An Empirical relationship between Macroeconomic Indicators and Pakistan Stock Market: 1992-2012

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Summary
The present study investigates the relationship between macroeconomic indicators and the performance of Pakistan's stock market proxied by KSECAP by estimating a linear regression model with OLS, ARDL Cointegration, and a Vector Error Correction Mechanism (VECM) techniques. This empirical study used monthly data from 1992M01 to 2012M12. The statistical results lead to the conclusion that macroeconomic indicators including inflation (CPI), money supply (M2), a nominal exchange rate of Pakistan's currency (Rupee) per US dollar (EXR), gross domestic savings (SAV), the gross domestic product (GDP) and a nominal interest rate (INT) at levels and at their respective lag values have a significant impact on the performance of Pakistan's Stock Market. Results also conclude that TAX has an insignificant impact on the performance of Pakistan's stock market. In addition, it is concluded from the results generated from the ARDL bound testing cointegration technique that the long-run equilibrium relationship does exist between macroeconomic indicators and the performance of Pakistan's stock market. Furthermore, a VECM also confirms that a long-run relationship does exist between macroeconomic indicators and the performance of Pakistan's stock market. At the same time, the estimated error correction term indicates that the speed of adjustment is 1.2830 percent to adjust back to a long-run equilibrium in case of any departure from it. The current empirical study has short-run as well as long-run implications, especially when policymakers are designing policies about the growth prospects of financial markets, when fund managers are making investment decisions to invest in the capital markets and also when project managers are formulating capital investment decisions in emerging economies like Pakistan's. In addition, implications are useful for retail investors looking for good returns on investments in capital markets such as stock markets.

Key words:
ADF, OLS, ARDL COINTEGRATION, VECM, KSECAP, TAX, CPI, M2, EXR, SAVINGS, GDP AND INTEREST RATE.

1. Introduction

Stock markets play a pivotal role in the macroeconomic performance of developing as well as developed countries by directing capital resources owned by individuals, corporations, governments and non-residents towards the users of capital including individuals, businesses and governments. As a result, underlying benefits include risk diversification, the mobilization of savings, corporate governance, all which provide access to capital through equity issues. Most of the empirical studies in recent decades have investigated the relationship between economic growth and financial development based on the banking industry (Levine and Zervos, 1998) but there are only a few studies that examine the effect of the macroeconomic performance on the stock market. Particularly, this importance has further enhanced after empirical consideration of the researchers in post East-Asian Financial Crisis (Chakrabarti and Roll, 2002). The relationship between macroeconomic indicators and stock markets of developed economies by (Fama, 1990; Chen, 1991; Thornton, 1993; Darrat and Dickens, 1999 and Kim, 2003), and the same of developing economies by (Mookherjee and Yu, 1997; Maysami and Koh, 2000; Kwon and Shin, 1999 and Ibrahim, 1999) have been investigated.

Stock markets shift capital surplus from small investors to businesses who are deficient in capital. This transfer of capital can be enhanced by appropriate risk management, full access to information, and stock market efficiency. This enhanced capital transfer will in turn boost the performance of a stock market, which ultimately translates into the economic growth of a developed or a developing country such as Pakistan (Abdelbaki, 2013).

Stock markets act as a liaison between borrowers and savers. Stock markets mobilize the savings of small savers, which are large in numbers, and channel their savings into fruitful investments, which are ultimately incorporated into economic activities (Sohail and Hussain, 2009). Empirical studies to determine the relationship between financial development and economic growth or vice versa have been conducted focusing on bank based financial development. However, studies which demonstrate a direct link between stock market development and economic growth are rare (Ho and Odhiambo, 2012).

This current research study has been undertaken to ascertain the relationship between macroeconomic indicators and the performance of Pakistan's stock market. Here, the performance of Pakistan's stock market is proxied by Karachi Stock Exchange Capitalization (KSECAP). The macroeconomic indicators include:

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inflation measured by Consumer Price Index (CPI), savings (SAV), money supply in a broader sense (M2), the foreign exchange rate (EXR), the interest rate (INT), and taxes (TAX). Use of the variable TAX as an independent variable makes this study the first of its kind, which investigates the relationship between the macroeconomic indicators and the performance of the stock market.

The objective of the present study is to assess the relationship between economic growth and the performance of Pakistan's stock market. To assess this relationship, monthly KSECAP data is used as a proxy for the performance of Pakistan's stock market and economic growth is proxied by macrocosmic indicators. Further, the estimation is done by employing certain econometric techniques, which are discussed and presented in the methodology section below.

The expected outcome of this empirical research is of great significance as it can lay down a strong foundation for decision makers and policymakers at the individual, institutional, governmental, and multinational levels to formulate policies affecting stock market performance that ultimately affects macroeconomic performance. Furthermore, a better understanding of the long-run relationship between macroeconomic indicators and stock markets can assist individuals and institutions in managing risks. The findings of the study can also sway policymakers to revise current policies and possibly formulate new policies so that liquidity is enhanced via stock markets to fulfill the capital needs of individuals, institutions, governments, as well as multinational corporations.

The study has been organized in the following manner. The next section, i.e., Section II presents an overview of stock markets. Section III covers a review of the literature. Section IV deals with data sources and methodology, and Section V presents the statistical results along with their analysis. Finally, the last section, i.e., Section VI is on conclusion along with policy implications.

2. Overview of Stock Markets

In this modern world, stock markets provide a platform for selling and buying shares and derivatives at settled prices. In the corporate sector, companies raise capital by issuing shares. The trading of shares is an important financial activity, which determines the prices of outstanding shares based on both companies as well as macroeconomic performance. Likewise, stock markets are a venue where individuals, institutions, and governments with capital surpluses and shortages meet each other after which the forces of market supply and demand determine the price of financial instruments. In addition, exchanges perform the role of clearing houses delivering and collecting the stocks and ensuring payment to the sellers.

Stock Exchanges perform important functions for businesses such as helping them raise capital while simultaneously creating investment opportunities for small investors, mobilizing savings, facilitating company growth, and redistributing wealth in an efficient and justified way. The total dollar value in the world's stock markets was $224.62 trillion in 2008, which almost doubled to $ 454.32 trillion in 2016 (World Bank, 2017). The New York Stock Exchange (NYSE), the NASDAQ, the London Stock Exchange and the Tokyo Stock Exchange boast the largest total market capitalizations, respectively.

There are three stock exchanges in Pakistan, namely the Karachi Stock Exchange (KSE), the Islamabad Stock Exchange (ISE) and the Lahore Stock Exchange (LSE). These three stock exchanges have been merged as the Pakistan Stock Exchange (PSX) on January 11, 2016, to reduce market fragmentation. The PSX's activities, which currently involve about 560 listed companies, are regulated by the Security and Exchange Commission of Pakistan (SECP). The merger and functioning of SECP as a regulatory authority attracted both foreign and local investors. As a result, PSX consisted of 1886 foreign institutional investors, 883 domestic institutional investors, as well as about 220,000 retail investors by May 2016. There are about 400 brokerage houses, which are members of the PSX, as well as 21 asset management companies. Furthermore, the PSX sold 40 percent strategic shares to a Chinese consortium for $85 million in December 2016.

3. Literature Review

Various empirical studies have been undertaken to examine the long-run relationship between macroeconomic indicators and stock market performance. A pioneering study to investigate the relationship between macroeconomic indicators and equity market performance was undertaken by Chen et al. (1986). They found that macroeconomic indicators including industrial production, risk premium changes, yield curve, and changes in expected and unanticipated inflation impacted the performance of the stock market proxied by equity market returns.

Macro indicators such as the interest rate, inflation, and money supply are closely interrelated and affect the performance of stock markets. The mobilization of capital from savers to users is affected by changes in the interest rate made by the central banks. Consequently, interest rate fluctuations also affect the long-run performance of stock markets. Empirical research demonstrates a long-run relationship between the interest rate and stock market returns (Maysami and Koh, 2000; Wongbango and

Sharma, 2002; Shah, Kouser, Aamair and Saba, 2012; Al-Majali and Al-Assaf, 2014). Likewise, a dynamic relationship exists between savings and stock market returns (Abdelbaki, 2013). Also, a significant relationship between the inflation rate (CPI) and stock market returns has been investigated and researchers concluded the existance of a long-run equilibrium relationship between them (Mayasami and Koh, 2000; Wongbango and Sharma, 2002; Mukhopadhyay and Sarkar, 2003; Ali I, Rehman, Yllmaz, Khan and Afzal, 2010; Shah, Kouser, Aamair and Saba, 2012; Al-Majali and Al-Assaf, 2014) although, in other studies, this relationship turned out to be insignificant (Sohail and Hussain, 2009).

Alternatively, previous studies examine the relationship between stock market returns and macro indicators such as the foreign exchange rate, production, and trade balance (Kwon and Shin 1999). However, money supply is the key macro indicator that has a dynamic relationship on the performance of the stock markets (Maysami and Koh, 2000; Wongbango and Sharma, 2002; Mukhopadhyay and Sarkar, 2003; Sohail and Hussain, 2009). Nevertheless, a few studies demonstrate the absence of relationship between money supply and the performance of stock markets. (Ali I, Rehman, Yllmaz, Khan and Afzal, 2010; Sohail and Zakir, 2010). Contrarily, foreign exchange reserves affect the money supply for importers, the foreign exchange rate, and the trade balance in emerging economies that in turn influence the long-run performance of the relevant stock market (Sharma and Mahendru, 2010). Among macroeconomic indicators, economic growth is the key indicator and enhances earnings, savings, and ultimately, investments in stock markets. Therefore, the previous studies found a statistically significant relationship between economic growth proxied by GDP and stock market returns (Nisa and Nishat, 2012; Abdelbaki, 2013). Wongbango and Sharma (2002) studied a dynamic relationship between the stock returns of the ASEAN-5 countries: Singapore, Indonesia, the Philippines, Malaysia, and Thailand and each country's respective macro indicators such as gross national product, the consumer price index, money supply, the interest rate and the exchange rate. They employed maximum likelihood co-integration approaches devised by Johansen (1988, 1991) and Johansen and Juselius (1990) and found the presence of cointegration between stock indices and respective macro indicators; in other words, a long-run equilibrium relationship did exist between them. By employing the vector error correction mechanism, it was also found that any deviation between macro indicators and stock market returns adjusts back to the long-run equilibrium. Additionally, industrial production, which is one of the foremost gauges to measure economic growth has a long-run relationship with the performance of stock markets (Mukhopadhyay and Sarkar 2003; Sohail and Hussain 2009; Sohail and Zakir 2010). However, Ali et al (2010) found contrary results.

Shah et al. (2012) conducted a study to estimate the dynamic relationship between macroeconomic variables and the stock market. They applied the Autoregressive Distributed Lag (ARDL) model devised by Pesaran, et al. (2001) and used monthly time series data from the 2003: M01 to 2009: M04 of KSE-100 Index. This study concludes that a long-run relationship does exist between stock prices and macroeconomic variables: the interest rate, the exchange rate, and inflation. Shah et al. (2012) also concluded that a short-run relationship does exist between macroeconomic variables and the KSE-100 index, which helps investors foresee future behaviour of a stock market by analyzing current behaviour and trends of the exchange rate, the interest rate and inflation (Shah, Kouser, Aamir, & Saba, 2012). Previous studies were undertaken to investigate the long-run relationship between macro indicators and the performance of the stock markets but there is no study that investigated the long-run relationship as well as the short-term dynamic relationship between macro indicators and the performance of a stock market. Hence, there is a gap in the existing literature. And now, it is expected that the current study will fill this gap by devising a new functional form of the model, using a new data set to measure the performance of Pakistan's stock market with KSECAP including the most relevant macroeconomic indicators such as inflation (CPI), savings (SAV), money supply (M2), the foreign exchange rate (EXR), the interest rate (INT), and, for the first time, taxes (TAX).

4. Data and Methodology

In the current study, the monthly data of the Karachi Stock Exchange Capitalization (KSECAP) in US$ has been used as a proxy for Pakistan's stock market performance. Meanwhile, KSECAP has been computed as a total number of shares outstanding multiplied by the current market share price (=share prices x total number of shares outstanding). The on KSECAP for the period from 1992M01 to 2012M12 have been obtained from the website of World Development Indictors and the website of the State Bank of Pakistan. Data for macroeconomic indicators: money supply in a broader sense (M2) in Pak-rupees, inflation gauges from the consumer price index (CPI), savings (SAV) in US$, taxes on products (TAX) in US$, gross domestic product (GDP) in US$ was obtained from World Development Indicators (WDI). Furthermore, data of the average monthly nominal foreign exchange rate of the Pak-rupee versus the US$ (EXR) was collected from the website of International Financial Statistics (IFS). The interest rate data was obtained from the website of Banking

Statistics of Pakistan and the State Bank of Pakistan. Annual time series data have been converted into monthly data whenever required by employing the linear interpolation method devised by Chow (1971).

Methodology of this study is divided into two parts. Part 1 describes the functional form of the model. In Part 2, the relationship between macroeconomic indicators and performance of the Pakistan stock market is investigated by employing the Auto Regressive Distribution Lag (ARDL) model for a long-run relationship and an error correction model for a short-run analysis of this study has been divided into two sections. First section describes the functional form of the model. In second section, relationship between macroeconomic variables and stock exchange is examined by employing Auto Regressive Distribution Lag (ARDL) model for long run relation and error correction model for short run analysis.

4.1 Functional Form of the Model

To estimate the impact of macroeconomic indicators on the performance of Pakistan's stock market proxied by the Karachi Stock Exchange Capitalization (KSECAP), Model 1 was specified and shown below as Equation (1). Before using Model 1, the stationarity of all variables included in the model was checked by employing the Augmented Dicky Fuller (ADF) test. The statistical results obtained from the ADF are given in Appendix II. Furthermore, before testing the stationarity of variables, the optimal lag length of TAX, CPI, M2, EXR, SAV, GDP, INT, and KSECAP was also identified by using a VAR Lag Order selection criterion and the empirical results are presented in Appendix I. Because the results that were generated by the Akaike Information Criterion test statistic (AIC) indicated an optimal lag selection of 12, therefore, an optimal lag of 12 was used for further empirical investigation. The results generated from the ADF test indicate that the variables, taxes and interest rate are stationary at the 1st difference or integrated of order one I(1), while variables, KSECAP, CPI, M2, EXR, SAV, and GDP are stationary at the 2nd difference; in other words, are integrated of order two I(2). Based on ADF test results, the following econometric model (referred to as Model 1, hereafter) was specified to estimate the impact of macroeconomic indicators on the performance of Pakistan's Stock Market.

$$KSECAP_t = \alpha + \beta_1 TAX_t + \beta_2 TAX_{t-1} + \beta_3 CPI_t + \beta_4 CPI_{t-1} + \beta_5 CPI_{t-2} + \beta_6 M_{2t} + \beta_7 M_{2t-1} + \beta_8 M_{2t-2} + \beta_9 EXR_t + \beta_{10} EXR_{t-1} + \beta_{11} EXR_{t-2} + \beta_{12} SAV_t + \beta_{13} SAV_{t-1} + \beta_{14} SAV_{t-2} + \beta_{15} GDP_t + \beta_{16} GDP_{t-1} + \beta_{17} GDP_{t-2} + \beta_{18} INT_t + \beta_{19} INT_{t-1} + \beta_{20} KSECAP_{t-1} + \beta_{21} KSECAP_{t-2} + \varepsilon_t \quad (1)$$

Where the dependent variable is the Karachi Stock Exchange Capitalization (KSECAP) in US$, the independent variables are: TAX as the net tax revenues in US$, inflation measured by the consumer price index (CPI), money supply in a broader sense (M2) in Pak-rupees, the EXR as the average monthly nominal foreign exchange rate of the Pak-rupee versus the US dollar, gross domestic savings in US$ (SAV), gross domestic product (GDP) of Pakistan measured in US$ and the nominal lending interest rate (INT). Model 1 has been estimated by the OLS estimation technique.

4.2 Long Run relation and Error Correction Model for short run analysis

To estimate the long-run relationship between the performance of Pakistan's stock market and selected macroeconomic indicators, the ARDL model was employed, which was proposed by (Pesaran, Shin, & Smith, 2001) for co-integration analysis. The reason for selecting this technique is that there is no effect on the estimated results even if the integration order of the variables is not the same. However, before applying the co-integration test, the Vector Auto-regression (VAR) model was applied on the time series to determine the optimal lag length of the independent variables to be included for further estimation. Once the time series are found co-integrated, a vector error correction mechanism (VECM) was employed to find out the short-run relationship between cointegrated variables. Additionally, a significant equilibrium error term with a negative sign indicates that the variables are cointegrated and in case of any departure from the long-run equilibrium relationship, variables converge to a long-run equilibrium. The estimated results based on Model 1 are presented and discussed in the next section.

5. Result and Data Analysis

This section presents the estimated statistical results along with their analysis and has been divided into two sub-sections. Sub-Section (A) presents the statistical results obtained by estimating Model 1by OLS. It is mentioned here that the VAR Lag Order Selection Criteria and the stationarity of all variables has been checked by the Augmented Dickey-Fuller (ADF) test as a pre-requisite. Sub-Section (B) deals with the long-run relationship between the explanatory variables and the dependent variable, which is estimated by the Auto Regressive Distributed Lag (ARDL) cointegration approach, and lastly, the short-run relationship is estimated by employing the Vector Error Correction Mechanism (VECM).

5.1 Long Run Relationship between Macroeconomic Performance of Pakistan and Its Stock Market

Statistical results for Model 1 as presented in Table 1 below reveal that tax coefficient at the current level (βˆ1= 0.216239) and that with one lag (βˆ2= - 0.227637) shows a direct and inverse (both being insignificant) relationship, respectively with the KSECAP. By the same token, CPI coefficients at the current level and at two lags (βˆ3= -650000000, βˆ5= -529000000, respectively) indicate a negative but significant effect on the stock market of Pakistan. The results indicate that a one percentage point increase in inflation causes the KSECAP to lose US $650,000,000 in the current month .The statistical results also leads to the conclusion that inflation causes the KSECAP to decline by US$529,000,000 even after two months in response to a one percentage point rise in inflation, whereas, the CPI coefficient at one lag (βˆ4 = 1,140,000,000) indicates a positive and significant impact on Pakistan's stock market showing a gain of US$1,140,000,000 in KSECAP for every one percentage point increase in inflation in the previous month. The statistical results related to the impact of money supply on the stock market indicate that M2 coefficients at the current level, with one and two lags (βˆ6= 0.047866, βˆ7= - 0.087486, βˆ8 = 0.040121, respectively) are significant. The results indicate that money supply affects the stock market directly in the current month and two months after, whereas, it affects the stock market inversely one month after the change in M2. The magnitude of M2 coefficients indicates that one unit increase in money supply causes the stock market to gain US$0.047866 units in the current month and US$ 0.040121 units after two months but, in contrast, one unit increase in money supply causes the stock market to loseUS$0.087486 units after one month. Similarly, estimated statistical results related to the impact of exchange rate on stock market indicate that the nominal exchange rate (EXR), as defined in the present study, coefficient at the current level and with two lags (βˆ9 = -1450000000, βˆ11= -1240000000, respectively) shows a negative relationship with the KSECAP, i.e., a one rupee depreciation in the Pak-rupee versus the US dollar causes Pakistan's stock market to lose US$1,450,000,000 in the current month and US$ 1,240,000,000 after two months. On contrary, the nominal exchange rate coefficient with one lag (βˆ10= 2660000000) shows a direct relationship with the KSECAP. It indicates that a one-rupee depreciation in the nominal exchange rate of Pak-rupee versus the US$, the Pakistan's stock market gains US$ 2,660,000,000 in the following month. Statistical results related to the impact of savings on the stock market indicate that saving (SAV) coefficient at the current level and with two lags (βˆ12= 1.534097, βˆ14= 1.259658, respectively) have positive and significant relationship with the KSECAP. In contrast, a coefficient with one lag (βˆ13= - 2.758963) has a negative and significant relationship with the KSECAP. The estimated coefficients of savings indicate that a one unit increase in savings causes stock market to gain US$1.534097 units in the current month and US$1.259658 units after two months. On contrary, the SAV coefficient with one lag (βˆ13= -2.758963) indicates that when savings increases by one unit, the stock market will lose US$2.758963 units in the next month in response.

Table 1: Impact of TAX, CPI, EXR, SAV, GDP and INT on the KSECAP as Estimated by OLS

Vari-ables	Coefficients.	Standardized regression Coefficients
C	1.18E+09*	24437869.82*
TAX	0.216239	0.0000
TAX(-1)	-0.227637	0.0000
CPI	-6.50E+08*	-5538461.54*
CPI(-1)	1.14E+09*	18078106.51*
CPI(-2)	-5.29E+08*	-4350946.75*
M2	0.047866*	0.0000*
M2(-1)	-0.087486*	0.0000*
M2(-2)	0.040121*	0.0000*
EXR	-1.45E+09*	-14757396.45*
EXR(-1)	2.66E+09*	52255621.30*
EXR(-2)	-1.24E+09*	-12840236.69*
SAV	1.534097*	0.0000*
SAV(-1)	-2.758963*	0.0000*
SAV(-2)	1.259658*	0.0000*
GDP	-1.03403*	0.0000*
GDP(-1)	1.867168*	0.0000*
GDP(-2)	-0.842287*	0.0000*
INT	2.82E+08*	1650638.88*
INT(-1)	-2.76E+08*	-1562853.94*
KSECAP(-1)	1.827045	0.0000
KSECAP(-2)	-0.840597*	0.0000
R^2	0.999880	
Adj. R2	0.999868	
F – Statistics	90130.12	
P-value F-Stat	0.0000	

Note: *,**,*** represent significane at 1%, 5% and 10% significance levels, respectively.

The results as reported in Table 1above indicate that the coefficient associated with GDP at the current level and with a second lag (βˆ15= -1.03403, βˆ17= - 0.842287, respectively) have a negative but significant relationship with the KSECAP. The results indicate that as GDP increases by one unit, the stock market will lose US$1.03403 units and US$ 0.842287 units, respectively in the current month and after two months in response. In other words, the performance of Pakistan's stock market falls in the current month and again after two months. Contrarily, the estimated coefficient of the GDP with one lag (βˆ16= 1.867168) indicates that as GDP of Pakistan increases by one unit the stock market of Pakistan will gain US $1.867168 units in the following month or the performance of Karachi stock market inclines in the next

month in response. The estimated results related to the impact of Interest rate on the stock market indicate a positive relationship at the current level but a negative relationship with one lag as the estimated coefficients of INT are (βˆ18= 282000000 at the current level) and (βˆ19= -276000000 with one lag), respectively. The results indicate as the interest rate increases by one percentage point the Pakistan's stock market will gain US$282,000,000 in the current month and lose US$276,000,000 in the following month. Statistical results also indicate that the historical returns of the KSECAP also affect the current performance of the KSECAP as KSECAP coefficients at one lag (βˆ19= 1.827045) and at two lags (βˆ20= - 0.840597) respectively, have a direct and inverse significant relationship with the performance of Pakistan's stock market. The estimated results also show that the current performance of Pakistan stock market depends directly on its previous month performance i.e., for every one unit increase in the value of KSECAP in the current month the value of KSECAP will increase by US$1.827045 units in the next month but will decrease by US$0.840507units after two month. This finding leads to the conclusion that the performance of the Pakistan stock market is a weak form efficient.

Statistical results also indicate that the explanatory power of independent variables is very high as indicated by the values of R-squared (=0.999880) and Adjusted R-squared (=0.999868). Furthermore, the estimated F-statistic (=90130.12) is significant with a p-value of 0.00000, which in turn indicates a goodness of fit of this model strongly supported by the data.

To identify the most important determinant associated with the performance of Pakistan's stock market proxied by the KSECAP from the independent variables in Model 1, standardized regression coefficients are computed. The results generated from therein indicate that a standardized regression coefficient of the exchange rate with one lag has the biggest │52,255,621.3│ magnitude. In other words, it has the biggest impact on the performance of Pakistan's stock market. The computed results also indicate that the next biggest standardized coefficient │18,078,106.51 │is of inflation with one lag. The importance of the remaining macroeconomic indicators influencing the Pakistan's stock market is shown in order below. The exchange rate at the current level │14,757,396.45│, the exchange rate with two lags │12,840,236.69│, inflation at the current level │5,538,461.538│, inflation with two lags │4,350,946.746│, interest rate with one lag │1,562,853.936│, savings with one lag │7.31364E-11│, savings at the current level │2.06564E-11│, savings with two lags │1.78873E-11│, GDP with one lag │1.42198E-11│, GDP at the current level │3.99062E-12│, GDP with two lags │3.63365E-12│, Taxes with one lag │2.87741E-12│, Taxes at current level │2.69216E-12│, money supply with one lag │2.31553E-14│,money supply at the current level │6.40951E-15│, money supply with two lags │6.40951E-15│, and interest rate (INT) at the current level │-1650638.876│. The information contained in the standardized coefficients can be exploited by individual investors and fund managers working in the stock market of Pakistan

5.2 Long-run relationship between Macroeconomic Indicators and the Pakistan's Stock Market

To investigate the dynamic relationship between macroeconomic indicators and the KSECAP, an ARDL model is employed and estimated by the ARDL bounds test cointegration approach devised by Pesaran et al. (2001). Results of the ARDL bound test cointegration are presented in Table 2 below.

Table 2: ARDL (p, q) Bound Test Approach to Cointegration

Dependent Variable		**F-Test Statistics**			
KSECAP		4.694380			
Critical Value Bounds					
1%		5%		10%	
Lower Bound I (0)	Upper Bound I(1)	Lower Bound I (0)	Upper Bound I(1)	Lower Bound I (0)	Upper Bound I(1)
2.96	4.26	2.32	3.5	2.03	3.13

The statistical results as reported in Table 2 above, indicate the F-statistic (= 4.694380) is greater than the upper bound test value (I(1)= 3.5)) at a one percent significance level. The result leads to the conclusion that cointegration does exist between the KSECAP and macroeconomic indicators. In other words, a long-run equilibrium relationship does exist between the KSECAP and macroeconomic indicators of Pakistan. Since the KSECAP and the macroeconomic indicators are cointegrated, there is a need to estimate the long-run relationship between the macroeconomic indicators and the KSECAP which has been done below.

Table 3: Long run Relationship between KSECAP with ARDL (p, q) Model

Dependent Variables	Coefficients
TAX	-0.399667
CPI	-2.299E+09*
M2	0.034306*
EXR	-1.912E+09*
SAV	2.579966*
GDP	-0.590661
INT	85622156
C	8.201E+10

Note: * denotes significant at 1% significance level

Statistical results estimated by the ARDL technique, as given in Table 3, above indicate that a long-run coefficients of CPI and EXR (= - 2299395707.389751, -1911715900.685985, respectively) reveal a negative and significant relationship with the KSECAP at a 2.5 percent

level of significance. Whereas, the long-run coefficients of SAV (= 2.579966) and M2 (= 0.034306) show a positive and significant relationships with the KSECAP. It further indicates that a one-unit increase in SAV causes a US$2.579966 units increase in the value of KSECAP in the long-run. The long-run coefficients of TAX (=-0.399667), GDP (= -0.590661), and INT (=85,622,156) are not statistically significant, therefore the indicators TAX, GDP and interest rate have no relationship with the KSECAP. Hence, no further explanation is called for.

5.3 Error Correction Mechanism for ARDL (p, q) Model

With the existence of a long-run relationship between the KSECAP and macroeconomic indicators, a short-run relationship is estimated by using a vector error correction mechanism (VECM) from the following devised error correction model (2) for the ARDL (p, q).

$$\Delta KSECAP_t = \alpha_0 + \sum_{i=1}^{n} \beta_1 \Delta KSECAP_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta TAX_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta CPI_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta M2_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta EXR_{t-i} + \sum_{i=0}^{n} \beta_6 \Delta SAV_{t-i} + \sum_{i=0}^{n} \beta_7 \Delta GDP_{t-i} + \sum_{j=0}^{n} \beta_8 \Delta INT_{t-j} + \eta ECT_{t-1} + \varepsilon_t \quad \cdots (2)$$

A significant error correction term ECTt-1 with a negative sign indicates that a short-term dynamic relationship does exist between KSECAP and macroeconomic indicators. In addition, a significant negative coefficient of ECT demonstrates a long-run relationship between variables (Banerjee, Dolando, & Mestre, 1998). Further, a negative/positive sign of the estimated coefficient of the ECT indicates a convergence to/divergence from the long-run equilibrium relationship, respectively whereas a magnitude of the ECT indicates the speed of convergence/divergence.

Table 4: Short Run Relationship between KSECAP with ARDL (p, q) Model

Variables	Coeff.
D(KSECAP(-1))	0.857545*
D(TAX)	-0.005128
D(CPI)	-747745610*
D(CPI(-1))	592386708.74*
D(M2)	0.048939*
D(M2(-1))	-0.042159*
D(EXR)	-1436167666*
D(EXR(-1))	1261568807.36*
D(SAV)	1.61*
D(SAV(-1))	-1.342554*
D(GDP)	-1.060578*
D(GDP(-1))	0.89*
D(INT)	509851528.77*
D(INT(-1))	-296274652.9*
ECT(-1)	-0.01283*

Note: * denotes significant at 1% significance level

Statistical results as reported in Table 4 above indicate that the error correction term coefficient (= - 0.012830) is significant at a one percent level and is correctly signed. This leads to the conclusion that the KSECAP and macroeconomic indicators are cointegrated. This means that a long-run equilibrium relationship does exist between them. Additionally, the magnitude of the vector error correction term $|-0.012830|$ indicates the speed of adjustment in the short-run in case of any departure from the long-run equilibrium relationship due to any short-term shock. Meanwhile, the estimated error correction term also represents the speed of adjustment as 1.2830 percent, and it takes almost 78 months to adjust back to the long-run equilibrium where any departure from equilibrium relationship between macroeconomic indicators and the KSECAP caused by short term shocks.

6. Conclusion

The present study investigates the relationship between macroeconomic indicators and performance of Pakistan's stock market by employing econometric techniques to estimate the linear regression model with OLS, ARDL cointegration, and the vector error correction mechanism (VECM). In this empirical study, monthly data was used from 1992M01 to 2012M12. Statistical results lead to the conclusion that macroeconomic indicators: taxes (TAX), inflation (CPI), a money supply (M2), a nominal exchange rate of Pak-rupee vs US Dollar (EXR), gross domestic savings (SAV), the gross domestic product (GDP) and a nominal interest rate (INT) at current and at their respective lag values have an impact on the performance of Pakistan's stock market proxied by the KSECAP. Results also reveal that taxes have an insignificant impact on Pakistan's stock market. Inflation has a negative impact in the current month but a positive impact in the following month and then again, a negative impact after two months on the performance of the Pakistan's stock market. These findings are consistent with the findings of Nisa and Nishat (2012) and Sohail & Hussain (2009) but differ from those of Abdelbaki (2013) and Sharma and Mahendru (2010). Statistical results also concluded that a money supply (M2) has a negative impact in the current month but a positive impact in the following month followed by a negative one after two months on the performance Pakistan's stock market. These findings of the current study are aligned with Kwon and Shin (1999) and Wongbango and Sharma (2002) but differ from Sohail and Hussain (2009) and Nisa and Nishat (2012).

The statistical results obtained from the techniques used in the study also indicate that a nominal exchange rate has an inverse impact in the current month and after two months but a direct impact in the following month on the

performance of Pakistan' stock market. These findings of the present study are consistent with the findings of Mukhopadhyay and Sarkar (2003) and Sharma and Mahendru (2010). Meanwhile, it is also found from the statistical results that savings has significant positive impact in the current month but a negative impact in the following month, and then again, a positive one after two months on the performance of the Pakistan's stock market. On the other hand, it is found from the results that GDP has a negative impact in the current month but a positive impact in the next month and even after two months on the performance of the Pakistan's stock market. These findings are consistent with the findings of Nisa and Nishat (2012). The empirical results further help to conclude that the interest rate has a positive impact in the current month but a negative impact in the following month on Pakistan's stock market. This finding is aligned with Wongbango and Sharma (2002).

Meanwhile, statistical results generated from an ARDL test bound cointegration technique identify that a long-run equilibrium relationship does exist between macroeconomic indicators: taxes, inflation, money supply, the exchange rate, savings, GDP and interest rate and Pakistan's stock market proxied by the KSECAP. These findings are aligned with those of Wongbango and Sharma (2002), Sohail and Hussain (2009), Ali et. al (2010), Sohail and Zakir (2010), Shah et. al. (2012) Abdelbaki (2013), Al-Majali and Al-Assaf (2014) but differ from those of Maysami and Koh (2000).

Further, statistical results indicate that error correction term coefficient (= - 0.012830) is significant at 1 percent significance level and is correctly signed. This leads to the conclusion that the KSECAP and macroeconomic indicators of Pakistan are cointegrated and a long-run relationship does exist between them. Furthermore, the magnitude of the vector error correction term $|-0.012830|$ indicates the speed of adjustment in a short-run in case of any departure from the long-run equilibrium relationship due to any short-term shock. Meanwhile, the estimated error correction term also shows that the speed of adjustment is 1.2830 percent and it takes almost 78 months to adjust back to the long-run equilibrium in case of any departure between the macroeconomic variables and the KSECAP. These findings are consistent with those of Wongbango and Sharma (2002) and Sohail and Zakir (2010) and differ from those of Abdelbaki (2013).

The current empirical study has short-run as well as long-run implications, especially when policymakers are designing policies about the growth prospects of financial markets, and retail investors and fund managers are making investment decisions about investing in the capital markets, and when project managers are formulating capital investment decisions in emerging economies like Pakistan. Since this empirical study examines the dynamic relationship between macroeconomic indicators and the performance of a stock market in an emerging economy, the analysis of the dynamic relationship between macroeconomic indicators and the performance of stock markets in developed and developing countries informs a valuable instrument in literature to measure and predict stock market activity.

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Appendix I

VAR Lag Order Selection Criteria

Endogenous variables: TAX, CPI, M2, EXR, SAV, GDP, INT, KSECAP
Exogenous variables: C

Sample: 1992M01 2012M12
Included observations: 240

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-44830.36	NA	3.2e+147	373.6864	373.8604	373.7565
1	-37499.65	13867.26	3.1e+121	313.7971	316.0595	314.7087
2	-35934.74	2803.806	2.2e+116	301.9562	**306.3069***	**303.7092***
3	-35887.79	79.42829	5.2e+116	302.7649	309.2041	305.3594
4	-35842.75	71.68409	1.2e+117	303.5896	312.1171	307.0256
5	-35790.86	77.39639	2.8e+117	304.3572	314.9731	308.6346
6	-35723.75	93.39206	5.9e+117	304.9980	317.7023	310.1169
7	-35633.19	116.9732	1.1e+118	305.4433	320.2360	311.4037
8	-35531.69	120.9579	1.9e+118	305.7974	322.6785	312.5993
9	-35402.26	141.2991	2.8e+118	305.9188	324.8883	313.5621
10	-35245.08	155.8669	3.5e+118	305.8090	326.8669	314.2938
11	-34960.71	253.5598	1.8e+118	304.6393	327.7855	313.9655
12	-33677.60	**1015.801***	**2.4e+114***	**295.1466***	320.3813	305.3144

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix II

Augmented Dickey-Fuller unit root test, with Trend and without trend

Variables	ADF without trend Test Statistics			ADF with Trend Test Statistics		
	AT Levels	1st Difference	2nd Difference	AT Levels	1st Difference	2nd Difference
KSECAP	-1.972864	-2.74792***	-10.25750*	-3.280464	-2.748401	-10.23578*
TAX	-2.850462**	-3.630717*	-	-4.306993	-3.637361**	-
CPI	-2.597376	-2.872495**	-8.923752*	-2.690056	-2.876896	-8.904252*
M2	0.380525	0.7206	-10.32682*	-1.816604	-2.70819	-10.28561*
EXR	-0.736271	-2.772873***	-15.71772*	-2.927335	-2.750313	-15.69192*
SAV	-1.925777	-2.033673	-8.872999*	-1.668300	-2.551035	-8.877531*
GDP	0.171513	-2.54522	-15.71645*	-1.982939	-2.726339	-15.70169*
INT	-2.55217	-3.28142**	-	-2.56868	-3.2781*	-

Note. Numbers in parenteses represent p-value and *,**,*** represent significane at 1%, 5% and 10% significance levels, respectively.