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Effect of macro-economics variables in stock market

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Abstract

The rapid growth of the Indian economy after the financial crisis of 2008 has raised several empirical questions based on the significant correlation between stock prices and key macroeconomic indicators. Investment decisions are highly influenced by macroeconomic variables because changes in macroeconomic variables have different effects on stock markets depending on the country's economy and government policies. This study examines the impact of macroeconomic variables on the stock market from April 2010 to March 2017. This paper aims to examine long and short-run relations between selected macroeconomic variables and stock market returns concerning India. To estimate the relationship, this study used Correlation, unit root tests, ADF test, and Co-integration Engle Granger regression. The results showed that the error correction terms contribute to explaining the changes in all the variables. Looking at estimated coefficients and t-statistics, it can be seen that for foreign institutional investors, the consumer price index, Call money rate and dollar price have a significant positive influence on the stock market in the long run. The regulators should maintain interest rates relatively low to stimulate economic activities, improve the external economic environment through rule-based exchange rate policy, and avoid discretionary measures.

Keywords: Stock Market, macroeconomic variables, unit root test, co-integrating regression

Introduction

Stock Market plays a vital role in the financial sector of every economy. A stock market is the center of a network of transactions where buyers and sellers of securities meet at a specified price. Stock market plays a key role in the mobilization of capital from surplus to deficit unit in a market, leading to the growth of commerce and industry of a country, as a repercussion of liberalized and globalized policies adopted by most emerging and developed government. In fact, Indian Stock Market is one of the largest among the world at \$2.3 trillion market capitalization.

The Efficient Market Hypothesis (EMH) suggest that an "an efficient market successfully incorporates all the publicly available information within itself and reflects it in stock performances". The movement in the stock indices is highly volatile and sensitive to the changes in the economy. And so, for the expectations about future prospects. These predetermined expectations are influenced by both micro and macro fundamentals. Macroeconomic variables can be apprehended as variables which reflects general economic conditions, variables which relate to interest rate, monetary policy, price levels and which involves international activities. There cannot be a finite list. Studies have been carried using different macroeconomic variables to scrutinize which factors have the most critical impact on stock returns.

Relationship between macroeconomics variables and stock returns can be looked up in two ways. One alternative is to see the stock market as the leading indicator of economic activity and macroeconomic variables which are based on the findings that stock market signals changes in real activity. Another alternative is that, the macroeconomic variables influence and predict stock returns. The perfect knowledge of stock market volatility with respect to the macroeconomic variables is important in order to find the perfect relationship which lies with the macroeconomic indicators and Indian stock market to analyze the investment decisions, economic policies and business policies.

There exists a huge volume of literature on how stock returns get influenced. Much of the investigation between stock returns and economic forces is based on the presumption that macroeconomic indicators are highly influential in predicting stock returns and asset prices. In this view an empirical question to be answered is does and at what extent the Indian stock market responds to the changes in macroeconomic variables Kiran Kumar, 2016^[9].

Literature Review

In the past couple of decades, many researchers, financial analysts and practitioners have tried to predict the relationship between stock market and macroeconomic variables. They have conducted some empirical studies to examine the effect of stock price on macroeconomic variables or vice-versa. This section of the paper has discussed some such previous research works and their empirical conclusions that are related to our sector analysis.

Gikas A. Hardouvelis (Macroeconomic Information and Stock Prices, Journal of Economics and Business, 1987) noted both monetary and non-monetary news affects the stock indices. Among monetary news he noted M2 and three-month Treasury bill rate caused indices to move most. Similarly, non-monetary news which includes fiscal deficit, unemployment rate, personal income also affected the indices movement.

Nurudeen (2009)^[10] has examined the relationship between stock market development and economic growth using error correction model (ECM). He utilized time-series data of gross domestic product, market capitalization, all share index, rediscount rate, market turnover and openness of the economy from 1981 to 2007. The results carried out depicted the presence of long-run relationship between stock market development and economic growth.

Hosseini, *et al.* (2011)^[11] inspected the relation between stock market indices and macroeconomics indicators like crude oil price (COP), money supply (M2), industrial production (IP) and inflation rate (IR) in China and India using monthly data ranging from January 1999 to January 2009. They tested vector autoregressive (VAR) model and showed that in both long-run and short-run there are linkages between four selected macroeconomic variables and the stock market index in China and India.

Bhattacharya and Mukherjee (2006)^[12] using the monthly data between April 1994 and march 2003, concluded there has been a consistent movement between exchange rate(\$/Rs), interest rate (SBI lending rate), IIP, Inflation (WPI), money supply with stock market except for certain period of fluctuation.

Srinivasan (2004)^[13] used Johansen and Julius multivariate co integration methodology to look into the long run relationships between NSE-Nifty Share Price index and macroeconomic variables. The macroeconomic variables used by them were industrial production, consumer price index, interest rate, money supply, exchange rate and stock price index. With this, multivariate vector error correction model was applied to test the short run causality between NSE-Nifty share price and the macroeconomic variables in India. The empirical research showed that the NSE-Nifty share price index has a significantly positive long run relationship between money supply, interest rate, Index of

Industrial Production and the US stock market index. Moreover, there exists a significant negative correlation between NSE-Nifty share price index and exchange rate in the long run. The results carried out from the analysis indicate that there is a strong unidirectional causation running from interest rate to NSE stock market and the US stock market return to NSE stock market return.

Bhunja (2002)^[14] gave an opinion on the shock of oil extracted from the ground price, stock price and exchange rate on the growth of Indian (process of people making, selling and buying things). It is found that the growth rate of Gross Domestic Production was extremely importantly (changed by/affected by) the rate of stock price, the rate of oil price and rate of exchange rate but the more famous and important (number or thing that changes) is the growth rate of stock price.

Ramanarayana (1997)^[15] gave an opinion on the hit of Foreign Institutional Investment on The Indian Stock Market during the World Financial Crisis. The Engle-Granger, Johansen and Granger tools were used to inspect the co integration and between the Foreign Institutional Investment and BSE 500. The monthly data were employed to get the results. Hence, the institution can use the available information of one variable to predict about the performance of the second variable.

Chakraborty, Sangeeta (2007)^[16] study also notes there exists a unidirectional relationship between IIP, Inflation & Stock market. She also wrote there happens to be no causal relationship between stock prices & exchange rate. The study was conducted by taking monthly date between the period of 1991 & 2005 using Granger non-causality test.

Sangmi (2001)^[17] investigated the effect of macroeconomic variables on the Indian stock prices. The macroeconomic variables include six variables inflation, exchange rate, industrial production, money supply, gold price and interest rate. These were selected to check its effect on the performance of three indices Sensex, Nifty and BSE 100. Multiple regression test was on monthly data which indicated a significant relationship between the dependent and independent variables i.e. stock market prices and macroeconomic variables.

Basabai (2006)^[18] has proposed that there is a bi-directional causality which exist between stock return and the FII and unidirectional causality runs from exchange rate to stock returns, not vice-versa.

According to the research work by Koh (2000)^[19], he found weak causality between IIP to Sensex and Bhattacharya (2003)^[20] has reported the nature of the casual relationship between stock prices and macroeconomic aggregates in the foreign sector in India.

Another study conducted by Pethe and Kamik (2000), examined using the Indian data for April 1992 to December1997, attempted to establish a relationship between stock price indices and crucial macroeconomic variables in India, and the cause effect relation. This study runs causality tests in an error correction framework on non-cointegrated variables, which is not appropriate according to econometrics. Study carried by the authors show that there is weak causality running from IIP to Sensex and Nifty but not the other way around. Hence, it holds the view that the state of economy affects stock prices.

Objectives

The objective of the study is to examine the impact of macroeconomic variables on the stock prices. This study will establish the relationship between Indian stock market and macroeconomic variable and the implications of it. To shed light whether the Indian Stock market is strong form efficiency or weak form efficiency. To Examine the existence of correlation between dependent (stock price) & independent variables macroeconomic variables) & the extent to which they are correlated.

Limitations of study

For the research to be carried out, there are some limitations that need to be acknowledged and addressed regarding the present study. And these limitations are as follows:

Data Reliability: This study is based on the analysis of the secondary data that has been gathered. Secondary data is the data that is already available and has been used for further analysis and thus might not be reliable.

Accuracy: The result and conclusion of the study might not be accurate due to the reliability on the secondary data and limitations on the variables which are selected and in which time span.

Time Period: A time span of 7 years has been considered for examining the relation between macroeconomic variables and Indian stock market.

Limited Variables: This study will mainly focus on selected five independent variables which may not completely represent the macroeconomic variables.

Research Methodology

Data

In this paper, we examine the case for India using monthly frequency of data from April,2010 to March,2017 and taking macro-economic variables *viz.*, Index for Industrial Production (IIP), Foreign Institutional Investments (FII) , Exchange Rate (Ex), Consumer Price Index (CPI) and Weighted Average Call Money Rate (WACMR). We have taken IIP as a proxy for GDP, Growth Rate. CPI has been taken as a proxy of Inflation. We have used Weighted Average Call Money Rate as a proxy of Interest Rate. Exchange Rate is acquired through US Dollar/Indian Rupee FX Spot Rate. For tracing stock returns in India, we have taken S&P BSE SENSEX, the benchmark stock index for the Indian equity market. Data of these macroeconomic variables is collected from the website of Reserve Bank of India, indiastats.com, msci.com, dbie.com, website of Bombay stock exchange and moneycontrol.com. Stock prices are collected from the website of BSE.

Variables

BSE SENSEX The S&P BSE SENSEX (S&P Bombay Stock Exchange Sensitive Index) called as BSE30 or simply the SENSEX is a free-float market-weighted stock market index of 30 well-established and financially sound companies listed on Bombay Stock Exchange representing a

sample of large, liquid and representative companies. In this paper, SENSEX is being considered as dependent variable representing Indian stock market.

Explanatory Variable

Consumer Price Index (CPI)

It is the index value of basket of consumer commodities purchased by households residing in a particular country over a given period. The annual percentage change in a CPI is used as a measure of inflation. A CPI can be used to index (i.e. adjust for the effect of inflation) the real value of wages, salaries, pensions, for regulating prices and for deflating monetary magnitudes to show changes in real values.

Exchange Rate

Exchange rate is defined as price of domestic currency in terms of foreign currency. In broader sense, it represents the bilateral nominal rate of exchange of the Indian Rupee (Rs.) against one unit of a US Dollar (\$). Due to dominating nature of US Dollar across worldwide, Indian rupee exchange rate is considered against the foreign currency (US Dollar). There is a linkage between stock market and exchange rate as depreciation of domestic currency results decline in stock prices because of expected inflation. On an average, export-oriented companies are adversely affected by stronger domestic currency while import-oriented firms benefit from it.

Index of Industrial Production

Index of Industrial Production (IIP) is used as proxy to measure the growth rate in real sector. It measures the short-term changes in the volume of production of a basket of industrial products during a given period with respect to chosen base period. It is expected that an increase in industrial production index is positively related to stock price because increase in Industrial Production Index results in increase in production of industrial sector which increases the profit of industry and corporation. A fall in IIP gives the perfect opportunity to invest in strong companies at discount price. Before investing, IIP figure should be checked.

Foreign Institutional Investor

FII's play a very important role within the Indian economy. It's a brief term investment created by international investors. It's a two-way effort with the returns of alternative money markets like securities industry, exchange and interchange market. It's very vital for associate degree rising economy as FII exerts a bigger impact on the domestic money markets within the short run and a true impact within the end of the day.

Call Money Rate

Call money rate is the interest rate on short-term loan that banks give to brokers who in turn lend the money to investors to fund margin accounts. This is the benchmark rate for what investors pay to buy securities on margin. A service charge or mark-up is typically added by the broker. The relationship between interest rates and stock prices suggests that an increase in interest rates increases the opportunity cost of holding money and as a substitution of

stocks with interest bearing securities results in falling stock price.

Model Specification

The model includes the following variables: BSE SENSEX, Consumer price index, production index, foreign institutional investor, call money rate and exchange rate. The functional relationship of the model can be represented as

$$\text{Sensex} = f(\text{CPI, IIP, FII, CMR, EX RATE}) \quad -1$$

Here in equation 1, Sensex is the S&P BSE Sensex index, f is the functional relation, CPI is consumer price index, IIP stands for index of industrial production. FII is foreign institutional investor, CMR represents the call money rate and EX Rate is the dollar exchange rate.

Hence, transforming this functional equation in linear function

$$\text{Ln Sensex} = \beta_1 + \beta_2 \text{CPI} + \beta_3 \text{Ln IIP} + \beta_4 \text{Ln FII} + \beta_5 \text{Ln CMR} + \beta_6 \text{Ln ExRate} + \epsilon_1 \quad -2$$

Theoretical Framework

With a view to accomplish the pre-determined set of objectives to show the relationship between macroeconomic variables and stock market, different tests and techniques are conducted in order to achieve the goal. Firstly, we will

do the Normality Test to check if the data is normal and accurate. Followed by it, we will perform Descriptive statistics technique like mean, standard deviation, variance, minimum, maximum etc. are carried out to show the nature and characteristics of the variables used in the analysis. Then the Correlation matrix will be performed to check the causal relationship between dependent variable (Indian stock market) and independent variables (macro-economic variables). Since our data is monthly data for 7 years, so we have checked trend and stationarity by Augmented Dickey Fuller test, using unit root test. Co-integrating regression is carried out to check the long run and short run relationship with the stock market and macroeconomic variables.

Normality test

In Statistics, Normality tests are done to check if the data set is well modelled by a normal distribution. Normality can be decided on the basis of “p value” or skewness of the data set. Testing normality is important because if the data set appears “non-normal” then it can render the whole statistical test inaccurate.

Here we have used skewness to test the normality of the data. If the value of skewness lies between -1 and 1 then the data is said to be normal.

Clearly the skewness of every dataset here appears to be between -1 and 1 (Table1). So, from the findings we can conclude that the collected data is well set to perform further statistical analysis.

Table 1: Show Clearly the skewness of every dataset here appears to be between -1 and 1

	SENSEX	IIP	DP	CPI	FII	WACMR
Obs	84	84	84	84	84	84
Pr(Skewness)	0.3821	0.0494	0.1575	0.3039	0.5275	0.0165
Pr(Kurtosis)	0.000	0.7323	0.000	0.0041	0.6163	0.0465
Adj chi2(2)	-	4.12	28.86	8.21	0.66	8.52
Prob>chi2	0.000	0.1277	0.000	0.0165	0.7178	0.0141

Descriptive Statistics

Table 2 represents a summary of descriptive statistics of all the variables. Sample mean, standard deviation, maximum, minimum, skewness, kurtosis and range of 84 observations of our variables, viz, Sensex, Index of Industrial Production CPI, weighted average call money rate, dollar price, FII, are reported. The mean value of Sensex over the period of 84 months is 22330.56 points with 29918.4 being the maximum hit of the market. The standard deviation for the same period is 4402.68 points which basically implies either the Indian market has grown tremendously over the year or the rate of volatility is too high or the mixer of the two factors. Similarly, next most mobile variable is dollar price whose standard deviation stands at around Rs 8.01 over the time taken. The average price of dollar per unit has been Rs 57.5, the maximum and minimum being 68.6 and 44.21

respectively. The average CPI for the period with 2010 base is 95.65 and continued to be more or less same throughout the entire period except for the period post December 2015 when the rate was 100+. The figure for IIP is very impressive averaging around 174.34 points with 205.3 points being the highest over the period under consideration. Foreign Institutional Investments figure has been comparatively more volatile than the rest of the variables with in many instances reporting a negative equity investment (selloff being more than buy) during the period. The standard deviation for the same stood at around 10707.89. The maximum of the net investment stood at around 33781.93. The variability of call money rate has been very moderate with only 1.14% being the standard deviation. The average for the same stood at 7.37%.

Table 1: Show represents a summary of descriptive statistics of all the variables

	SENSEX	DP	IIP	CPI	FII	WACMR
N	84	84	84	84	84	84
Mean	22330.56	57.5	174.34	95.65	6217.03	7.37
Median	20652.89	60.02	174.1	96.51	6992.6	7.55
Maximum	29918.4	68.6	205.3	105.16	33781.93	9.97
Minimum	15454.92	44.21	156.1	84.83	-17737	3.56

Range	14463.48	24.39	49.20	20.33	51518.93	6.41
Standard deviation	4402.68	8.01	10.48	4.69	10707.89	1.14
Skewness	0.22	-0.37	0.52	-0.26	0.16	-0.65
Kurtosis	-1.56	-1.28	0.07	-0.91	-0.3	1.3

Correlation

The relationship between stock market and macroeconomic variable has been analyzed using Pearson’s correlation analysis. According to the test it is observed that there exists a positive linkage of BSE Sensex with dollar price, IIP, and foreign investors whereas negative relationship is observed with inflation i.e., CPI and Weighted Average CMR which shows the interest rate. Significantly there is a positive relationship for Exchange Rate, IIP, &FII with BSE Sensex. Thus, these variables have an important association with

stock index. The table above shows the correlation matrix of BSE Sensex with the selective set of macroeconomic variables. The IIP has a significant positive association with FII (0.362). The highly significant positive association exists among inflation and IIP (0.109) whereas negative is shown between inflation and FII (-0.159) and inflation and DP (-0.208). As the value of Indian currency declines with respect to dollars, the inflation rate should increase in the country.

Table 3: Show BSESEN-x dollar-e, IIP Inflat-n, FII and WACMR

	bseesen~x dollar~e	iip inflat~n	fii	wacmr		
bseesensex	1.0000					
dollarprice	0.7995	1.0000				
iip	0.5168	0.5097	1.0000			
inflation	0.5370	0.2077	0.3623	1.0000		
fii	-0.0486	-0.2076	0.1092	-0.1593	1.0000	
wacmr	-0.2059	0.0666	0.0677	-0.7120	0.0791	1.0000

Table 4: Show BSE Sensex, DP, IIP, FIE, CPI and WACMR

	BSE Sensex	DP	IIP	FIE	CPI	WACMR
Bse Sensex	1,000	.799	.517	.537	-.049	-.206
DP	.799	1,000	.510	.208	-.208	.067
IIP Pearson Correlation	.517	.510	1,000	.362	.109	.068
FII	.537	.208	.362	1,000	-.159	-.712
CPI	-.049	-.208	.109	-.159	1,000	.079
WACMR	-.206	.067	.068	-.712	.079	1,000
Bse Sensex	-	.000	.000	.000	.330	.030
DP	.000	-	.000	.029	.029	.274
IIP Sig. (1-tailed)	.000	.000	.	.000	.161	.270
FII	.000	.029	.000	-	.074	.000
CPI	.330	.029	.161	.074	.	.237
WACMR	.030	.274	.270	.000	.237	.
Bse Sensex	84	84	84	84	84	84
DP	84	84	84	84	84	84
IIP N	84	84	84	84	84	84
FII	\$4	84	84	84	84	84
CPI	84	84	84	84	84	84
WACMR	84	84	84	84	84	84

Regression

The Regression Table provides information about the variation in the dependent variable (SENSEX) with respect to macroeconomic variables taken in this research paper. The probability of f-test is close to 0 which tells us that SENSEX is significantly dependent upon the 5 variables i.e. Dollar Price, IIP, Inflation, FII, Weighted CMR.

We can see that the value of R-Square is 0.8158 which could be interpreted as 81 percentage variances in SENSEX has been explained with the help of selected data. The value of adjusted R square is 0.8040 which means that 80.40 percentage variance in SENSEX caused due to the relevant variables has been explained and rest 20.6 percentage is not.

Table 5: Show Regress BSESEN SEX dollar price IIP inflation FII WACMR

Source	SS	df	MS	Number of obs = 84		
Model	1.3284e+09	5	265670290	F(5, 78) =	69.10	
Residual	299868401	78	3844466.68	Prob > F =	0.0000	
Total	1.6282e+09	83	19617106.6	R-squared =	0.8158	
				Adj R-squared =	0.8040	
				Root MSE =	1960.7	

bseensex	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dollarprice	425.5318	32.71513	13.01	0.000	360.401	490.6626
iip	-37.1382	29.1221	-1.28	0.206	-95.11584	20.83943
inflation	474.3934	82.93608	5.72	0.000	309.2804	639.5065
fii	.0801151	.0218548	3.67	0.000	.0366055	.1236247
wacmr	361.2374	313.7119	1.15	0.253	-263.315	985.7898
_cons	-44199.79	8000.937	-5.52	0.000	-60128.43	-28271.15

Vector Autoregressive Model (VAR)

Empirical work based on the time series data assumes that the underlying time series is stationary i.e. the mean and variance is constant over the time and do not show any trending behaviour. Then we will check for autocorrelation. Sometimes, autocorrelation results because the underlying time series is nonstationary.

In Statistics, a Unit Root Test tests whether a time series variable is not stationary and possesses a Unit Root. The null hypothesis is defined as the presence of a Unit Root and the alternative hypothesis is Stationary.

Test for stationarity

We will be using ADF (Augmented Dickey Fuller test) to

check for the stationarity of the time series.

After plotting a time series graph for the variables (dependent and independent) we have observed a constant trend, either upward or downward.

Hypothesis for ADF Test

H0 = There is a unit root, Non-Stationary Ha=Stationary
 P-Value < Significance Level → Reject Null Hypothesis
 P-Value > Significance Level → Can't Reject NULL Hypothesis

The significance level which we took is 10%
 After running the test, our data came out to be

Table 6: Show variable, p-value and inference

Variable	P-Value	Inference
BSE Sensex	0.5505	P > sig. Level Non-Stationary
Inflation	0.7027	P > Sig. Level Non-Stationary
FII	0.00009715	P < Sig Level Stationary
IIP	0.002622	P < Sig Level Stationary
Dollar Price	0.4247	P > Sig Level Non-Stationary
CMR	0.04579	P < Sig Level Stationary

Transformations to achieve Stationarity

We can difference the data, i.e., given the series Zt, we can create the new series

$$Y_i = Z_i - Z_{i-1}$$

The differenced data will contain one less point than the actual data We transformed the data by differencing it for the first time and the very difference of the variables gave

All the selected variables are non-stationary at the level while they all are stationary at the first difference. This analyses that the series is integrated of order one, I(1).

the required result, i.e. the data became stationary even at 1% significance level.

Table 7: Show data became stationary even at 1% significance level

Variables	P-Value	Inference
Sensex	3.95e-011	P-Value < Sig. Level Stationary
Inflation	1.367e-007	P-Value < Sig. Level Stationary
Dollar price	1.625e-010	P-Value < Sig. Level Stationary

All the selected variables were not stationary at the level

While they all became stationary at the first difference. This analyses that the series is integrated of order one, I(1). Also, we checked for multicollinearity, which is a phenomenon in which two or more independent variables in

a multiple regression model are highly correlated.

Minimum possible value = 1.0

Values >10.0, may indicate a collinearity problem.

VIF (j) = 1/ (1-R(j)²), where R(j) is the multiple correlation coefficient between variable J and the other independent variables.

Table 8: Show independent variables

Variables	P Value
Dollar Price	1.498
IIP	2.035
Inflation	3.314
FII	1.197
WACMR	2.780

Table 9: Show must exist unidirectional relationship between variables

	Coefficient	Std error	T-Ratio	P-Value
Const	-9140.81	17991.9	-0.5081	0.6129
Dollar Price	109.515	149.495	0.7326	0.4660
IIP	-42.6855	28.5731	-1.494	0.1393
CPI	279.698	121.144	2.309	0.0236**
FII	0.0614963	0.02303	2.671	0.0092***
WACMR	63.7978	336.019	0.1899	0.8499

***, ** and * show the significance at the 1%, 5% and 10% levels respectively

Ln SENSEX= -9140.81+109.515 ln Ex Rate -42.6855lnIIP +279.698lnCPI + 0.06149lnFII +63.7978 ln CMR

The coefficients for FII, CPI, DP and WACMR are positive while the coefficient for IIP is negative and statistically significant. On the other hand, the coefficient for inflation and FII is positive but statistically insignificant. The intercept term is negative. In general, the signs of all variables are in line with theoretical predictions. It is seen that there is long term positive relationship between stock market and exchange rate. An increase in Dollar price with respect to rupees increases the stock indices. The positive long-run relationship between consumer price index as a proxy for inflation and stock market is consistent. This positive relationship suggested that investors are compensated for inflation and that the Stock market development cannot be used as a hedge against inflation since investors will require higher returns to compensate for high inflation. FII and CMR also have a positive relation with Stock market index.

Whereas, IIP has a negative relationship between stock market. An increase in Production index decrease the stock index.

In the short run, results show that IIP and CMR has negative and statistically insignificant impact on the stock market. However, one-year lag of CMR has positive and significant impact on the stock market, whereas IIP shows no significant impact.

Conclusion

The study was done to check whether there exists any relationship between real macroeconomic variable and stock prices. The variables were chosen carefully to suit Indian context, viz, Index of Industrial Production, Consumer Price Index (CPI), Weighted Average Call Money Rate (WACMR), Dollar Prices (DP) and Foreign Institutional Investments (F(II) for seven years of monthly data starting

Hence, according to the Belsley-Kuh-Welsch collinearity diagnostics, there is no multicollinearity in the selected time series data.

Co integration

In Statistics, co integration analysis is used to estimate and test stationary linear relations or co integration relations. Co integration regression is done to check the co-integrating relationship between underlying variables.

Co-integration results suggest that there exist long run relationships among variables, but says nothing about the direction of causality. Engle and Granger suggest that, if variables are co-integrated in long run then there must exist unidirectional relationship between variables

from April 2010 to March 2017. We executed multiple exercises to come to the conclusion of our study. These exercises include test for normality of data, regression analysis, correlation analysis, advanced Vector autoregressive model.

Since for some variables stock market follows a nonlinear pattern, we undertook ADF test and found out Sensex, CPI, DP were not stationary at the level but those were all stationary at first difference. Through correlation analysis it is observed that there exists a positive linkage of BSE Sensex with dollar price, IIP, and foreign institutional investments in equity whereas negative relationship is observed with inflation (CPI) and interest rate (WACMR). The regression analysis showed that SENSEX is significantly dependent upon the 5 variables i.e. Dollar Price, IIP, Inflation, FII, Weighted CMR. However, our co-integration test showed there exists a long term positive relationship between Dollar prices and inflation with stock market. FII and CMR also had a positive but inconsistent relationship with BSE Sensex. IIP however had a long-term negative relationship with Sensex.

The study reaffirms that macro variables do play an important role in determining the movement of stock market index and certain variable do determine the movement of the market relatively more than the others. This study bears an important lesson for policy makers, corporates, retail investors and all those financial institutions who play significant roles for smooth functioning of the stock market.

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