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ABSTRACT

The main objective of this study is to identify the impact of macroeconomic factors on stock market of India for period from 1987 to 2019. In this study, stock market index return act as dependent variable whereas others, gold price return, inflation rate, crude price rate and exchange rate depreciation are independent variable. The entire variables establish negative relationship with stock market index return except exchange rate depreciation established no relation. ADF test is used to check the stationarity of the variables and OLS Model is used to establish the relationship.

Keywords: *Stock Market Index Return, Gold Price Return, Inflation Rate, Crude Price Rate, Exchange Rate Depreciation, ADF test, Stationarity, OLS Model*

INTRODUCTION

Economy is where production and consumption of product and services takes place. It is allocation of scarce resources to its end user. It applies from individual to entity in a country. Economy can be divided in two main heads, microeconomics, and macroeconomics. Microeconomics focuses on individual consumer and firm decision. It deals with change in price due to change in demand and supply. It also deals with factor pricing, product pricing, economic welfare, production consumption and many more. Macroeconomics focuses on overall economy of national and international level rather than focusing on individual market. It includes factors such as government fiscal rate, unemployment, monetary policy, gold price, crude oil price, inflation rate, exchange rate, poverty and more. Macroeconomics mainly deals with environmental and external issues whereas microeconomics deals with internal issues.

Stock market is the marketplace where buying and selling of stock takes place. These financial activities are conducted through formal channel or over the counter (Kumar, 2013). It is the marketplace which is regulated through defined set of rules and regulation. In India, there are two stock markets prevailing at current date. Bombay Stock exchange (BSE) was established in 1875, which is the Asia's first exchange and largest securities market. It enables the investors to trade in mutual fund, equities, debt instruments, currencies, and derivatives. Other is the National Stock Exchange of India Limited which is also known as NSE. It was incorporated in 1992. Its popular offering is NIFTY 50 Index, which holds largest asset in Indian stock market.

One of the key differences between both of the market is that a large number of stocks is traded in NSE thus result is variation in price, therefore before purchasing any stock it is advisable to compare in both of the market.

Stock market acts as a backbone as well as sensitive asset in an economy. It influences economic activity by creating liquidity. It helps the company to raise and expand, which in return helps to generate hundreds and thousands of employments. Macroeconomic factors directly or indirectly influence the stock market. These factors either establish positive relationship with the market or negative relationship. Sometimes, it may also happen that there are few factors which have no impact on the stock market. Some of the macroeconomic factors which has affected stock market are money supply, inflation rate, foreign institutional investment, exchange rate, index of industrial production, consumer price index, treasury bill rate and many more (Naka, Mukherjee & Tufte, 1998).

By studying all these impacts, government can try to stabilize the stock market and economic factors which can result in attracting a greater number of investors. Thus, results in the formation of a stronger economy. It will also allow the firms to work more efficiently.

Study's Objective

- Impact of macroeconomic factors on stock market, and
- To establish a relationship between dependent variable and independent variable of macroeconomic factors.

LITERATURE REVIEW

The growth of any country is not shown only by the economic development but also with the change in the stock market. The fluctuation in the market is the result of change in the economy (Singh, 2014). Sometime hostiles alter in stock market can have negative impact on the economy (Barakat, Elgazzer & Hanafy, 2016). In any economy, there are various factors which influence the stock market. One of the factors or rather we can say the major factor which impacts the stock market is the macroeconomic factors (Pal & Mittal, 2011; Singh, 2014). There is large number of macroeconomics factors such as market index, money supply, inflation rates, exchange rate, industrial production index, population, movement in global market, gold price, crude oil price, and many more.

When we look on the broader aspect of the study than it can be mainly being divided on two parts; first part of the study can be that it helps to examine the impact of macroeconomic factors on stock price and last part is focused on the correlation between the stock market volatility and volatility in the macroeconomic indicators (Naik & Padhi, 2012). This paper deals with the first part which establishes a relationship of the impact of macroeconomic factors in stock market.

Talking about the relationship between macroeconomic factor and stock market, both establish either a long run relationship or causal relationship. Macroeconomic factors are important in the fluctuations of the stock market (Barakat, Elgazzer & Hanafy, 2016). Model like Capital Asset Pricing Model (CAPM) and Arbitrage Price theory (APT) have been used by researcher for establishing a relationship between them but there is no specific clarification of which economic factors or particular events govern asset price as stated by Ouma & Muriu (2014).

Market does not only react to macroeconomic variables only but also to the dimensions of macroeconomic variables. There can be news to which market reacts promptly which results in causing instability and fluctuation in the performance of the economy (Pal & Mittal, 2011).

To study this state, we can go through the example by taking one of the macroeconomic factors and see the direct and indirect impact on the economy. Consider that there is a rise in the crude oil price in a particular economy this will have direct influence on the stock market and due to increment in the price of crude oil there will be growth in the transportation cost,

production cost and increase in various other cost which result in inflation, low economy growth and diminishing consumers' discretionary spending thus affecting the stock market indirectly (Hosseini, Ahmad & Lai, 2011).

A macroeconomic factors impact on stock market can vary as the time period of the study changes likewise, a study by Hosseini, Ahmad & Lai (2011) which has studied for the period of Jan 1999 to Jan 2009 shows that money supply has negative impact whereas other study done by Singh, 2014 for the period of Jan 2011 to Dec 2012 shows that money supply has favorable effect on the stock market. Same can be seen in the case of exchange rate as it does not have any influence on the stock price as per Gunasekarage, Pisedtasalasai & Power (2004) whereas according to Singh, 2014, exchange rate has adverse impact on the stock market.

Various studies had shown that gold price have adverse impact on the stock market. It has shown that investors are mainly attracted to the glitter of the commodity which is an unhealthy situation for the market (Singh, 2014).

Studies have also shown that the inflation rate of the economy has favorable impact on the stock market whether it is developing country like India or China (Hosseini, Ahmad & Lai, 2011).

Research Gap

Various research established a relationship between stock market and macroeconomic variables but none of them establish a specified method or number of variables to be taken into consideration. Method and variables vary from theories to theories. One market is different from other in terms of its rules, regulations, and investors.

RESEARCH METHODOLOGY

The objective of the research is to demonstrate the impact of macroeconomic factors on stock market. The variables taken are stock market index, gold price, inflation rate, crude price, and exchange rate. These data were taken from S&P 500 Index, bank bazar, inflationdata.com and many more sites. Data were transformed to interpret the result, therefore returns were calculated on such, like gold price return, stock market index return, exchange rate depreciation and crude price return were calculated. A detailed explanation about each variable is given below:

Stock market index return: It is the statistical

measure which helps to identify the changes incurring in the stock market.

Gold price return: The rate which gold is present at current date to be purchased. These prices fluctuate because for various factors impacting them.

Inflation rate: Inflation rate is the rate of increase in the price of the commodity which is used by the citizens of the country in a tenure.

Crude oil return: Crude oil is used worldwide that is traded in market and its price is affected by demand and supply of the oil.

Exchange rate depreciation: The drop in the value of currency in a floating exchange rate system is called as exchange rate depreciation.

To conduct a study on secondary data, cross sectional analysis and time series analysis can be used. Time series analysis is done when data is dealt over a period or intervals whereas cross sectional analysis is done when many subjects are observed over a same point of time. In this study, all the dependent and independent variables have been taken for a period of 32 years. Time series analysis has been incorporated since variable are studied over a period. Data has to be made stationary so that effect of another variable can be studied.

Dependent variables are those variables on which testes are conducted. Independent variables are those variables whose effect is measured on dependent variable. Dependent variable of this study is stock market index return. Independent variables of this study are gold price return, inflation rate, crude oil return and exchange rate depreciation.

Stationarity of data can be described as those data whose variance, mean and autocorrelation structure does not alter gradually. These data are without trend, constant variance over time and are constant autocorrelation structure over time and no periodic fluctuations. They do not have upward or downward trend or any seasonal effect. To check the stationarity of the variables Augmented Dickey Fuller Test i.e. ADF Test has been used. This helps in testing the null hypothesis of the unit root which is present in time series sample. Using this test, if we arrive on null hypothesis (H0) than it means that a unit root is present in a time series sample. Null hypothesis (H0) rejection leads to alternate hypothesis (H1) which suggests that the time series does not have a unit root, meaning it is stationary. If p -value > 0.05 , then null hypothesis (H0) is accepted which signifies that data has a unit root and

is non-stationary and if p -value ≤ 0.05 , then reject null hypothesis (H0) as data does not have a unit root and is stationary. It is necessary for time series data to be stationary in nature because being stationary it becomes easier to calculate and secondly, time effect on the variable is removed than making it easier to calculate the effect of other variables.

Lag variable are the variable which has it value coming from an earlier point in time. Present values are the sequence of earlier values.

Ordinary Least Square (OLS) Model is linear least square method which is used for estimating unknown parameters in a linear regression model. This model estimates by minimizing the sum of the squared errors. It is computationally feasible and can be easily used while doing any econometrics test and it is important to know the underlying assumptions of OLS regression.

Significant, taken at 5% which means those variables are taken in consideration whose p -value ≤ 0.05 and thus these values are included in the regression equation.

RESULTS & DISCUSSION

Augmented Dickey-Fuller test result (refer to table 1):

Table 1: Augmented Dickey-Fuller test

Variables	Test with Constant	With Constant and Trend
SIR	8.308e-005	0.0005651
GPR	0.01459	0.05856
Inf_rate	0.02825	0.02466
CPR	9.622e-006	0.0001
ERD	0.003474	0.002875

Full form of abbreviation:

SIR = Stock Market Index Return

GPR = Gold Price Rate

Inf_rate = Inflation Rate

CPR = Crude Price Rate

ERD = Exchange Rate Depreciation

An ADF test is used to test the null hypothesis of unit root present in time series sample. Data is null hypothesis when it is non-stationary and its alternate hypothesis when it is stationary in nature. In the given table, the column of, with constant and trend of p -value ≤ 0.05 which states that data is stationary.

OLS model is a type of linear least square used for estimating the unknown parameters in a linear regression model. Significant has been taken at 5%. Variable with significance has been used in the equation. The highest coefficient variable is considered more important.

Linear Regression Equation

$$y = a + bx$$

$$\text{Stock market index return} = 23.9746 + (-1.39646\text{GPR} + 10.2146\text{Inf_rate (1)} - 5.18363\text{Inf_rate (2)} - 0.461279\text{CPR (2)} - 0.346958\text{CPR (4)} - 1.11298\text{SIR (4)})$$

Line graph bases on variables collected (Figure 1-5)

Figure 1: Stock Market Index Return

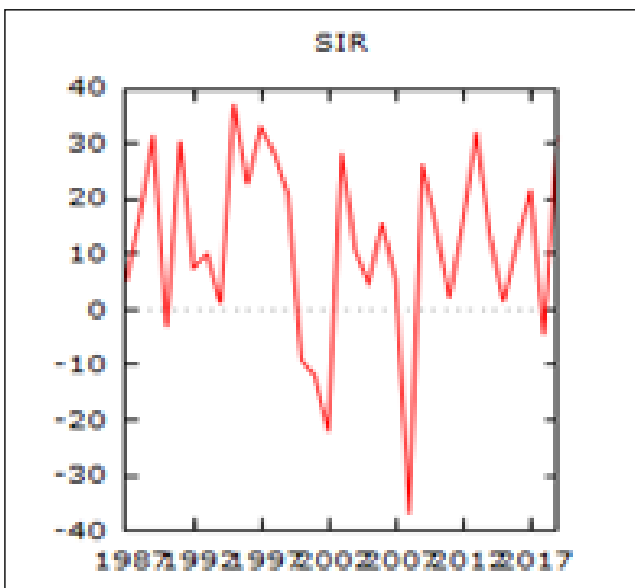


Figure 2: Gold Price Return

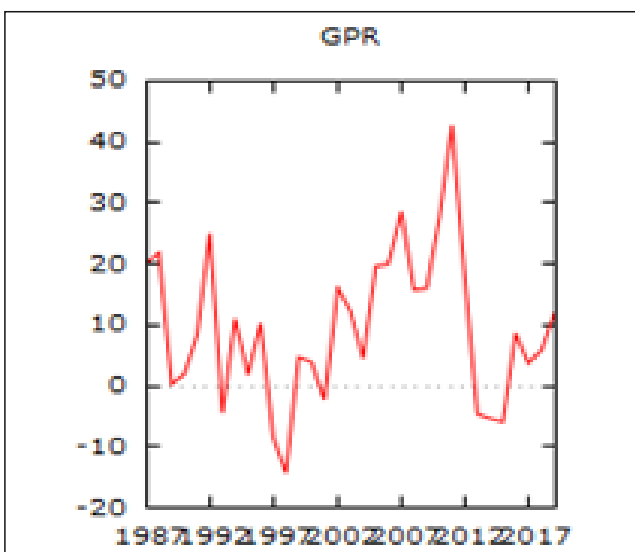


Figure 3: Inflation Rate

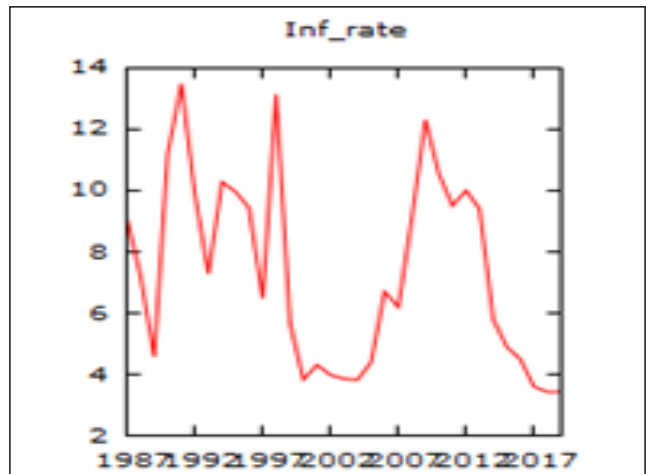


Figure 4: Crude Price Return

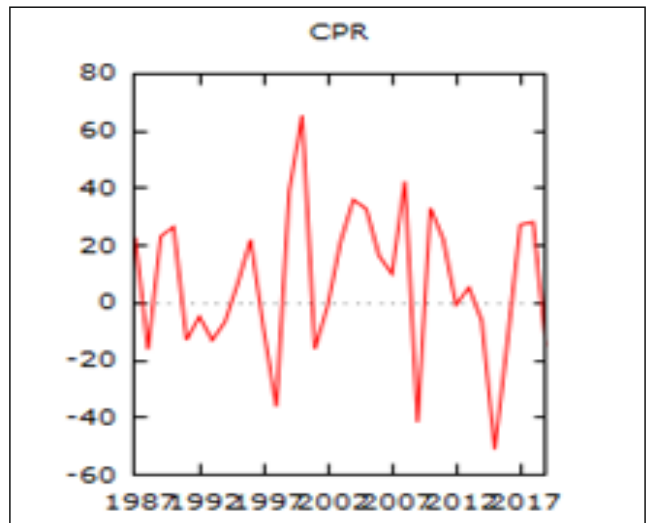
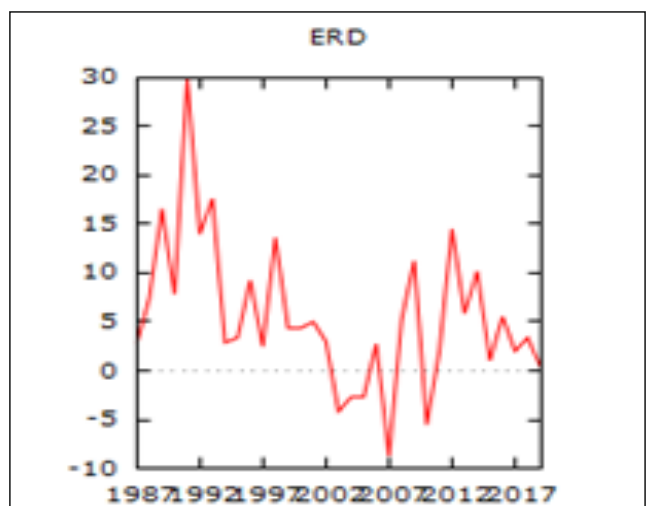


Figure 5: Exchange Rate Depreciation



Model 1: OLS, using observations 1991-2019 (T = 29)
(refer to Table 2)

Dependent variable: SIR
HAC standard errors, bandwidth 2 (Bartlett Kernel)

Table 2: OLS, using observations 1991-2019

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	23.9746	6.64606	3.607	0.0226	**
GPR	-1.39646	0.384772	-3.629	0.0222	**
GPR_1	0.376323	0.182825	2.058	0.1087	
GPR_2	0.0439921	0.217889	0.2019	0.8498	
GPR_3	-0.848876	0.370067	-2.294	0.0835	*
GPR_4	0.0530910	0.237241	0.2238	0.8339	
Inf_rate	-0.399090	1.15793	-0.3447	0.7477	
Inf_rate_1	10.2146	2.41580	4.228	0.0134	**
Inf_rate_2	-5.18363	1.16559	-4.447	0.0113	**
Inf_rate_3	-1.49050	1.20618	-1.236	0.2842	
Inf_rate_4	2.04955	1.42875	1.435	0.2247	
CPR	-0.234319	0.156141	-1.501	0.2078	
CPR_1	0.142517	0.108314	1.316	0.2586	
CPR_2	-0.461279	0.110612	-4.170	0.0140	**
CPR_3	0.0640930	0.0837648	0.7652	0.4868	
CPR_4	-0.346958	0.115936	-2.993	0.0402	**
ERD	-1.72008	0.621868	-2.766	0.0505	*
ERD_1	0.0750520	0.544518	0.1378	0.8970	
ERD_2	1.17303	0.505828	2.319	0.0812	*
ERD_3	-0.687193	0.436999	-1.573	0.1909	
ERD_4	-0.641770	0.361522	-1.775	0.1505	
SIR_1	-0.413245	0.197641	-2.091	0.1047	
SIR_2	-0.234969	0.218635	-1.075	0.3430	
SIR_3	0.0869188	0.195478	0.4446	0.6796	
SIR_4	-1.11298	0.183501	-6.065	0.0037	***

Mean dependent var	11.82759	S.D. dependent var	17.49291
Sum squared resid	1449.116	S.E. of regression	19.03363
R-squared	0.830870	Adjusted R-squared	-0.183911
F (24, 4)	354.5499	P-value (F)	0.000017
Log-likelihood	-97.86471	Akaike criterion	245.7294
Schwarz criterion	279.9118	Hannan-Quinn	256.4349
rho	-0.681131	Durbin-Watson	3.303308

CONCLUSION

Variables which are used for study, establish either association between the macroeconomic factors and stock market or there is no association. Variable which were taken in consideration were stock market index return, gold price rate, inflation rate, crude price rate and exchange rate depreciation.

Using Augmented Dickey Fuller Test (ADF) model the time series data was made stationary i.e. the effect of time has been removed from the variables just making it free from trend. All the variables were tested with

constant and with constant and trend since p -value ≤ 0.05 . Hence, it establishes that they are stationary in nature.

For checking optimum lag length, Ordinary Least Square (OLS) Model is used. Significant is taken at 5%. Using the coefficient of constant and variable the equation is formed, which help to signify the bond between the dependent variable and independent variable.

By referring to the equation, various relationship which can be identified that variables, gold price return,

inflation rate, crude oil price establish a negative relationship with stock market index return whereas inflation of lag (2) establish a positive correlation with the dependent variable i.e. stock market index return. Exchange rate depreciation has no relationship with the stock market return index as it neither establishes positive relationship nor negative relationship. Similar result has been also depicted in the study conducted by other authors. It has been also established that exchange rate does not have influence on stock price and that inflation have negative impact.

R-squared (R^2) has come to be more than 0.05 i.e. 0.830870 which establish that the model is good and best fitted. If r-squared would have come less than 0.05 than it may not be good model.

The study can be further taken forward by taking more variables and studying their outcome on the stock market and different method for analysis can be taken to find out different findings.

Conflict of interests- The authors declare that they have no conflict of interest.

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