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RETURNS VOLATILITY IN STOCK MARKET AND PERFORMANCE OF BANKS: Evidence from Pakistan

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Abstract

Irregular behavior of stock market affects all sectors of economy however, financial sector is the most vulnerable sector. The study attempts to examine the impact of stock market returns volatility on performance of banking sector in Pakistan. Two main hypotheses are constructed to achieve the objectives of study: i.e., (1) There exists a significant relationship between the returns volatility in stock market and the banking performance, and (2) Bank size has a significant role in establishing the volatility-performance relationship. Two step GMM system estimator is used to test these hypotheses. The results reveal that stock market volatility has a significant negative impact on return, equity, and the assets of banks; and, the bank-size has a significant negative impact on volatility-performance relationship. Specifically, the results suggest that during the time of high volatility, banks' profitability starts to decline but this profitability decline is not same, for all size of banks. The negative impact of volatility for larger banks is high.

Key Words: Returns Volatility, GARCH, Banking Performance.
JEL Classification: G17, G21.

I. Introduction

Banking sector play a very important role in economic development of a country. The economic health of a nation is affected by soundness of the banking system. A financially sound banking system guarantees to enhance the economic activities in a country. Banks help in making the trade process easier which ultimately flourish business, and is beneficial for the whole economy. In the modern world, banks became an essential part of the trading system; and are now considered the central part of the economy. Companies and households contact banks when they require funds. Iimi (2004) argued that, generally in developing countries, allocation of funds by banks have a great impact on economic growth of a country. Banks facilitate in buying and selling process,

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within and outside the country. All cross country transactions are accomplished with the help of banks; and thus, the progress of banking system is very essential to achieve the progress of a country. Chatzoglou, et al. (2010) claimed that for financial improvement of banks, it is necessary to make and apply efficient strategies that lead towards high profitability. Development of banking system will translate into economic progress of a country [Hondroyiannis, et al. (2005). Liang (2005) described that development in financial sector have played an important role in economic development of China. Therefore, it can be concluded that development of banking industry and economic development of country go side by side.

The banking system in Pakistan was established over a period of time. Ali, et al. (2011) claimed that due to lack of capital and political conditions of the country, banking system has undergone the state of rapid changes. From the time of independence of Pakistan, policies of government have influenced the financial structure of the country. As mentioned by Iimi (2004) in the mid-1970s, the government of Pakistan took steps to nationalize its domestic banks. As a result, the state owned banks had a leading impact on decisions on financial side of the country. However, in the late 80s, the government again took the decision to privatize the state owned banks to strengthen the financial industry in order to compete the financial sector of developing countries. In the past years, interest rate of banks was policy administered, and sometime it was too low and gave negative real returns, due to high inflation in the country. Low interest rate adversely affects the economic growth in the country, as well [Khan, et al. (2005)]. Arif and Anees (2012) argued that in 1997 the State Bank of Pakistan (SBP) became an independent organization for administration of banking industry in Pakistan. Since then, the SBP administer and observes all banks, to ensure that every bank is following the predefined rules and regulation.

Development of banking sector contribute in development of a country. There are many factors which affects performance of the banking industry. Ali et al. (2011) found the effect of macroeconomic and bank-specific indicators on profitability of banks and presented that profitability of conventional banks is affected by efficient assets management, credit risk, capitalization, operating efficiency, and economic growth in Pakistan. Hassan and Charif (2011) documented that bank size affect the performance of banks, positively. There are some other factors/variables on which no empirical work (such as returns volatility in stock market) has been under taken in Pakistan, Tan and Floros (2012) concluded that price variation in stock market create risk and every rationale investor tries to save himself from that risk. Thus, in presence of high volatility, investors would hesitate to invest in stock exchange; rather, they would try to find other investment opportunities with some return, e.g., term deposits and fixed deposits. According to the certainty effect (discussed in prospect theory), if there is a large risk prevailing in the market then people give less importance to outcome with low probability, as compared to the outcome which is more certain [Kahneman and Tversky (1979)]. Therefore, in this case return from fixed deposit and term deposit have certainty than

the return from stock market and that's why investors would prefer to go to banks; and these deposits affect the profitibility of banks. Garcia-Herrero, et al. (2009) argued that these deposits affects positively the profitability of banks in China. Such deposits also help banks to provide liquidity to its customers. Akhtar, et al. (2011) claimed that deposits assist banks to provide liquidity and fulfill loan requests made by their customers.

In this situation banks are in direct link with price fluctuations of the stock markets and this volatility affects the performance of banks in many ways. Firstly, the return volatility in stock market is an indicator of higher systematic risk in the market; and when firms pose to the higher systematic risk they tend to decrease their fixed cost bearing bank loans preferring other financing options. Thus, the banking profitability is affected. Secondly, many banks earn profit through nontraditional activities, such as venture capital, asset securitization and the investment banking. DeYoung and Torna (2013) concluded that probability of banking failure increase the situation of crisis with increase in assets based nontraditional activities of banks. Therefore, increased deposits from investors at the time of high volatility in stock market have an impact on the profitability of banks. Indeed, there are empirical evidences on existence of relationship between volatility in stock market and banking sector performance, in some developed countries. Tan and Floros (2012) proclaimed that stock market volatility positively affects the banking performance in China. Another study conducted by Angbazo (1997) concluded that the stock market volatility has more strong relationship with lending rate of banks than the deposit rate. However, when literature on Pakistan is reviewed, there is no empirical evidence as to how the volatile returns in stock market affects the banking sectors' performance.

Bank size is another important factor that also affects the performance of banks. Many empirical studies reveals that banks with larger size perform better than the small size banks, e.g., Hassan and Charif (2011), Fadzlan and Kahazanah (2009), and Kosmidou (2008). The rationale behind this nexus is 'too big to fail' thinking of depositors as described by Santos (2014). i.e., the depositors have more trust on banks with large size as compare to small size banks. Thus, they are likely to deposit their holdings in large banks which may affect the performance of banks. According to the prospect theory when there is high volatility in stock market, investors would deposit their money in banks, and due to 'too big to fail' thinking of investors they would prefer large banks for deposit their holdings. Janjua, et al. (2014) concluded that in Pakistan, monetary tightening puts more burden on smaller banks. Given all this, banks size may act as a moderator for relationship between stock market volatility and the banking performance. As per best of the authors knowledge, no one has investigated this relationship in Pakistan. Therefore, in this study, the role of bank size as a moderator between stock market volatility and banking performance relationship is also examined empirically.

In view of the above discussion, there are three different objectives to study this area. First, is to measure the volatility in the Karachi Stock Exchange using KSE-100 index data for the period of nine years (2006 to 2014) applying the GARCH model. Second is

to investigate the impact of stock market volatility on performance of banks operating in Pakistan; and third is to investigate the impact of size of the banks on volatility-banking performance relationship. Therefore, the present study contribute to the literature by examining relationship between the stock market volatility and banks' performance in Pakistan, over the period of eight years (2006 to 2013) and calculating the marginal effect of bank size on the volatility-performance relation. The rest of the study is organised as follows. Section II explains the theories describing the research phenomenon. Section III describes the existing preliminary literature on the topic. Section IV clarifies the definition of variables employed in this study and Section V deals with the econometric model of the study. Section VI illustrates the results of test conducted to measure the impact of stock market return volatility on banking performance and the impact of bank size on the volatility-performance relationship. The last part of the study, Section VI concludes the study and give recommendations for management of banks.

II. Theoretical Background

The empirical model employed in this study is based on a well-known economic theory relating to the banking sector: 'the theory of bank size which is discussed in detail in this section.

1. Theory of Bank Size

The theory of optimal bank size, basically describe the importance of bank size in determining the profitability of banks in presence of non-diversifiable aggregate risk. This theory was developed by Stefan Krasa and Anne Villamil in 1992. It had implication for size distribution of banks. The theory states that as the size of a bank's portfolio increases its default probability will start declining. In the theory of bank size, it has been shown that both the risk and cost considerations are important determinants of bank size. Banks in general faces two main types of risks: the first is related to their portfolio which is diversifiable and the second is a non-diversifiable macro risk. Both types of risk are important in determining the size of a bank. As the size of bank starts to increase, its specific diversifiable risk starts to decline. Thus, the bank-specific risk is negatively related to the size of bank. The second type of risk is non-diversifiable macro risk which is not related to banks' portfolio, but its risk is present in the environment, in general and uncontrollable for the management of the bank. Stock market volatility is also referred to such types of risk, which is not specific to any organization but it is presented in the economy. The theory of optimal bank size describes that bank size is also related to bank exposure of macro level risk [Krasa and Villamil (1992)]. The theory states that even when banks' portfolio is subjected to non-diversifiable macro risk, it will improve default probability of a bank; and leads to increase monitoring cost. Larger banks have to bear higher monitoring cost

when they are subjected to higher macroeconomic risk; and this increase the monitoring cost which is a cause of declined profitability of banks.

III. Literature Review

Financial markets are very important for development of a country. They fulfill the requirement of money deficit and surplus units of economy. Pagano (1993) highlighted the role of financial markets in funneling the savings to firms; improving allocation of capitals and affecting the saving rate. Different types of organized exchanges have been developed keeping in view the demand of economy. Securities are traded and financial needs of several participants are fulfilled. The price of these securities depends on their fundamentals and demand supply forces. Sudden increase or decrease in the prices of financial securities disturbs the balance of overall economy. The effect of these variations is distributed to all sectors of the economy, but financial institutions (commercial and investment banks) are most vulnerable to these variations [Al-Rjoub and Azzam (2012)]. The stock market volatility is also conceived as macroeconomic risk of an economy. Schwert (1990) defines that stock market volatility is basically dispersion of returns which is measured through standard deviation. Hamilton and Lin (1996) stated that due to variations in stock prices, sometimes it becomes riskier to invest in stocks rather than the other investment opportunities. During the period of crises, the volatility of stock market reaches the peak level and the prices of stocks decrease in both types of markets, i.e.. developed and emerging. In newly emerged markets, these effects are quick, abrupt as well as long lasting [Patel and Sarkar (1998)]. The stock market volatility affects banks' profitability which is another important aspect. As mentioned earlier, banks use public deposits to invest further. Therefore, in this sense, banks act like investors and their concern is only the rate of return which they earn in the volatile market. There exists a positive but insignificant relationship between the expected volatility and expected stock returns in the stock market of UK [Poon and Taylor (1992)].

French, et al. (1987) also investigated the relationship between volatility and expected stock returns by using different statistical techniques in New York Stock Exchange for the period of January 1928 to December 1984. They concluded that there exists a direct relationship between the expected risk premiums and the expected stock return volatility, and an inverse relation between the unexpected volatility and unexpected stock returns. Baillie and DeGennaro (1990) proclaimed the presence of a weak relationship between volatility and returns on a stock portfolio. As referred earlier the stock market volatility is basically the fluctuation that comes in return of stocks. This will affect the behavior of investors. According to Ahmad and Zaman (1999) increased volatility in stock market is considered as higher risk in the individual sector and so this increased risk will affect individual's investment decision. Because of this, investment decisions of banks are also very likely to be effected by stock market volatil-

ity. According to Tan and Floros (2012), stock market volatility affects positively, the performance of banks in China. This result holds, regardless the performance is measured in term of return on equity (ROE) or excess return on equity (EROE). Albertazzi and Gambacorta (2009) utilized about five indicators of performance of banks to find the effect of stock market volatility on the performance of banks for major developed countries and concluded that three out of five indicators of banking performance are positively related to stock market volatility. These indicators are non-interest income, net interest income, and return on equity. Albertazzi and Gambacorta (2010) conducted another research in which the taxation is considered as independent variable and profit after tax is used instead of return on equity. The findings reveal that non-interest income, profit after taxes and provisions are directly related to stock market volatility and, net interest income is inversely related to stock market volatility.

Several bank-specific, industry-specific, and macroeconomic indicators also have significant impact on profitability of banks. For example, a strong positive relationship was observed between bank size and the profitability of banks [Pilloff and Rhoades (2002)]. Ramlall (2009) and Sufian (2009) also found similar results. In particular, they found that bank size has a significant and positive impact on the profitability of banks; while there are many other studies suggesting a negative relationship between bank size and the profitability of banks, like Kosmidou (2008) and Spathis, et al. (2002). Several studies reveal the importance of bank-specific variables in measuring the profitability of banks; e.g., Wu, et al. (2007) conducted a study to find the impact of financial development and bank characteristics on banking performance, and concluded that non-traditional activities have a negative impact on the profitability of banks in China. Similarly, Garcia-Herrero, et al. (2009) documented that bank capitalization is positively and significantly related to banking profitability. In their empirical analysis, they used five bank-specific variables as control variables. These variables are credit risk, capitalization, taxation, liquidity and non-traditional activity. Some macroeconomic factors also contribute towards the profitability of banks. Alexiou and Sofoklis (2009) claimed that inflation rate and economic growth of any country have strong positive relations with the profitability of banks. Demirgüç and Detragiache (1998) suggested that both the high inflation rate and little economic growth cause diseconomies of scale and lower the business of banks.

As mentioned earlier, several studies in literature have examined the impact of stock market volatility in the profitability of banks. These studies including some others are Angbazo (1997), Albertazzi and Gambacorta (2009), Albertazzi and Gambacorta (2010), and Tan and Floros (2012). A common finding emerging from these studies is that volatility of stock market is significantly related to the profitability of banks. Although there are mixed results like Albertazzi and Gambacorta (2009); and Tan and Floros (2012) who examined the positive impact, there are other studies which evidence the negative impact of stock market volatility on banks. However, when reviewing the literature on Pakistan, no empirical evidence was found on relationship between

stock market volatility and the banks profitability. Furthermore, it was also known as to how the small and large banks respond to the volatility of stock market; yet, understanding of the differential response of large and small banks to stock market volatility would enhance our knowledge regarding relationship between stock market volatility and banks' profitability. Therefore, this study aims to examine, not only the impact of stock market volatility on banks' performance but also to the role of bank size in formulating the volatility-performance relationship.

IV. Operational Definitions of Variables

In this study, four different types of variables are used, i.e., dependent, independent, moderator and control variables. The independent variable used in this study is the stock market volatility. The objective is to find the impact of stock market volatility on banks' performance, and so, the banks' performance is the dependent variable, which is measured by three alternative proxies. The second objective of this research is to check the impact of bank size on volatility performance relationship. Thus, the bank size is used as moderator in the study.

1. Banking Performance

Financial performance of banks can be examined through different proxies. For example, the researchers like Hassan and Charif (2011), Wu, et al. (2007), Sufian and Parman (2009), Stiroh and Rumble (2006), used different proxies of banking performance. In this research three different indicators are used as proxy of banking performance. First is the return on equity, which is the basic indicator of bank performance used by Ahmed and Khababa (1999), Gilbert and Wheelock (2007), and Hassan and Charif (2011). It basically shows 'the ratio of net income after tax to shareholders equity'. An increase in return on equity means that banks performance is good or vice versa. The data regarding this variable can be found from the financial statements and annual reports of different banks. Return on assets is the second indicator of banking performance (used in this study) which is also used by many researchers to measure the profitability of banking industry, such as Wasiuzzaman and Gunasegavan (2013). According to them, it shows as to how the efficiently of firm is using its assets to earn high level of profits. It is basically the ratio between net income, after tax with total assets. As banking activity relates to borrowing and lending, therefore due to this variable the profitability coming from lending and other assets can be adjusted. Net interest margin is the third indicator of financial performance, specifically for banks. Main business of banks is borrowing and lending of money, and so this indicator depicts the differential interest earned during this activity. Heffernan and Fu (2010) and Tan and Floros (2012) have used this performance indicator in their study.

2. Stock Market Volatility

Stock market volatility is simply defined as a measure of fluctuation in stock prices; these prices are sometime high and sometime they are low. These variations in stock market are measured through stock market volatility which shows unexpected changes in price level of stocks over the time. So, it is a method of calculating risk prevailing in stock market. Stock market volatility affects each and every player of the economy. Normally, the volatility of stock prices can be measured through standard deviation of returns across the time. Lau, et al. (2013) used standard deviation of monthly return to find the stock market volatility which they used in different logs of stock market index. Hameed and Ashraf (2006) claimed that standard deviation has become an unsophisticated measure to calculte volatility and thus, they used a generalised GARCH model to measure stock market volatility. They claimed that it is most suitable measure of capturing the effects of volatility in stock return. Husain and Uppal (1999) measured the stock market volatility in stock markets of Pakistan, through ARCH and GARCH models and found that GARCH model is appropriate for measuring conditional variance. Hameed and Ashraf (2006) concluded that return in Pakistan stock market is not charecterized as rendom walk and pose a strong serial correlation; they advised to show caution when using the model with data normality assumption. The volatility calculation through standard devioation is also based on data normality assumption; hence, it can not give accurate results of variation in stock prices. Husain and Uppal (1999) agued the presence of persistence in variance of returns in stock market of Pakistan. The GARCH model for volatility estimation can adjust the serial correlation in returns and presence of persistence in variance of returns; hence it is used in model of this study to gauge the stock market volatility over the sample period.

3. Control Variables

Bank size is used as a moderator in this study. Fadzlan and Kahazanah (2009) found a positive relationship between bank size and profit efficiency of banks. Similarly, Kosmidou (2008) argued that bank size is an important variable in determining profitability of banking sector because it helps banks to capture more market shares. Normally, bank size is measured through quantity of assets held by banks. Ameur and Mhiri (2013) used the log of total assets of a bank as a proxy for bank size. Similarly, Ali, et al. (2011) also used the natural log of total assets to find bank size and found a strong positive relationship between banking performance and the size of banks, when they studied bank-specific and micro economic determinants of profitability in Pakistan.

There are some other important variables which also affect the profitability of banks. Therefore, it is important to take their effects into consideration while exam-

ining the impact of stock market volatility on banks' performance. In this study, the following two main categories of variables are used as control variables. The first category is related to bank specific variables that affects performance of banks. Fadzlan and Kahazanah (2009) conducted a research to find the empirical determinants of profitability for commercial banks for the period of seven years ranging from 2000 to 2007. Their findings suggest that bank-specific variables, namely, the bank size, capitalization, and credit risk, are positively related to profitability of banks, while the overhead cost and liquidity have negative and statistical significant impacts on banks' profitability. Similarly, Garcia-Herrero, et al. (2009) explained that capitalization is positively related to the banking sectors' profitability. In the present study, five bank-specific control variables are considered. These variables are bank size, credit risk, capitalization, liquidity, and non-traditional activity. These variables were commonly used in previous studies as well, e.g., Adesina and Olurotimi (2013), Ahmad and Bashir (2013), and Ongore and Kusa (2013). List and proxy of measuring these variables are given in Table A-3 Appendix. The second category used in this study is about macroeconomic variables that contribute in the performance of banks. Many authors used macroeconomic variables in their research while studying the banking sector, e.g., to gauge the performance of banking sector. Ali, et al. (2011), Ghazouani (2004) and Liu and Wilson (2013) incorporated macroeconomic variables in their model, Ali, et al. (2011) mentioned two main indicators which played an important role in determining profitability of banks. These two variables are GDP growth and inflation rate. Therefore, in this study all these variables are used for capturing effects of macroeconomic variables in performance of conventional banks in Pakistan.

V. Econometric Model

Annual data for eight years (2006 to 2014) of 27 conventional banks in Pakistan was collected where total number of observations, were 243. As objective of the study is to capture the impact of stock market volatility on overall banking industry, this study opt the sample of both the Islamic and conventional banks. From 2006 onwards, the data of banking industry is easily available from the SBP reports and this study used it for the period of 2006-2014. Due to the effects of banking crisis and the period of lower volatility (2010 to 2013) it is characterized as the period of higher volatility (2006 to 2009). Stock market data from KCE-100 index is utilized to measure the return volatility in stock market. Volatility in daily returns is measured through GARCH model and then it is annualized. As bank specific and macroeconomic variables are important in measuring profitability of banks, both of them are used in the model. To examine the relationship between these variables, three step approach is used in this study. In the first step volatility of stock market is measured through GARCH model. In the second step, effects of stock market volatility, banking performance is measured via regression analysis. In the last step effect, the bank size is measured in volatility-banking performance

relationship. To examine the relationship generalized methods of moments (GMM), system estimator is used. This method is used by many researchers like Athanasoglou, et al. (2008), and Sharma and Gounder (2012). The main advantage behind adaptation of this method is its ability to save the model from endogeneity problem. Thus, the econometric model used in the second step is as follows.

$$BF_{it} = \beta BF_{it-1} + \sum_{m=1}^{m} \alpha_m X_{it}^{m} + \sum_{j=1}^{n} \rho_n Y_t^{n} + \delta Vol_t + f_i + U_{it} \quad (1)$$

representations of symbols used in Equation (1) are as follows,

BF_{it} is performance of individual bank *i* in year *t* measured in terms of ROE and ROA,
BF_{it-1} is performance of bank *i* in year *t-1*,
X_{it}^{m} is bank-specific variables which determine profitability of banks, i.e., credit risk, liquidity, capitalization, and non-traditional activity of bank,
Y_t^{n} is macroeconomic determinants of banking profitability, i.e., GDP growth size of banking industry and inflation rate,
Vol_t is volatility in KSE-100 index in year *t*,
f_i is time invariant bank-specific nonobservable effect, and
U_{it} is an error term.

Time invariant bank specific non-observable factor is much likely to correlation independent repressors hence, the OLS will generate biased estimates. The problem of bank specific time invariant fixed effect can be overcome by estimating a model using standards within group estimator. However, both OLS methodologies, used within group estimation does not save the model from endogeneity issues. GMM system estimator was developed to avoid these biases in the model. GMM system methodology, effectively remove the bank specific effects from the model by taking the first difference variables and it also use these differences in estimation. Thus, any static (time-invariant) bank specific factor will not create biasness in the results. The GMM system estimator is also adopted to avoid such biases in the model. In the second step of examining the impact of bank size in formulating the volatility-performance relationship, another econometric model is made. To capture the effect of bank size on volatility-performance relationship, same variable are used [see, Equation (1)]. Additionally, interaction term of stock market volatility and the bank size is introduced to gauge the moderating role of bank size.

$$BF_{it} = \beta BF_{it-1} + \sum_{m=1}^{m} \alpha_m X_{it}^{m} + \sum_{n=1}^{n} \rho_n Y_t^{n} + \delta Vol_t + \tau Vol_t \times Size_{it} + f_i + U_{it} \quad (2)$$

All symbols in Equation (2) are same as in Equation (1), with just an additional variable of $Vol_t \times Size_{it}$ which is used to take the effect of moderator, i.e., bank size in the volatility-performance relationship.

VI. Results and Discussion

1. The GARCH

Several methods are used to compute volatility in the stock market and, standard deviation and GARCH are the most common among them. Generalized Auto Regressive Conditional Heteroskedasticity (GARCH) process was introduced by Robert F. Engle in 1982, while studying inflation of the United Kingdom. This process is used to estimate the volatility in financial market. To capture small variation in stock prices, GARCH model can be used in stock market of Pakistan. Husain and Uppal (1999) measured the stock market volatility in stock market of Pakistan through ARCH and GARCH models and found that GARCH model is appropriate for measuring conditional variance. The data of stock prices changes very frequently. These short period changes have to be considered while calculating the volatility. This is the main motivation behind the selection of GARCH model for volatility. In this study, we have applied the GARCH model to gauge the volatility in daily stocks of KSE-100 index. Results of the GARCH model are given in Table 1.

Table 1 shows the results of GARCH model applied to calculate the volatility in stock prices. In the return equation, P-value of AR(1) is significant and coefficient of AR(1) is positive; which shows that the current period return is based on 9.94 per cent and is higher than the last period return. In the variance equation, P-value of GARCH (-1) is significant and shows that the current volatility is influenced by previous day's volatility. The coefficient of GARCH (-1) is positive, and reflect that 80 per cent of the last day volatility is transferred in the current volatility. The results of these diagnostic tests through GARCH model are calculated on variance of KSE-100 index for each day. Using the GARCH model this day to day variance in KSE-100 index, is shown in Figure A-1, in the Appendix.

Using daily data of the stock returns, volatility in KSE-100 index, is presented in Figure A-1, Appendix. However, in this study the annualized volatility in the Karachi

TABLE 1

Results of GARCH Model

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.001	0.000	5.067	0.000
AR (1)	0.099	0.024	4.100	0.000
Variance Equation				
C	0.000	0.000	12.173	0.000
RESID(-1)^2	0.155	0.015	10.651	0.000
GARCH(-1)	0.805	0.014	59.251	0.000

Source: Authors' estimation based on the model.

Stock Exchange is needed to make the data of volatility coherent with the data of banking sectors' performance. For this purpose, the daily volatility in stock exchange has to be converted into annual volatility. According to Smithson and Minton (1996) risk for longer time period can be measured by multiplying the risk for shorter time with square root of time[1]. Therefore, the average daily volatility was converted into annual volatility by applying the same method. The annual volatility in KSE-100 for the period of 2006 to 2013 is shown in Figure A-2 in Appendix.

The Karachi Stock Exchange remains uncertain during most of the time. During the period of study the Annual volatility prevailing in KSE, is shown in Figure A-2 in Appendox. Before 2010, the results indicated a higher volatility in stock return and during all times in 2009, it showed high value of 0.26, for the study period. There are certain reasons behind the higher volatility in stock returns from the period of 2006 to 2009. Haroon and Shah (2013) described the period till 2007 which consists of great political uncertainties. The Prime Minister of the country kept on changing during these days; and thus the Stock market faced the biggest one day crash because of the emergency rule imposed by the President. Finance crisis is another cause of high volatility in the KSE. Ali and Afzal (2012) revealed that financial crisis of 2008 was the largest financial recession (after 1930s), which affected adversely the stock market of Pakistan. High volatility in 2008 and thereafter was also one of the consequences of this financial crisis.

2. GMM Results

Due to several reasons, Generalized Method of Moments is applied in this study to find the impact of stock market volatility on banking performance, e.g., presence of endogeneity and autocorrelation in panel data. In case of performance determination, there are evidence that performance of a year depend on performance of the previous year. [Athanasoglou, et al. (2008)] concluded that performance of banks depends on performance of their previous year, measured in terms of return on assets (ROA). GMM model was initially developed by Arellano and Bond (1991). The main characteristic of this model is that it uses lagged value of dependent and lagged value of independent variables as instrument in the model. This model is known as GMM difference. Later, this was critiqued by Arellano and Bover (1995); with the view that if instruments are weak than this model would be inefficient. Therefore, they developed a new model known as GMM system in which lagged values of dependent and independent variables are at level and their differences are used as instrument. GMM system yields more efficiency since it allows equation at level with instrument in the first difference and the equation in differences with instrument in level [Rashid (2013)].

[1] $\sigma_T = \sigma_1 \times \sqrt{T.}$

Hence, in this study generalized method of moment system estimator is applied. Performance of banking industry is examined through three different indicators: return on equity (ROE), return on assets (ROA) and net interest margin (NIM). Taking each of these indicators GMM System model is applied as dependent variable. Therefore, the same model is used to check the moderating role of bank size in volatility and performance relationships in banking industry of Pakistan. Result of econometric model is shown in Table 2, where it is tried to investigate the impact of stock market volatility on banking performance. Results of GMM system estimation shows the insignificant value of j-statistic in all the three proxies of financial performance. This insignificant value, confirm the validity of instrument. Hence, the results are reliable. The value of AR(2) is used to check the second order of correlation; its insignificant value indicates that residuals are free from the second order correlation. So it can be said that the estimation is good.

The results suggest significant negative impact of stock market volatility on return of equity assets, while insignificant negative impact is shown on net interest margin. Two among the three performance indicators have shown negative relationship between return volatility and the banking performance. The rationale behind this rela-

TABLE 2

GMM System Results

	ROA		ROE		NIM	
Independent Variable	Coefficint	t-Stats	Coefficient	t-Stats	Coefficint	t-Stats
Banking Performance	-0.103	-0.280	0.004	0.050	0.226	5.920***
Volatility	-0.132	-3.890***	-0.799	-1.980**	-0.015	-0.240
Bank Size	0.022	2.830***	0.211	2.600***	0.006	3.990***
Credit Risk	-0.126	-2.690***	-0.315	-3.250***	-0.081	-4.530***
Liquidity	-0.001	-0.020	-0.785	-0.760	-0.126	-6.600***
Capitalization	0.149	2.220**	0.322	2.580***	0.029	1.280
Non-Traditional Activity	-0.001	-0.100	-0.012	-0.980	0.008	0.400
Size of Banking Industry	-0.022	-3.090***	-0.392	-0.520	-0.010	-0.780
GDP	-0.398	-1.590	-0.154	-0.770	-0.820	-2.320**
Inflation	-0.096	-1.430	-1.324	-0.290	-0.079	-0.970
Constant	0.130	0.400	0.534	0.360	0.327	0.780
AR(2)	-0.700		0.620		1.010	
p-value	0.485		0.536		0.310	
J-Statistics	19.010		159.000		165.900	
p-value	0.754		0.375		0.183	

***p<0.01,** p<0.05.

Source: Authors' estimation based on the model.

tionship can be explained by uncertainty and leverage relationship. When uncertainty in the market increases, banks demand higher lending rates and firms try to decrease a portion of debt in their capital structure [Levy and Hennessy (2007)], as banks cannot utilize their deposits effectively to get high returns. Rashid (2013) explained that macroeconomic uncertainty has negative impact on firms leverage decisions. In another study, Rashid (2014) revealed that when macroeconomic risk rises, firms are less likely to do external financing through debt. Hence, when volatility in stock exchange rises, banks demand higher lending rate. As the level of risk increases organizations do not go for debt financing and do not agree to give such higher rates; hence, banks cannot utilize their deposits effectively to get high returns. Results of statistics indicate that one per cent increase in stock market volatility will cause to decrease in ROA with 0.13 per cent and in ROE with 0.79 per cent. Tan and Floros (2012) have also established the relation of returns volatility and banking performance in China, but their study revealed positive relation between these variable.

Financial performance of banks proved to be lag dependent only in case of net interest margin where it shows a significant relationship with its own lag; the other two proxies of performance could not establish any relation with their lag. Bank size has significant positive impact on all proxies of banking performance; hence, bank size has proved the most significant variable in determining banking performance. Fadzlan and Kahazanah (2009) also reported a positive effect of bank size on performance of banks. Credit risk revealed a significant variable causing to reduce performance of banks in Pakistan and established an inverse relationship with all performance indicators of banks in Pakistan. It refers to a portion of non-performing loans in total loans as the level of non-performing loans rises it becomes dangerous for banks. Liu and Wilson (2013) claimed that credit risk as a negative determinant of banking performance in Japan. Liquidity in banking sector organization has significant effect on banking performance in terms of net interest margin. It also causes decrease in both the returns on assets and returns on equity, although this effect is not significant. Capitalization has shown a significant progressive relationship with banking sector returns in terms of return on assets and equity. A well-capitalized bank will be more profitable than its competitor banks. A well-capitalized bank refers to the bank that has more portion of shareholders' equity in its capital structure. As portion of shareholders' equity rises depositors gain more confidence and deposit their holdings to such institute. Clementina and Isu (2013) and Berger (1995) also claimed the positive relation between capitalization and banking performance. Non-traditional activity of banks and inflation has insignificant relation with all the performance indicators. NTA affects negatively to return on assets and equity while it also affects positively to the net interest margin. Inflation contributes negatively to the financial performance of banks and all its measures exhibit a negative relation with inflation prevailing in a country. The size of banking industry predicts the financial performance of banks negatively. In case of return on assets its impact is significant. The logic behind this relationship

is that when industry grows, it becomes difficult for banks to earn more profit because they would face more competition. GDP growth has also shown a negative relation with financial performance. The rationale behind this relationship can be drawn that as GDP growth of a country increase, competition in the banking sector is more by giving an opportunity to other bankers to come and work in the country; thus it will cause a decrease in performance.

3. Bank Size as Moderator

Bank size proved a significant variable in determining performance of banks. If the situation is favorable, larger banks have more opportunities to earn than the smaller ones. Milbourn, et al. (1999) explained that increasing bank size may offer strategic advantage in shape of increased profitability. However, at the time of higher systematic risk in environment, the larger banks have more to lose. The demand of high compensatory rate by banks in presence of high volatility tends to decrease the loan requests by borrowers. Rashid (2014) revealed that when macroeconomic risk rises, firms are

TABLE 3

GMM System Results Bank Size as Moderating Variable

	ROA		ROE	
Independent Variable	Coefficient	t-Stats	Coefficient	t-Stats
Banking Performance (-1)	-0.119	-0.330	0.005	0.070
Volatility	-0.121	-2.730 ***	-0.481	-1.030
Bank Size × Volatility	-0.005	-3.880 ***	-0.148	-1.970 **
Bank Size	0.023	2.970 ***	-0.060	-0.190
Credit Risk	-0.128	-2.720 ***	-3.070	-3.150 ***
Liquidity	-0.001	-0.040	-0.936	-0.900
Capitalization	0.147	2.170 **	3.416	2.650 ***
Non-Traditional Activity	-0.008	-0.070	-0.012	-0.950
Size of Banking Industry	-0.022	-3.100 ***	-0.344	-0.460
GDP	-0.401	-1.590	-1.831	-0.740
Inflation	-0.096	-1.420	-1.016	-0.220
Constant	0.113	0.350	14.040	0.570
AR(2)	0.640		0.630	
p-value	0.520		0.530	
J-Statistics	19.000		158.600	
p-value	0.755		0.361	

***p<0.01,** p<0.05.

Source: Authors' estimation based on the model.

less likely to do external financing through debts. Hence, the deposits of financial institutions cannot be managed efficiently in presence of high volatility in the market. The role of bank size in establishing volatility and performance relationship can be viewed in the following model. In the second step of research approach, when impact of stock market volatility was measured on banking performance, two among the three performance measures (i.e.. ROE and ROA) showed a significant relationship with returns volatility in stock market, and therefore, to check the moderating role of bank size in volatility and performance relationship only. these two performance measures were examined.

VII. Conclusion

Banks are main source of funds for different organizations working in an economy. Most frequent lending and borrowing from organizations, make banks able to run their business. The main chunk of profit of these banks comes from the interest difference between lending and borrowing. There are many factors that affect the profit of banks. Some of them are bank specific and some are macroeconomic. These variables are used in the model to investigate their impact on performance of banks. The results suggest that lagged value of ROE and ROA do not contribute significantly in performance determination while in case of NIM it positively predicts performance. Stock market volatility relates negatively with return on equity and assets. Bank size has significant positive relation with all the performance indicators, i.e., ROE, ROA and NIM. Similarly, credit risk of individual bank is significantly related negatively to these three performance indicators.

Capitalization of a bank, also contribute positively for performance of the banking system. ROE and ROA showed a significant positive relation with capitalization. Generally, well capitalized banks are more profitable than the others. Size of the banking industry is an essential factor in determining profitability of banks, as described earlier by the researchers. It has negative significant relationship with return on assets. As the size of banking industry rises an increased competition which a bank has to face, is viewed; and that is why, the rise in competition of industries makes rather difficult for banks to earn the same amount of profit which it was earning before. As discussed earlier the profitability of banks decreases at the time of high uncertainty in the market. Nevertheless, bank size plays an important role in establishing relation between volatility and profitability. When the impact of bank size is examined as moderator, the results reveal a negative relation in this nexus. This explains that in the time of high volatility banks profitability starts to decline, but this profitability decline is not the same for all sizes of banks. In other words, at the time of volatility its negative impact on banks with larger size is high. The larger banks are more exposed to the volatile conditions of stock market. The larger banks are more involved in non-traditional activities and so they have to face the crisis in larger extent.

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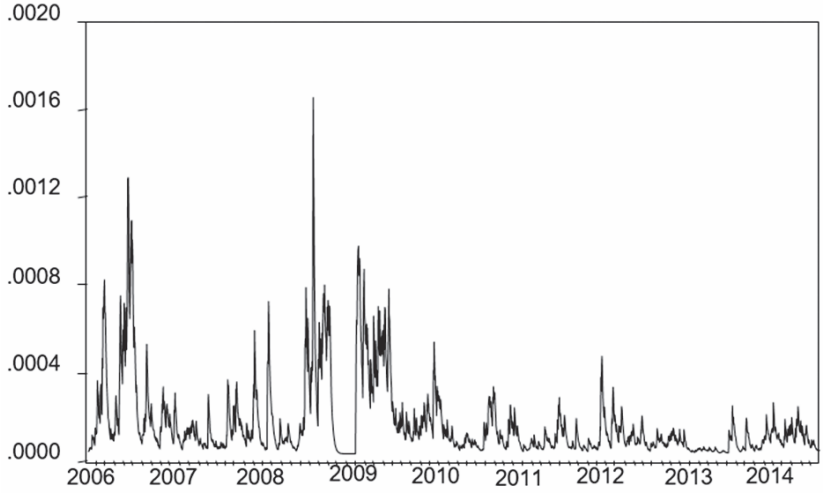
APPENDIX

TABLE A-1

Summary of Variables with Defination

Category of Variable	Name of Variable	Definition
Dependent	BF	Banking Performance
	ROE	Return on Equity
	ROA	Return on Assets
	NIM	Net Interest Margin
Independent	Vol	Annualized volatility in share return of Stock exchange
Moderator	BSize	Log of total Asset of specific bank
Control Variable		
i) Bank Specific	CR	Ratio of Non-performing loans to total loans
	Liq	Ratio of Loans to Assets
	Cap	Ratio of Shareholders Equity with total Assets
	NTA	Ratio of Non-interest income to Gross Income of Bank
ii) Macro Economic	SBI	Log of total asset of banking industry
	GDP	Growth rate in Gross domestic product
	Inf	Growth in Money supply

Source: Proxies of variables are used from different studies mentioned in Section IV: Operational Definition of Variables of this paper.

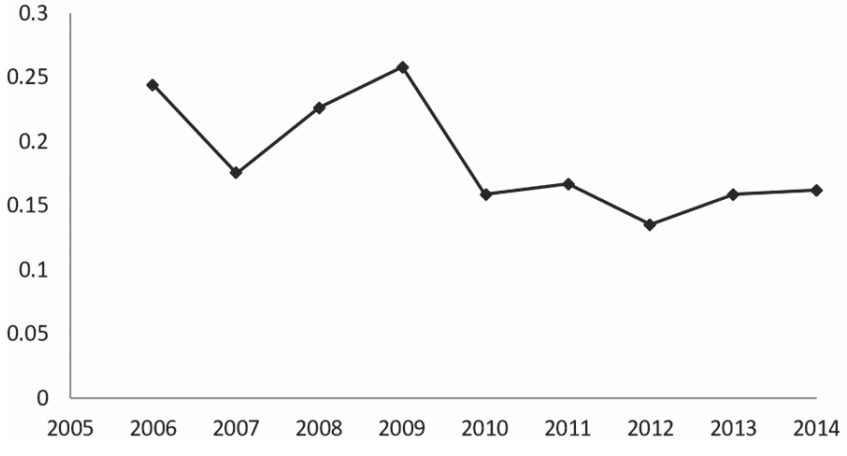


Daily Returns Volatility

Source: Authors' calculation.

FIGURE A-1

Returns Volatility by using GARCH Model



Annual Stock Market Volatility

Source: Authors' calculation.

FIGURE A-2

Annualized Volatility in KSE-100 Index