Impact of Macroeconomic Variables on Pakistan Stock Market

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Abstract

This study explores the intensity and influence of macroeconomic variables on Pakistan stock market with monthly data analysis from 30 June 2011 to 30 June 2018. The findings from multiple regression analysis divulge that a significant effect of money supply and exchange rate with negative and positive sign respectively whereas inflation and interest rate show a positive insignificant behavior toward Pakistan stock market. Furthermore correlation matrix, heteroskedasticity and serial correlation test are also actualized to check the accuracy of data for appropriate findings. These patterns of study and its findings are considerably useful for those investors who are interested in Pakistan Stock Market and Government to designed the policies for stock market development.

Keywords: Pakistan Stock Exchange, Inflation rate, Interest rate, Money supply, Exchange rate OLS.

Introduction

There is an immense store of writing survey exist which demonstrates the relationship between macroeconomic factors and the share trading market. A well- established and efficient monetary market plays a crucial role in the development and improvement of a country as well as its GDP rate (Waqar & Khan, 2017). Through the money related framework, the economy's rare assets move from savers to borrowers. Savers give their surplus pay to the money related framework with the desires to accomplish the most noteworthy rate of return in the future (Mukit, 2012). The significant relationship of the stock market and macroeconomic variables acquired resilient support from previous studies with different outcomes.

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Waqar & Khan (2017) explored the relationship between the stock market and macroeconomic variables (Interest Rate, Inflation Rate & Exchange Rate) empirically by using the annual series data from 1991 to 2017. The preferred long run ARDL model shows that interest rate has negatively affected the stock market and its estimate coefficient was statistically highly significant whereas stock market positively affected by Inflation rate and exchange rate in which inflation rate was highly significant and exchange rate insignificant. Dhaka stock market, monthly data from 1997 to 2010, elucidated the significant relationship of the stock market, exchange and interest rate (Mukit, 2012).

Bulmash and Trivoli (1991) concluded that US current stock price has a positively correlated relation with previous stock, money supply, recent federal debt, current tax-exempted government debt, long-term unemployment, the broad money supply, and federal rate. US stock prices affected by inflation rate and real economic activity negatively (by inflation) and positively (by real economic activity (Geske& Roll, 1983). Long-run and Short-run relationship between macroeconomic variables and stock market exist in BRIC countries, but this relation is not consistent, it variesconcerning time and other circumstances (Chittedi, 2015). Wycliffe and Peter (2014) by using 10 years stock market data of Kenya from 2003 to 2013 and applying APT (Arbitrage Pricing Theory), CAPM (Capital Assets Pricing Model) and OLS (Ordinary Least Square) concluded that stock market of Kenya is significantly affected by the money supply and inflation rate, but the exchange rate has a negative impact on the stock market. The interest rate is not an important factor which has an impact on the stock market.

A causal relationship is explored from 1998-2007 among stock prices, exchange rate and a specific set of macroeconomic variables for the Romanian stock structured market. The significant positive relation is observed between money supply and stock market whereas the relationship of the exchange rate (as nominal effective exchange rate) and stock prices negatively related to each other (Horobet and Dumitrescu, 2008). Additionally, they recognized a negative connection between authorized reserves and stock returns, and also between the genuinely viable exchange rate and stock prices. Stock prices not only rejoinder with short-run shock overs but also the long-run. They enlightened the appearance of stock prices counter to shocks in money supply and official reserves — the co-integrated relationship of the Singapore stock market and property index perceived with changes of a specific set of macroeconomic variables (Ramin&Maysami*et al*.,2004).

Divergent researches are supported the long and short-run relationship of stock markets &macroeconomic variables by using mathematical approaches (Johansen's multivariate Co-integration, Granger Causality test,etc.) with informational data of Egypt, Tunisia, Malaysia and India (Islam &haiku, 2003; AkthamMaghayereh, 2003; Bekhet& Ibrahim, 2012; Barakat *et al*., 2015).AkthamMaghayereh (2003) analyzed monthly data of the Jordanian stock market by using the Johansen's multivariate co-integration methodology and concluded that macroeconomic variables endow with the directlong-run equilibrium of the stock market. The stock market of Malaysia is co-integrated with macroeconomic variables (Bekhet& Ibrahim, 2012).

Rectification of short-run disequilibrium at 1.79% the Nepali stock market pointed toward long-run trend between the stock market and set of macroeconomic variables on monthly premises from 2003-2013 (Phuyal, 2016). Hosseini *et al.,* (2011) showed that Chinese and Indian securities exchanges are connected with specific macroeconomic factors like crude oil price, money supply, industrial production, and inflation rate. Gross domestic product and money supply decidedly while unemployment, exchange rate, and short-run interest rate negatively influenced the stock market prices of Lithuania (Donatas and Boguslauskas, 2009). The main purpose of this research is enlightened the integration and relationship of stock market and macroeconomic variables in Pakistan. The Ordinary Least Square (OLS) is used to analyze the relationship of macroeconomic variables and Pakistan stock market. From the above discussion, it appears that there is a rundown of huge research on the relationship between macroeconomic factors (Money Supply, Inflation Rate, Interest Rate, and Exchange Rate) and its impact on stock price. Like this, we find that it is intriguing to investigate these impacts and relationship of macroeconomic factors with stock prices for Pakistan case to look at whether they are consistent or not with the prior examinations.

Objective of Study

The overall objective of this study is to find out that association between the stock prices and macroeconomic variables or not.

- Examine whether Pakistan stock market performance is influenced by money supply, inflation, interest and exchange rate in Pakistan.

Data and Research Methodology

This study based on monthly data for Pakistan stock exchange 100-index (PSX), Board money supply(MS), Inflation (INF), Interest (INR) and

Exchange rate (EXR) over the period of 30thJune 2011 to 30thJune 2018 from Pakistan Stock Exchange market and State bank's websites. The non-stationarity of these 84 corresponding observations will calculate the inaccurate results so for the accuracy of results we should fix the non-stationarity of data series. To eliminate the non-stationarity, the series of particular data convert into the return of it by the following formula:

$$\boldsymbol{R_{mt} = Ln\,(\frac{P_t}{P_{t-1}}) * 100}$$

Where R*mt* represents a monthly market return for period *t,* P*t* denotes current period,and P*t-1* denotes the previous period of market price.

To check the relationship between the PSX-100 index and macroeconomic variables the multiple regression econometric technique is used. One dependent and four independent variables are used in this study, the Dependent variable is PSX-100 index,and independent variables are money supply, inflation rate, Interest rate & exchange rate. The econometric regression equation is given below:

$$\mathrm{PSX} = \alpha + \beta_1 \mathrm{MS} + \beta_2 \mathrm{IFR} + \beta_3 \mathrm{INR} + \beta_4 \mathrm{EXR} + \mathrm{e_t}$$

In this equation α is constant, β show the relationship of dependent & independent variables and e_t represents error term as Ouma & Muriu (2014). The variables are explained below:

PSX= represent the Karachi stock exchange 100-index. KSE-100 Index is performing as stander to match prices on Pakistan Stock Exchange (PSX) over a time. In demonstrative companies to calculate the index companies with nominated maximum market capitalization.

MS= represents the broad money supply (M2) or call money in the Pakistan economy. If the supply of money increases, so the purchasing power of the residents of the country also increases, not only for the consumption but also for investment. Hence, a positive direct relation is expected between stock and money supply.

IFR= be a symbol of the inflation rate of Pakistan economy. In the inflation epoch, prices are always unbalanced and rising. Due to inflation people spend a colossal part of their incomes on their necessaries. So, saving and investments are negatively affected by inflation (Haq*et al.,* 2015)

INR= represents the interest rate of Pakistan which determined by the 90 days Treasury bill rate. Variation of time span can change the impact of interest rate on stock prices (Chandra, 2004). Long-term interest rate has negative whereas positive relation occurred in short-run on stock prices (Goswami & Jung, 1997).

EXR= is the exchange rate of the Rupee per dollar. Low currency prices affect the economy negatively. In an economy which is import determined a depreciation of local currency lifted the prices. This situation makes difficulties for people to save money for the investment (Cyprian Okey Okoro., 2017).

Empirical Results

Descriptive analysis of this study is presented in table-1, related to mean, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera and observations of endogenous and exogenous variables. An easy understating is developed by numeric figures, stock market return displays mean value & standard deviation of PSX-100 is -0.005 and 7.447 respectively which pointed out the fluctuation in stock market. The maximum value is 21.594 which observed in August 2016 and minimum value is -17.763 in October 2014. Figurative details of independent variables are also given in table such as PSX-100 index as (Pervaiz et al., 2018; Bekhet& Ibrahim, 2012).

Table-1 Descriptive Statistics

	Mean	Max.	Min.	Std. Dev.	Skew.	Kur.	JB	Obs.
PSX	-0.005	21.594	-17.763	7.447	0.14	3.326	0.648	84
MS	0.011	0.049	-0.022	0.014	0.182	2.761	0.663	84
IFR	-0.011	0.528	-0.622	0.187	-0.012	5.16	16.327	84
INR	-0.007	0.044	-0.127	0.031	-2.055	7.568	132.133	84
EXR	0.003	0.031	-0.047	0.01	-0.995	9.783	174.903	84

The positive value of skewness shows data is positively skewed in stock market and Money supply case and negatively skewed in rest of cases. Value of Kurtosis is more >3 under specific set of variables except money supply so money supply is platykurtic and remaining variables are shown leptokurtic or fat tailed behavior. The results of Jarque-Bera test comprise the PSX-100 and Money supply series are normally distributed and the remaining series are beyond of normality of distribution (Abdullah, 2017).

Table-2 Correlation Matrix

	KSE	EX	M2	IN	IF
KSE	1.000	0.162	-0.375	0.035	-0.066
EX	0.162	1.000	0.039	0.118	-0.214
M2	-0.375	0.039	1.000	0.124	0.199
IN	0.035	0.118	0.124	1.000	0.201
IF	-0.066	-0.214	0.199	0.201	1.000

Table 2 presented the outcomes of correlation matrix. Multiple regression model found no linear relationship exist between the

independent variables. Rules of multicollinearity are, in excess of 0.8 regressorvalues between two variables so there is a serious problem of multicollinearity in series (Ahmet. B, 2010; Shafana,2012). Presenting table is shown the values of correlation matrix lie between 0.201 to -0.375. Existence of multicollinearity is check via Pearson's correlation analysis and concluded that series of data free from the multicollinearity.

Table-3 Regression Analysis
Dependent Variable: KSE
Method: Least Squares

Variable	C	M2	IF	IN	EX
Coefficient	2.08**	-213.604*	1.644	12.883	130.726***
	(1.017)	(56.458)	(4.371)	(25.262)	(77.066)
R-squared			0.177026		
F-statistic			4.248329*		
Prob. (F-statistic)			0.003634		

Stander errors in parenthesis*,**,*** indicate 1%, 5%, 10% level of significance

Table-3 comprises the results of regression analysis in which C is constant. Regression analysis generated the coefficient of all variables (Pervaiz et al., 2018). Money supply and exchange rate both influenced Pakistan Stock Exchange at 1% (negatively) and 10% (positively) level of confidence. Inflation rate and interest rate having no impact on PSX-100 index.

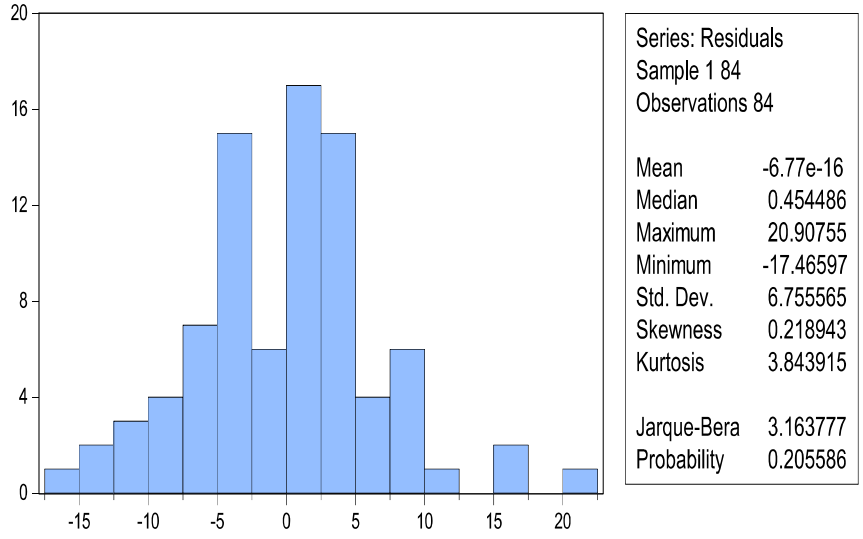
Table-4 Heteroskedasticity Test

F-statistic	1.058	Prob. F(4,79)	0.383
R^2	4.270	Prob. Chi-Square(4)	0.371

Table 4 encompasses the results of heteroskedasticity by using Breusch Pagan Godfrey test. F-statistics has value of 1.058 with 38% of probability which clearly indicates that data is free from heteroskedasticity.

Graphical representation of normality test is shown in figure-1. The value of Jarque-Bera is 3.163777 and corresponding probability value is approximately 21% is more than 5% level of confidence. We can't reject the distribution normality null hypotheses and it's an assumption of good regression line as (Ouma&Muriu, 2014). The Jarque-Bera test in present analysis indicates toward the normal distribution of series.

Figure-1



Conclusion

This research is an effort toward the gauge the relationship between macroeconomic variables and stock market of Pakistan. The rationale behind the examination is that comprehensively stock exchanges are viewed as money related establishments where assets can be brought up in request to back speculation in order to accomplish high-financial development and subsequently improvement in line (Pervaiz et al., 2018). The vast majority of the investigations completed stock prices have fairly focused on its linkage with monetary development and generally in developing nations. It was thusly regarded fitting to look at the effect of macroeconomic variables on the execution stock market exchanges from a small nation measurement as these essentials have not been steady throughout the years as (Horobet and Dumitrescu, 2008). This research concluded the money supply is negatively affected the stock market and exchange rate positively. The inflation rate and interest rate behave positively but insignificant which shows no impact on stock market. These patterns of this study and its findings are considerably useful for those investors who are interested in Pakistan Stock Market, economists, researchers, potential researchers and Government.

References

Abdullah, S. M., Siddiqua, S., Siddiquee, M. S., & Hossain, N. (2017). Modeling And Forecasting Exchange Rate Volatility In Bangladesh Using Garch Models: A Comparison Based On

Normal And Student's T-Error Distribution. *Financial Innovation* , 1-19.

Abraham, T. W. (2011). Stock Market Reaction To Selected Macroeconomic Variables In The Nigerian Economy. *Cbn Journal Of Applied Statistics*, Vol. 2, Issue 1, Pp. 61-70.

B.Ahmet. (2010). The Effects Of Macroeconomics Variables On Stock Returns: Evidence From Turkey. *European Journal Of Social Sciences*, 14(3), Pp.404-415.

E, F. (1981). Stock Returns, Real Activity, Inflation And Money. *American Economic Review*, 71: 545-565.

Goswami G, J. S. (1997). Stock Market And Economic Forces: Evidence From Korea. *Working Paper*, Http://Www.Cfses.Com/Documents/Cses.

Haq, M. A., Qamri, G. M., & Akram, F. (2015). The Impact Of Inflation On Stock Prices: Evidence From Pakistan . *Microeconomics And Macroeconomics* , 3(4): 83-88.

He, O. (2003). The Impact Of Economic Reform On The Behaviour Of Stock Prices: Empirical Evidence From The Nigerian Stock Market. *The Indian Journal Of Economics*, 287-304.

Hussain, M. M. (2012). The Impact Of Macroeconomic Variables On Stock Prices: An Empirical Analysis Of Karachi Stock Exchange. *Mediterranean Journal Of Social Sciences*, Vol. 3(No.3).

Kalyanaraman, L., & Tuwajri, B. A. (2014). Macroeconomic Forces And Stock Prices: Some Empirical Evidence From Saudi Arabia. *International Journal Of Financial Research*, Vol. 5, No. 1; 81-92 .

Khalid, W., & Khan, S. (2017). Effects Of Macroeconomic Variables On The Stock Market Volatility: The Pakistan Experience . *International Journal Of Econometrics And Financial Management*, Vol. 5, No. 2, 42-59 .

Maghayereh , A. (2003). Causal Relations Among Stock Prices And Macroeconomic Variables In The Small, Open Economy Of Jordan . *Jkau: Econ. & Adm*, Vol. 17, No. 2, Pp. 3-12.

Maysami, R. C. (2004). Relationship Between Macroeconomic Variables And Stock Market Indices: Cointegration Evidence From Stock Exchange Of Singapore's All-S Indices . *Journal Of Pengurusan*, 24, 47-77.

Muktadir-Al-Mukit, D. (2012). Effects Of Interest Rate And Exchange Rate On Volatility Of Market Index At Dhaka Stock Exchange. *Journal Of Business And Technology (Dhaka)* , Vol.7 Issue 2, Pp.1-18.

Okoro, C. O. (April 2017). Macroeconomic Factors And Stock Market Performance: Evidence From Nigeria. *International Journal Of Social Sciences And Humanities Reviews* , Vol.7 No.1, ; P.1 – 9.

Ouma, W. N., & Muriu , D. (July 2014). The Impact Of Macroeconomic Variables On Stock Market Returns In Kenya. *International Journal Of Business And Commerce* , Vol. 3, No.11: [01-31] .

P, C. (2004). Investment Analysis And Portfolio Management. New Delhi: Mcgraw-Hill.

Pervaiz, J., Masih, J., & Jian-Zhou, T. (2018). Impact Of Macroeconomic Variables On Karachi Stock Market Returns. *International Journal Of Economics And Finance* , Vol. 10, No. 2; 1916-9728.

Phuyal, N. (2016). Can Macroeconomic Variables Explain Long Term Stock Market Movements? A Study Of Nepali Capital Market. *Journal Of Business And Management Research* , 26-38 .

Pilinkus, D., & Boguslauskas, V. (N.D.). The Short-Run Relationship Between Stock Market Prices And Macroeconomic Variables In Lithuania: An Application Of The Impulse Response Function. *Economics Of Engineering Decisions* , 2009.

S.B. Bulmash, G. T. (1991). Time-Lagged Interaction Between Stock Prices And Selected Economic Variables. *Journal Of Portfolio Management*, 61-66.

Shafana , M. (2012). Macroeconomic Variables Effect On Financial Sector Performance In Emerging Sri Lankan Stock Market . *International Journal Of Science And Research (Ijsr)*, 227-231.