THE IMPACT OF MACROECONOMIC DETERMINANTS ON KARACHI STOCK INDEX IN PAKISTAN: AN EMPIRICAL STUDY

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ABSTRACT

The study examines the impact of macroeconomic Determinants on KSE-100 index over the period of 1997-2016. In this study, the data are used on annually basis and E-Views software is used for data analysis. Multiple Regressions and Pearson's correlation models used to study the impact of macroeconomic determinants on stock prices (KSE-100index). Finding from the test shows seventy five percent variations in the dependent variable showed by independent variables. Model was good fit and was strong relationship between dependent and independent variables. Stock prices variation was up to seventy-five variations in independent variables. The results further suggested that negative impact found on the stock prices of KSE-100 index of the interest rate while exchange rate, inflation and GDP (Gross domestic product) growth rate were positively related with stock prices (KSE-100index).

Key words: *Inflation rate, Interest rate, Gross Domestic Product, Exchange Rate, KSE-100 index*

Introduction

Karachi Stock Exchange is the largest stock market in Pakistan and oldest stock market in south Asia. The 654 firms were listed in this market with total market capitalization over U.S $30 Billion in national as well worldwide in 2009. Trading in KSE started with 50 shares index, after it turned into KSE 100 index in 1991. KSE declared best performing stock market in 2002. As Stock Market play a crucial role in modern era in the boost up of the economy. Change in stock exchange index causes disturbance in the macroeconomic factors (Adam et al. 2008). Longstanding Research study examine and offer evidences about macroeconomics determinants affect stock exchanges prices. The growing linkages between macroeconomic variables and the movement of stock prices for the developed countries have well been documented in the literature over the last several years (Fama, 1981; Lee, 1992; Kaneko and Lee, 1995; Mukherjee and Naka, 1995; Booth and Booth, 1997; Mavrides, 2000; Maysami and Koh, 2000; Sadorsky, 2003; Chen, 2003).

The relationship between macroeconomic variables and a developed stock market is well documented in literature. In this study, we are using four macroeconomic indicators and checking the impact of these four indicators on the KSE-100index. This study in the context of Pakistan to check the relationship between macroeconomic determinants and KSE-100index. This study takes consideration into four macroeconomic indicators such as Exchange rate, Gross domestic product (GDP) interest rate and inflation rate to check the impact of these independent variables on the dependent variable KSE-100 index.

Many researchers have applied many models in the captivation to determine the relationship between macroeconomics indicators and stock prices index. The study of (Adamet al. 2008) concluded that fluctuations in macroeconomic variables, which leads to the change the structure of stock exchange index. The government polices whether it is fiscal or monitory have a greater impact on the economic activities and stock prices of a country (Abdulland1997).

Abdullah & Hayworth (1993) examined that interest rate answered harmfully on stock returns while stock returns were absolutely linked with inflation rates and money growth.

Stock markets provide investment opportunity. Stock market of any country accelerates the economic growth. Ups and downs in stock prices is an understandable dilemma of economies among the investors, corporation, policy makers and researcher. Researchers are trying to find out the factors, which effect stock prices. The fundamental macroeconomic variables are export, gross domestic product, interest rate, industrial production index, inflation, unemployment, foreign exchange

reserves money supply and exchange rate has causality with prices index of stock exchange (Booth 1997 and Chan 2003).

Mohamed et al. (2007) examined the study in the context of Malaysia and found that there is positive relationship between macroeconomic indicators and stock returns and they also found that inflation positively connected with stock prices.

Stock exchange market is vital actor of financial sector and provides a platform to the users and suppliers of the financial resources for investment purpose in the stocks of companies. Kyereboah-Coleman and Agyire-Tettey (2008) examined the effect of macroeconomic variables on Ghana Stock Exchange. They found those macroeconomic indicators such as lending rates and the inflation rate effect on stock market performance.

Interest rate and foreign exchange rate risks are two important economic factors affecting the common stocks (Hyde, 2007, Vazz et al., 2008)

The stocks are sensitive to interest rates, as the changes in interest rates are inversely related to stocks (Alam, Uddin, 2009).

Literature Review

In this section, review of the literature on the relationship between stock market index and macroeconomic variables such as Exchange rate, gross domestic product, interest rate and inflation rate has been mentioned.

Devi and Chandramohan (2016)held the study and find out the relationship between macroeconomic indicators and Nigeria stock market returns monthly data is used from January 2000 to march 2013 and used augmented dickey fuller test, unit root test and analysis zed the relation that's all used macroeconomic variables are integrated and have great influence on Nigerian stock market returns.

Ilahi et al(2015) took that the impact of inflation rate, interest rate and exchange rate on the return of stock KSE100 index. They use the three independent and one is dependent variable (stock returns). Use the data from January 2007 to December 2012 and using a multiple linear regression model for data analysis. They concluded that these independent variables have week impact on the stock return.

Nijam, et al (2015)studied in the context of Sri Lanka examined that there is a relationship between Colombo stock exchange and five macroeconomic variables (Exchange rate, Balance of payments, Inflation by whole sale price index, Interest rate, GDP). Data used from 1980 to 2012 using the ordinary least square to estimates the parameters of the regression model. Findings of this study there is a strong causality between macroeconomic factors and stock market performance in the Sri Lanka.

Kpanie, Vivian, and Sare (2014) took the study in the Ghana context and examined the dynamic connection between macroeconomic variables like as Treasury bill (proxy for interest rate), Inflation rate, exchange rate, Interest rate, Oil prices and money supply these are the independent variables with dependent variable Ghana stock market. Then find that there is a long run relationship between some of the macroeconomic variables and stock market. Then used quarterly time series secondary data from 1995 to2011 using the error correction models, Augmented Dickey fuller, co-integration analysis.

Kibria et al. (2014) took the study in the Pakistani context and check the relationship of macroeconomic variables they are closely related with each other. Then used the five macroeconomic variables (Exchange rate, Money supply, GDP per Capita and inflation savings)these are the independent variables check the effect on the dependent variable 100 KSE index. And data is used in this research project since 1991 to2013 and used the different techniques for analysis such as Descriptive analysis, correlation analysis, Granger causality test and regression analysis and concluded that regression analysis shows that these are the variables have a positive significant impact on the KSE-100 index.

Zaheer and Rashid (2014) examined the study and check the impact of macroeconomic

variables on the stock market returns with the used of five macroeconomic indicators like as industrial production, exchange rate, Money supply, interest rate and inflation and found that there is long term relationship exist between macroeconomic variables and stock market and also find that the industrial productions have direct relationship with stock market returns and inflation have negative relation with stock market returns and exchange rate also relate with stock market negatively. These results showing advise in the long run the Pakistani stock market will be reactive to the macroeconomic variables.

Zafar (2013)studied and described the foreign direct investment and value traded have positive effect on the performance of the stock market and also found that there is inverse relationship between real interest rate and stock market performance and also banking sectors have no significant impact on the stock market performance.

Karaca (2013)examine the impact of exchange rate, gold prices and import export on ISE100 index. They use set of four variables in which three is independent and one is dependent. Use the data from 1996 to 2011 for their research and used a VAR (vector auto regression) modeling technique for data analysis. They concluded that weather have a significant correlation with exchange, gold export and import sequence or not noteworthy impact on the stock exchange index.

Patel (2012)held the study in the context of India and find the relationship between macroeconomic variables and Indian stock market indices and found that there is the long run equilibrium relationship exist between these. And also, described the commodity prices like as gold price oil price and sliver price are the very important determinants of the stock markets.

Kuwornu (2012)held the study and find out that through the analysis with the use of monthly data from 1992 to 2008 and all four indicators are co-integrating with stock return of Ghana and have long run equilibrium relationship. The Johannsen multivariate co-integration test is used for analysis and found that inflation rate and treasury bills have great influence on the stock return in short time period.

Jasra, et al (2012) concluded that the relationship between dependent variable (companies return) and independent variable (interest rate, exchange rate, consumer price index) is insignificant but these variable also have significant impact on the insurance industry and using regression model technique for data analysis these data taken from four industries such as oil, and gas chemical, and insurance industry. Consumer price index has significant effect on chemical and cement industry. Oil & gas and insurance industry but exchange rate has showed that the significant negative impact on four industries also found that there is casual relationship between the macroeconomic factors and stock index in Pakistan

Asaolu and Ogunmuyiwa (2011)examined the study and found the impact of macroeconomic indicators on average share price of Nigeria stock market after used the different test like as augmented ducky fuller test, granger casualty test, co integration and error correction model on used time series data and find that there is weak relationship between macroeconomic variables and average share price in Nigeria.

Rahman, Sidek, and Tafri (2009)examined the study in the context of Malaysia and find the monetary police variables effect on the Malaysia stock exchange and found that the domestic supply factor has significant relation with the stock exchange market. In general, four macroeconomic variables exchange rate, interest rate, money supply and industrial production index have countless impact on stock market in both ways positively and negatively. Hussainey and Khanh Ngoc (2009) examined the study and found the effect of macroeconomic indicators on Vietnam stock prices with the use of data from 2002 to 2008 and used test vector auto regression model and also used vector error correction model and find out long term relationship between macroeconomic variables and Vietnam stock prices.

Research of Granger, Husang and Young's (2008) describe that stock market and devaluation in currency can both affect each other. Zietz and Pemberton (1990) and Hsing (2004) consider monthly data and design model and at the same time figure out macroeconomic variables.

Research Methodology

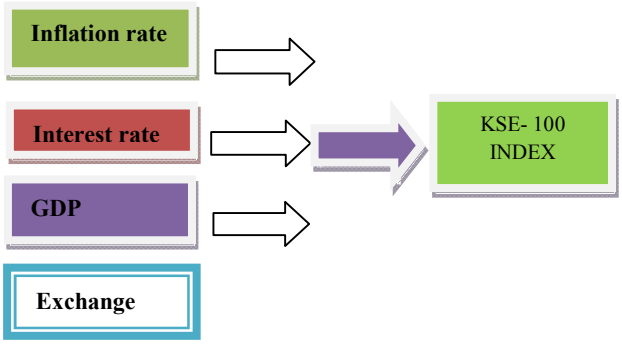
Description of Variables

In this paper, gross domestic product (GDP), interest rate, exchange rate and inflation rate, and check the impact of these independent variables on dependent variable KSE100 index. Inflation is the rate at which prices increase over time, resulting in a fall in the purchasing value of money. Interest rate the amount of annual cost which is occur for using the principal borrowed amount .Gross domestic product (GDP) is the monetary value of all the finished goods and services produced within a country's borders in a specific time period and Exchange rate between two currencies is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in relation to another currency.

Data Collection

The main objective of the paper is to examine the relationship between macroeconomic variables and stock exchange market. Variables are exchange rate, interest rate, inflation rate, GDP (Gross domestic product) and stock prices of KSE-100 index. Yearly data from 1997 to 2016 data have been used for variables. Secondary data have been used to find the objectives of the research. Secondary data about the macroeconomic variables have taken from different web sites i.e. Trading economic website, (www.tradingeconomics.com), website of state bank of Pakistan (www.sbp.org.pk), KSE website (www.kse.com.pk), and (www.google.com) etc. To determine the impact of macroeconomic variables on KSE-100 index.19 years' data are used for measuring the relationship between Variables and KSE-100 index. KSE-100 index was started in 1997 so there for 19 centuries data was collected to find the relationship between macroeconomic variables and stock prices of KSE-100 index.

Theoretical Framework



One of the leading stock exchanges of Pakistan is the Karachi Stock Exchange. Investors use stock prices as a benchmark. There are 38 sectors of the Karachi stock exchange. All sectors are affected with greater variations in the prices of the stocks. The stock prices affected due to macroeconomic indicators like as unemployment, current account deficit but hottest indicators which have great influence on the Karachi stock exchange-100 index inflation, interest rate, GDP and Exchange rate. Here in this model KSE-100 index is dependent variable and inflation, interest rate, exchange rate and GDP independent variables.

Research Model

In this study Specification of Model the multiple regression models was used in this research to examine the relationship between KSE, GDP, Exchange rate inflation and interest rate. The model used GDP, Exchange rate, Inflation and interest rate as independent variables of the study and Karachi Stock Exchange-100index as the dependent variable to find out the relationship between these variables.

The following is Econometric model.

Y= Karachi Stock Exchange-100Index (KSE- 100 index)
X1= Inflation (INF)
X2= Interest Rate (INT)
X3= Gross Domestic Product (GDP)
X4= Exchange Rate (EXCH)

KSE-100 index= $\alpha+\beta 1(INF)+\beta 2(INT)+\beta 3(GDP)+\beta 4(EXCH)$

Result and Findings

Method

From data found, relationship between the dependent variable and independent variables, which shown in the above table1. There aggression model should have concluded by using the result of the above mention table.

KSE-100 index= α+β1(INF)+β2(INT)+β3(GDP) +β4(EXC)

KSE-100 index = (-65.777) + (4.1827) INF1+ (-2.3134) INT2+ (5.3032) GDP3 + (1.5385) EXCH4

From the above data mentioned in table 1, it is clear that changes occur in the independent variable, which also to bring changes the dependent variable. Also clear from the data given in table 2 that exchange rate, interest rate, inflation rate and GDP growth rate are the independent variables which bring change in the dependent variable KSE-100 index. From the data given in table 2 exchange rate, inflation rate and GDP growth rate show positive relationship p with stock prices of KSE-100 index. All independent variables except interest rate show negative relationship with stock prices of KSE-100 index.

Table 1. Model Estimation: Coefficient of Determination

Sample size	20
Coefficient of determination R^2	0.7597
R^2-adjusted	0.7590
Multiple correlation coefficient	0.8999
Residual standard deviation	21.3379

Table 2. Model Estimation: Regression Model results

Coefficients					
Model					
Independent variables	Coefficient	Std. Error	partial	T	P
(Constant)	-65.7770				
Exchange	1.5385	0.3920	0.7118	3.925	0.0014
Interest	-2.3134	2.3150	-0.2498	-0.999	0.3335
Inflation	4.1827	1.3475	0.6254	3.104	0.0073
GDP	5.3032	3.0640	0.4080	1.731	0.1040

Interpret the model from the data given in table 2, relationship between exchange rate, and stock prices of KSE-100 index is positive because when (100%) change occur in the exchange rate, it brings (1.5385%) positive change in the stock prices of KSE-100 index. Negative relationship between interest rate and stock prices of KSE-100 index, if there is (100%) change in the interest rate it brings (-2.3134%) negative changes in the stock prices of KSE-100 index. If there is (100%) change occurs in the inflation it leads to (4.1827%) positive change in the stock prices of KSE-100 index. At the end in the regression line model, if there is (100%) change in the independent variable GDP growth rate, it leads to change (5.3032%) positive change in the stock prices of KSE-100 index.

Check the significance level of the model, that the variables are significant or insignificant in the data analysis.

Therefore, first use the t-ratio.

T-Ratio

T-ratio is used to check the individual significance of the regression coefficients. For this purpose, first find the degree of freedom, with the help of the following formula.

Degree of freedom = total number of observations – total number of variables

Degree of freedom = 20-5 = 15

Find the confident level which is α = 0.05

Find the value of t-tabulated from the t – distribution table and in the t– distribution table the value of the t-tabulated is (1.753). Look at the above table; find out the value of t-calculated for each independent variable. Compare the value of t-calculated with the t-tabulated, which show either the independent variables are significant or insignificant.

If t – calculated > t-tabulated, then the coefficient of variables are significant

If t – calculated < t-tabulated, then the coefficient of variables are insignificant

T-calculated value for exchange rate from table 2 is (3.925), interest rate is (-0.999), inflation is (3.104) and GDP growth rate is (1.731). Look at the above data so; conclude in the following words that exchange rate and

inflation are statistically significant, while interest rate and GDP growth rate is statistically insignificant.

F-Ratio

F-test is used to check the overall model is significance or insignificance. For this purpose, first find the degree of free demand confidence interval value of f-tabulated from the f-distribution table.

F – Tab = (0.05) (4, 15) = 3.06

If f – calculated > f – tabulated, then the overall model is significant

If f – calculated < f-tabulated, then the overall model is insignificant

The value of f-calculated from table 4 is (15.9592) and the f–tabulated value is (3.06). Compare the value of f -calculated with f -tabulated. Therefore, the overall model is statistically significance.

Table 3. Analysis of Variance

ANOVA						
Model	Sources	DF	Sum of Squares	Mean Square	F	Sig
1	Regression	4	29065.1540	7266.2885	15.9592	0.001
	Residual	15	6829.5822	455.3055		
	Total	19	35894.7362			

Table 4. F-Ratio

F-ratio	15.9592
Significance level	P<0.001

Coefficient of Determination (R^2)

To check that the model is fit or not the coefficient is determined. It ranges from (0) to (1). In the above table 1, the value of R2 is (0.7597), which is near to (1). It shows that (75%) variation in the dependent variable has explained by the independent variable. Therefore, the model is good fit and there is a strong relationship between dependent and independent variation in the stock prices explained up to (75%) by the variation in the independent.

Pearson's Product Movement Correlation Coefficient

Pearson's products movement correlation coefficient was used to test the relationship between the variables, denoted by Greek letter ρ. Its range from (+1 to -1) when (ρ > +1) it indicates positive liner relationship and if (ρ < -1) it indicate negative liner relationship and if (ρ = 0) it show no relationship among the variables.

Table 5. Variables and Zero order correlation coefficients

Variable	R
Exchange	0.7559
Interest	-0.4300
Inflation	0.4648
GDP	0.1539

Exchange Rate → KSE-100 Index

The relationship between exchange rate and stock prices of KSE-100 index in table 5 and 6 is strong positive, which gives the strongest relationship with stock prices of KSE-100 index. The Pearson's correlation finding suggests that there is (75.6%) strong positive relationship between exchange rate and stock prices of KSE-100 index. According to the above table 6 exchange rate is statistically significant correlation i.e. (p is 0.001). From the above analysis relationship between exchange rate and KSE-100 index fall the same with the research conducted by (Aggarwal 1981), found that U.S dollar is positive with stock prices. The study of (Ibrahim 2001) also shows positive relationship between stock prices and exchange rate.

Table 6. Exchange rate → KSE-100 index

Model		KSE	Exchange
KSE	Correlation Coefficient Significance Level Pn		0.756 0.0001 20
Exchange	Correlation Coefficient Significance Level Pn	0.756 0.0001 20	

Interest Rate → KSE-100 Index

According to the Pearson's correlation, analyzed the relationship between interest rate and stock prices of KSE-100 index is moderate but negative in table 5 and 7. The analysis suggests that there are (-43%) negative relations between stock prices index and independent variable interest rate. Correlation between interest rate and stock prices is statistically insignificant because the value of (p i.e. 0.0584) which is greater than (0.05). The negative correlation confirmed the previous research study. The study of (Nishat and Shaheen 2007) and (Asperm 1989) shows negative correlation between interest rate and stock prices.

Table 7. Interest rate → KSE-100 index

Model		KSE	Interest
KSE	Correlation Coefficient Significance Level Pn		-0.430 0.0584 20
Interest	Correlation Coefficient Significance Level Pn	-0.430 0.0584 20	

The above study verified economic theory regarding the inverse relationship between the interest rate and investment. In July (2008) when the inflation moved to double the digits, the government also wants to control the hipper inflation, they increase the rate of interest, which caused bad effect on stock prices.

Inflation Rate → KSE-100 Index

Moderate positive correlation between inflation and stock prices KSE-100 index in table 5 and 8. According to the Pearson's correlation coefficient result, suggest (46.5%) moderate positive correlation between dependent variable KSE-100 index and independent variable inflation. The value is less then (0.05), therefore, the correlation between inflation and stock prices of KSE-100 index is statistically significant. This correlation is somehow against the correlation given in literature as reviewed. The research of (Neshat and Shaheen 2004), (Akbar and Shahid Ali 2008), (Roll and Gaske (1983), (Zahid and Naka 1994), (Fama, and Schart 1977) all of them have shown negative correlation founded between inflation and stock prices. However, the study of the (Asperm 1989) shows positive correlation with stock prices. The study of (Robert Johnson) shows positive relationship between inflation and stock prices.

Table 8. Inflation rate → KSE-100 index

Model		KSE	Inflation
KSE	Correlation Coefficient Significance Level Pn		0.465 0.0389 20
Inflation	Correlation Coefficient Significance Level Pn	0.465 0.0389 20	

GDP Growth Rate → KSE-100 Index

From the analysis of the data in the table 5 and 9, relationship between GDP growth rate and stock prices of KSE-100 index is very weak positive. The model suggests only (15.4%) positive correlation between GDP growth rate and stock prices and statistically insignificant. The study analysis follows the previous researcher study. The research study of (Gevit Duca) show positive relationship between the stock prices and GDP. The study of (Mustafa 2007), the study of (Zahid 2010) and (AL-Tamimi 2007) analyzed the same result according to this study i.e. GDP and stock prices show very weak and positive correlation with stock prices index of Karachi stock exchange.

Table 9. GDP Growth rate → KSE-100 index

Model		KSE	GDP
KSE	Correlation Coefficient Significance Level Pn		0.154 0.5171 20
GDP	Correlation Coefficient Significance Level Pn	0.154 0.5171 20	

From the analysis of the data in the table10, relationships amongst independent variables

like exchange rate and interest rate, inflation rate and GDP growth rate. The relationship between exchange rate and interest rate, confirmed the correlation between independent variable exchange rate and dependent variable KSE-100 index. Exchange rate and inflation show positive but weak correlation. The correlation between exchange rate and GDP growth rate is negative and weak. The relationship between interest rate and inflation show moderate positive in the table 10, which confirm the study of (Chen et al.1986) and (Fama 1990). The interrelations between interest rate and GDP growth is moderate negative. Relationship between interest rate and GDP growth rate is negative but very weak correlation between these two independent variables.

Table 10. Correlation Model amongst Independent Variables

Models overall results		Exchange	Interest	Inflation	GDP
Exchange	Correlation Coefficient Significance Level Pn		-0.436 0.0546 20	0.193 0.4159 20	-0.218 0.3566 20
Interest	Correlation Coefficient Significance Level Pn	-0.436 0.0546 20		0.344 0.1381 20	-0.419 0.0656 20
Inflation	Correlation Coefficient Significance Level Pn	0.193 0.4159 20	0.344 0.1381 20		-0.099 0.6787 20
GDP	Correlation Coefficient Significance Level Pn	-0.218 0.3566 20	-0.419 0.0656 20	-0.099 0.6787 20	

Conclusion

A number of variables in the economy that affect the stock prices of stock exchange of any nation. In the Pakistani economy. Karachi stock exchange is the oldest and biggest stock exchange in Pakistan. Karachi stock exchange captures (74%) of capital market of Pakistan. It plays very important role in the development of Pakistani economy. Four different macroeconomic variables are used to find out the impact of these variables on stock prices of KSE-100 index. Data was collected from (1997) to (2016) and used for the study.

According to the Pearson's correlation model, the relationship between exchange rate and stock prices of KSE-100 index show strong positive correlation with stock prices and also statistically very significant. The result of this study is the same as the research of (Agarwal 1981), (Ibrahim and Nadeem Sohail) and (Zakir Hussain 2002).

Moderate positive correlation between inflation and stock prices and it is also statistically significant, that confirmed the result of the (Asperm 1989) research study. GDP growth rate correlation with stock prices of Karachi stock exchange is positive but very weak and also statistically insignificant. Therefore, it does not require too much consideration. From the relationship, it was Concluded that independent variables show positive and negative or direct and indirect relationship but not strong enough to consider important.

The finding from the test shows (75%) variations in the dependent variable were explained by the independent variable. Therefore, the model was good fitted and there was a strong relationship between dependent and independent variables, variation in the stock prices explained up to (75%) by the variation in the independent variables. The results further suggested that negative impact found on the stock prices of KSE-100 index of the interest rate while exchange rate, inflation and GDP (Gross domestic product) growth rate were positively related with stock prices (KSE-100index).

The relationship between interest rate and stock prices is moderate but negative in nature. It means that when rate of interest increase, the stock prices of stock exchange decrease, which confirmed the previous research studies, which wear conducted by different researchers. (Nishat and Shaheen 2007), (Asperm 1989) shows negative correlation between interest rate and stock prices. Analysis among the independent variables suggests no such strong correlation amongst the independent variables which are for Further Research.

Limitations of the Study

The analysis is based on the data gathered for the year 1997-2016. Data size is small but due to the lack of time and data availability, we were restricted. Our result is reliable under these limitations. For better and comprehensive results on KSE- 100index, we need large sample size.A cross country study of developing countries with rich data is recommended to further investigate the determinants of Macroeconomic.

Future implications

This study is mainly emphasis on specifically macroeconomic determinants on KSE-100indexin Pakistan. A cross country study of developing countries with rich data is recommended to further investigate the impact ofmacroeconomic determinants like gold rate, Industrial Production (IP), Human capital (Labor force), infrastructure, domestic investment (DI), foreign direct investment (FDI) and Consumer price index (CPI), wholesale price index (WPI), Balance of payment and economics growth on Karachi stock Exchange- 100index inPakistan. Data can also be taken for larger sample sizes to increases the generalizability of the findings.

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