

Impact of Internal and External Factors on Bank Performance in Pakistan

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Abstract: The study mainly explores the impact of banks' internal (CAMEL factors) and external factors (inflation, GDP, and stock market performance) on banks' performance targeting all PSX listed commercial banks. To achieve the objective, the study uses the sample period from 2012 to 2016 and employs the Feasible Generalized Least Squares (FGLS) panel data model. The study finds that capital adequacy, asset quality, liquidity, and inflation have strong but indirect correlation with banks' performance while management efficiency, earning quality, GDP, and stock market performance have positive correlation though the significant impact on bank performance. FGLS also exhibits that CAMEL factors along with economic indicators statistically affects the banks' performance significantly over the studied period. The findings of the study evoke the management of banks to be concerned about CAMEL factors for rallying their performances, as good banking performance may be important for investors and shareholders for investment decisions.

Keywords: Internal Factor, External Factor, Bank Performance, Pakistan

1. Introduction

Organizations are now crumbling with an ever-higher level of competition [1] which compels organizations to improve their products and/or systems to uphold their competitiveness in the market and out-perform their rivals. Laeven, et al., suggested that organizations should keep an eye on different factors of their system so that organizations can evaluate the impact of these factors on the organizational system [2]. If these factors are supportive for organization performance, these factors are utilized further. On the other hand, if these factors are not supportive, these organizations may plan a course of action so that the influence of these factors on the performance of the organization might be mitigated. Hejazi et al. suggested that owing to the importance of survival in the current marketplace and growth in the long-term, an organization should develop a comprehensive performance management system which should cover all aspects of

organizational working [3]. A holistic evaluation of organizational performance may generate complete management insights, which can be implemented for delineating the organization with improvement and development. Insights inferred from such system may be related to the areas in which an organization may fall apart for having pitfalls or it may be related to those areas in which an organization may move forward. Karuhanga suggested that literature on performance evaluation of an organization puts forth two types of performance evaluation techniques [4]. The first type of technique is forward-looking and uses future data to evaluate performance whereas the second type of technique is backward-looking and uses historical data to evaluate past and current state of the organization. The latter type of technique is more structured, reliable and objective as the past is completely unfettered from uncertainty whereas the future seems dim with uncertainty lurking over it. Owing to this, it becomes important that decision-makers may decide about the future of the organization using an informed

and rational choice.

On the basis of above discussion, the researchers decided to conduct an analysis on the factors influencing banks' performance. The aim of this research paper is to analyze the influence of banks' specific and macroeconomic factors on the performance of Pakistani banks. In Pakistan, State Bank of Pakistan (SBP) regulates the banking industry. SBP has established a performance evaluation framework, CAMEL, and demands Pakistani banks to report on these factors. CAMEL comprises of five factors, which are, capital adequacy, asset quality, management, earning and liquidity and first letters of these five factors make the acronym CAMEL. The macroeconomic factors that were selected for this research were inflation, gross domestic product (GDP) and stock market performance.

Conceptualizing study in Pakistan has significance as it is the world's 6th largest country in terms of population and it possesses all destructive nuclear power. The geopolitical importance of Pakistan has been booming as Pakistan and China are developing Economic Corridor in the region, connecting North and South of the country directly [5]. Banking sector of Pakistan is the backbone of Pakistan's economy and is a major contributor to its economic well-being. Ishaq et al. suggested that like all other organizations, performance evaluation is important for banks [6]. Pakistani banks are no exception to this. The fierce competition between members of the industry and damaging macroeconomic policies of Government of Pakistan are causing lots of strains on the banks' performance. Consequently, this becomes important that one should evaluate current performance of Pakistani banks along with factors that are influencing bank's performance. Furthermore, Athanasoglou, et al. and, Masood and Ashraf suggested that both bank-specific factors (internal), as well as macro-economic factors (external or environmental), may have an influence on bank's performance [7-8]. It is, therefore, important that analysis of both internal and external factors on bank's performance should be carried out. The outcome of such analysis will help decision-makers in improving banks' performance by manipulating internal factors and by mitigating/capitalizing the influence of external factors.

Research gaps were identified by reviewing of earlier literature. Ishaq et al., Bodla and Verma, Gupta and Sibal, Ongore and Kusa and, Molina focused only on internal or bank specific factors while this study attempts to employ three external factors as well [6, 9-12]. Moreover, this research uses latest data (2016 and earlier) and targets for bringing fresh insights on the influence of CAMEL and external factors (inflation, GDP, and stock market performance) on bank's performance. Moreover, the present turbulent situation of the banking industry of Pakistan requires an analysis of situation so that the performance of banks can be improved. Likewise, a study of Ishaq et al. was based on data of 2015 and earlier whereas present study uses data related to 2016 and past 4 years [6]. This study brings a fresh perspective into the matter.

This paper has discussed the relevant literature in section

two that is followed by description of data and methodology. The fourth section presents the results of statistical tests and econometric models and findings which are debated in the discussion area. The study ends with conclusion and policy recommendations.

2. Literature Review

2.1. Performance of Banks – Tobin's Q

Iqbal suggested that performance evaluation involves measuring and reporting effectiveness, efficiency, and economy of operations of an organization [13]. Dibrell et al. added that performance evaluation might involve an evaluation of past data of the organization [14]. Such evaluation may become a basis of approval or disapproval of past strategies and may guide future strategy formulation. Performance measurement forms the main core of strategic management and needs the careful attention of business analysts. Performance management literature has several performance evaluation frameworks including ratio analysis, DuPont's analysis, balance scorecard, economic value added, etc. One such model is "general equilibrium theory or 'q' theory". Tobin suggested that the combined market value of all companies listed on a stock market should be equal to the value of replacement costs of these companies [15]. This concept has roots in investment economics. Tobin's q can be calculated as follows:

$$\text{Tobin's } q = \frac{\text{Market value of the economy's installed capital}}{\text{Market price of the capital or its replacement cost}} \quad (1)$$

This formula can also be used at the firm level. In order to compute the value of q for a firm, the total market value of the firm is divided by the value of total assets of the firm. According to Tobin, if the market value of shares of an organization is more than the replacement cost of these shares (total assets of the firm), it would indicate that firm is performing better and will generate profits in future [15]. Tobin further suggested that fluctuations in the stock market have impact on investments, which were made in the stock market [15]. Firms' profits positively influence stock prices. Higher share prices are an incentive for shareholders for their investment in the stock market. Value of Tobin's q helps in analysis of expected future profits and performance along with forecasting future economic outlook of an enterprise. Using values in equation 1, if the value of q is greater than 1, it would indicate that firms have capacity to increase value of their shares in the stock market. Conversely, if the value of q is lower than 1, managers may choose to replace capital. Chung and Pruitt suggested that Tobin's Q is not free from weakness and should be used with caution [16]. For instance, calculation of q is based on the use of the replacement cost, which is lagging in nature. Moreover, it is difficult to measure q with high level of accuracy. Hejazi et al. added to limitations of Tobin's q and suggested that since value of financial assets depends on lots of macro-economic factors and perception of people [3]. Consequently, share price would also fluctuate.

In Pakistan, SBP regulates banking industry and oversees activities of banks, which are operating in Pakistan. This includes both local and foreign banks. As a policy framework, SBP has promulgated CAMEL framework and requires banks to report different aspects of its financial and operational situation. CAMEL framework is based on five indicators, which are capital adequacy, asset quality, management, earning and liquidity. First letters of these five factors are used to name the model, CAMEL. SBP uses values of these indicators for making policy decisions for the banking sector of Pakistan. Ishaq et al., Bodla and Verma, Gupta and Sibal, Ongore and Kusa, and, Molina used CAMEL for evaluation of bank's performance (Bahrain, India, Pakistan and Venezuela) [6, 9-12]. CAMEL factors are explained below.

2.1.1. Capital Adequacy Ratio

Bodla and Verma explained that capital adequacy ratio (CAR) is related to liability and capital side of the bank's balance sheet [9]. It can be calculated by dividing the total capital of bank with total assets of bank. This ratio helps the analyst to analyze the level up to which a bank can absorb the certain level of losses prior to becoming insolvent. Banks are required to ensure a certain level of CAR. This minimum level of CAR serves as protection to customers/depositors of the bank. It is an indicator of stability and efficiency of financial system of bank. CAR is a protection to depositors of bank. Higher it is better it would be. It indicates the stability of bank. Aktas et al. suggested that CAR prevents bank from becoming insolvent which raises customers' confidence [17]. They further highlighted that minimum Basle Capital Accord required that central banks should ask banks to ensure at least minimum level of CAR. Minimum capital adequacy ratios requirement for tier one capital is 4 percent and more whereas for tier two capital it is 8 percent. The relevant hypothesis is:

H_{1-1} = There is a significant impact of capital adequacy ratio on bank's performance.

2.1.2. Asset Quality

Ongore and Kusa highlighted that banks should evaluate asset quality (level of money, advances and investments) as it indicates the credit risk of bank [11]. An effective management of asset quality would help banks in controlling and monitoring credit risk, which leads to the higher credit rating of bank. Ahamed suggested that asset quality of a bank is related to the evaluation of level of money and risks related to bank resources (investment and advances) [18]. The quality of assets kept by the bank is a major concern for its decision-makers. An evaluation of asset quality of the bank gives an indication of level and size of credit risk faced by the bank with reference to its level of operations. Akhtar and Ahmad highlighted that an evaluation of asset quality is linked with evaluation of the adequacy of allowance for loan and lease losses [19]. There are different types of risks, which influence value of an organization's/bank's assets. These risks include but are not limited to market, reputation,

strategic, operating and compliance risks. Bodla and Verma suggested that asset quality could be measured by dividing non-performing loans with total advances of the bank [9]. The relevant hypothesis is:

H_{1-2} = There is a significant impact of asset quality on bank's performance.

2.1.3. Management Efficiency

Gupta and Sibal suggested that management efficiency is the extent to which a bank generates income in proportion to its total assets [10]. It is a direct indicator of management or directors' capacity and can be evaluated by dividing the net income of bank with its total assets. It is an easy and fast method of evaluating a bank's ability to use its assets for generating revenues. If a bank applies strict cost control, then a bank would be able to generate the high level of efficiency ratio. However, there are chances that profits in the corresponding period are not high. Due to the disparity in bank management practices, a comparison of banks with similar conditions is more meaningful. Overall, from the efficiency ratio perspective, higher management's efficiency in using organizational assets, higher will be return on assets and higher will be overall bank's profitability and performance. The relevant hypothesis is:

H_{1-3} = There is a significant impact of management efficiency on bank's performance.

2.1.4. Earnings Quality

Ongore and Kusa (2013) highlighted another factor of CAMEL, which is earning quality. They suggested that earnings quality demonstrates the capability of bank. Earning quality is the level to which a bank can earn regularly and sustain and increase its future earnings. It can be measured by dividing the net income of organization with total equity of the bank. Kapan and Minoiu suggested that earnings quality is a measure of financial performance of bank, level of growth and sustainability of future earnings capacity [20]. For their own sustainability, banks make all possible attempts to ensure safe and secure earnings so that they may finance their activities. It is one of the most important performance measurements of bank performance as it helps banks in achieving its ultimate aim, which is provision of profits to the shareholders of the banks. Gupta and Sibal suggested that quality of earnings might also help banks in performing activities such as paying dividends, ensuring appropriate level of capital, making diversification and maintaining competitive advantage in the marketplace [10]. The relevant hypothesis is:

H_{1-4} = There is a significant impact of earnings quality on bank's performance.

2.1.5. Liquidity

Suresh and Bardastani explained the fifth factor of CAMEL, liquidity, and suggested that it is the extent to which a bank can convert its resources into cash [21]. Higher the level of fluid resources, higher will be level of liquidity. It is concerned with the short-term ability of bank in repaying its obligations. Bank's liquidity can be measured by dividing its cash and

other liquid assets with short-term borrowings and current liabilities. Suresh and Bardastani added to this and suggested that liquidity risk of a bank is concerned with bank's ability to fulfill or meet the unanticipated funds, which may be claimed by the depositors at any time [21]. In other words, the liquidity of banks is related to a bank's ability to repay its current obligations. A strong, liquid and solvent bank leads to prosperity for industry as a whole as well as shareholders of banks. If a bank is unable to meet its short-term liquidity, the bank may face crisis and it may also hurt general image of the bank so banks always ensure that it maintains appropriate liquidity position. The relevant hypothesis is:

H_{1.5} = There is a significant impact of liquidity on bank's performance.

2.2. Influence of External Factors of Bank's Performance

This section presents an account of external factors, which are inflation, gross domestic product and stock market performance.

2.2.1. Inflation

Van suggested that inflation is defined as a persistent increase in the general price level in an economy [22]. Inflation causes a decrease in disposable personal income of people and savings of people. This reduces level of deposits in the bank. Athanasoglou, et al. added and suggested that with an increase in inflation, demand for goods decreases which leads to a decrease in demand for bank loans [7]. This may adversely influence bank's profits and performance. Inflation is highly associated with bank's wellbeing as banks deal in nominal financial instruments, which is currency unit. When a bank grants loan to a borrower, for example, both parties decide a certain sum of money that is to be paid in future. However, if during the course of time, if the level of inflation increases then purchasing power of money to be paid to the bank will decrease. Moreover, expected inflation also leads to an increase in interest rate [23]. Consequently, people may expect that banks have to pay them more interest on their deposits with the bank. An increase in interest rate on lending may also result in a decrease in bank loans as a cost of financing has increased. This is an undesirable situation for a borrower and they may refrain from getting loans from bank. The relevant hypothesis is:

H_{1.6} = There is a significant impact of inflation on the bank's performance.

2.2.2. Gross Domestic Product

Demirgüç-Kunt and Huizinga highlighted that the gross domestic product (GDP) is the total value of goods produced and/or services produced within geographical boundaries of a country in one year [24]. Higher the level of GDP, higher will be

the income of the people, which will cause an increase in the level of savings and consequently higher levels of deposits of banks. An increase in GDP may have a positive impact on bank's performance. Kiganda added to this and suggested that an increase in GDP positively influences the performance of banking industry [25]. There are three ways in which banks' performance can be influenced. These are net interest income, loan losses improvement and operating costs. Performance of banks improves during those times when the economy expands and vice versa. GDP increases as a result of increase in income of the people living in the country. If income increases, demand for goods and services increases. This requires that manufacturers produce more. For this, they might need bank loan so that they may expand their business operations. Consequently, demand for loan of banks increases, which positively influences banks' performance. Ongore and Kusa suggested that relationship between GDP and banks' performance is mixed [11]. Their work revealed that the relationship of GDP was negatively associated with return on assets and positively associated with return on equity. However, the findings of their research further revealed that these relationships were not significant. This requires further analysis of the relationship of GDP and bank performance. The relevant hypothesis is:

H_{1.7} = There is a significant impact of GDP on bank's performance.

2.2.3. Stock Market Performance

Amassoma and Rukayat suggested that stock market performance is an indicator of well-being of an economy [26]. If the stock market performs well, economy will perform better which is an indicator of an increase in level of income of the people living in the country. Consequently, this increase in income will lead to an increase in the level of saving and/or investment, which in turn, increases in demand for banking services. Chen et al. suggested that stock market performance can be evaluated by looking at the total market capitalization for the year [27]. Tan and Floros suggested that stock market performance is out of many factors that have an influence on the performance of bank [28]. When stock markets perform better, people take money out of the bank and purchase shares. This would momentarily reduce bank balances. However, when companies receive this money from shareholders, the operations of these companies would expand which would increase economic activity in the country. Consequently, the size of economy would increase. This would, ultimately, cause an increase in level of deposits with the banks. The relevant hypothesis is:

H_{1.8} = There is a significant impact of stock market performance on bank's performance.

The theoretical framework for this research is given below.

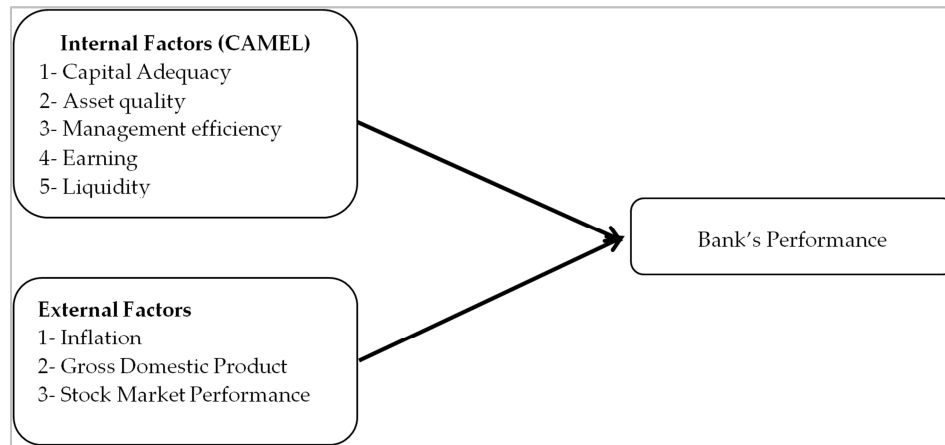


Figure 1. Theoretical Framework of Research.

3. Data and Methods

The study has scrutinized the determinants of performance for commercial banks listed on Pakistan Stock Exchange (PSX), formerly known as Karachi Stock Exchange. Strongly balanced panel dataset covers five years' period ranging from 2012 to 2016 of two Islamic and 19 conventional commercial banks of Pakistan bringing about total 105 observations. All commercial banks of Pakistan were unit of our analysis, however, public listed commercial banks constituted working population. Since public trading of shares is allowed only to the listed companies so we can't have market value per shares of private banks and excluded them from population. There are only 21 commercial banks listed on PSX and the study

covered all of them to generate information about variables at every point in time. In such a situation, we don't require to apply any sampling technique. Further, the study also fulfills conditions of optimal sample size. As a rule of thumb, 80% of the population as the sample size is sufficient to get statistically significant results [29]. According to Balsley and Clover, sample size of 10% has proved satisfactory and significant for various studies [30]. These thoughts were later verified by Morse and added that if population is known, sample size 10% is sufficient [31]. Basic information of banks is given in table1, where Habib Bank Ltd. Pakistan is the oldest bank, National Bank of Pakistan has the biggest workforce of 15793 as well as highest number of branches operating worldwide.

Table 1. Basic Information about Banks.

Sr. No.	Bank Name	Obs.	Formation date	No. of Employees	Branches
1	National Bank of Pakistan	5	1949	15793	1469
2	The Bank of Punjab	5	1989	6092	344
3	Bank of Khyber	5	1991	1300	150
4	Askari Bank	5	1991	7252	501
5	Allied Bank Limited	5	1942	10430	1150
6	MCB Bank Limited	5	1947	10951	1238
7	Faysal Bank	5	1994	3611	335
8	Habib Bank Ltd. Pakistan	5	1941	1500	170
9	Bank Alfalah	5	1992	7902	639
10	Habib Metropolitan Bank	5	1992	3670	240
11	United Bank Limited	5	1959	10200	1341
12	JS Bank	5	2006	4163	307
13	Soneri Bank	5	1991	2715	288
14	Summit Bank	5	2007	3022	192
15	NIB Bank	5	2003	2150	171
16	Standard Chareterd Bank	5	1863	4500	101
17	Silkbank Limited	5	2001	3367	88
18	Samba Bank Limited	5	2007	680	37
19	Bank al-Habib	5	1991	9415	609
20	BankIslami Pakistan.	5	2002	9168	571
21	Meezan Bank Ltd.	5	2004	4021	321

Note: Serial no. from 1 to 19 is Conventional Commercial Banks while 20 and 21 are Islamic Commercial Banks

The sample annual financial data of banks (CAMEL) was extracted from audited financial statements available on the banks' websites while the data of external factors was obtained from World Bank and Pakistan Stock Exchange (PSX). Data

used in the study was secondary in nature which means it was not originally collected or generated by the researcher himself for his specific research question [32]. This kind of data comes with some disadvantages. It suffers from cons of no control of

researcher over data generating process and requires efforts on part of data analyst to convert into usable form specific to the needs of research [33]. Use of secondary information may tolerate inaccuracy, reporting errors or data entry mistakes. Researchers also must consider the relevance of data to his study, even if data is highly accurate; it will be of no use if lacks relevance to given study. Moreover, various secondary data sources restrict access regarding the length of time for their use, the person who can use the data, and the type of secondary data to be used. Apart from these, working with secondary data is attractive for being less costly and time efficient [34]. The study tried to ensure the reliability of the data by collecting it from reliable resources like banks' annual reports that are prepared by chartered accountants and then audited by independent firm, World Bank that is considered as credible and open source of socioeconomic information, and PSX that is reliable and

efficient marketplace for over 60 years of trading securities. With specific research objectives, we extracted the relevant information from a pile of data and converted it into usable form through operationalization of variables (table 2). All the figures were in million Pakistani rupees except inflation that is represented as a percentage. Due to non-availability of quarterly data for all the banks, annual data was utilized in Pakistani rupees. The variables and their measurements are taken up from the previous literature to ensure profound comparison of our results with findings of prior researches. Dependent variable under analysis includes bank performance; regressors include internal factors such as capital adequacy, asset quality, management efficiency, earning quality, liquidity risk, and external factors like inflation, gross domestic product and stock market performance. The operationalization of variables is given in Table 2.

Table 2. Variables of Interest and Their Measurement.

No.	Variables	Measurement
1	Bank performance (bnk_per)	Tobins Q = Ratio of firm's market value to book value of assets
2	Capital Adequacy (cap_ad)	Ratio of total deposit to equity ratio
3	Asset quality (ast_q)	Ratio of non-performing loans to advances
4	Management efficiency (mgt_ef)	Return on assets = Ratio of net income to total assets
5	Earning quality (erg_q)	Return on equity = Ratio of net income to total equity
6	Liquidity risk (liq_rsk)	Ratio of total loans to total deposits
7	Inflation (inf)	Consumer price index (Annual %)
8	Gross domestic product (gdp)	Annual Gross Domestic Product (millions PKR)
9	Stock market performance (st_mkt_per)	Total market capitalization of stock index

Note: No. 1 is dependent variable while from 2 to 9 are independent variables

The study collected the needed data, edited, and coded in Microsoft Excel and then exported to STATA software for applying the panel data analysis procedures accordingly. To identify the impact of CAMEL factors and macroeconomic factors (GDP, inflation, stock market performance) on bank performance operationalized by Tobin's Q ratio, the base model was as follows:

$$bnk_{per_{it}} = \beta_0 + \beta_1 cap_{ad_{it}} + \beta_2 ast_{q_{it}} + \beta_3 mgt_{ef_{it}} + \beta_4 erg_{q_{it}} + \beta_5 liq_{rsk_{it}} + \beta_6 inf_t + \beta_7 gdp_t + \beta_8 st_{mkt_per_t} + \mu_{it} \quad (2)$$

where

$bnk_{per_{it}}$ = Ratio of market value to book value of assets of bank i at time t

$cap_{ad_{it}}$ = Ratio of total deposit to equity of bank i at time t

$ast_{q_{it}}$ = Ratio of non-performing loans to advances of bank i at time t

$mgt_{ef_{it}}$ = Ratio of net income to total assets of bank i at time t

$erg_{q_{it}}$ = Ratio of net income to total equity of bank i at time t

$liq_{rsk_{it}}$ = Ratio of total loans to total deposits of bank i at time t

inf_t = Inflation (CPI) at time t

gdp_t = Gross domestic product of Pakistan at time t

$st_{mkt_per_t}$ = Total market capitalization of stock index at

time t

β_0 = constant term or y-intercept

β_1 to β_8 = coefficients of corresponding regressors

μ_{it} = error term of bank i at time t

Explanatory variables were plotted against dependent variables using graph matrix to test linearity. Non-linear relationships were converted into linear through applying data transformations techniques. These techniques adjust the variables either to correct violation of any assumption related to any multivariate model or to make the relation better between two variables. Moreover, these transformations can also cure the problem of heteroscedasticity and non-normality [35]. To apply the diagnostic tests, the basic estimation model was transformed form of equation 2 which is called pooled ordinary least squares (POLS) model and is given as:

$$\sqrt{bnk_{per_{it}}} = \beta_0 + \beta_1 cap_{ad_{it}} + \beta_2 \ln(ast_{q_{it}}) + \beta_3 mgt_{ef_{it}} + \beta_4 erg_{q_{it}} + \beta_5 liq_{rsk_{it}} + \beta_6 inf_t + \beta_7 gdp_t + \beta_8 st_{mkt_per_t} + \mu_{it} \quad (3)$$

Estimation of equation (3) leads us to diagnostic tests. Following diagnostic tests were applied to ensure suitability of econometric model. Firstly, normality was examined by kurtosis and skewness of the variables in descriptive statistics. Secondly, the study applied Breusch and Pagan and

Cook and Weisberg test of heteroscedasticity of residuals [36-37]. Null hypothesis (H_0) of constant variance will be rejected if *prob.* value is less than 0.05. Thirdly, the study tested the serial correlation in idiosyncratic errors produced by POLS estimation results of equation (3). Null hypothesis

of no first order autocorrelation for Wooldridge test was rejected for significant *prob.* value (i.e. $p < 0.05$) [38]. Fourthly, the study examined cross-sectional dependence (CD) of panel data residuals by implementing Pearson CD test against the null hypothesis of no cross-sectional dependence. *p*-value of less than 0.05 will imply the rejection of null in CD test [39]. Lastly, multicollinearity was diagnosed by calculating variance inflation factors (VIFs) for explanatory variables. As a rule of thumb, a VIF value of more than 10 needs further investigation [40].

Cross sectional dependence and serial correlation are two different concepts. Former defines correlation in the residuals between entities or cross sectional units [41]. However, later specifies the correlation between errors of different time periods [38]. For panel data, non-normality is not an issue. However, existence of disturbances like multicollinearity, serial correlation, cross sectional dependence, and expected heteroscedasticity of panel data structure directed us to apply feasible generalized least square (FGLS) model to produce robust estimates free from the afore mentioned disturbances [42]. This estimation method (FGLS) is also known as “Kmenta” or “Parks” method. FGLS model is similar to equation (3) in its form and the only difference lies in the residuals only.

where

$\sqrt{bnk_per_{it}}$ = Square root of the ratio of market value to book value of assets of bank *i* at time *t*

cap_ad_{it} = Ratio of total deposit to equity of bank *i* at time *t*

$\ln(ast_q)_{it}$ = log of the ratio of non-performing loans to advances of bank *i* at time *t*

mgt_ef_{it} = Ratio of net income to total assets of bank *i* at time *t*

erg_q_{it} = Ratio of net income to total equity of bank *i* at time *t*

liq_rsk_{it} = Ratio of total loans to total deposits of bank *i* at time *t*

inf_t = Inflation (CPI) at time *t*

gdp_t = Gross domestic product of Pakistan at time *t*

$st_mkt_per_t$ = Total market capitalization of stock index at time *t*

β_o = constant term or y-intercept

β_1 to β_8 = coefficients of corresponding regressors

μ_{it} = error term of bank *i* at time *t*

The main difference between the POLS and FGLS is that the later approach produces the efficient estimates free from disturbances mentioned before. Taylor used the model for heteroscedasticity while Rao and Griliches analyzed the model for case of autocorrelation [43-44]. Both studies found the FGLS to be more efficient than least squares if the sample is not too small and assumptions are not severely deviated.

4. Results

Figure 2 displays the graph matrix of variables indicating the relationship between independent (CAMEL) and dependent variable before transformation. Capital adequacy and asset quality have non-linear relationship with bank performance as depicted in figure 2. As regression model (POLS) requires the variables to be in linear relationship with dependent variable so the study applied transformation.

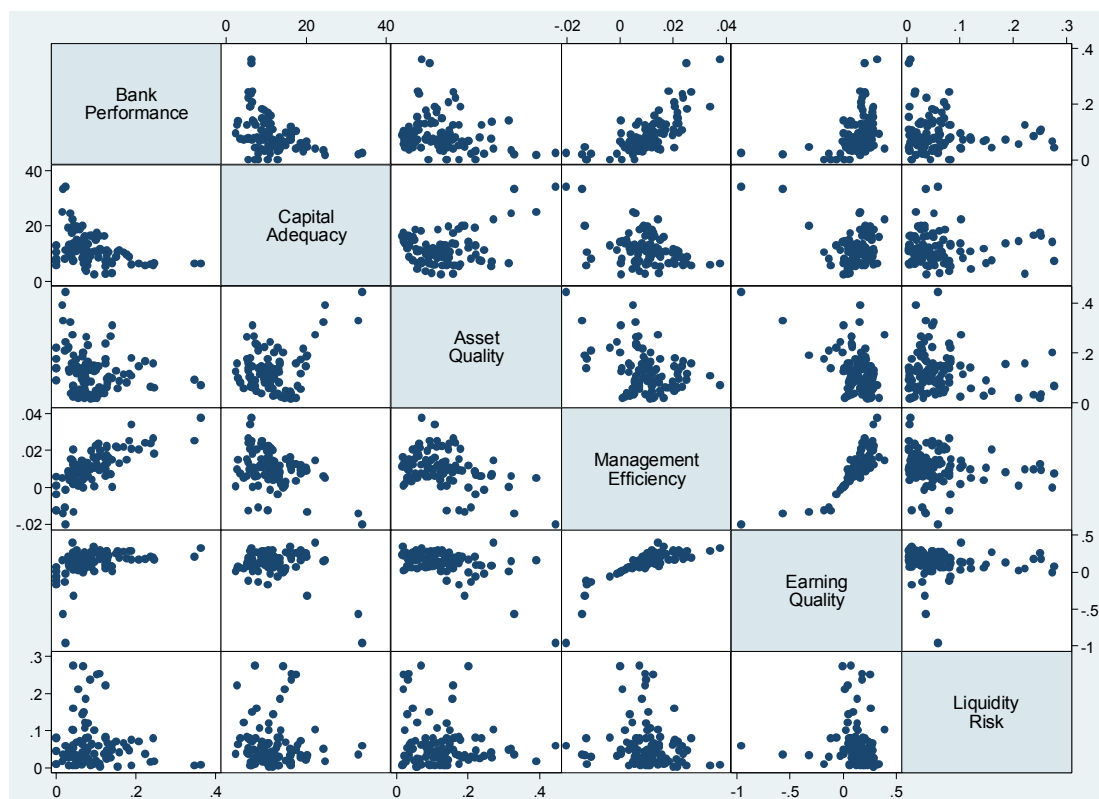


Figure 2. Graph Matrix before transformation indicate non-linear relationship of capital adequacy and asset quality with bank performance only. All other variables were linear with presence of some outliers.

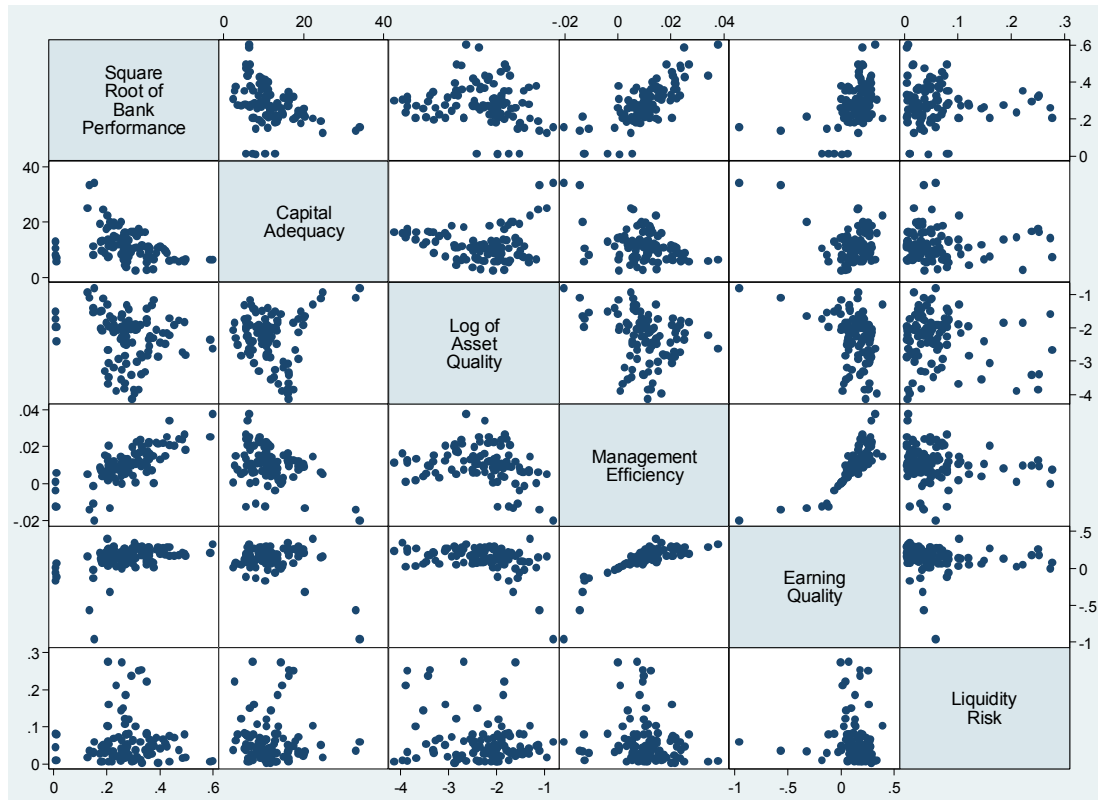


Figure 3. Graph Matrix after transformations indicate linear relationship of all regressors with bank performance with presence of outliers.

Summary statistics of the sample variables is presented in table 3 where minimum and maximum values of the variables indicate non-normality of the data with respect to their means (see table 3).

Table 3. Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
sqbnk_per	105	0.280	0.109	0.008	0.601
cap_ad	105	11.691	5.649	2.426	34.066
last_q	105	-2.304	0.735	-4.137	-0.809
mgt_ef	105	0.010	0.009	-0.020	0.038
erg_q	105	0.130	0.170	-0.954	0.395
liq_rsk	105	0.060	0.062	0.004	0.276
Inf	105	6.967	2.786	3.324	11.005
Gdp	105	10300000	588612	9470255	11100000
st_mkt_per	105	6851038	1765752	4242278	9628514

Note: sqbnk_per, cap_ad, last_q, mgt_ef, erg_q, and liq_rsk are internal factors while inf, gdp, and st_mkt_per are external factors of banks' performance

Correlational analysis of variables as given in table 4 shows that bank performance being the dependent variable has strong relationship with only one explanatory variable i.e. management efficiency.

Table 4. Correlation Matrix.

	sqbnk_per	cap_ad	last_q	mgt_ef	erg_q	liq_rsk	inf	gdp	st_mkt_per
sqbnk_per	1.000								
cap_ad	-0.377	1.000							
last_q	-0.172	0.032	1.000						
mgt_ef	0.745	-0.384	-0.267	1.000					
erg_q	0.435	-0.280	-0.379	0.810	1.000				
liq_rsk	-0.031	-0.026	-0.162	-0.134	-0.093	1.000			
Inf	-0.011	0.041	0.101	0.064	-0.063	-0.025	1.000		
Gdp	0.030	-0.064	-0.120	0.019	0.144	0.042	-0.927	1.000	
st_mkt_per	0.073	-0.054	-0.140	0.036	0.146	0.048	-0.834	0.937	1.000

Pre-requisite of applying feasible generalized least square (FGLS) model is the existence of group wise heteroscedasticity, serial correlation, and cross sectional dependence, so residuals were estimated using pooled OLS (equation 1) to run diagnostic tests. The outcomes of diagnostic tests are shown in tables 5 and 6. *Prob.* value of *chi2* in Breusch-Pagan heteroscedasticity test

was insignificant ($p > 0.05$) that suggested homoscedasticity in the data. Usually, the data with high frequency is assumed to be more heteroscedastic but non-availability of quarterly data leads us to proceed with annual figures. Wooldridge test indicated the presence of serial correlation as *prob.* value was significant ($p < 0.05$).

Table 5. Diagnostic Tests on Standardized Residuals.

	Breusch-Pagan (1979) and Cook-Weisberg (1983) Test of Heteroscedasticity	Wooldridge test for Autocorrelation
Null Hypothesis (Ho)	Constant variance	No first order autocorrelation
Chi2(1)	1.28	
Prob > chi2	0.2587	
F (1, 20)		17.245
Prob > F		0.0005

As a rule of thumb, the VIF should be less than 10 to an acceptable level of multicollinearity (Gujarati 2009). However, only *gdp* requires further consideration to deal with the multicollinearity having $VIF > 10$.

Table 6. Multicollinearity Test: Variance Inflation Factors (VIFs) of Regressors.

Variable	VIF	1/VIF
Gdp	9.57	0.051
st_mkt_per	8.84	0.113
Inf	8.07	0.124
mgt_ef	3.35	0.299
erg_q	3.31	0.302
last_q	1.25	0.797
cap_ad	1.2	0.830
liq_rsk	1.08	0.922
Mean VIF	5.84	

Cross sectional dependence of residuals was tested using Pearson CD test for the null hypothesis of no cross-sectional dependence. The outcome presented the significant *prob.* value (less than 0.05) that led towards rejection of null and presence of cross-sectional dependence across the residual of units *i*.

Table 7. Average Correlation Coefficient and Pearson (2004) CD test.

Variable	CD-test	p-value	corr	Abs (corr)
Residuals	17.68	0.000	0.546	0.57

The panel data of this study was identified to have the disturbances of autocorrelation, cross sectional dependence, and multicollinearity (see table 5, 6, and 7) so to produce the reliable and efficient estimates free from these problems, the study applied FGLS method to identify the proposed relationship.

The models summaries in table 8 show the extent to which independent variables can be used to estimate the outcome variable and indicate how well variables have fitted in overall model. In the first column of table 8, results of POLS though come up with strong R-square value of 68.2% which suggests that 68.2% variance in bank performance is explained by independent variables: capital adequacy, asset quality, management efficiency, earning quality, liquidity risk, inflation, GDP, and stock market performance. *p* values of

three variables: capital adequacy, asset quality, and liquidity risk were found to be insignificant in POLS that are greater than 0.05. However, this model did not produce reliable estimates as data was detected to be suffered from serial correlation and multicollinearity. Hence to adjust these disturbances, FGLS was estimated that turned up to generate more significant and reliable estimates of all predictor variables (see table 8).

Table 8. Effect of Explanatory Variables on Bank Performance using Pooled OLS and Feasible Generalized Least Squares Model.

	POLS	FGLS
VARIABLES	sqbnk_per	sqbnk_per
cap_ad	-0.002 (0.001)	-0.0033*** (0.001)
last_q	-0.005 (0.010)	-0.0168*** (0.005)
mgt_ef	13.32*** (1.212)	9.531*** (0.858)
erg_q	-0.331*** (0.067)	-0.288*** (0.036)
liq_rsk	0.120 (0.106)	0.142** (0.060)
Inf	-0.0153** (0.006)	-0.00882*** (0.002)
Gdp	-1.14e-07** 0.00	-9.52e-08*** 0.00
st_mkt_per	2.14e-08** 0.00	2.36e-08*** 0.00
Constant	1.315*** (0.468)	1.086*** (0.154)
Observations	105	105

According to FGLS results, all the explanatory variables have significant impact on the dependent variable. Signs of their coefficients indicate that capital adequacy, asset quality, earning quality, inflation, and GDP have negative association with bank's performance while management efficiency, liquidity risk, and stock market performance are indirectly related to the outcome variable.

5. Discussion

Capital adequacy has significant relationship with bank's performance where *p* value is 0.001 and coefficient is -0.0033. Negative coefficient implies that high capital has

adverse effects on bank's execution, if not balanced well by putting them into productive ventures. The correlation coefficient value indicates the indirect relationship between capital adequacy and bank's performance. Negative correlation coefficient between total deposit to total equity ratio and bank's profitability suggest that one variable is increasing and the other variable is decreasing. This implies that domestic banks are functioning over-cautiously by neglecting possible profitable endeavors. Higher capital adequacy ratio means increased deposits as compared to total equity; it clarifies that the bank is paying more to shareholders as dividends as compared to the benefits created and firm is utilizing retained earnings without putting these into new potential arrangements. Hence, researchers accepted the alternative hypothesis (H_{1-1}) and confirmed that there is a significant relationship of capital adequacy on bank's performance. Barnor and Odonkor observed capital adequacy to have an insignificant relationship with bank performance when measured by ROA and significant association when bank performance was assessed by ROE [45]. Similar findings have been found in previous studies [46-48].

Asset quality, measured by NPLs to total advances ratio also bears a significant relationship with outcome variable as its p-value is less than 0.05. In FGLS results of table 8, coefficient of *last_q* is negative which insinuate that if money advanced to individuals or firms is more turned into loss, the bank's performance, measured by a ratio of its market value to total assets will go down. Hence, the study accepted the second alternate hypothesis (H_{1-2}) to confirm that there is a significant impact of asset quality on bank's performance. These findings are consistent with previous researches [49-50]. In the former study, researchers measured the bank performance commercial banks in Kenya with ROA and uncovered the significant impact of asset quality on bank performance. Likewise, later the study also observed the similar association between asset quality and bank performance (measured by ROE).

Akin to the results of Heikal, et al. and, Azizi and Sarkani, this study also uncovered the significant impact of management efficiency on bank performance [51-52]. Coefficient of 9.531 with p-value of less than 0.05 implies that 1% intensification in return on assets will bring 9.5% increase in bank's performance and that is possible only by effectively utilizing the assets of organization. Hence, the third alternative hypothesis (H_{1-3}) is also accepted.

Moreover, earning quality quantified by return on equity was inversely related to our dependent variable. The P-value of less than 0.05 suggested the significant relationship between earning quality and bank performance. The positive correlation between these two indicates that bank's performance will increase with growth of ROE. Quality of earnings can help banks in performing activities such as paying dividends, ensuring appropriate level of capital, making diversification and maintaining competitive advantage in the market place. The fourth hypothesis (H_{1-4}) accepted for significant results. Interestingly, studies by Heikal, et al., Azizi and Sarkani and, Taani and Banykhaled

came up with harmonious results and present the significant relationship between these two [51-53].

Furthermore, the study also hypothesized that liquidity has significant influence on bank's performance. significant p-value of less than 0.05 leads us to acceptance of fifth alternate hypothesis (H_{1-5}) and it confirmed the significance of relationship between liquidity and bank performance. Positive sign of liquidity coefficient proposes the need to manage exceptionally the fluid resources to bolster the performance. Satisfactory liquidity helps the bank minimize liquidity danger and budgetary emergencies. The findings of the study were in accordance with Azizi and Sarkani, Agbada and Osuji and Olagunju, et al. discovered that satisfactory liquidity resources can help the banks to embrace any unforeseen stun caused by any surprising need for reducing liabilities or adding resources [52, 54-55].

Likewise, macroeconomic factors inflation, GDP, and stock market performance were estimated to have significant impact on bank's performance as presented by their significant p values (less than 0.05). Negative coefficient of inflation implies that 1% increase in inflation rate will shrink the bank performance by 0.08%. It also justifies the fact that when inflation could influence the purchasing power of masses, value of money, and interest rate charged and received by banks that ultimately impact their performance. Contrastingly, GDP was noted to have significantly negatively related with bank performance. Literature has documented mixed evidence about type of relationship between these two variables. According to Flamini, et al. GDP has not compulsory positive association with bank performance [56]. This situation is aligned with the fact that banks in developing countries perform better as compared to in developed countries. Finally, this study also obtained significant positive impact of stock market performance on commercial banks' performance of Pakistan for the period under study 2012 to 2016. With this discussion of macroeconomic factors with our dependent variable, the study accepted our remaining hypothesis H_{1-6} , H_{1-7} , and H_{1-8} .

6. Conclusion and Recommendations

Evaluation of organizational performance is vital to ensure survival and long term growth in current competitive scenario. Banking sector, being major contributor of Pakistani economy also demands the performance evaluation like other sectors. Tough competition among this industry members and damaging macro-economic policies of Government of Pakistan are causing lots of strain on the banks' performance. Hence, this paper aimed at studying the impact of bank's internal (CAMEL) factors and external factors (macroeconomic indicators) on bank's performance targeting all commercial banks listed on PSX using sample period 2012 to 2016. Examining the impact of chosen regressors on the outcome variable through Feasible Generalized Least Squares (FGLS) panel data model, it is found that capital adequacy, asset quality, liquidity, and inflation have strong but indirectly correlated with banks'

performance. On the other hand, management efficiency, earning quality, GDP, and stock market performance have positive correlation though significant impact on bank performance. FGLS exhibited that CAMEL factors along with economic indicators were statistically significantly effecting bank's performance over the studied period. Findings evoke the management of banks to be concerned about CAMEL factors for rallying their performances as good banking performance could be important for investors and shareholders for investment decisions. Being the latest research investigating influence of both internal as well as external factors on bank's performance would be an imperative contribution. This study is contextualized only to public listed banks of Pakistan using annual data. Further studies can be directed on private banks or non-banking financial institutions of Pakistan and by enhancing frequency of data through utilizing quarterly figures.

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