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Income Structure and Insolvency Risk: An Empirical Analysis of Banking Sector of Pakistan

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ABSTRACT

The aim of this paper is to investigate the relationship between income structure (income from advances, investment income, and fee income) of banks and insolvency risk in the banking sector of Pakistan. The study used the data set for the period of 2007 to 2015. Furthermore, the study used a Random Effect Model for data analysis after estimating multiple tests to determine the appropriate model for data analysis. In view of the results, the study shows mix results on the relationship between income structure and insolvency risk. The relationship between income from advances has an insignificant relationship with insolvency risk, while investment income and fee, commission and brokerage income are significantly related to insolvency. The results depict that a higher share of investment income decreases insolvency risk, while higher involvement of bank in generating fee income decreases the stability of bank and hence increases insolvency risk.

Keywords: Income structure, insolvency risk, advances, investment, fee income, random effect

INTRODUCTION

Since the nineteen seventies and in eighties financial regulation in western banking has been started, the banking system observed inclination in competition, concentration and restructuring of the system because of financial liberalization and regulation(Apergis 2014). So, the banks were to adopt a new environment by using a proactive approach and widening their range of products and offering new services to the clients. This strategy mainly influenced the change in non-interest income and its profit. Noninterest income is attached not only with the traditional line of services like checking, management of cash, letter of credit, but also new sources to generate income such as investment banking, venture capital, securitization. Moreover, with the decline in interest income and higher competition, banks started to charge higher fees on current and new services they offer (cash withdrawal, bank account management, and data processing, etc.). As a result, the sources of bank income have changed dramatically both in the banking sector of different economies. In nineteen-eighties, the proportion of noninterest income in U.S commercial banks was 19% of total income. Whereas, this share grew to 43% by the year 2001 (Stiroh 2004a). In Europe, the share of non-interest income increased to 41% from 26% between the years 1989 to 1998 (ECB, 2000).

The adoption of a new universal banking principal has allowed the bank to compete in a wider range of market segments (securitization, investment banking, trading). Whereas, many previous studies have questioned what is the impact of the new environment on bank risk. The issue is critical for the stability and soundness of the banking system and a great challenge for supervisory authorities (DeYoung & Torna, 2013).

The previous literature is mostly based on the US banking system, are either based on portfolio diversification effects on insolvency risk (Lepetit, Nys et al. (2008); DeYoung and Torna (2013); (Apergis (2014)) or on the benefits of portfolio for banks profitability (DeYoung and Roland (2001); DeYoung and Torna (2013)). There are very few studies that the combination of different state of income activities which are used for income diversification can reduce risk. Conversely, there are some research papers which defines the diversification impact on earnings volatility that increase risk profile for banks (DeYoung and Roland (2001); Stiroh (2004a); Stiroh and Rumble (2006)). As highlights by Stiroh and Rumble (2006) that there are three main reasons that can explain the increase in risk profile and volatility of income for banks, which are a new operational risk, market risk and legal risk. Furthermore, the author documented that the income from lending activities are more likely to be stable over the period because of the switching cost that a customer may face.

In the scenario of Pakistan, there were total 50 transactions of mergers and acquisitions cases executed between years 2000 and 2007 (Bhatti 2007), whereas the effect on the banks was that the total number of banks dropped from 41 to 23 between years 1997 and 2007(StateBank 2008). Later on by the year, 2006 consolidation of the banking sector of Pakistan was performed (Jaweria Haisum 2006). The banks in were given more liberalization and their operations were directed to streamline with the western banking system. This has given an incentive to banks to involve in the nontraditional line of business to meet the capital requirement imposed by the State Bank of Pakistan (Jaweria Haisum 2006). The aim of the liberalization of the banking sector was to increase banking sector stability but only in years of 2008 and 2009, there were 10 more transactions of mergers and acquisitions (Abbas,

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Hunjra et al. 2014). Specifically defining the stability of banks with income structure produces the example of KASB Bank which is merged due to involvement in nontraditional activities (Iqbal 2014). Thus, there is a need to find out the impact of these nontraditional income impacts on risk profile in the banking sector of Pakistan. Therefore, the current study uses the data of conventional banks of Pakistan to investigate the impact of income diversification on insolvency risk. Relying on the portfolio theory, the results of this study show that higher reliance on investment income generating activities is well associated with lower risk but on the contrary, fee, and commission income generating activities aggravate the risk of the bank. So, the purpose of this current paper is to asses empirically the impact of income structure on risk, to fill the gap in the literature by documenting empirical evidence on banking sector of Pakistan.

This paper contributes to the literature in three ways. First the paper, it fills the gap in the literature, which focuses on the effect of income structure diversification on insolvency risk in the banking sector of Pakistan as there is no previous study on this issue in the context of Pakistan. Second, the results of this paper are mixed in nature and inconsistent with previous studies. Third, this study contributes to further understand portfolio theory in the context of the conventional banking sector of Pakistan. The remaining sections of the paper are organized as follow: Section 2, review of the literature and empirical evidence from difference economies; Section 3, methodology; Section 4 empirical finding and discussion; section 5 discussion of results; Section 6 the concluding remakes.

REVIEW OF PREVIOUS LITERATURE

From a theoretical point of view, the decision of diversification of income sources has been good together for efficiency and risk management. The mutual expansion of an extensive array of financial products must raise the efficiency of bank and economy of scope (Klein and Saidenberg 1998). Thus in a general point of view, it has been understood that variation of income sources which are shifted from interest income towards noninterest income must be lessened to aggregate risk. The benefit of diversification should also enhance the profitability of the bank. So, the idea is that the activities of interest and noninterest income are thought to be uncorrelated or may be perfectly correlated, with those that generate interest income. So diversification should stabilize operating income and help to produce a more stable stream of profit (Chiorazzo, Milani et al. 2008).

The stream of literature highlighted the need for financial institutions to get involved in another kind of non-traditional activities as it has the potential of gains. Zhou (2014), explained the use of different asset mix portfolio as an explanation of banking institution tendency to involve in activities which are not based on the traditional line of the banking system. The author further explained that these activates can cause a manager to trade against the interest of the bank. According to Cornett, Ors et al. (2002) and Deng, Elyasiani et al. (2007), non-traditional activities on one aspect reduce the cost of debt. Whereas, Mester (2010) was in support to the previous argument and highlighted that due to involvement in nontraditional activities bank experience higher economy of scale, while the bank is forced to refrain from such activities which may cause unintended consequences.

Furthermore, DeJonghe (2010) highlighted that the banks which have intensive noninterest incomes tend to show higher tails of betas, their non-interest income is more sensitive than interest income to macroeconomic swings and market change. Consistent with the previous argument, fee-based income from retail banking is more pro-cyclical in nature (Clark, Dick et al. 2007). Elyasiani and Wang (2008) reported that banks and banks holding companies which produce a larger amount of income from fee-based are less transparent to the investor. While it is also highlighted by Demirgüç-Kunt and Huizinga (2010) that diversification in income at a certain level in noninterest income has gained but if the bank's strategies are more relying on generating noninterest income are risky.

The negative side of noninterest income has been viewed by many researchers. Among many Stiroh (2004b), Stiroh (2004a) and Stiroh and Rumble (2006) investigated the small U.S banks which diversify their income, either came across the gains of diversification of nontraditional activities or not. The results of the studies revealed that the impact of non-traditional activities has a negative impact on the performance of the bank. Whereas in the case of U.S financial holding companies' non-traditional income contributes substantially to deteriorating risk profile. Laeven and Levine (2007) highlighted that involving in nontraditional activities do no bring benefits, for example, higher return, resource efficiency, and economy of scope and scale but it entices to agency problem among different groups of these institution stakeholders and produces negative implication to both risk and profitability. Schmid and Walter (2009) documented that the banking sector if expands its functions to nontraditional activities leads to value discount but if it has the combination of commercial banking and insurance activities or commercial banking and investment banking it does not create value discount.

In contrast, DeYoung and Torna (2013) highlighted that the certain component of non-traditional income items, for example, fee-based income do no reduce the value of a healthy bank but it reduces the value of bank if the bank is financially distressed. Gambacorta and van Rixtel (2013) argued that nontraditional income of the bank does not increase the profitability of the bank, it does not lower the volatility of income and hence it does not help to reduce risk, while if there is any benefit from these activities, it is related to geographical and diversification of loan portfolio. The empirical examination by Fiordelisi and Marqués-Ibañez (2013) who supported that the positive impact of diversification is only limited to certain geographical areas as well as loan portfolio diversification. Whereas, the study didn't produce clear results relative to the impact of nontraditional activities on bank risk. In particular Baele, De Jonghe et al. (2007) investigate the long run benefit of nontraditional activities of a banking institution. Their results

are mixed as they indicated the positive effect on the value of institution and nonlinear effect on risk profiles which leads to lower risk-adjusted returns.

In contrast, in the case of the Italian banking system, Chiorazzo, Milani et al. (2008) finds that the diversification of income improves the risk and return trade-off and such gains of diversification are stronger in larger banks. Whereas in the case of small European banks, the diversification of income is not beneficial, higher gains from non-interest income are associated to lower profitability and increased risk. Specifically, trading activities are more risky and unprofitable (Mercieca, Schaeck et al. 2007). Berger, Klapper et al. (2009), investigated the maximum dimensions such as deposits, geography, loans and assets of income assortment. These dimensions of income structure are related to higher cost and also involved in reducing profits. Moreover, the authors also revealed that the banks with foreign ownership and those involved in conglomerates had have small diseconomies of diversification. So, foreign banks and conglomerate diversification helps to reduce risks.

In the empirical examination by DeYoung and Roland (2001) taking data of 472 U.S commercial banks for the period starting from 1988 to 1995, finds that on average most of the banks have based their noninterest income on fee-based activities rather than traditional lending activities. Due to this the volatility of earning of the bank and their degree of financial and operating leverage along with earning increases. The results imply that all three results have increased the volatility of earning and risk premium.

Brunnermeier, Dong et al. (2012), documented the study for the period of 1986 to 2008 on U.S financial institutions. The study highlighted that higher involvement of non-interest income like investment banking, trading activities and other noninterest activities, produces a higher contribution to risk than traditional deposit and lending activities. They also revealed that separately, venture capital, investment banking equally contributes to the risk. Whereas the banks which were involved more in trading income before the recession period earned less in the period of recession, but no such evidence was enabled in investment banking and venture capital.

The goal of an empirical study of Apergis (2014), was to empirically determine the effect of non-traditional activities on risk profiles of a financial institution which are involved in certain activities. The study used the data set ranging from the year 2000 to 2013 covering 1725 U.S financial institutions which were involved in a non-traditional line of business. The author applied the methodology of co-integration. The results of the study highlighted that nontraditional activities of banks exert a positive impact on both insolvency risk and profitability. The author further argues that the results were important for the regulator as they could serve as a pre-warning system of a potential risk which is existed in the market.

In contrast to the previous studies on the European banking system. Lepetit, Nys et al. (2008), investigated the results on the relationship between the risk of the bank and product diversification in many European countries banking industries. The data set for the study they used was ranged from 1996 to 2002. The results of the study highlighted that the banks those have expanded its line of business to non-interest income strategies have greater insolvency risk as compared to the banks remained in the traditional line of business. However, the authors further categorized the banking strategies into fee, trading, and commission and find the positive link amongst risk and the noninterest income for small-scale banks. Whereas, trading income has not been linked with higher risk for small banks but can effect on lower asset and is similar in the case of the Italian banking system. The author Chiorazzo, Milani et al. (2008) Studied the link between noninterest and profitability. The result of the study revealed that diversification in noninterest income increases the risk-adjusted returns. The study on Italian banking system supports the finding of European banks literature, however; the results are on contrary to the outcomes on U.S. Furthermore, the study highlighted that the relationship of noninterest income and profitability is stronger in the larger bank. In addition, there are limits to non-interest income gains specifically larger banks but small banks can gain benefits from diversification of income.

In the case of the Asian banking system, the results are somewhat similar to the EU banking system. Lin, Chung et al. (2012), used a switching regression model and categorized the banks into the management of the low and high level of income modification. The study took the countries of Asia (China, India, Indonesia, Japan, Philippines, Singapore, South Korea, Taiwan, and Thailand) and data from the year 1997 to 2005.The study document the results that interest income is less sensitive to volatility in diversified income banks in contrast to banks which specifically rely on the traditional line of business of banks. So, it implies, by diversifying the income causes a bank can lessen the shocks to interest income and reduce risk. It can only be harvested if the bank has a low level of diversification.

Skully and Perera (2012), also focuses on the case of South Asian emerging economies to assess the benefits of diversification of income. The author documented the influence of market control on the divergence of income and risk relationship of the bank. The results highlighted that if market power is greater than the insolvency risk is reduced even if the banks are involved in a non-traditional line of business. Whereas on the contrary, Berger, Klapper et al. (2009) found proof of the variation discounts, the results revealed that discounts of diversification are stronger in domestic banks as compared to a foreign bank in the Chinese banking system. The author further highlighted that in the Chinese banking system, the discount effect is due to lake of management expertise of top management or may be ineffective incentives for management to maximize the wealth of shareholder.

In the case of the Philippines banking system, the empirical examination was performed by Meslier, Tacneng et al. (2014). The study was to find the impact of diversification of revenue and performance of the banks. The results were in contrast to the western banking system. In the Philippine banking system, increase in the noninterest income increases the profit and reduce the risk. Specifically, the banks have been further indulged in trading strategies with government securities.

Whereas the benefit was more for overseas banks as compared to local banks. The results further documented that the benefits prevail for the bank's income diversification if they are less involved in SME loaning.

With reference to previous studies, the studies are mostly based on U.S, European banking system. There are few studies which are based on under developing and undeveloped countries such as Pakistan. In such a volatile economy of Pakistan, the change in income structure has been witnessed in the banking sector of Pakistan. So, with respect to the change in income structure what is the impact of this diversified change in income has an impact on insolvency risk is a question of this study? Thus, the purpose of this study is to answer the question. Furthermore, this study extends the literature in the context of Pakistan.

METHODOLOGY

The study computes insolvency risk by Z-Score, which indicates the probability of failure of a given bank. Z-Score takes into account of return on asset (ROA), capital to equity ratio (CAE) as the numerator and standard deviation of return on the asset as the denominator (Lepetit, Nys et al. (2008); (Williams and Prather (2010), DeYoung and Torna (2013)). The Z-score is constructed as the ratio of the sum of return on assets (ROA) and capitalization of the bank (equity to assets (CAE)) in a particular period, which is further divided by the standard deviation of Return on Assets (SDROA). The bank underlying this indicator is that the higher ROA and CAE and lesser volatility of returns indicate a higher value of Z-score and lower probability of bank failure. Thus, Z-score is inversely proportional to the probability of bank failure (Maudos 2017). The current study is using three years moving the window to calculate SDROA, the earnings volatility in the current year is measured by using current and two previous year's earnings (Lepetit, Nys et al. 2008, Bian, Wang et al. 2015, Chen, Huang et al. 2016, Maudos 2017).

According to Stiroh (2004a), Lepetit, Nys et al. (2008), Williams and Prather (2010) and Apergis (2014), one way to capture the diversification of banking activities is to count the share of income generated from traditional and non-traditional income activities. Therefore, the current study defines three kinds of incomes generated to specify a portfolio. The first one from the traditional source of interest income, second from income from investment and, third is free, commission and brokerage income of each bank. Income from interest is denoted as IATA, while IITA and FBTA define income from investment and income from fee, commission, and brokerage respectively.

According to Williams and Prather (2010), the accounting measure can have denominator in one of the following

- Total Assets
- Shareholder's Equity.

Thus, the current study is using Total asset as the denominator to develop ratios of income from advances to total assets (IATA), Income from investment to the total asset (IITA) and income from free, commission and brokerage income to total assets (FBTA). Furthermore, by using all these variables of income to check the impact of noninterest income on insolvency an econometric model can be developed. The study has further taken the log of a total asset as a control variable because the banks vary in size of their assets. To perform regression analysis, the study has taken all 23 commercial, domestic banks of Pakistan for the years 2007 to 2015. The data is obtained from the annual report of each bank.

Model

The methodology of the analysis is quantitative in nature. The panel data test analysis has been performed. The model can be zero effect, fixed effect or random effect based on Redundant and Hausman test (Hausman 1978). The function of risk is highlighted as follow,

Risk = Function of (Interest Income, Noninterest Income, Size) (1)

Risk = Function of (income from advances, income from investment, income from fee, commission and brokerage income, Size) (2)

As presented in equation 1 and equation 2, the risk is a function of interest and noninterest income. So, the derivation of this function can be an econometric model. Thus, the econometric model for testing the impact of income structure on insolvency risk is as displayed in equation 3.

Z-score= $\beta_0 + \beta_1 IATA + \beta_2 IITA + \beta_3 FBTA + \beta_4 LNSIZE + \varepsilon$ (3)

Where

Z-score = Insolvency Risk

IATA= Income from advances to total assets

IITA= Income from investment to total assets

FBTA= Income from fee, commission and brokerage income

LNSIZE= natural log of total assets

Table 1. Correlation matrix of variables

Variables	ZSCOR	IATA	IITA	FBTA	SIZE
ZSCORE	1				
IATA	-0.161	1			
IITA	0.172	-0.486	1		
FBTA	0.204	-0.366	0.073	1	
SIZE	0.1943	-0.393	0.182	0.506	1

Z-score=insolvency risk, IATA= income from advances to total assets, IITA= income from investment to total assets, FBTA= income fee and commission to total assets, SIZE= LN of Total Assets N=161

In order to control the effect of bank size, natural log of total assets has been used as a control variable. This variable has been widely used with income structure by previous researcher i.e.((Wiwattanakantang 2001);(Rime 2001, Lepetit, Nys et al. 2008);(Azureen 2012)) as a control variable in the banking sector and found a significant effect. Therefore, the current study has also taken a natural log of total assets as a control variable.

REVIEW OF FINDINGS

Before performing regression analysis, descriptive statistics of each variable is estimated. Descriptive statistics give an overview of the data used for analysis. As it can be seen in table 1 that the minimum values of Z-score is -9.3264 and the maximum value is 328.3216 with a standard deviation of 17.07214. These values indicate that there are some banks which are not stable as per descriptive statistics of Z-score. The higher value of the standard deviation indicates higher volatility

in ROA. Moreover, the minimum value of the IATA ratio is 0.002078 and the maximum value is 0.092199. The standard deviation of IATA is 0.0183. Table 1 also displays the minimum value of IITA, which is 0.0017 and the maximum value of 0.0708. The minimum value of FBTA is 0.0000 and the maximum value is 0.0125. SIZE is this study is used as a control variable to control the effect of bank size. The value of SIZE is in billion rupees. The minimum value of SIZE is billion 5.3003 rupees, while the maximum value of SIZE is 2218.423.

Table 2. Descriptive Statistics of Variables

variables	Mean	Median	Std. Dev.	Maximum	Minimum
ZSCOR	31.205	17.072	42.738	328.321	-9.326
IATA	0.0466	0.047	0.018	0.092	0.002
IITA	0.0315	0.032	0.013	0.070	0.001
FBTA	0.0048	0.004	0.002	0.012	0.000
SIZE	385.92	249.80	422.163	2218.42	5.300

Z-score=insolvency risk, IATA= income from advances to total assets, IITA= income from investment to total assets, FBTA= income fee and commission to total assets, SIZE= Total Assets N=161

In order to perform regression analysis, the basic assumption of regression is performed. To find the problem of autocorrelation, Breusch-Godfrey Serial Correlation LM Test is estimated (Bikker and Metzemakers 2005, Plaza 2011). The results of the test indicated that autocorrelation exists in the data. In order to diagnose heteroscedasticity in data, Breusch-Pagan-Godfrey and white tests were estimated (Ongena and Smith 2000, Watson and Teelucksingh 2002, Baum, Schaffer et al. 2003, Berger, Klapper et al. 2009), the results of both tests indicated that the data does not show any evidence of heteroscedasticity in data. Hence, the data is homoscedastic. The third observation of multicollinearity is tested by using correlational matrix. The matrix of correlation is displayed in table 2. It can be seen in table 2 that the highest correlation exists between SIZE and FBTA. Thus, data has only one problem with autocorrelation.

In order to select the proper model for data analysis, multiple tests have been estimated for data analysis. So, to select an appropriate model for regression results estimation among common effect, fixed effect and random effect test were estimate. The redundant fixed test estimates the results between common effect and fixed effect model. The results indicated that between common effect and fixed effect model, the fixed effect model is appropriate for data analysis. To further confirm the results, the Hausman test was performed that defines the results between fixed effect and random effect model (Hausman 1978). The results of the Hausman test suggested that the random effect model is more appropriate for data analysis. Thus, the random effect model is used for analysis. To perform a random effect model, EGLS with a white cross is applied to make autocorrelation consistent, so that result may not be biased.

Table 3. Summary of Results, Random Effect Model

Variable	Beta Coefficients	t-Static	p-Value
IATA?	-0.0301	-0.1538	0.8779
IITA?	0.1737	2.9091	0.0042
FBTA?	-0.1555	-2.7780	0.0061
SIZE?	0.2680	3.5863	0.0004

Z-score=insolvency risk, IATA= income from advances to total assets, IITA= income from investment to total assets, FBTA= income fee and commission to total assets, SIZE= LN of Total Assets N=161

The regression results of the random effect model are displayed in table3. The results are a mix in case of the banking sector of Pakistan. The results indicated that IATA has no significant relationship with Z-score. Whereas, the results indicated that IITA and FBTA have a significant relationship with Z-score. The direction of the relationship of IITA with Z-score is positive; this explains that an increase in income of IITA will increase the value of Z-score and hence decrease the risk of insolvency. In addition, the direction of the relationship of FBTA with Z-score is negative. The explanation is that the increase in FBTA will decrease the value of Z-score and reduces insolvency risk. The effect of the SIZE of banks is also displayed in table 3. The result of SIZE shows that effect of size with Z-Score is positive and significant and explains that increase in SIZE will increase the value of Z-score and reduces insolvency risk of the bank.

Discussion of Results

According to DeYoung and Roland (2001) further cited by Lepetit, Nys et al. (2008), there are three main reasons for volatility in noninterest income of a bank. As prescribed below;

1. A bank may lose a client which is providing bank a fee-based income because a client is not bounded for a long-run relationship like loaning. Even though over a longer period of time is considered, the fluctuation of interest rate and economic downturn do not destabilize the traditional line of business. The reason is that the relative cost of information and switching to a client is high which do not allow a client to walk away from a lending relationship this could be a reason for IATA has an insignificant relationship with Z-score. Moreover, the very plausible reason that IATA is insignificant because of increase dependency of government borrowing from commercial banks (Economic Survey 2009, Economic Survey 2015, Economic Survey 2016).
2. There is also a need for heavy investment if a bank tries to shift from interest-based activities to noninterest based activities. The investment needs both in technology and human resource. So, this increases the operating leverage and volatility of earning can cause a lower value of Z-score, hence may increase insolvency risk.
3. Fee-based income does not have any regulatory capital or any collateral for a security, so this actually tends towards a high level of financial leverage and hence results in high earning volatility.

The finding of DeYoung and Roland (2001) is limited to the studies made on the US banking system. The author argues that likely diversification of income and innovation can reduce insolvency risk which is in line with the portfolio theory(Markowitz 1952, Li and Zhang 2013). whereas, Zhou (2014) argued that the overall risk of the bank can be reduced if interest income risk is managed. There are studies which define that noninterest income increase the profitability and decrease the insolvency risk. Thus, this could be a reason for IATA has an insignificant relationship with Z-score.

Furthermore, Apergis (2014) argued that nontraditional activities have a positive impact on both profitability and risk profiles of the banking system. Whereas, the author further

notified that the components of nontraditional or noninterest income do not have any unified behavior across all such activities. So the finding of the author is mixed in nature as some of the components may or some may not be improving profit and reducing insolvency.

According to Acharya, Schnabl et al. (2013) argued that the limited involvement of a bank in non-interest income can reduce risk and increase the profitability, the gains are more it the diversification of revenue of such institute is limited in noninterest income. Whereas, the author further focus on the business line in which management can gain a clear advantage rather investing in nontraditional line. The main focus should be toward the regulatory body to properly develop the regulation for a non-traditional line of business. The study of the author does not define the limit of noninterest income or the threshold up till then a bank can involve in the noninterest or nontraditional line of business. In case of the Italian banking system, the suggestive results were clearly defining that there is a positive effect of noninterest income to profitability, and it is beneficial in reducing risk and increasing the profit (Chiorazzo, Milani et al. 2008).

The nontraditional activities have a meaningful effect on the probability of bank failure. It is also dependent on the financial position of the bank. Whereas, most part of nontraditional income has no effect on bank failure or it does not produce any benefit for the bank in the reign of crisis (DeYoung and Torna 2013). In line with DeYoung and Torna (2013), the results of the current study are mixed.

Furthermore, according to (Lepetit, Nys et al. 2008, Lepetit, Nys et al. 2008, Li and Zhang 2013, Apergis 2014) that one way to explain the diversification in the banking sector is to generate income from different sources and these sources shall have a negative relationship with each other. Similarly, in case of Pakistan, income from investment has a negative relationship with insolvency risk while fee, commission and brokerage income has a positive relationship with insolvency, thus producing a negative correlation among each other which explain the portfolio theory. Moreover, the investment income of bank is generated from investment in stocks of different companies. Therefore it is highly expected that investment portfolio return of investment income of banks shall have negative covariance between them which is defined by the portfolio theory (Markowitz 1959, Markowitz 1991). This negative covariance between investment return portfolio decreases the risk hence increases the stability of banks.

Summary of Finding and Conclusion

The results of the current study show mixed. It is revealed that there is no significant relationship between income from advances and insolvency risk, while income from investment has a negative relationship with insolvency risk. Moreover, fee, commission, and brokerage based income have a positive relationship in the banking sector of Pakistan. The implication of noninterest income can be for policy making and for further exploration of research. The first should be, if it is possible that the fee-based line of income should be separately reported of each type, rather they are aggregated into a single variable of non-interest income or fee-based income in annual reports of banks. For example, it can be defined as a fee for service, traditional or stakeholder's sources of noninterest income. The second can be, if the economic downturn is on its way the management or supervisors of banks may take proactive action to mix the product diversification of bank to gauge insolvency risk, specifically for distressed firms. Third, the de-regularization was the opportunity; it has nothing to do with bank failure in a financial crisis.

There is a positive relationship of diversification with insolvency risk bank. Whereas in all bank the fee-based income activities have a direct positive impact on insolvency. So engaging in trading activities may diversify risk for banks (Lepetit, Nys et al. 2008). There is a policy implication for regulatory bodies as they may assess the types of fee-based income which is directly affecting the insolvency risk of the banks. The proactive approach may be taken for noninterest income and regulation may be developed.

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