilst they focused on achieving high growth target.

Furthermore, Both INF and INT were insignificant to Z-SCORE of Islamic banks in Pakistan. On another note, these two factors have opposite effect on Islamic banks compared to conventional banks. While inflation (INF) is highly significant and has a negative effect on the Z-SCORE of conventional banks, but it is insignificant and positive to Z-SCORE of Islamic banks. Such different results highlight the difference in risk structure between conventional and Islamic banks. Further, the conventional banks are shown to be highly vulnerable to insolvency risk during high inflationary periods whereas Islamic banks were more stable.

Objective 4: To examine the moderating effect of capital regulations (capital adequacy ratio (CAR)) between asset quality, income structure, and macroeconomic factors and insolvency risk of conventional and Islamic banks of Pakistan.

In terms of asset quality, CAR has moderated/ strengthened the relationship between NPL, PNPL and Z-SCORE in both conventional and Islamic banks of Pakistan. The interaction of CAR*NPL in conventional banks has a significant relationship with Z-SCORE and the direction is positive. The effect of CAR has changed the direction (from negative to positive). This indicated that although there is an increase in NPL, adequate capital ratio in a bank could absorb the credit risk, market risk and operational risk, increase the value of Z-SCORE and decreases the insolvency

risk. The result thus provides empirical evidence that the imposition of higher minimum capital requirement (net of losses) and no relaxation in maintaining CAR at 8% minimum required by the State bank of Pakistan has been effective.

The result of the interaction of CAR*PNPL provide empirical evidence that the regulations by the State Bank of Pakistan has been effective. PNPL is provision for nonperforming loan. Higher value of provision indicates higher rate of NPL. Prior to the interaction of CAR, PNPL is negative but is not significant to Z-SCORE. However, with CAR*PNPL moderation, PNPL recorded a changing effect from negative to positive related to the Z-SCORE, meaning that CAR has strengthened the stability of banks (lower insolvency risk). The result could be explained by the important role the tier 2 capital of CAR plays in ensuring capital adequacy through inclusion of revaluation reserves, hybrid instruments and general provisions (Basel II Accord) (Gottschalt & Griffith-Jones, 2006). This result also suggests that CAR interaction could reduce earnings volatility in conventional banks of Pakistan with a stronger capital base.

In case of Islamic banks of Pakistan, CAR strengthens the relationship of NPL to Z-SCORE. The direction of relationship remains negative. Before introduction of CAR, the relationship between NPL and Z-SCORE is insignificant and negative. This indicates that CAR increase insolvency risk in Islamic banks of Pakistan. The plausible reason could be the directive of State bank of Pakistan to maintain minimum CAR at 10% (TBP, 2014; Zaman, 2015). Moreover, CAR also strengthens the relationship between PNPL and Z-SCORE but direction of relationship remains negative. Furthermore, when CAR is low in the relationship, it is insignificant and negative. This

phenomenon highlights that increase of CAR in the relationship between PNPL and Z-SCORE, increases insolvency risk. The reason could be that higher requirement of minimum capital requirement (net of losses) by State bank of Pakistan (Inayat Hussain & Ali, 2011) as PNPL is part of tier-2 capital of CAR.

In terms of income structure (IATA, IITA, FBTA) in conventional banks, the result shows that CAR does not moderate the relationships between IATA, IITA, FBTA and Z-SCORE. The direction of the relationship between IATA, IITA, FBTA and Z-SCORE is positive, which remains similar in both low and high CAR. The result suggests that conventional banks have greater exposure to higher insolvency risk as the banks' income structure is largely based on interest rates. The interest rate movements in Pakistan had exhibited sharp fluctuations during the study period 2007 and 2015 causing high standard deviations in ROA. This explains the lower Z-SCORE for the conventional banks in the study sample.

In contrast to Pakistan conventional banks, the Islamic banks' results show that CAR strengthened the relationship between all the three variables of income structure (IATA, IITA, FBTA) with the Z-SCORE. The interaction of CAR identifies the direction of relationship between IATA, IITA, FBTA and Z-SCORE. The direction of relationship of IATA*CAR and IITA*CAR is negative with Z-SCORE. This result provides empirical evidence that income structure for Islamic banks is less volatile since IITA and IATA were derived from the PLS and interest free based investment and financing contracts. However, the negative direction of the CAR moderation effects indicate that CAR is able to moderate the tendency of Islamic banks to increase their risk taking in order to achieve the expected higher return (income) from their

investments and financings. Another possible explanation for the negative relationship is the fact that Islamic banks in Pakistan do not have many Islamic products for customers to choose against and compared with conventional banking. The limited options hinder their income generation ability, which could lower their return on Asset, resulting in lower Z-SCORE and higher insolvency risk. Moreover, the results of the study also reported that there is a significant positive moderating effect of CAR and FBTA to Z-SCORE in Islamic banks. The relationship indicates that increase in FBTA will increase the value of Z-SCORE and hence reduce insolvency risk. The reason could be that the source of FBTA income does not require any capital cushion and hence an Islamic bank can expand its services to fee income generation in order to reduce insolvency risk.

For the moderation effects on macroeconomic and external variables, the results highlight that CAR only moderates the relationship with INF, but it does not moderate the relationships between GDP, INT and CUR with Z-SCORE in conventional banks of Pakistan. The reason CAR does not moderate GDP could be that higher GDP growth improves income and loan servicing capacity of customers. Consequently, the repayments will improve the retained profit of the banks, which lead to an increase in Tier 1 capital of CAR. Conversely, CAR moderates the effect of INF positively. This could be explained that higher inflation increases the valuation of asset; hence this effect may result in higher value of Z-SCORE (as a result of higher revaluation reserves of the assets which increases CAR), alternatively lower insolvency risk. The results of this study also show that CAR does not moderate the relationship between INT and Z-SCORE. This result supports Hellwig (1994) and Issing (2003). They argued that it is in practice that between inflation and interest, only one is kept in check by the banking

regulatory authorities. For CUR, CAR does not moderate the relationship between CUR and Z-SCORE. The possible reason could be that corruption (CUR) is an external factor and CAR does not hold any cushion against corruption.

In case of Islamic banks, CAR does not moderate the relationship between GDP, INF, INT, CUR and Z-SCORE. The possible reason CAR does not moderate the relationship between GDP and Z-SCORE could be the sharp fluctuation of GDP during the study period 2007 to 2015 (see Table 1.6, chapter 1). Moreover, the reason that CAR does not strengthen the relationship between INF and Z-SCORE in Islamic banks because in higher inflation Islamic banks operate more on asset and equity based. In this situation, the banks are required to own the assets first before financing which is as per direction of *Shariah* law (Kpodar & Imam, 2010). Hence, any changes in the inflation rate during the financing period may not directly affect the pricing of the Islamic contracts. In case of INT, that CAR does not moderate the impact of INT on Z-SCORE. This can be explained by the prohibition of *Riba* in compliance to Sharia principle. Furthermore, similar to the conventional banks, CAR does not moderate the relationship between CUR and Islamic banks' insolvency risk. The plausible reason could be that CAR does not hold any cushion against depletion of money due to corruption.

Table 7. 1

Summary of Findings of the study

Objective	Conventional	Islamic
OBJECTIVE 1. To determine the relationship between asset quality which is based on nonperforming loans/financing ratio and provision for non-performing loans/financing ratio with insolvency risk of conventional and Islamic banks of Pakistan.	NPL -> **Significant , Positive** PNPL-> **Insignificant, Positive**	NPL-> Insignificant, Positive PNPL->Insignificant, Positive
OBJECTIVE 2. To investigate the empirical relationship of income structure (income from advances, income from investment, fee and brokerage income) with insolvency risk of conventional and Islamic banks of Pakistan.	IATA-> Insignificant, Negative IITA-> **Significant, Negative** FBTA-> **Significant, Positive**	IATA->insignificant Negative IITA->insignificant, Negative FBTA>insignificant, Negative
OBJECTIVE 3. To identify which macroeconomic factor (GDP growth, inflation, interest rate, corruption) significantly influencing the insolvency risk of conventional and Islamic banks of Pakistan.	GDP-> **Significant, Negative** INF-> **Significant, Positive** INT->Insignificant, Negative CUR-> **Significant, Positive**	GDP->**Significant, Positive** INF-> Insignificant, positive INT-> Insignificant, negative Cur->**Significant, Negative**
OBJECTIVE 4A.To examine the moderating effect of capital regulations (capital adequacy ratio (CAR)) on the relationship between asset quality and insolvency risk of conventional and Islamic banks of Pakistan.	CAR*NPL-> **Moderated -** **>Significant, Negative** CAR*PNPL **-> Moderated -** **>Significant, Negative**	CAR*NPL-> **Partial Moderation** **->Significant Positive** CAR*PNPL**-> Partial Moderation** **->Significant, Positive**
OBJECTIVE 4B.To examine the moderating effect of capital regulations (capital adequacy ratio (CAR)) on the relationship between income structure and insolvency risk of conventional and Islamic banks of Pakistan.	CAR*IATA -> No Moderation - >Insignificant, Positive CAR*IITA -> No Moderation ->Insignificant Negative CAR*FBTA -> No Moderation - >Insignificant, Positive	CAR*IATA -> **Moderated -** **>Significant, Positive** CAR*IITA**-> Moderated** **-> Significant, Positive** CAR*FBTA**-> Partial Moderation** **->Significant, Negative**
OBJECTIVE 4C. To examine the moderating effect of capital regulations (capital adequacy ratio (CAR)) on the relationship between macroeconomic factors and insolvency risk of conventional and Islamic banks of Pakistan.	CAR*GDP-> No Moderation - >Insignificant, Negative CAR*INF**-> Moderated** **->Significant, Negative** CAR*INT-> No Moderation - >Insignificant, Negative CAR*CUR-> No Moderation ->Insignificant, Negative	CAR*GDP-> No Moderation ->Insignificant, Negative CAR*INF-> No Moderation ->Insignificant, Negative CAR*INT-> No Moderation ->Insignificant, Negative CAR*CUR-> No Moderation ->Insignificant, Negative

7.3 Contribution of the study

This study contributes to the body of knowledge in the following ways:

7.3.1 New Findings

This study extends the contributions of previous studies on insolvency risk which is currently scant. The extension of knowledge is within the scope of conventional and Islamic banks of Pakistan covering a more recent study period of 2007 to 2015. Similar to the previous studies that argued that NPL has a positive and significant relationship with insolvency risk (i.e.Berger, Klapper, and Turk-Ariss (2009),Barth James, Caprio Gerard, and Ross (2004),(Boyd and De Nicolo (2005); Zhang *et al.*, 2016)), this study finds that NPL and PNPL are positively related to insolvency risk in conventional and Islamic banks of Pakistan. NPL however, is significant to insolvency risk of conventional banks at 10 percent significant level while, PNPL is showing an insignificant relationship to insolvency risk. Moreover, NPL and PNPL are not significantly related to insolvency risk of Islamic banks in Pakistan. These contrasting results henceforth, distinguish the effects of NPL and PNPL on the Pakistan banking system from other global banking systems.

The second new contribution is on the effect of different types of income on insolvency risk. For the first time in Pakistan banking literature, the total income structure is analyzed in detail in terms of Income from advances, income from investments and income from fees, commissions and brokerage. This detailed

analysis enables bank management to differentiate the individual effect of banks' income structure on insolvency risk.

The mixed result between conventional and Islamic banks is another new contribution. For conventional banks, only income from investment and income from fees, commissions and brokerage is significant and positively related to insolvency risk. This result is in contrast to the result obtained by Apergis (2014). For Islamic banks, fee and brokerage income is negatively related to insolvency risk in presence of CAR. This finding for Islamic banks is a fresh finding as fee, commission and brokerage income reduce insolvency risk in the presence of CAR. Furthermore, the finding is in support to the studies of Fiordelisi and Marqués-Ibañez (2013) and DeYoung and Torna (2013) in essence that fee, commission and brokerage income reduces insolvency risk.

In addition, the study finds an important aspect of macroeconomic variables relationship to insolvency risk for banks in Pakistan. In the case of GDP, there is a significant relationship with insolvency risk for both conventional and Islamic banks. But, in conventional banks, GDP is significant at 1% level and negatively related to insolvency risk, supporting to the previous studies (Iannotta, Nocera, & Sironi, 2007; Agoraki, Delis, & Pasiouras, 2011). Meanwhile, in Islamic banks, GDP is significant at 10% level and positively related to insolvency risk. This defines that increase in GDP can increase insolvency risk, which is contrary to the finding of previous literature (Iannotta, Nocera, & Sironi, 2007; Agoraki, Delis, & Pasiouras, 2011).

Similarly, inflation also shows mixed results on insolvency risk which conventional bank has a positive impact but Islamic banks' results show an insignificant negative relationship with insolvency risk. Similar to the inflation, interest rate has contrasting effect on insolvency risk, for both conventional and Islamic banks. Interest rate is negative to insolvency risk in conventional banks while, it is positive to insolvency risk in Islamic banks. Inspite of the contrasting direction of relationship in conventional and Islamic banks, the relationship of interest with Z-SCORE is insignificant.

Another new contribution provided by this study is on the effect of Corruption on banks' insolvency risk in Pakistan. Interestingly, the finding shows that increase in corruption can reduce insolvency risk in Islamic banks, whereas, it increases insolvency risk in conventional banks.

7.3.2 New Research Setting

Unlike past studies such as (Lepetit *et al.* (2008a); Agoraki, Delis, and Pasiouras (2011); Skully and Perera (2012); Apergis (2014)), those used pooled data for U.S banking system, European, Asian countries. This study has taken one South Asian country which is Pakistan. Therefore, new research setting was developed by extending the research framework to introduce the moderating effect of capital regulation (CAR) in the conceptual framework for both conventional and Islamic banks in Pakistan. CAR was selected as a moderator in light of a high emphasis of CAR in risk management in banking sector.

The result from hierarchical moderated multiple regression provides a new empirical evidence of the moderating effect of CAR on the relationship between asset quality, income structure and macroeconomic factors with insolvency risk. Hence, this study is different from the previous studies (Leventis, Dimitropoulos, & Anandarajan, 2011; Azureen, 2012; Zhang *et al.*, 2016), they tested CAR as moderator with different dependent and independent variables.

7.3.3 Theoretical Contribution

The theoretical contribution of study is drawn from reviews of the previous literature and empirical findings. Most of the previous studies have addressed the problem of nonperforming loans, provision of nonperforming loans and bank stability using Agency Theory for banks based in U.S, Europe and other developed countries. These countries have different economic, environmental and cultural characteristics than developing countries. Thus, the study has extended the understanding of Agency Theory in a developing country, specifically on banking sector of Pakistan.

The study also extends the understanding of Agency Theory in relation to macroeconomic factors such as GDP, Inflation and Corruption. Furthermore, in accordance to the theory that asset quality is positively related to insolvency risk, the current study has empirically found that there is a positive relationship between asset quality and insolvency risk (Z-SCORE) unless capital regulation is applied as a moderator (in conventional banks). The result is stronger in Islamic banks of Pakistan where CAR strengthens (the direction of relationship remains negative)

the relationship of nonperforming loans, provisions for nonperforming loans and Z-SCORE. Thus, it further extends the understanding of Agency Theory and the importance of capital regulation in the banking sector.

This study also provides support to the application of Modern portfolio theory that a firm (in this case, Pakistan banks) can reduce volatility of earning by diversification. The variance of combined cash flows can be reduced by investing in multiple assets or using multiple sources of income such as income from advances, income from investment and income from fee, commission shown by this study. On contrary to Lepetit *et al.* (2008a) and Apergis (2014), the results of this study find some mix results of diversification. The result of this study further extends the understanding of Modern Portfolio Theory particularly in the context of conventional and Islamic banks of Pakistan. This study reveals that Diversification takes another form in Islamic banking. Banks diversify the counter party risk through the different modes of financing contracts that they offer to their customers predominantly in bai' c, ijarah and murabahah contracts.

In addition, the integration of Capital Regulation as a moderator provides insights in understanding Modern Portfolio Theory of maintaining sources of income of different classes of risk as evidenced from the results of IITA which produce a positive and FBTA has a negative influence on the insolvency risk in conventional banks of Pakistan. On contrary, CAR increases risk in Islamic banks income structure, which is also a fresh finding in understanding of Modern Portfolio Theory in context of Islamic banks of Pakistan.

7.4 Implications of the Study

The current study gives motivation to certain implications. There are two types of implications that can be proposed by using the results of this study. The implications are presented in the following sub section.

7.4.1 Policy Implication

The results of asset quality and insolvency risk in both conventional and Islamic banks of Pakistan might imply the effectiveness of the State Bank of Pakistan's policies in controlling and monitoring risks of the banking industry. Although the results of this study might also show that the State Bank of Pakistan is serious in protecting creditor's interest by employing strict regulation and supervision but high nonperforming loans in banking sector is still an issue for the stability of the banking system. According to the Prudential Regulation R-8 (Inayat Hussain *et al.*, 2011), banks or DFI can restructure a consumer's nonperforming loans after approval is given by the board of directors. Moreover, the restructuring of a commercial financed nonperforming loans can be done if the borrower has paid 10% of the outstanding amount which is prescribed in Prudential Regulation R-8 (Jameel Ahmed, 2009). In addition to this, a commercial nonperforming loan classified category can be changed if the consumer has paid 50% of the borrowed amount (Jameel Ahmed, 2009). This policy has been further relaxed subject to the payment if made 35% in Prudential Regulation R-8 in year 2015 (Zaman, 2015).

However, the results of this study further suggest that the State Bank of Pakistan shall consider the higher ratio of NPL as an indicator for detecting moral hazard problem of the bank and design a transparent policy to monitor banking operations closely. Moreover, the policy for nonperforming loans should remain tight and the State Bank of Pakistan and other policy makers should be urged to continue to be sensitive to the governance issues that might affect the stability of the banking institutions.

The effect of different types of income with insolvency risk could provide deep insight to the regulatory body about the risk associated with each type of income generating portfolio. The results for conventional and Islamic banks are different from each other. In conventional banks of Pakistan, the income from fee, commission and brokerage increase insolvency risk. According to the Prudential Regulation R-8 "Investments and Other Assets", there is no specific guide line for generation and management of this kind of income (Jameel Ahmed, 2009). Therefore, regulatory bodies may seek which certain income has direct effect on stability of banks. A policy could include that the diversification of income in banks should be proactive to maintain profitability but in essence, it is to enhance stability of banks through risk diversification. Moreover in Islamic banks, the aggregate investment is limited to 35% of total equity (Zaman, 2015). While the results of current study highlight that the structure of income could reduce insolvency risk, the State Bank of Pakistan may consider revising the policy to suit the nature of Islamic banks.

The study also examines the relationship of macroeconomic factors with insolvency risk. This provides evidence that the relationship exists between macroeconomic factors and insolvency risk in both conventional and Islamic banks of Pakistan. The effect of macroeconomic factors on insolvency has given different results in conventional and Islamic banks. In conventional banks, the effect of GDP on insolvency risk of bank is negative, while effect of inflation and corruption is positive. Whereas, in case of Islamic banks, GDP has a positive relationship with insolvency risk and corruption has a negative relationship. This gives an understanding to the regulatory authority of Pakistan to devise separate regulation for both conventional and Islamic banks of Pakistan because there are no certain guide lines provided in Prudential Regulations for Consumer and Commercial banking (Jameel Ahmed, 2009; Inayat Hussain & Ali, 2011; Zaman, 2015). Furthermore, the policy could be defined to limit the costs of economy on financial system distress to reduce likelihood of failure.

In Addition, according to Dr. Mohammad Umar Chapra, Senior Research Advisor at the Islamic Research and Training Institute (IRTI) of the Islamic Development Bank, the development of human being and allocation of resources should confirm the Islamic teaching without curbing human freedom and creating imbalances in national wealth. On the contrary to the former argument the results of this study are suggesting that economic system of Pakistan is negatively impacting the stability of Islamic banks which defines that the economic system of Pakistan may not be in accordance to Islamic teaching (Akhtyamova, Panasyuk, & Azitov, 2015) Therefore, the Islamic teaching in respect to the development of economy may be considered to build suitable policy.

Moreover, according to Quran al Karim, those who are in authority and spread corruption and mischiefs among people bestowing favors on some and oppressing other is strictly prohibited in Islam. The Prophet Mohammad (PBUH) added that the bribe giver, and their go between, provoke Allah's wrath and condemnation (Kamali, 2013). Whereas, results of current study is suggesting that increase in corruption increases the stability of banking system which is against the teaching of Islam. Hence, on the basis of results of current study and Islamic teaching on corruption provides and deep understanding to regulatory authorities to provide certain guidelines and rules govern Islamic banks.

Evidences on the influence of capital adequacy ratio on the relationship between asset quality, income structure and macroeconomic factors and insolvency risk in conventional and Islamic banks of Pakistan, indicate different results in compliance to CAR. In conventional banks of Pakistan, CAR moderates the relationship between NPL, PNPL and INF with Z-SCORE. This indicates that regulatory authority of Pakistan developed CAR to control the effects of NPL, PNPL and INF to secure creditor's interest. On the contrary, the application of CAR in Islamic banks is different. As indicated by the results, in Islamic banks the application of CAR increases insolvency risk. This might be due to the similar requirement of CAR by the State Bank of Pakistan (Malik, 2005, 2014; TBP, 2014; Zaman, 2014). Therefore, this study gives an understanding to the regulatory authority to separately devise appropriate capital regulation to keep Islamic banks solvent and stable.

7.4.2 Practical Implication

The results on the relationship between asset quality, income structure, macroeconomic factors and regulation shows the significant role of each variable to insolvency risk which cause banks to become insolvent or bankrupt. The results thus imply that the State Bank of Pakistan, as the central bank, could consider implement deposit insurance funds (DIF) through the establishment of Federal Deposit Insurance Corporation (FDIC) to protect the stability of banking system and depositors. By having DIF, a certain sum of deposits is set aside to pay back the money lost due to the failure of banks or any financial institution.

Another practical implication could be that banks should observe prudential regulations on capital management to protect from capital erosion due to credit risks or high non-performing loans. This could be done through compliance to higher level of risk management requirements through the adoption of Basle III, which have not yet been implemented in Pakistan banking system.

7.5 Limitation of the Study

The study has several limitations that should be noted. First, this study has used two samples of data i.e. conventional banks and Islamic banks, so the results of this study cannot be applied to other financial institutions of Pakistan such as development financial institutions or any other non-deposit taking institutions.

Second, the study has taken data from 2007 to 2015 based on reported and audited annual reports of the banks. The data of Islamic windows of conventional banks have not been taken since the commencement of operations of these Islamic widows is in different years. Hence, the results of this study are confined to the analysis of the financial years between 2007 and 2015, for both conventional and Islamic banks of Pakistan.

Third, the study has only considered the banking sector of Pakistan, thus the results are limited to the banking sector of Pakistan with regards to insolvency risk measured by Z-SCORE. Hence, the study does not represent banking sector of other developed, developing and under developing countries.

Fourth, the study is not exhaustive since its scope covered is limited to the impact of asset quality, income structure and macroeconomic factors on insolvency risk of the conventional and Islamic commercial banks. The banks' operations were governed by the Banking Act and guidelines issued by the central bank which is the State Bank of Pakistan during the period of study. The interpretation of the results was within the context of these laws and guidelines.

7.6 Suggestions of Future Research

With regards to the current study, there are several suggestions for future directions or future research as highlighted below:

First, insolvency risk is one of the key issues to ensure stability in the banking sector of Pakistan. It has been debated in various reports but not empirically examined. In addition to the findings of this study which used solely secondary data, future studies can use a mixed approach in which the empirical results can be further enhanced with information obtained from primary data and interviews with relevant authorities.

Second, this study is further limited to study the relationship of asset quality income structure with insolvency risk. Hence, it is suggested that further research should be conducted to identify key drivers of insolvency risk of banks in Pakistan. In addition, the area of research should not be limited to banking sector alone; it should be extended to other non-banking financial institution such as development financial institutions and insurance sector.

Third, this study has taken four macroeconomic factors, i.e. GDP growth, inflation rate, interest rate and corruption to examine the impact of these macroeconomic factors on insolvency. Future research should be extended to investigate the lead, lag relationships between macroeconomic factors and bank insolvency risk. Furthermore, other macroeconomic factors such as unemployment, poverty can be taken for further investigation.

Fourth, the financial institutions such as conventional, Islamic banks, development financial institutions are not working in isolation and they share common regulations implemented by State bank of Pakistan. So, contagion effect cannot be overlooked. Hence, it is suggested that contagion effect of one financial institution on other institution should be considered for future research.

Fifth, to get more comprehensive analysis of current research model of insolvency risk for banks, a comparison between other banking systems of South Asian region is essential. Thus, it is suggested that a cross country study should be conducted to compare the results of Pakistan banking sector with other banking sectors operating in the region.

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Appendix – I: List of Commercial banks of Pakistan

SR#	List of Banks In Pakistan		
	Public Sector Bank	Incorporation Date	
1	First Women Bank	1989	
2	NBP	1949	
3	Bank of Khyber	1991	
4	Bank of Punjab	1989	
	Private Commercial Banks		
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	
	Specialized Banks		
1	Punjab Provincial Cooperative Bank	1976	
2	SME Bank. Ltd.	2002	
3	Zarai Taraqiati Bank	1991	
	Total Banks	**23**	
	No of Observation Expected	**23 * 9 (2007-2015)**	**207**

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
	Total Banks	**5**
	No of Observations	**5*9 (2007-2015) = 45**

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**

Redundant Fixed Effects Tests

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**

Correlated Random Effects - Hausman Test

Pool: Conventional Banks
Test cross-section random effects

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

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

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

Breusch and Pagan Lagrangian multiplier test for random

Test: 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

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 earing 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 aversive. 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 aversive 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 relat1ionship 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 6.11that 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.