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Indian Stock Market:
An analysis of Impact of Macroeconomic Variables

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*Dr. Anil Kumar Goyal & **Gaurav Malhotra

*Professor, Rukmini Devi Institute of Advanced Studies, Delhi anilgoyal20@gmail.com
**MBA Student, Rukmini Devi Institute of Advanced Studies, Delhi, gauravm2895@gmail.com

Address for Correspondence: editojohp@gmail.com

Abstract

The Present study investigates the impact of macroeconomic variables on Indian Stock Market to test that whether a growth in macroeconomic variables lead to growth in Indian stock market with respect to India. For the purpose of the study, on the basis of extensive review of literature, 9 macroeconomic variables are selected Viz. Wholesale Price Index, inflation, Foreign Exchange Reserves, Crude oil Price, Exchange Rate, Gross Fiscal deficits, Call Money Rate, Foreign Institutional Investment and Gold Price as independent variables and Market Indices of BSE 500 as dependent variable. Secondary data for 11 years ranging from April 2007 to March 2018 analysed using Augmented Dicky Fuller Test (ADF) of Unit root to check the stationarity of the data and then multiple regression (OLS) is applied to check the impact of macroeconomic variables on the BSE. The results reveal that Exchange Rate, Inflation and Wholesale Price Index have negative impact while Foreign Institutional Investment, Crude Oil Price and Foreign Exchange Reserves have positive significant impact on Indian Stock Market

Keywords: Indian Stock Market; BSE 500; Macroeconomic Variables; Augmented Dicky Fuller Test (ADF); Multiple Regression (OLS).

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Introduction:

It has been an entrenched reality that Indian Stock Market is viewed as an indicator of the financial and monetary prosperity of the individual country. Securities exchange acts both as a venture road and as an impetus animating financial development and giving chances to amplify returns utilizing different market techniques and consequently fence against different dangers related with the market and that is the reason it's a market space wherein speculators without their particular nationality can partake in look for capital thankfulness too. For sure, a moment change in its separate development will cause certain effect into the economy and consequently macroeconomic factors come into spotlight. Macroeconomic factors are the measuring sticks for estimating financial strength of a country and henceforth shows as of now experiencing patterns in the economy. These factors can be comprehended as pursues: Variables reverberating general financial contemplations i.e fiscal approach factors and call cash rates, factors copying value levels, for example, Wholesale Price Index, Variables including global exercises are : FII and Exchange rate and plenty of different other large scale pointers. Present examination selected 8 macroeconomic variables to find the impact on market measuring stick for example BSE 500 for a time period ranging from 2008 to 2018. Empirical tests are being performed to assess the impact of the previously mentioned free factors onto the reliant factor for example BSE 500 lists on a month to month premise.

Table 1: Macroeconomic Variables

S. No.	Symbols	Variables	Nature	Source
1	ER	Exchange Rate	Independent Variable	Handbook of Statistics on Indian Economy, Reserve Bank of India Publication for respective financial years ending 2008-2018
2	INF	Inflation		Historical CPI Inflation Report sourced from https://www.inflation.eu/ on a monthly basis for respective financial years ending 2008
3	FII	Foreign Institutional Investment		Handbook of Statistics on Indian Economy, Reserve Bank of India Publication for respective financial years ending 2008-2018
4	FisD	Gross Fiscal Deficits		Handbook of Statistics on Indian Economy, Reserve Bank of India Publication for respective financial years ending 2008-2018
5	GP	Gold Price		Handbook of Statistics on Indian Economy, Reserve Bank of India Publication for respective financial years ending 2008-2018
6	WPI	Wholesale Price Index		Handbook of Statistics on Indian Economy, Reserve Bank of India Publication for respective financial years ending 2008-2018

7	COP	Crude oil Price		Thomson Reuters, Weekly Reports sourced from https://www.eia.gov/dnav/pet/pet_pri_spt_s1_ m.htm , Release Date-13.02.2019
8	CMR	Call Money Rate		Handbook of Statistics on Indian Economy, Reserve Bank of India Publication for respective financial years ending 2008-2018
9	Forexres	Foreign Exchange Reserves		Handbook of Statistics on Indian Economy, Reserve Bank of India Publication for respective financial years ending 2008-2018
10	BSE	BSE Sensex Indices	Dependent Variable	Handbook of Statistics on Indian Economy, Reserve Bank of India Publication for respective financial years ending 2008-2018

1. **Exchange Rate:** Exchange rate is the number of units of a currency for the exchange of one unit of another currency. The exchange rate is the indicator of economic strength of the country. The less volatile currency is treated as good and having positive impact on economy and vice versa.
2. **Inflation:** When price rises and the purchasing power money decreases, the scenario is known as inflation in the economy and it is assumed to have an impact on stock market.
3. **Foreign Institutional Investment:** A remote institutional speculation is a reserve enrolled in a nation outside of the one in which it is contributing. Institutional financial specialists most remarkably incorporate flexible investments, insurance agencies, annuity reserves and shared assets. The term is utilized most ordinarily in India and alludes to outside organizations putting resources into the money related markets of India.
4. **Gross Fiscal Deficits:** The gross fiscal deficiency (GFD) is the abundance of absolute consumption including advances net of recuperation over income receipts and non-obligation capital receipts. The net financial shortage is the gross monetary deficiency less net lending of the Central Government.
5. **Gold Price:** Of all the valuable metals, gold is the most commonly used. Investors take gold as an alternative investment option to stock market.
6. **Wholesale Price Index:** The Wholesale Price Index (WPI) is the cost of a delegate container of discount merchandise. It additionally impacts stock and settled value markets. The Wholesale Price Index centres around the cost of merchandise exchanged between companies, as opposed to products purchased by customers, which is estimated by the Consumer Price Index. The reason for the WPI is to screen value developments that reflect free market activity in industry, assembling and

development. This aids in examining both macroeconomic and microeconomic conditions. In the study it is taken as an independent variable.

7. **Crude Oil Price:** The connection between raw petroleum costs and financial development is accepted to be significant according to different wellsprings of writing, anyway this relationship shifts from nation to nation as per reliance and utilization of oil i.e. whether the nation is an exporter or a merchant and increment in oil costs will be beneficial for those whose items are comprised of raw petroleum or refined items.
8. **Call Money Rate:** The call cash rate is the financing cost on a sort of transient advance that banks provide for specialists who thus loan the cash to speculators to subsidize edge accounts. For the two representatives and speculators, this kind of advance does not have a set reimbursement plan and should be reimbursed on interest. The call cash rate is likewise called the dealer advance rate.
9. **Foreign Exchange Reserves:** Foreign Exchange Reserves is money or different resources held by a central bank or other monetary authorities so it can pay its liabilities if needed. It has been taken as second independent variable.

Review of Literature:

(Gurloveleen and Bhatia (2015) in an empirical study evaluated the effect of macroeconomic factors on the functioning of Indian Stock Market. The study used monthly data of ten selected macroeconomic factors as independent and one securities exchange index BSE 500 as a dependent variable. The Augmented Dickey Fuller (ADF) Test, Multiple Regression and Granger Causality Tests were used to analyse the data and found that selected factors have no impact on BSE 500 index during the selected time frame. **(Aanchal, 2017)**, in an empirical research examined the effect of macroeconomic factors on Indian Stock Market to test that regardless of whether a development in macroeconomic factors lead to development in securities exchange as for India. With the end goal of the examination, five macroeconomic factors are picked up and CNX Nifty 50 is taken as a measure for securities exchange execution. The examination utilizes the information for a long time beginning from 2004 to 2015. The Data was examined utilizing Augmented Dicky Fuller Test for testing the Unit Root of the information at that point further Correlation and Granger Causality Test are connected to discover the connection between the factors. Ultimately, it is discovered that there exists a positive relationship between Indian securities exchange and the five factors examined.

(Samveg, 2012) studied how macroeconomic factors affect Indian Stock Market by using monthly data for a period ranging from January 1991 to December 2011 for selected 8 macroeconomic variables. The Data is examined utilizing Augmented Dicky Fuller Test for testing the Unit Root of the information at that point further Johansen Cointegration test, Granger Causality Test & Vector Error Correction Model and it was founded that long run relationship existed between variables and stock market indices and study also revealed causality runs from exchange rate to stock market indices.

(Rakesh, 2013), Analysed the impact of 12 macroeconomic factors on Indian stock market using PCA and grouping these variable in 3 factors viz. Macro Environment, Industrial Performance and Policy Rates for the period ranging from January, 2001 to May, 2013 and it was found that market depend more on hopeful macroeconomic condition require state's reasonable endeavours to keep up full scale soundness. Moreover, securities exchange reacts to execution of the firm explicit elements and unexpected occasions in the economy. (**Kotha and Sahu,2016)** studied long and short run relations between chosen macroeconomic pointers and securities exchange with reference to India. The investigation utilizes monthly information from July 2001 to July 2015 since real securities exchange changes viz., boycott of Badla framework, presentation of moving settlement and presentation of stock subordinates, were altogether actualized in July 2001. With the assistance of co -integration and mistake rectification display (ECM), the examination uncovers the nearness of long run connection between the BSE Sensex and selected macroeconomic markers viz., exchange rate, discount value record, T-charge rates and M3. (**Garg & Kalra, 2018)** studied the impact of Macroeconomic factors on Indian securities exchange over the time from 1991 to 2017. The point of the investigation was to examine the connection between chosen macroeconomic variables and Indian securities exchange. The results depict that impact of the chosen macroeconomic factors on the share trading system value returns was significant. The outcome demonstrates that there is a positive connection between the sensex and macroeconomic components with the exception of avg. swelling and joblessness rate as they show negative relationship. **(Nisha, 2015)** study joined both worldwide and local factors and broaden this assumed connection between stock returns and macroeconomic factors to the developing business sector of India. Utilizing time-arrangement investigation, using Vector Auto Regression (VAR) to decide the effect of macroeconomic factors on the stock returns of Bombay Stock Exchange (BSE) and study found that loan fee, gold value, conversion scale and cash supply have an extensive effect on the stock returns of BSE. Moreover, a solid impact of the worldwide macroeconomic factor of the world value record is likewise found, which infers a continuous reconciliation of BSE towards the worldwide monetary markets. At long last, the examination features the administrative and arrangement suggestions, future research headings and confinements from the point of view of India.

(Venugopal and Sahithi, 2018) studied the relationship connecting select macroeconomic factors viz., call cash rate, cash supply (M3), swapping scale, gold &silver costs, forex stores, and buyer value list as an intermediary for swelling, and the stock costs of 30 firms which shape the reason for the primary indicator of India's economy, Bombay Stock Exchange's Sensex (BSE30). It attempts to comprehend the level of effect of select macroeconomic factors on costs of stocks and the other way around. In this examination, time arrangement information is utilized. The required information is gathered from solid optional sources, for example, RBI, BSE and other worldwide destinations. This examination is led for the period Jan 2000-Aug multi month-wise and results were foreseen utilizing OLS strategy and Granger causality test. Also, discovered Call Money rate, Exchange rate and Forex holds have indicated critical effect on the Indian BSE 30 Index. Catchphrases BSE Sensex, macroeconomic factors, stock costs, OLS strategy, Granger Causality test**.**

(**Parmar, 2013)** examined the impact of different macroeconomic factors on Indian securities exchange. The considered macroeconomic factors preferred reverse repo rate, CRR, SLR, Repo rate, swelling rate, CPI, Index of modern generation, gold rate, oil rate, swapping scale to distinguish its association with stock exchange development and foresee showcase conduct in future. Fundamental destinations of this investigation are to discover bury connection between macroeconomic factors and its effect. Speculation testing on connection between's securities exchange records and macroeconomic factors. Exact examination period were chosen January 2004 to December 2012. Every factor is tried one by one to discover critical connection between the macroeconomic factors and SENSEX. (**Sudhakaran and Balasubramanian, 2016),** explored whether Money Supply, Inflation Rate, Foreign Direct Investments (FDI), Foreign Exchange Reserves, Index of Industrial Production (IIP) and Foreign Portfolio Investments (FPI) are having any significant effect on the BSE Bankex returns over a time of 10 years running from April 2005 to March 2015. The investigation uncovered that FDI and Foreign Exchange Reserves significantly affect the BSE Bankex returns. (**Naik and Padhi, 2012)** studied & explored the relarionship between BSE Sensex and five macroeconomic factors, in particular, mechanical creation file, discount value record, cash supply, treasury charges rates and trade rates over the period April 1994 to June 2011 and found that macroeconomic factors and the stock exchange list are co-incorporated and, subsequently, a long-run harmony relationship exists between them. (**Ray et. al, 2007)** prepared a new endeavour to unwind the relationship between the financial factors and the capital market in Indian setting. Monthly information of national yield, financial shortfall, loan fee, conversion scale, cash supply, remote institutional interest in Indian markets somewhere in the range of 1994 and 2003 were used, and attempt to uncover the general impact of these factors on the Bombay stock exchange was made. The results reveal that some factors like the loan fee, yield, cash supply, expansion rate and the swapping scale has significant impact in the share trading system development in the thought about period, while alternate factors have entirely unimportant effect on the stock exchange.

Gap in Literature

Though, many studies were carried out to find out the impact of macroeconomic variables on Indian stock market. The results are concluded in terms of reporting of empirical results, but present study is different in terms of a fresh enquiry into this concept deploying a period of April 2007 to March 2018 i.e. post impact of global financial crisis up to the current market scenario in which demonetisation too played a critical role & presence of constructive suggestions.

Research Methodology:

The present examination depends on auxiliary information with a target to ponder and look at the impact of selected macroeconomic variables on Indian Stock Market. The study uses monthly data for the period April 2007 to March 2018. To accomplish the target, necessary data has been collected from the respective RBI Publications for respective monthly durations. The collected data is then analysed in deploying various statistical and empirical tests for crystal clear understanding. The Augmented Dickey Fuller (ADF) test was applied to check the unit root in the series and after checking the stationarity of variables, Multiple Regression (OLS) was applied to find out the variables significantly affecting the stock market.

A typical regression equation is as follows:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \ldots \ldots \ldots . + \beta_n x_n + \mu$$

Where

Y is the dependent variable

x_1, x_2 ………… x_n are the independent variables.

β_0 is the constant term (intercept parameter of the regression)

β_1 β_2…………………..β_n are the slope parameters that represent the partial effects of x_i on y keeping all other factors constant

μ represents the unobserved factors that change over time and affect y.

Objective:

The sole objective of the study is to find out the impact of selected macroeconomic variables on Indian stock market.

Analysis and Interpretation:

Table 2: Results of ADF Test

	Level		I(1)	
	t-statistics	P-value	t-statistics	P-value
BSE	-2.465589	0.3446	-9.001695	0.000
ER	-2.272757	0.4454	-10.7967	0.000
Inf	-2.821855	0.1922	-9.4222	0.000
FII	-8.476662	0.0000	-11.7145	0.000
FisD	-2.505969	0.3249	-12.9162	0.000
GP	-1.24526	0.8963	-10.5113	0.000
WPI	-2.344768	0.4067	-11.4487	0.000
COP	-2.631233	0.2674	-7.0274	0.000
CMR	-3.413382	0.0540	-9.4807	0.000
Forexres	-1.447584	0.8422	-11.0356	0.000

In table 2 all the variable were checked for unit root and found that all the variables except Foreign Institutional Investment (FII) are non-stationary at level as the p-value is more than 0.05. All the variables again checked for stationary at first difference and found that all of them are stationary and free from unit root at first difference having p-value less than 0.05. The data processed for further analysis of multiple regression to find out the impact of these macroeconomic variables on Indian stock market.

Table 3: Result of Multiple Regression (OLS)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-3.812259	1.557754	-2.44728	0.0158*
ER	-1.051013	0.283797	-3.703398	0.0003*
Inf	-0.118554	0.034372	-3.449166	0.0008*
FII	0.000342	0.000129	2.648397	0.0092*
FisD	-2.06E-05	2.73E-05	-0.753447	0.4526
GP	0.016865	0.099799	0.168986	0.8661
WPI	-0.403741	0.147181	-2.743168	0.007*
COP	0.145123	0.05756	2.521226	0.013*
CMR	-0.062409	0.042207	-1.478621	0.1418
Forexres	1.353682	0.150326	9.004979	0.000*
R-squared	0.82119	Mean dependent var		9.909991
Adjusted R-squared	0.80789	S.D. dependent var		0.304234
S.E. of regression	0.133347	Akaike info criterion		-1.11846
Sum squared resid	2.151554	Schwarz criterion		-0.89898
Log likelihood	83.25899	Hannan-Quinn criter.		-1.02927
F-statistic	61.74393	Durbin-Watson stat		0.25754
Prob(F-statistic)	0			

*Significant at 5% level of significance

The Regression Equation based on the results of OLS is as follows:

BSE = -3.812259 -1.051013*ER -0.118554*Inf + 0.000342*FII -2.06E-05*FisD +0.016865*GP -0.403741*WPI + 0.145123*COP -0.062409*CMR +1.353682* Forexres

Table 3 summarises the results of multiple regression and it can be interpreted that 6 variables out of nine are significant at 5% and intercept also significant at the same level of significance. The variables like Exchange Rate, Inflation, Foreign Institutional Investment, Wholesale Price Index, Crude Oil Price and Foreign Exchange Reserves have significant impact on the Indian Stock Market. Exchange Rate, Inflation and Wholesale Price Index have negative impact while Foreign Institutional Investment, Crude Oil Price and Foreign Exchange Reserves have positive significant impact but Fiscal Deficit, Gold Prices and Call Money Rates do not have any significant impact on the Indian Stock Market. The Adjusted R-squared is 0.82119 which signifies that the model explains 82% of the variance. P-value of F-statistic is 0.000 which signifies that the goodness of model fit.

Conclusion

On the basis of objective of the study to find out the impact of macroeconomic variables on the Indian Stock Market and the process to analyse these variables with the help of multiple regression, it can be concluded that some of the selected variables have positive impact on the stock market while others have negative impact but three variables viz. Fiscal Deficit, Gold Prices and Call money Rates are found not to found any significant impact on the Indian stock market. These results are for the given set of data and for the selected period of time. As every study passes through some limitations, hence the results may vary if the time period and /or selection of variables differ. The study is useful for researchers to carry forward from these results and it can also be useful to policy makers to frame the economic policies in tune with the results to find favourable results.

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