Profitability of the Banking Sector of Pakistan: Panel Evidence from Bank-Specific, Industry-Specific and Macroeconomic Determinants

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Abstract

This study investigates determinants of banks' profitability in Pakistan by using the panel data of 18 banks from the period of 2001 to 2010. Pedroni panel cointegration results confirm that there exists valid long run relationship between considered variables. Results of random effects model suggest negative and significant effect of bank size, credit risk, liquidity, taxation, and nontraditional activity with profitability. Conversely, positive and significant effects of capitalization, banking sector development and inflation have been found with profitability. However, the stock market development has negative but insignificant relationship with profitability. Sensitivity analyses confirm that the results are robust.

Key words: Profitability, Banks, Panel Data, Credit Risk

JEL Classification: G21, E44, L8

1. Introduction

Dynamic and sprout banking is imperative and mutually beneficial for the economic growth because it magnetizes each other in a way, banks receive deposits from individuals and provide loans to the investors who establish industries and start production which create employment opportunities and boost economic growth. The strength of banking system is essential to ensure the financial stability in an economy. Banking is the main component of financial sector which perform various functions for instance risk and asset management, follow central bank prudential regulations; manage profitability and appreciation of equity market. Many researchers argue that without a strong and sustainable financial system economic and financial growth is unattainable[1].

Banking is considered as one of the most performing and contributing service sector in an economy because it encourages people to save and invest in productive streams and become contributing individuals of a nation and it also provides security and ensure safety of investments and savings[2].Today banking is no more conventional as advancement in technology like online banking has heightened the competition among banks at both national and international level.[3]

Now-a-days banks are exposed to various internal and external factors which affect their profitability. Internal factors are those over which a bank's management has control. These factors include bank size, credit risk, liquidity, taxation, capitalization and non-traditional activity. External factors are those over which the management of the bank lacks control. These factors generally related to the industry and macroeconomic variables within which the banks operate. These factors are banking sector development, stock market development and inflation.

[1] Rajan and Zingales (1998), Levine and Zervos (1998)
[2] Sufian and Habibullah (2009)
[3] Alper and Anbar (2011)

Bank Size shows the strength of bank in its assets with respect to their quantity. It can be measured by relative share of each bank upon sum of all assets of all banks in an economy. Large banks may be able to exert market power through stronger brand image and abnormal profits could be obtained through the exercise of market power in wholesale or capital markets, which may also positively affect the profitability of larger banks.[4] Conversely, bank size has negative impact on profitability due to aggressive diversification strategy of banks, to minimize risk which leads to lower returns thus decreases profitability.[5]

Credit risk refers to the risk that a borrower will default on any type of debt by failing to make payments which it is obligated to do. It is one of essential component to determine profitability, as risk cannot be eliminated but minimized which leads to rise in profits because secure lending minimize loan loss provisions and enhance profitability.[6] A negative relationship reported between credit risk and profitability, due to higher risk associated with loan which results in high level of loan loss provisions; due to this banks are unable to follow the profit-maximization rule.[7]

Liquidity means the possible inability of banks to accommodate decreases in liabilities or to fund increases on the assets' side of the balance sheet, liquidity is considered an important determinant of bank profitability. A larger share of loans to total asset should imply more interest revenue because of higher risk. Thus, one would expect a positive relationship between liquidity and profitability. [8]

Tax is a compulsory payment levied by the state on its inhabitants in order to finance the government expenditures for the developmental purposes. Banks are also subject to direct

[4] Goddard et.al (2004)
[5] Bannaceur and Goaied (2008)
[6] Morgan Jr and Muztagh (2012)
[7] Miller and Noulas (1997)
[8] Bourke (1989)

taxation, a negative relation of taxation on profitability has been reported because the more taxes paid by the bank, the higher cost incurred by the bank, thus decrease the profitability. [9]

Capitalization particularly in banking is defined as shareholder's equity to total assets. It demonstrates to be an important factor in explaining the performance of financial institutions. It can be considered a cushion to raise the share of risky assets, such as loans. When market conditions allow a bank to make additional loans with a beneficial return, it should imply higher profitability but an increase in capital may raise expected earnings by reducing the expected cost of financial distress including bankruptcy.[10] Banks with more capital should be able to lower their funding cost because large share of capital is an important indicator of their creditworthiness. [11]

Non-traditional activity means the income generated by the bank through non interest source for instance the income generated by the banks through online transaction charges, demand draft fees, bill collection fees etc. It is also one of the essential component that affects profitability because when banks are more diversified, they can generate more income resources, thereby reducing its dependency on interest income which is easily affected by the adverse macroeconomic environment. Diversified banks appear to be more profitable due to nontraditional activity.[12] On the other hand, trade in currencies, derivatives and credit cards provisions exert a negative impact on profitability due to intense competition among banks internationally.[13]

Banking Sector Development shows the efficiency of banks in an economy with respect to economic growth, the higher ratio of bank assets to GDP implies that there is high demand for

[9] Hameed and Bashir (2003), Tan and Floros (2012)
[10] Berger (1995)
[11] Molyneux(1993)
[12] Jiang et al. (2003)
[13] Demirguc-Kunt and Huizinga (1998), Gischer and Jutter, (2001)

banking services, which in turn, attracts more potential competitors to enter the market. It is argue that due to high government barriers the potential banks are repelled to enter into banking industry may stagnant their profitability.[14] The financial development can improve the efficiency of banking sector in underdeveloped countries by adopting efficient and less-than-competitive pricing behaviors. [15]

Stock market development is one of the essential component while determining the profitability of any firm because it provides improved availability of equity finance to firms so that it can reduce its risks of loan default, increase its lending capacities and allow it to be better capitalized, improved information availability on publicly traded firms makes it easier for banks to evaluate and monitor credit risks associated with them.

The profitability of banks is not only influenced by internal factors but also by the macroeconomic factors. Inflation is a vital macroeconomic factor and it also has its impact on profit of banks. Inflation has positive impact on bank profitability when it's anticipated because it gives bank to adjust their interest rates accordingly, hence the bank's revenue increases faster than costs which boost their profitability.[16] In some studies researchers also found negative effects of inflation on banks' profitability due to unexpected raises in inflation causes cash flow difficulties for borrowers which can lead to premature termination of loan arrangements and results rapid loan losses.[17]

Motivation of the Study

In developed countries there have been lot of researches conducted to analyze the determinants of banks profitability, although various researchers have studied on panel of

[14] Tan and Floros (2012)
[15] Demirguc-Kunt and Huizinga (1998)
[16] Tan and Floros (2012)
[17] Perry (1992), Sufian and Chong (2008), Sufian and Habibullah(2009)

multiple countries, which does not give the clear picture of actual determinants of bank profitability of an individual country, because those researches represents the whole region.[18] Furthermore research on countries like Pakistan is relatively scant.

This is the first ever study in Pakistan which investigates three different groups of determinants affecting profitability, namely the bank-specific, industry-specific and macroeconomic variables. This research seeks to identify the factors influencing the profitability of 18 Pakistani banks from the period of 2001 to 2010. During this period State Bank of Pakistan has executed financial sector reforms which particularly focused on rejuvenation of banking, adaptation of advance technologies like internet based computerized banking software, consolidation, lending to small and medium enterprises, agricultural and housing sector. These current changes by State Bank of Pakistan may encourage the financial development in Pakistan which leads to economic growth.

Our study is entirely different from the previous studies in four different ways. First, we analyzed the desire relationship on a panel of 18 banks covering the time period from 2001 to 2010 whereas in past studies various researchers have used short time period by using data ranging from five to seven years respectively in their studies.[19]

Second, in past studies researchers did not use any panel co-integration technique to analyze the long run relationship between considered variables.[20] In this study we use a pioneering methodological contribution that is Pedroni's panel co-integration framework.[21] Instead of using other co-integration methods of panel data Pedroni's co-integration has several advantages, for instance it controls the biasness from cross-section and resolves the issue of

[18] Levine and Zervos (1998), Hameed and Bashir (2003), Kosmidou (2008), Naceur and Omran (2011)
[19] Ramlall (2009), Horvath (2009) Sufian (2010).
[20] Levine and Zervos (1998), Goddard et.al (2004), Sufian and Habibullah (2009),Tan and Floros (2012)
[21] See, Pedroni (1999)

heterogeneity.[22] This ensures that our conclusion regarding the co-integration relationship between the determinants of bank profitability is accurate and reliable results as compare to past studies.

Third, in most of the previous studies they were restricted to a particular econometric technique to analyze the behavior of co-efficients of focus variables.[23] In this study we use four different econometric techniques namely Pooled Ordinary Least Square (POLS), Generalized Method of Moments (GMM), Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) respectively in order to ascertain the robustness of the results. Fourth, in past studies, researchers only discussed the long run co-efficients of focus variables but they did not discuss the causal relationship.[24] In this research, to better understand the causal relationship between considered variables, we use panel Granger causality test.

This paper is organized in five sections which start from introduction, section 2 represents previous literature, section 3 provides methodology, section 4 represents long run estimations, section 5 shows results from sensitivity analyses, section 6 represents the results of causality analysis while last section concluded the study and give policy implications.

2. Literature Review

In this section, to develop a better understanding from previous studies regarding the determinants of banks profitability some literature is studied.

Molyneux and Thornton (1992) were the first to explore thoroughly the determinants of bank profitability on a sample of 18 European countries during the 1986 to 1989 period. They

[22] Das and Choudhary (2011)
[23] Kosmidou (2008), Sufian and Habibullah (2009), Naceur and Omran (2011), Alper and Anbar (2011)
[24] Goddard et.al (2004), Ramlall (2009) Sufian (2010), Alper and Anbar (2011), Naceur and Omran (2011), Tan and Floros (2012), Saad and Moussawi (2012)

found a significant positive association of bank concentration and government ownership with profitability.

Turen (1996) analyzed the profitability of Islamic banks in Bahrain from 1979 to 1989. Profitability has been measured from three different perspectives which are profitability ratios, financial ratios and their risk levels by measure of dispersion method. Results show that the financial ratio analysis and stock analysis both revealed that Islamic banks in Bahrain offers higher return and a lower coefficient of variation as compare to conventional banks. It is recommended that bankers may achieve an above average performance at a moderate level of risk by using the profit sharing concept of Islamic banks as compared to the interest based banking system of conventional banks.

Chaudhry *et.al* (1995) analyzed the determinants of commercial banks profitability in U.S. from the time period of 1970 to 1985. Multivariate regression was applied to obtain results which show that the stability of commercial banks is dependent on the size of bank. Variables like loan loss provision and real estate residential loans was found to be insignificantly related to the profitability of banks, moreover only the state securities investment variable was found to have a positive impact on the profitability of banks other variables have a contingent relation and depend on the interest rates.

Vivas (1997) analyzed the profit efficiency of Spanish banks from 1986 to 1991 by using thick frontier profit function model. Results revealed that revenue inefficiencies were greater than cost inefficiencies for Spanish savings banks that reportedly a profit downfall from 32% in 1986 to 19% in 1991. It was analyzed that savings banks experienced no significant impact in frontier profits during 1986 to 1991 because apparently they preferred to sacrifice their short term profits in order to expand their market share.

Kunt and Huizinga (1998) analyzed the determinants of commercial banks profitability using bank data of 80 countries from the time of period 1988 to 1995 by using weighted least square method. They incorporated various factors like bank characteristics, macroeconomic conditions, implicit, explicit taxes and general financial structure. They found that well capitalized banks have higher profitability due to low cost of funding because of lower perspective of bankruptcy cost. Inflation has higher realization interest margin and has positive impact on profitability because when inflation increases bank are able to adjust their cost hence their revenue increase faster than cost which boost profitability.

Barajas et al. (1999) examined the impact of financial liberalization on bank's profitability in Colombia. They bifurcate the data into two different periods: pre-liberalization period from 1974 to 1988, and post-liberalization period from 1991 to 1996. Results showed that overall spread has not declined after financial reform, the relevance of the different factors behind the bank spreads were affected by such measures. Another change linked with the liberalization process was the increase of the coefficient of loan quality after the liberalization.

Goddard *et.al* (2004) analyzed the profitability of European banks from 1992 to 1998 by using Auxiliary regression analysis. They found that there exists positive relationship between bank profitability and risk, whereas bank size has insignificant impact on profitability. Bannaceur and Goaied (2008) investigate the profitability of commercial banks in Tunisia from 1980 to 2000 by using panel econometric model and regression analysis. They found that bank loans and capitalization of market stocks have a positive impact on profitability whereas bank size has a significant negative effect on profitability. They recommended that the profitability of Tunisian banks can be enhanced through national regulation programs and authentication of capitalization of banks, development of equity market and the privatization of state owned banks.

Kosmidou (2008) examined the profitability of Greece banks in the era of financial integration in European Union (EU) from the time period of 1990 to 2002 of 23 commercial banks in Greece. Results of multiple regression reveal that bank size and banks' capitalization has positive impact on profitability while inflation has a negative relationship with banks' profitability.

Sufian and Chong (2008) determined the profitability of banks in Philippines from the period of 1990 to 2005 by using multivariate regression technique. They found that bank size and credit risk have a negative relation with profitability whereas non interest income and capitalization are positively related. There is a negative influence of inflation on banks profitability. They recommended adding further variables like taxation, regulations, quality of offered services and exchange rates with addition of frontier techniques and statistical cost accounting for future study.

Sufian and Habibullah (2009) examined the profitability of Chinese banking sector from the period of 2000 to 2005 by using multivariate regression analysis. They found that capitalization, liquidity risk and credit risk have positive impact on profitability of state owned commercial banks whereas overhead cost has negative impact on the profitability. They recommend that banks should offer cost efficient products and services as well as they should employ optimal utilization capabilities and use the best of their resources. Moreover stable and sustaining competitive return is an important component of competitiveness in Chinese banking sector.

Horvath (2009) analyzed the determinants of profitability of Czech banks from the period of 2000 to 2006 by using regression analysis. Results revealed that high capital adequacy is

linked with low profitability, banks with higher loans to total assets ratio have high profitability, and inflation has positive impact on profitability.

Sufian and Habibullah (2010) analyzed the performance of banks during the financial crisis in Indonesia by using data from 1990 to 2005. Results of linear regression shows that bank profitability is certainly associated with income diversification whereas bank size has negative influence. The profitability of banks has been positively influenced by the economic growth whereas financial crisis in Asia has negatively influenced. Researchers recommend further study by adding additional variables like taxation, offered services and exchange rates.

Naceur and Omran (2011) studied the influence of regulation on bank, financial reforms and competition on performance of banks in Middle East and North Africa (MENA) countries namely, Tunisia, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Saudi Arabia, and United Arab Emirates from the period of 1988 to 2005 by using multiple regression technique. Results show that credit risk and market capitalization of stock has a positive influence on the profitability of banks, efficiency of cost and net interest margin and all macro economic variables are insignificant excluding inflation which show that when it increases the bank tolerate negative inflation cost.

Alper and Anbar (2011) analyzed macroeconomic, bank specific determinants of profitability of commercial banks from 2002 to 2010 in Turkey by using multiple regression. Results show that there exists a positive relationship between asset size and non-interest income with profitability, while negative relationship exists between loans and profitability. They recommended that the profitability of banks can be enhanced by increasing non interest income and bank size. .

Saad and Moussawi (2012) analyzed the profitability of commercial banks of Lebanon from the time period of 2000 to 2010. Results of regression analysis show that inflation does not represent the determinant of profitability. Credit risk and profitability are inversely proportional to each other. On the other hand, operating cost has insignificant impact on banks profitability.

Tan and Floros (2012) evaluated the banks' profitability in China from the time period 2003 to 2009 by using econometric approach. Results revealed that high cost efficient, stock market development and high rate of inflation have positive impact on profitability while bank size, taxation and nontraditional activity have negative impact on profitability.

3. Methodology

After reviewing the empirical studies, the model to analyze the determinant of banks' profitability in Pakistan for empirical estimations as follows:

$$BP_{i,t} = \alpha_0 + \beta_1 BS_{i,t} + \beta_2 CR_{i,t} + \beta_3 LIQ_{i,t} + \beta_4 TAX_{i,t} + \beta_5 CAP_{i,t} + \beta_6 NTA_{i,t} + \beta_7 BSD_{i,t} + \beta_8 SMD_{i,t} + \beta_9 INF_{i,t} + \varepsilon_{i,t}$$

In the above model *i* represent the number of banks in the panel and *t* represents the number of observations over time. *BP* is bank profitability, *BS* is bank size in terms of their assets, *CR* is credit risk in terms of loan loss provisions to total loans, *LIQ* is liquidity in terms of loans to total assets ratio, *TAX* is taxation in terms of ratio of tax to operating income before tax, *CAP* is capitalization of banks measured by multiplying share price with company's outstanding shares, *NTA* is nontraditional activity of banks computed by dividing noninterest income to total interest revenue earned, *BSD* is banking sector development computed by ratio of bank assets to GDP, *SMD* is stock market development computed by market capitalization of listed companies to GDP and *INF* is inflation which is the annual inflation rate.

Insert Table 3.1 here

In this study the annual panel data of 18 Pakistani banks have been used from 2001 to 2010 as shown above in Table 3.1. All data are gathered from the official database of State Bank of Pakistan and World Bank. Im Pesaran and Shin and Levin, Lin and Chu unit root tests are used to examine the stationary properties for long run relationship of variables. The present study also employs the Pedroni (1999) panel cointegration technique to analyze the long run relationship among variables. In this study we use four different econometric techniques namely Pooled Ordinary Least Square (POLS), Generalized Method of Moments (GMM), Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) respectively in order to ascertain the robustness of the results. We have also used Granger causality test to analyze the causal relationship between considered variables.

4. Results and Estimations

To check the stationary properties of variables, we use lm, Pesaran and Shin and Levin, Lin and Chu unit root tests. Table 4.1 represents the results of stationary tests. This test is applied first on level of variables then on their first difference.

Insert Table 4.1 here

Results of table 4.1 show that all variables are stationary and integrated at first difference. This signifies that series of variables may exhibit a valid long run relationship. Since possibly valid long run relationship in our dataset has been seen by the stationary results from two different unit root test, we use the long run cointegration relationship between our considered variables by using co integration technique developed by Pedroni (1999). The Pedroni's panel co-integration approach has several advantages upon other co-integration method of panel data. This approach controls the biasness from cross section and also solves the issue of

heterogeneity.[25] A panel co-integration technique is examined by analyzing the variables and residuals of a model. The variables should be co-integrated on ***I***(1) while the residuals should be ***I***(0) if the variables are co-integrated. The residuals of the hypothesized co-integration equation can be established from the following equation.

$$BP_{i,t} = \alpha_0 + \beta_1 BS_{i,t} + \beta_2 CR_{i,t} + \beta_3 LIQ_{i,t} + \beta_4 TAX_{i,t} + \beta_5 CAP_{i,t} + \beta_6 NTA_{i,t} + \beta_7 BSD_{i,t} + \beta_8 SMD_{i,t} + \beta_9 INF_{i,t} + \phi it + \varepsilon_{it}$$

Where i=1,…..,N; t=1,…..,T, and N is the number of banks in the panel and T is the number of observations over time. The estimated residuals become:

$$\varepsilon_{it} = \rho_i \varepsilon_{it-1} + \nu_{it}$$

When the residual is *I*(1) and $\rho_i = 1$ then this is the null hypothesis of no co integration. The alternative hypotheses are two. First, for all *i* the homogenous alternative (within dimension test), ($\rho_i = \rho$) <1 and second is for all *i* heterogeneous alternative (between dimension or group statistics) ρ_i <1.

Pedroni (1999) panel co integration consists of seven cointegration statistics in which three are based on group statistics by making a use of appropriate mean and variance while other four statistics are based on within dimension test. In these statistics the asymptotic distribution follows normal distribution.[26]

$$K = \frac{K_{NT} - \mu\sqrt{N}}{\sqrt{\upsilon}} \Rightarrow N(0, 1)$$

[25] Das and Choudhary (2011)
[26] See Pedroni (1997)

In above distribution μ and υ are the moments of Brownian function whereas K_{NT} shows related form of test statistics with respect to *N* and *T* which are represented in Pedroni (1999) while the determinants of the numerical values of μ and υ are the number of regressors, time trend and the existence of constant in the co integration test regression.

Insert Table 4.2 here

Table 4.2 represents the results of Pedroni's panel cointegration. Results show that panel ADF and PP statistics and group ADF & PP statistics based on both within dimension and group based approach statistics reveal the rejection of null hypothesis of no cointegration which signifies alternative that determinants of banks profitability in Pakistan are co-integrated. The group statistics has the best ability to judge the cointegration among the test statistics of Pedroni (1999).[27] It is concluded that our considered variables exhibit a valid long run relationship.

Insert Table 4.3 here

Wald test is used to analyze the cross section and period effects in the model. First we test the cross section effects; the null hypothesis is that cross section effects are absent. The second null hypothesis for period effects is that the period effects are absent. Results of Wald test indicate that both hypothesis are rejected and there is a significantly difference in determinant of banks profitability across the bank and time as well in Pakistan.

Hausman test is used to identify the most preferable method between fix and random effects model.[28]The null hypothesis of Hausman test is that the country effects are not correlated with the other regressors in the model.[29]If the country effect is correlated (null hypothesis is rejected), a random effect model is violating the basic assumption of Gauss-Markov and

[27] Guterrez (2003)
[28] See Greene (2000) pg. 576-577
[29] See Hausman (1978)

produces biased estimators. If null hypothesis is rejected then fixed effect model is preferred. Consequently if the null hypothesis is accepted then the estimated result of random effect model is preferred and one should focus on random effect model's results hereafter. The results of Hausman test indicate that null hypothesis is accepted and random effect model is preferred.

Wu Hausman test[30] is used to analyze the exogenous properties of estimated model. The rejection of null hypothesis indicates the presence of endogeneity in the model. The endogeneity is an issue when there is a correlation between the parameters and the error term. The results of Wu Hausman test indicates that null hypothesis is not rejected that's mean there is no simultaneity exist between the determinants of profitability of banks in Pakistan. The acceptance of null hypothesis also concludes that the estimators are unbiased and consistent.[31]

From the above discussion it is clear that two way random effect is preferred for this study. Results of random effect model represent in Table 4.4.

Insert Table 4.4 here

Table 4.4 shows the results of random effect estimations. The first variable is banking sector development. Results reveal that there is significant and positive impact of banking sector development on banks' profitability in Pakistan. The co-efficient of banking sector development (BSD) shows higher contribution towards profitability, its signifies that in long run 1% increase in BSD will increase the profitability of banks by 0.30%. It implies great demand for banking services which contribute in the economic growth of the country because high bank assets to GDP ratio imply financial development in an economy. This result is consistent with the findings of Demirguc-Kunt and Huizinga (1998) and Tan and Floros (2012).

[30] See Greene (2000) pg. 385-386
[31] See Greene (2000) pg. 654

The second variable is Capitalization. Results show that capitalization has significant positive impact on banks' profitability in Pakistan. The co-efficient of Capitalization (CAP) shows higher contribution towards profitability, its signifies that in long run 1% increase in CAP will increase the profitability of banks by 0.009%. It implies that well capitalized banks will be able to provide quality services and have sufficient capacity to lend advances to the consumers hence it will enhance their profitability because more loan would generate more revenues. This result is consistent with Garcia-Herrero et al. (2009) and Tan and Floros (2012).

The coefficient of Inflation (INF) has positive and significant effect on profitability. It shows that 1% increase in inflation causes increase in profitability by 0.057% because when inflation is anticipated it gives banks the opportunity to adjust their interest rates accordingly, resulting in revenues that increase faster than costs, with a positive impact on profitability. This result is consistent with Guru *et al.* (2002), Jiang *et.al* (2003), Pasiouras and Kosmidou (2007), Fadzlan and Kahazanah (2009), Garcia-Herrero et al. (2009) and Tan and Floros (2012).

Among all negative relationship Bank Size (BS) has negative and significant impact on profitability. It shows that 1% increase in bank size will decrease the profitability by 0.008% because banks assets can be increased by debt financing as a result banks have to pay interest expense which is a cost as it increases, it erodes the profitability also due to aggressive diversification strategy of banks, to minimize risk which leads to lower returns thus decreases profitability. This result is consistent with Bannaceur and Goaied (2008) and Tan and Floros (2012).

The coefficient of Credit Risk (CR) has significant negative impact on profitability. It shows that 1% increase in credit risk will decrease the profitability by 0.008% because that the financial institutions being more exposed to high risk loans increase the accumulation of unpaid

loans and decrease the profitability. This result is consistent with Miller and Noulas (1997) and Tan and Floros (2012).

The coefficient of Liquidity (LIQ) has significant negative impact on profitability. It shows that 1% increase in liquidity will decrease the profitability by 0.005% due to large number of advances, banks may be locked in their positions and unable to stop accumulating losses. The forced extension of the investment horizon leaves banks with substantial exposure to credit risk. This result is consistent with Molyneux and Thornton (1992).

The coefficient of taxation has significant negative impact on profitability. It shows that 1% increase in taxation will decrease the profitability by 0.005% because the more taxes paid by the bank, the higher cost incurred by the bank, thus decrease the profitability. This result is consistent with Bourke (1989) and Tan and Floros (2012).

The coefficient o nontraditional activity (NONTA) has negative and significant impact on profitability. It shows that 1% increase in nontraditional activity will decrease the profitability by 0.019% due to the aggressive competition among banks at national and international level. This result is consistent Demirguc-Kunt and Huizinga (1998) and Gischer and Jutter (2001).

The coefficient of stock market development (SMD) has positive but insignificant impact on profitability. This result is consistent Demirguc-Kunt and Huizinga (1998) and Gischer and Jutter (2001). The possible reason of this insignificant effect is that the stock market development make certain the strengthen of financial sector of economy but it does not directly affect the profitability of banks. Therefore, the relationship between stock market development and banks' profitability is insignificant.

5. Sensitivity Analysis

In this section to check the robustness of initial results four different sensitivity analyses have been performed namely; pooled ordinary least square (*POLS*), generalized methods of moments (*GMM*), dynamic ordinary least square (*DOLS*) and fully modified ordinary least square (*FMOLS*).

Insert Table 5.1 here

5.1 Pooled Ordinary Least Square (*POLS*)

The robustness in the initial results of determinants of banks' profitability in Pakistan is firstly examined by using pooled ordinary least square (*POLS*) estimations procedure. Attanasio et al. (2000) argue that even simple *OLS* estimations may be appropriate when the sample period is big enough. In table 5.1 the results of pooled ordinary least square estimations of banks' profitability model confirms that the coefficients of all determinants remain same sign and significance after using simple pooled ordinary least square estimations. The coefficients of all determinants are also almost same as in the random effect model.

5.2 Generalized Methods of Moments (*GMM*)

The robustness in the initial results of determinants of banks' profitability is secondly examined by generalized methods of moments (*GMM*) estimations procedure. Generalized Method of Moments (*GMM*) technique for panel data first developed by Arrellano and Bond (1991) and later subsequently expanded by Blundell and Bond (1998). We have employed generalized methods of moments (*GMM*) technique in order to avoid for the possible endogeneity of considered variables.

Table 5.1 also represents the results of generalized methods of moments estimations of economic growth model. Results confirm that the coefficients of all determinants remain same

sign and significance after using generalized methods of moments (*GMM*) estimations. The coefficients of all determinants are also almost same as in the random effect model.

5.3 Dynamic Ordinary Least Square

The robustness of the relationship between dependent variable and explanatory variables is also tested through Dynamic Ordinary Least Square (*DOLS*) technique developed by Stock and Watson (1993). This method involves estimating the dependent variable on explanatory variable by using the levels, leads and lags of the explanatory variable. This method resolves the issues of small sample bias, endogeneity and serial correlation problems by adding the leads or lags of explanatory variable (Stock and Watson, 1993).

Table 5.1 also represents the results of dynamic ordinary least square of economic growth model. We have run our model of *DOLS* by taking the lead and lag of 2. Results confirm that the coefficients of all determinants remain same sign and significance after taking the different lag and lead in the model. The coefficients of all determinants are also almost same as in the random effect model.

5.4. Fully Modified Ordinary Least Square (*FMOLS*)

The fully modified ordinary least square technique developed by Philips and Hansen (1991) is also used to analyze the robustness of our initial results of random effect model. *FMOLS* provides the optimal estimates of the cointegration equation.[32] The *FMOLS* modifies the *OLS* to control the problems of serial correlation and endogeneity in the regressors that results from the existence of a cointegrating relationship.[33] Results of *FMOLS* are also presented in table 5.1.

[32] Bum and Jeon (2005)
[33] See, Philips and Hansen (1990), and Hansen (1995)

Results of *FMOLS* confirm that the coefficients of all determinants remain same sign and significance as in the random effect model. The coefficients of all determinants are also almost same as in the random effect model.

From above, all sensitivity analyses show that the coefficient of all considered determinants of banks' profitability have remain same sign and significance even magnitude is also almost same as in random effect model. These findings confirm that the initial results are robust.

6.1. Granger Causality Analysis

The direction of causality between dependent and independent variables is analyzed by panel Granger causality test. We determine the causality analysis of our profitability of banks model on lag one. Jones (1989) favors the ad hoc selection method for lag length in Granger causality test over some of other statistical method to determine optimal lag. The results of Granger causality test are reported in table 6.1.

Insert table 6.1 here

Results of table 6.1 confirm that the bidirectional causal relationship of profitability of banks is found with liquidity, taxation, capitalization and banking sector development. Conversely, unidirectional causal relationship of profitability of banks is found with bank size, credit risk, nontraditional activity and inflation. The direction of causality is runs from considered variables to profitability of banks of Pakistan. There is no causal relationship is found between stock market development and profitability of banks of Pakistan.

7. Discussion and Policy Implications

This study is the first ever attempt in Pakistan to investigates three different groups of determinants affecting profitability of banks, namely the bank-specific, industry-specific and

macroeconomic variables by using the panel data of 18 banks from the period of 2001 to 2010. Pedroni panel cointegration results confirm that there exists valid long run relationship between considered variables in Pakistan. Hausman test confirms that the random effect model is more appropriate than fixed effect model. Results of random effects model suggest negative and significant effect of bank size, credit risk, liquidity, taxation, and nontraditional activity with profitability of Pakistani banks. Conversely, positive and significant effects of capitalization, banking sector development and inflation have been found with profitability. However, the stock market development has negative but insignificant relationship with profitability.

Sensitivity analyses have been performed to check the robustness of the initial results by applying pooled ordinary least square, generalized methods of moments, dynamic ordinary least square and fully modified ordinary least square estimations procedure. Sensitivity analyses confirm that the results are robust. Results of panel Granger causality test confirm that the bidirectional causal relationship of profitability of banks is found with liquidity, taxation, capitalization and banking sector development. Conversely, unidirectional causal relationship of profitability of banks is found with bank size, credit risk, nontraditional activity and inflation. The direction of causality is runs from considered variables to profitability of banks of Pakistan. However, there is no causal relationship is found between stock market development and profitability of banks of Pakistan.

It is recommended that the more profitable bank will be able to offer more new products and services. To this end, the role of technology advancement is particularly important given that a bank with relatively more advanced technologies may have added advantage over its peers. The continued success of the Pakistan banking sector depends on its efficiency, profitability, and competitiveness. Furthermore, in view of the increasing competition attributed to the more

liberalized banking sector, bank managements as well as the policymakers will be more incline to find ways to obtain the optimal utilization of capacities as well as making the best use of their resources, so that these resources are not wasted during the production of banking products and services.

Moreover, the ability to maximize risk adjusted returns on investment and sustaining stable and competitive returns is an important element in ensuring the competitiveness of the Pakistan banking sector. Thus, from the regulatory perspective, the performance of the bank will be based on their efficiency and profitability. The policy direction will be directed towards enhancing the resilience and efficiency of the financial institutions with the aim of intensifying the robustness and stability of the banking sector. In addition to this following are some valuable recommendations for banks' to enhance their profitability.

The banks should thoroughly analyze the credit worthiness of borrower before lending and they should acquire collateral have sufficient monetary value so that in case of default the bank not only take over the collateral security but also gain profit on sale of that particular security. It will reduce the less loan loss provisions (bad debts) thus increase profitability. The bank size in terms of total assets should be diversified up to certain limit because it leads to lower credit risk and thus lower returns, as bank raise its assets by two ways; debt or equity financing on debt financing bank has to pay interest which is a cost thus, higher total assets with less earning assets leads to lower profitability.

The banks should adhere to the development of the equity market in order to improve their profitability as stock market development plays an important role in financial development of country. The banks should offer quality services to its customers particularly organizations for instance collection of payments through offices give a secure and risk free environment to the

organization due to law and order situation, and charge sizeable fees for it, can increase revenue of banks from non-traditional activity. Banks should anticipate inflation because it give banks' the opportunity to adjust their interest rates accordingly, resulting in revenues that increase faster than costs, with a positive impact on profitability.

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Table 3.1: List of Sample Banks of the Study

Sr. No	Banks
1	Allied Bank Ltd.
2	Askari Bank Ltd.
3	Bank Alfalah Ltd.
4	Bank Al Habib Ltd.
5	Faysal Bank Ltd.
6	First Women Bank Ltd.
7	Habib Bank Ltd.
8	Industrial Development of Pakistan.
9	KASB Bank Ltd.
10	MCB Bank Ltd.
11	Habib Metropolitan Bank Ltd.
12	My Bank Ltd.
13	National Bank of Pakistan.
14	Punjab Provincial Commercial Bank Ltd.
15	Silk Bank Ltd.
16	Soneri Bank Ltd.
17	The Bank of Khyber.
18	United Bank Ltd.

Table 4.1: Stationary Test Results

Variables	Im, Pesaran and Shin				Levin, Lin and Chu			
	I(0)		I(1)		I(0)		I(1)	
	C	C&T	C	C&T	C	C&T	C	C&T
BP	-0.157	-0.413	-2.593*	-3.998*	-0.2584	-0.5578	-4.047*	-7.627*
BS	0.714	0.363	-1.774**	-3.258*	0.505	1.400	-2.927*	-3.163*
CR	-0.998	-1.159	-6.672*	-4.991*	-0.785	-0.885	-7.824*	-8.119*
LIQ	0.293	-0.508	-3.934*	-1.674**	0.792	-0.048	-8.246*	-11.205*
TAX	0.073	0.654	-2.133**	-5.221*	-0.775	-0.993	-4.250*	-7.420*
CAP	-0.754	-1.014	-4.178*	-1.510***	-0.574	-0.678	-8.128*	-9.101*
NTA	-0.946	-1.222	-7.005*	-3.466*	-0.318	-0.499	-11.811*	-13.683*
BSD	-0.297	0.367	-2.281**	3.352*	-0.217	-0.998	-4.881*	-1.635***
SMD	-1.134	-1.112	-7.130*	-7.234*	-1.234	-1.115	-8.224*	-11.492*
INF	-0.681	-0.834	-1.568***	-4.108*	-0.687	-1.034	-1.987**	-4.361*

*, **, *** indicates significance level respectively at 1%, 5% and 10%.
Source: Authors' estimation.

Table 4.2 : Panel Cointegration

Estimates	Stats.	Prob.
Panel v-statistic	-4.231	1.000
Panel rho-statistic	4.167	1.000
Panel PP statistic	-20.294	0.000
Panel ADF statistic	-4.805	0.000
Alternative Hypothesis: Individual AR Coefficient		
Group rho-statistic	6.058	1.000
Group PP statistic	-29.415	0.000
Group ADF statistic	-3.877	0.000

Note: The null hypothesis of Pedroni's (1997) panel cointegration procedure is no cointegration
Source: Authors' estimation.

Table 4.4: Long Term Determinants of Profitability of Banks

Variables	REM		
	Coeff.	**t-stats**	**Prob.**
C	0.091	2.554	0.012
BS	-0.008	-2.452	0.015
CR	-0.008	-2.261	0.025
LIQ	-0.005	-2.549	0.012
TAX	-0.005	-1.737	0.084
CAP	0.009	2.864	0.005
NTA	-0.019	-2.841	0.005
BSD	0.300	2.563	0.011
SMD	0.004	0.466	0.642
INF	0.057	1.994	0.048
Adj. R^2	0.756		
F-stats (Prob.)	48.128 (0.000)		

Source: Authors' estimation.

Table 5.1: Results of Sensitivity Analysis

Variables	POLS			GMM			DOLS			FMOLS		
	Coeff.	**t-stats**	**Prob.**	**Coeff.**	**t-stats**	**Prob.**	**Coeff.**	**t-stats**	**Prob.**	**Coeff.**	**t-stats**	**Prob.**
C	0.134	0.597	0.552	0.175	0.893	0.374	0.161	1.015	0.312	0.163	1.633	0.104
BS	-0.013	-3.140	0.002	-0.018	-3.276	0.001	-0.017	-2.464	0.015	-0.017	-2.945	0.004
CR	-0.009	-2.148	0.033	-0.009	-1.958	0.053	-0.010	-2.693	0.008	-0.011	-1.802	0.073
LIQ	-0.006	-4.536	0.000	-0.006	-2.925	0.004	-0.001	-1.856	0.066	-0.002	-2.609	0.010
TAX	-0.005	-1.910	0.058	-0.006	-3.159	0.002	-0.009	-2.289	0.024	-0.008	-1.983	0.049
CAP	0.011	4.144	0.000	0.008	2.374	0.019	0.009	1.822	0.070	0.009	2.568	0.011
NTA	-0.028	-3.723	0.000	-0.024	-1.884	0.062	-0.027	-1.849	0.066	-0.032	-3.038	0.003
BSD	0.475	5.228	0.000	0.677	5.539	0.000	0.573	4.021	0.000	0.595	4.772	0.000
SMD	0.006	0.597	0.552	0.002	0.088	0.930	0.019	0.945	0.346	0.008	0.573	0.568
INF	0.059	1.894	0.060	0.051	4.105	0.000	0.056	3.321	0.001	0.070	4.003	0.000
Adj. R^2	0.776			0.692			0.728			0.772		

Source: Authors' estimation.

Table 6.1: Results of Panel Granger Causality Test

Variables	F-Stats	Prob.
BS does not Granger Cause BP	3.148	0.078
BP does not Granger Cause BS	2.410	0.123
CR does not Granger Cause BP	4.335	0.039
BP does not Granger Cause CR	1.431	0.233
LIQ does not Granger Cause BP	3.685	0.028
BP does not Granger Cause LIQ	2.366	0.098
TAX does not Granger Cause BP	4.696	0.011
BP does not Granger Cause TAX	8.402	0.000
CAP does not Granger Cause BP	2.681	0.072
BP does not Granger Cause CAP	5.415	0.005
NTA does not Granger Cause BP	4.600	0.034
BP does not Granger Cause NTA	1.311	0.254
BSD does not Granger Cause BP	56.224	0.000
BP does not Granger Cause BSD	59.602	0.000
SMD does not Granger Cause BP	1.149	0.675
BP does not Granger Cause SMD	0.009	0.923
INF does not Granger Cause BP	4.321	0.039
BP does not Granger Cause INF	0.588	0.444

Note: The lag length of all focus variables is 1.
Source: Authors' estimations.