Impact of Macro Economic Variables on Stock Indices of Indian Stock Market

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***Abstract*- The study examined on the impact of macroeconomic variables in Indian stock market. Analysis used in this study is correlation, granger-causality test, descriptive tests and Augmented – Dickey fuller test. Gross domestic product and exports have positive correlation with SENSEX. Whereas consumer price index, inflation, imports, gross fiscal deficit and unemployment have negative correlation with SENSEX. In Augment Dickey Fuller test it was found that SENSEX, gross fiscal deficit, consumer price index, imports and exports, inflation and unemployment become stationary at first level difference. Gross Domestic Product become stationery at second level difference. In granger causality test it was found that exports, inflation, gross domestic product and unemployment have one- way causality relationship with SENSEX. From the descriptive statistics test it was observed that it rejects null hypothesis, it reveals that macroeconomic variables have a significant effect on SENSEX. In this study it concludes that changes in the macroeconomic variables make a significant effect on Indian stock market.**

INTRODUCTION

We need only less sum of money to invest in stock market. We need more time to expand the business, a lump amount to buy a physical asset comparing to these investing in shares takes minimum time, amount and it allows for quick liquidation so it is better than paying monthly mortgage. In stock market bonds, derivatives, shares of a company and other financial instruments are traded. In share market only shares are traded. A stock in a company is defined as share in the ownership of the designated company. Stock indices are used to measure the price movement of a specific group of stocks. Investor who is holding the share of company they will receive profit if there is an increase in share as dividend payments. On the whole stock market is a manifestation of the economy of the country. In this paper among many macroeconomic variables only seven variables are considered to examine the impact on Indian stock market.

OBJECTIVES OF THE STUDY

- To examine the correlation between macroeconomic variables and stock indices of BSE.
- To examine the cause and effect relationship between macroeconomic variables and BSE indices.
- To examine whether the changes in the SENSEX because of the changes in various macroeconomic variables.

SCOPE OF THE STUDY

This study includes the pre and post period of the demonetization in India. Among many stock markets it has limited to Bombay Stock Exchange. We can able to analyze the difference in the movement of stock market before and after the demonetization.

LIMITATIONS

- SENSEX is taken as representative of Indian stock market movement (indices).
- Variables which are quantitative in nature are only considered.
- There are many macroeconomic factors which affect Indian stock market but in this study only selected variables have been considered.
- Only ten years of annual data have been taken i.e from 2007 to 2017.

REVIEW OF LITERATURE

Shin and Kwon (19991) Shin and Kwon examine about the impact in the returns from the stock market

due to the economic activities. Macroeconomic variables considered in this paper are exchange rates, production index, trade balance and money supply and Korean stock market index. Co integration test and vector error correction model is conducted in this study. The growth of money supply leads to a drop in interest rates, hence an increase in investment and GDP, and eventually in the rise of stock prices. In this paper they conclude that macro-economic variables provide long term equilibrium with the stock market indices. Aviral kumar Tiwari (2015 2)In this paper he analysed the relation between stock market and Indian economic growth. He conducted granger causality test and unit root tests in this paper. In this investigation, they break down the Granger-causality in recurrence area between stock costs and monetary development in India. For this reason in the initial step distinctive occasional and auxiliary breaks unit root tests. In the second step we utilize a contingent VAR around the restrictive and non-restrictive recurrence area causality tests. Investigation demonstrates that stock costs are a main pointer for development in the modern creation in India. For this situation, so as to alter the modern generation in the long haul, the Indian monetary strategies ought to be centered with preference around the share trading system condition.

Adam, Anokye M, George and Tweneboah (2008 3) This investigation looks at the job of impact of stock costs development in Ghana due to macroeconomic variables. Investigation includes both long-run and short-run dynamic connections between money markets record and the monetary variable with quarterly information. In this study they use Johansen's multivariate cointegration test and advancement bookkeeping systems. There is cointegration between macroeconomic factors recognized and Stock costs in Ghana showing long run relationship.

Hirak Ray and Joy Sarkar (20144) In this paper they conducted causality tests and innovation analysis to analyse about the sway of the variables. In this paper they found that there is an optimistic correlation in the long run with stock market returns and exchange rate. Whereas there is an unconstructive correlation with stock market returns and short term interest. Stock market returns and long term interest have unconstructive correlation. Stock market returns and inflations have pessimistic correlation.

Kenneth Anyalechi (20145) This paper analyzed the responsiveness of the share trading system comes back to change in oil cost in Nigeria utilizing month to month. To break down the long-run display just as the short- run elements by autoregressive estimation test. The discoveries uncovered that adjustments in oil cost have had positive yet inconsequential effect on securities exchange returns both over the long term and the short-run. Effect of expansion was unimportant over the long run however emphatically huge in the short-run. Genuine loan fee and log of conversion scale applied negative effect on the share trading system returns.

Hyo and Lyke (20176) This is the first paper which has taken survey to study about the stock market developments. In this paper they classified the determinants of stock market into two categories. They are macroeconomic factors and institutional factors. In this paper they talked about how the macroeconomic factors affect stock market returns.

Amith Vikram Megaravalli (20187) In this paper he scrutinize about impact in India, China and Japan stock markets in long and short run relationship because of the changes in the macro economic variables. In this paper they consider few macroeconomic factors; they are inflation and exchange rate. As per the result they conclude that exchange rate have long run and positive effect while the inflation has short run relationship and no significant effect in the stock market.

N.M.Odhiambo and Sin-Yu Ho (20188) In last few years Philippine stock market has an unparalleled growth. This paper made analysis to explore about this remarkable growth. In this paper they give a conclusion that in the long run trade openness had a unconstructive impact in Philippine stock market. In the short run exchange rate have a positive impact in the stock market due to the modifications in the banking sector. They suggest that policymakers should endorse the equity finance in the export areas, banking area and also they have to alleviate the domestic currency to endorse stock market development.

Patricia AP Rayappan (20189) In this study Rayappan said that stock market can be directly effect on government, policies and framework regulated by the country's Government. In this paper

he has taken exchange rate and inflation rate as the macroeconomic variables. Both the exchange rate and stock market are one of the crucial elements.

Gan, Lee, Yong and Zhang (200610) This study examines the effects of selected macroeconomic variables in the New Zealand stock market. The exponential model GARCH (Nelson, 1991) applies. It finds that the New Zealand Stock Exchange Market index is positively influenced by real GDP and the world stock market index and is negatively affected by the government debt to GDP ratio, the real interest rate, the nominal rate NZD / USD exchange rate, expected inflation rate, and US government bond yields. They conclude that there is a non-linear relationship between the stock market index and the ratio of money supply to GDP.

Chandhini Makhan, Avneet Kaur Ahuja and Saakshi Chauhan (201211) In this study, the study did the necessary analysis to answer the question of whether some of the identified macroeconomic factors could affect the Indian stock market. Macroeconomic variables are represented by industrial output index, consumer price index, interest rate (call rate), exchange rate, gold price, oil price, external institutional investment. There is a positive correlation between FII and SENSEX, call rate and SENSEX. Exchange rate and SENSEX show a negative correlation. This merely concludes that the Indian stock market's long-term market is more driven by local macroeconomic factors than by global factors.

SOURCES OF DATA

The data for this study are taken from the BSE website, NSE website, WDI (World Bank database) which consist of many macroeconomic indicators performance of many countries and RBI website where we can get some indicators data.

RESEARCH FRAMEWORK

In this study the financial performance of past 10 years i.e. 2007-2017 is considered to analyze the impact on the Indian stock market indices because of macroeconomic variables. To find out the result Correlation, Augmented dickey fuller test, Granger causality test and Descriptive statistics tests were used.

Table 1 Data Description

Variable	Frequency	Sources
SENSEX	Annual	Kunaldesai.blog
Gross Domestic Product (GDP)	Annual	(World development indicators) wdi databank
Inflation	Annual	(World development indicators) wdi databank
Consumer price index (CPI)	Annual	(World development indicators) wdi databank
Imports of goods and services (Imports)	Annual	(World development indicators) wdi databank
Exports of goods and services (Exports)	Annual	(World development indicators) wdi databank
Gross fiscal deficit (GFD)	Annual	(World development indicators) wdi databank
Unemployment	Annual	(World development indicators) wdi databank

Table 2 Correlation between SENSEX and Macroeconomic variables

Variables	Correlation value	Result
SENSEX & GDP	0.9	Positive
SENSEX & Inflation	-0.5	Negative
SENSEX & Exports	0.4	Positive
SENSEX & Imports	-0.6	Negative
SENSEX & Unemployment	-0.4	Negative
SENSEX & CPI	-0.8	Negative
SENSEX & GFD	-0.4	Negative

For correlation SENSEX is kept in common for all the eight macroeconomic variables. There are three relationships which come under positive correlation SENSEX and gross domestic product (GDP), SENSEX and Inflation, SENSEX and Exports of goods and services. In negative correlation there are SENSEX and Imports of goods and services, SENSEX and unemployment and at last SENSEX and Consumer price Index.

- If there is rise in index at the same time it shows that there is rise in market return which indicates that there will be constructive outlook in the country's economy. This is the cause for the positive correlation between SENSEX and GDP. When the companies in the country earns good sum of profit then there will be a positive rise in GDP. Rise in GDP also means there is a high valuation for the companies. This situation says that GDP and SENSEX are directly proportional.
- Inflation has a negative correlation with index which means that increase in the index will have a positive reception of money. If there is a rise in inflation consumer are less likely to hold cash in their hand because the rupee value get gradually decreases. High inflation decreases the purchasing power of consumer. The taxation levels also increase in high inflation income from the stocks is less attractive. Economists say that stocks are less attractive during high inflation

period than the low inflation period. This explains that inflation and SENSEX are indirectly proportional.

- If there is an increase in the GDP of India it may be because revenue of the country got increased due to exports of goods and services. In a country exports bring revenue. Exports generate income thus it is added to calculate Gross domestic product of the country. Increase in GDP gives a positive effect in SENSEX. The trade deficit and trade surplus have an impact in the domestic country currency value. Exports and SENSEX are directly proportional.
- Imports of goods and services means one country is buying from other country which simply means money is spent. Imports generate income to abroad thus it is subtracted from other components to calculate Gross domestic product of the home or domestic country. If imports gets increase than exports it simply means Domestic County spending more money than the generated income. This results in the decrease of GDP and there will be a negative effect in stock prices. Imports and SENSEX are indirectly proportional.
- If the unemployment rate increases then the consumer spending rate gradually gets decreases. This situation makes the stock price fall because the valuation of the companies gets decreased. If the companies made loss or if the companies cut down the labors to reduce costs then there will be negative effect in GDP. Thus unemployment rate and SENSEX are indirectly proportional. A recession has a domino effect, where rising unemployment leads to a smaller increase and a decrease in consumer spending affecting businesses that leave employees losing their jobs. A drop occurs when there are two or more consecutive waves of negative gross domestic product (GDP) growth.
- Consumer price index and SENSEX are indirectly proportional. When CPI gets increase the cost of living gets pricier. Because of this situation the savings of the people gets reduce and this inversely affect the stock market as same as inflation.
- Gross fiscal deficit rise reduce the corporate profits and this leads to reduce the equity prices. Decrease in the corporate profits, increase in interests and low earnings of citizen are the cause of rise in gross fiscal deficit. Hence GFD and SENSEX are indirectly proportional.

Table 3 Correlation among macroeconomic variables

Variables	GDP	CPI	GFD	Exports	Imports	Unemployment	Inflation
GDP	1						
CPI	-0.05	1					
GFD	0.10	0.25	1				
Exports	-0.35	0.49	0.28	1			
Imports	-0.28	0.63	0.39	0.92	1		
Unemployment	0.33	0.33	-0.41	0.06	0.22	1	
Inflation	0.01	0.81	0.30	0.66	0.81	0.41	1

From the table it is inferred that correlation among the seven macroeconomic variables are shown that Gross domestic product and consumer price index have negative correlation. Gross Domestic Product and gross fiscal deficit have positive correlation. Gross Domestic Product and exports of goods and services have negative correlation. Gross domestic product and imports of goods and services have negative correlation. There is a positive correlation between Gross domestic product and unemployment and inflation. Whereas consumer price index, exports, imports, unemployment and inflation have positive correlation with the other variables. Gross fiscal deficit have positive correlation with other macroeconomic variables except unemployment.

Table 4 Output of ADF test (Augmented Dickey Fuller Test)

Variable	Test	Probability
SENSEX	First level difference	0.006
GDP	Second level difference	0.02
Inflation	First level difference	0.007
GFD	First level difference	0.04
Unemployment	First level difference	0.006
CPI	First level difference	0.02
Exports	First level difference	0.02
Imports	First level difference	0.03

Hypothesis in unit root test is

H0: There is a unit root for the series.

Ha: There is no unit root for the series. Data set is stationery.

- SENSEX variable dataset was checked with the first test 'Level' but the probability is above 0.05 it says that SENSEX is non-stationery data. So we have to check the p-value

with the second test 'First level difference'. Then SENSEX probability came out as 0.006 (in the first level difference) so that it rejects the null hypothesis.

- GDP dataset variable was checked with the first test 'Level' but the probability is above 0.05 it says that GDP is non- stationery data. So we have to proceed with the second test 'First level difference'. Even in first level difference p value resulted above 0.05 hence we have to move to the last test 'Second level difference'. Then GDP data probability came out as 0.02 (in the second level difference) so that it rejects the null hypothesis.
- Inflation variable dataset was checked with the first test 'Level' but the p-value is above 0.05 it says that the data series is non- stationery data. So we have to check with the second test 'First level difference'. Then inflation data probability came out as 0.007 so that it rejects the null hypothesis.
- GFD variable dataset was checked with the first test 'Level' but the probability is above 0.05 it says that data is non- stationery data. So we have to calculate the p- value with the second test 'First level difference'. Then GFD data probability came out as 0.006 so that it rejects the null hypothesis.
- Unemployment variable data was checked with the first test 'Level' but the probability is above 0.05 it says that data is non- stationery data. So we have to calculate the p-value with the second test 'First level difference'. Then GFD data probability came out as 0.006 so that it rejects the null hypothesis.
- CPI data series variable was checked with the first test 'Level' but the probability is above 0.05 it says that data is non- stationery data. So we have to calculate the p-value with the second test 'First level difference'. Then GFD data probability came out as 0.006 (in the first level difference) so that it rejects the null hypothesis.
- Imports data series variable was checked with the first test 'Level' but the probability is above 0.05 it says that data is non- stationery data. So we have to calculate the p-value with the second test 'First level difference'. Then imports data probability came out as 0.006 (in the first level difference) so that it rejects the null hypothesis.
- Exports data series variable was checked with the first test 'Level' but the probability is above 0.05 it says that data is non- stationery data. So we have to calculate the p-value with the second test 'First level difference'. Then exports data probability came out as 0.006 (in the first level difference) so that it rejects the null hypothesis.

From the above table it is concluded that the data set is stationery because the values are less than 0.05. Hence the data series are stationery causality test can be calculated. This makes to reject null hypothesis and accept alternate hypothesis. The computed p-value is lower than the significance level α which is 0.05. From this it is concluded that data of the study are stationery.

Table 5 Output of Granger Causality Test

S.NO	Null hypothesis	Probability	Result
1	Exports does not Granger cause CPI	0.03	Rejected
	CPI does not Granger cause Exports	0.11	Accepted
2	GDP does not Granger cause CPI	0.31	Accepted
	CPI does not Granger cause GDP	0.94	Accepted
3	GFD does not Granger cause CPI	0.43	Accepted
	CPI does not Granger cause GFD	0.02	Rejected
4	SENSEX does not Granger cause CPI	0.80	Accepted
	CPI does not Granger cause SENSEX	0.66	Accepted
5	Inflation does not Granger cause CPI	0.72	Accepted
	CPI does not Granger cause Inflation	0.60	Accepted
6	Unemployment does not Granger cause CPI	0.71	Accepted
	CPI does not Granger cause unemployment	0.86	Accepted
7	Imports does not Granger cause CPI	0.35	Accepted
	CPI does not Granger cause Imports	0.11	Accepted
8	GFD does not Granger cause Exports	0.02	Rejected
	Exports does not Granger cause GFD	0.21	Accepted
9	Imports does not Granger cause Exports	0.04	Rejected
	Exports does not Granger cause Imports	0.15	Accepted
10	Inflation does not Granger cause Exports	0.11	Accepted
	Exports does not Granger cause Inflation	0.43	Accepted
11	SENSEX does not Granger cause Exports	0.60	Accepted
	Exports does not Granger cause SENSEX	0.04	Rejected
12	Unemployment does not Granger cause Exports	0.61	Accepted
	Exports does not Granger cause Unemployment	0.61	Accepted
13	GDP does not Granger cause Exports	0.15	Accepted
	Exports does not Granger cause GDP	0.41	Accepted
14	GFD does not Granger cause GDP	0.03	Rejected
	GDP does not Granger cause GFD	0.21	Accepted
15	Imports does not Granger cause GDP	0.77	Accepted
	GDP does not Granger cause Imports	0.29	Accepted
16	Inflation does not Granger cause GDP	0.6	Accepted
	GDP does not Granger cause Inflation	0.06	Accepted

17	SENSEX does not Granger cause GDP GDP does not Granger cause SENSEX	0.22 0.02	Accepted Rejected
17	Unemployment does not Granger cause GDP GDP does not Granger cause Unemployment	0.24 0.12	Accepted Accepted
18	Imports does not Granger cause GFD GFD does not Granger cause Imports	0.06 0.02	Accepted Rejected
19	Inflation does not Granger cause GFD GFD does not Granger cause Inflation	0.04 0.34	Rejected Accepted
20	SENSEX does not Granger cause Imports GFD does not Granger cause SENSEX	0.56 0.24	Accepted Accepted
21	Unemployment does not Granger cause Imports Imports does not Granger cause Unemployment	0.12 0.12	Accepted Accepted
22	SENSEX does not Granger cause Inflation Inflation does not Granger cause SENSEX	0.53 0.03	Accepted Rejected
23	Unemployment does not Granger cause Inflation Inflation does not Granger cause Unemployment	0.48 0.65	Accepted Accepted
24	Unemployment does not Granger cause SENSEX SENSEX does not Granger cause Unemployment	0.04 0.65	Rejected Accepted

Granger Causality provides a statistical evidence for the causality between two variables. Causality is likely as cause and effect relationship. Null hypothesis should not be rejected when the probability level is above 5%. Thus null hypothesis should be accepted if it is above than 5% (0.05).If both the hypothesis gets rejected then it is known as two way causality relationship between the variables. If there is one rejection in the hypothesis then it is known as unidirectional relationship. If both the hypothesis gets accepted then it is known as nil relationship between the variables. Because neither X nor Y have cause and effect relationship. There is no two-way causality relationship between the variables. Other than one-way causality relationship all the hypothesis have nil relationship. None of the hypotheses have two way causality relationship.

The one way causality relationships among the variables are

GDP GRANGER CAUSE SENSEX

One null hypothesis got accepted and other got rejected. Thus it provides statistical evidence on predicting changes in SENSEX with GDP value. In other words GDP will get increase because of increase in country's production hence there will be an increase in citizen's income so they will also spend more. This situation makes a change in SENSEX because the value of company is higher. If the company goes bankrupt naturally the value of the company goes down so this affects SENSEX. For a employee in accompany whose share prices falls that doesn't affect the common man life in a huge way, employee will receive the salary unless the company goes bankrupt or got shut down. But at the same time major movements in stock market indices doesn't prove that economy is in progression or regression.

UNEMPLOYMENT GRANGER CAUSE SENSEX

Unemployment is a significant indicator to measure the economic growth. If the unemployment rate increases it means that there is less production. If a person does not have job whole family gets affected thus if the rate increases it means that consumer spending got reduced. This results in low economic period. At this period luxury items demand will go down because if many citizens lose their they have less cash in hand so they will not spend lavishly so many items demand will come down which will affect the stock market directly or indirectly. Even if the employment rate is higher when the cost of labor could not be covered it may cause inefficient economy. When the wages got inflated company could not make high profits this also affect the stock market.

INFLATION GRANGER CAUSES SENSEX

Rise in GDP also make inflation to get increase because citizen will spend more because they earn more. In inflation both company and consumer spend money on goods. In this case demand exceeds the supply of goods in the market. So normally manufacturer increase the price of goods when the demand of the goods get increase. As the company fail to meet demand for the goods due to increase in raw material costs, labor wages and others so supply power gets reduced. It may affect the profits of the company thus the value of the company stocks also goes down.

EXPORTS GRANGER CAUSE SENSEX

If a country has more imports than exports then it will reduce the domestic products it affects the domestic market of the country. When the exports are more compare to imports then it will cause trade surplus. In business a country must have a comparative advantage other than other countries. India have large marketplace for a developing countries so when the exports increases it rises the gross domestic product both have appositive impact on SENSEX. When the imports get increase than exports will result in trade deficit. This will result in loss of domestic jobs and also affect the stability of economic. Loss of domestic jobs slowly increases the unemployment rate which may result in inflation, increase in interest rate and increase in foreign direct investment. Foreign direct investment is an advantage for small countries but in larger country the large proportion of assets and resources will be owned by the foreign country. Hence the country may lose the control over the assets and resources.

Therefore exports, inflation, gross domestic product and unemployment have one- way causality relationship with SENSEX. Meanwhile in granger causality test it rejects the hypothesis where SENSEX cause any impact on macroeconomic variables. Hence SENSEX is the dependent variable whereas the all seven macroeconomic variable are independent variable. Thus from this test it is interpreted that with the past data of exports, inflation, GDP and unemployment future changes of SENSEX can be predicted.

There are six one way causality relationships between the macroeconomic variables. They are GFD Granger cause Imports, Inflation Granger cause GFD, CPI Granger cause GFD, GFD Granger cause Exports, GDP Granger cause GFD and Exports Granger cause CPI. It is interpreted that granger causality test provides a statistical evidence that with the past values of GFD and trade values we can predict the future changes in exports and imports. If there is a change in CPI we predict there may be an effect on GFD value. Granger causality test provides a statistical evidence that with past values of gross domestic product of the country we can predict the changes that may happen in gross fiscal deficit. Granger causality test provides a statistical evidence that with past values of exports of the country we can predict the changes that may happen in consumer price index.

Table 6 Descriptive statistics

Variables	Kurtosis	Probability
SENSEX	2.13	0. 01
GDP	2.38	0.02
GFD	1.87	0.006
CPI	2.44	0.003
Inflation	1.63	0.001
Imports	1.87	0.02
Exports	1.47	0.005
Unemployment	2.97	0.014

Hypothesis is

H0: There is no significant influence on the stock market (dependent variable) by the macroeconomic variables (independent variables).

Ha: There is a significant influence on the stock market (dependent variable) by the macroeconomic variables (independent variables).

Kurtosis:

The kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked (leptokurtic) relative to the normal if the kurtosis value is less than 3 then the distribution is flat relative to the normal. The test statistic measures the difference between the Skewness and kurtosis of the series with those from the normal distribution.

Kurtosis value of the SENSEX is 2.13. Kurtosis value of the gross domestic product is

2.38. Kurtosis value of the gross fiscal deficit is 1.87. Kurtosis value of consumer price index is 2.44. Kurtosis value of inflation is 0.032. Kurtosis value of unemployment is

2.97. Kurtosis value of imports of goods and services is 1.87. Kurtosis value of exports of goods and services are 1.47.As the Kurtosis value is less than 3 then it is shown that data series are platykurtic. If kurtosis has positive value then it means there are many data in the tails. If the kurtosis has negative value it denotes that there are less data at the ends. If the data are normally distributed then Skewness and kurtosis value will be equal to zero. Thus data are not normally distributed but it is close enough to normal distribution. Kurtosis value ranging from 4 to 50 is said to be extremely deviated from the normal distribution. But from the above table it is concluded that data are not extremely deviated from normally distribution.

PROBABILITY

Probability value of the SENSEX is 2.13. Probability value of the gross domestic product is 2.38. Probability value of the gross fiscal deficit is 1.87. Probability value of consumer price index is 2.44. Probability value of inflation is 0.032. Probability value of unemployment is 2.97. Probability value of imports of goods and services is 1.87. Probability value of exports of goods and services is 1.47. Thus the Probability values of the entire variable are less than 0.05.If Probability value is less than 0.05 then we have to reject he null hypothesis in term alternate hypothesis must be accepted. In this study the alternate hypothesis is there is a significant influence on SENSEX due to macroeconomic variables. Therefore we accept the alternate hypothesis. In other words we accept that there is a significant impact on SENSEX due to macroeconomic variables.

SKEWNESS

It is a measure to find whether it is asymmetrical or symmetrical distribution around the mean. Skewness value of the SENSEX is 0.2. Skewness value of the gross domestic product is 0.3. Skewness value of the gross fiscal deficit is 0.17. Skewness value of consumer price index is 0.55. Skewness value of inflation is 0.032. Skewness value of unemployment is 1.22. Skewness value of imports of goods and services is 0.09. Skewness value of exports of goods and services is 0.042. It is a positive skewness hence it has long right tail.

FINDINGS

SENSEX and gross domestic product has positive correlation. SENSEX and Inflation have negative correlation. SENSEX and Exports of goods and services have positive correlation. SENSEX and Imports of goods and services have negative correlation. SENSEX and unemployment have negative correlation. SENSEX and Consumer price Index have negative correlation.

Gross Domestic Product and consumer price index have negative correlation.

Gross domestic product and gross fiscal deficit have positive correlation. Gross domestic product and exports of goods and services have negative correlation. Gross domestic product and imports of goods and services have negative correlation. Gross domestic product and unemployment have positive correlation. Gross domestic product and inflation have positive correlation.

- Consumer price index has positive correlation with the other variables.
- Exports of goods and services have positive correlation with the other variables.
- Imports of goods and services have positive correlation with the other variables.
- Unemployment has positive correlation with the other variables.
- Inflation has positive correlation with the other variables.
- Gross fiscal deficit have positive correlation with other macroeconomic variables but negative correlation with unemployment.

Unit root test – Augmented Dickey Fuller test

Data for this study are tested for stationery and the p-value of all the variables came below 0.05. SENSEX, GFD, CPI, imports and exports of goods and services, inflation and unemployment p-value came below 0.05 in the first level difference. GDP p-value came below 0.05 in the second level difference.

Granger causality test

- Exports, inflation, gross domestic product and unemployment have one- way causality relationship with SENSEX. It rejects the hypothesis where SENSEX cause any impact on macroeconomic variables. From this test it provides a statistical evidence that with the past data of exports, inflation, GDP and unemployment future changes of SENSEX can be predicted.
- There are six one way causality relationships between the macroeconomic variables. They are GFD and Imports, Inflation and GFD, CPI and GFD, GFD and Exports, GDP and GFD and the last Exports and CPI.

Descriptive statistics test:

From the kurtosis value it is concluded that data set of this study are platykurtic and there are heavy data at the tails. As the Probability value is below 0.05 then it shows that it rejects null hypothesis.

Suggestions

High inflation makes the market conditions difficult. It is suggested than when the people in a country

reduce the spending it halts the inflation of the economy. Imbalance of trade (trade deficit) also causes an impact in stock market. Thus country has to maintain the balance in trade because it may affect the currency value. Higher in unemployment reduce the value of stocks at the same time higher in employment may increase the inflation. Thus the labor cost has to be maintained and at the same time utilization of labor force in country is essential to boost up the economy to protect the company value. If the supply power gets decrease but the demand have not be fulfilled in the market it leads to inflation. In this case price of the products gets increase but they could not meet the demand in the market. Thus demand and supply have to be balanced.

If imports are increased than exports then the value for the domestic product come down and there will be economic imbalance. Thus it is suggested to balance imports level below the exports level. Fiscal deficit increases the interest rate and leads to inflation. Thus to reduce the fiscal deficit economic growth is the way which can increase the tax revenue for the government without increasing the tax rate. Market volatility plays a significant role in the economy changes of the country. Investors have to consider the changes in economic factors and maintain a diverse portfolio is helpful to have a safe return.

CONCLUSION

In this study the relationship between macroeconomic variables and SENSEX are analyzed with four tests. In correlation tests we can determine the movement of the stock market indices when there is a change in macroeconomic variables. In this study last ten years of data from 2007 to 2017 are considered. As it is a time series unit root test is performed to check the stationery of the data. Inflation has an impact in stock market as it leads to economic inefficiency. Unemployment, fiscal deficit also leads to inflation which affects the gross domestic product of the country and cause economic inefficiency. Normally if the stock prices reduced to 100 or 1000 points this do not have any impact in normal people lifestyle in India until the person lose his job. But in countries like United States this have at least a minor effect in normal people lives. Monetary and fiscal measures are used by government to reduce the inflation. Economic stability is a significant one to maintain the stock market. Thus investors have to be aware of economic changes in the country to manage the volatility in stock market.

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