

Impact of Selected Macroeconomic Variables on Indian Stock Market Index

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Abstract

Undoubtedly, stock market is very important to the global economic. It provides a channel that can move the funds from people who lack productive investment opportunities to people who have them. Therefore, stock market played a pivotal role in improving the economic growth (Demirguc-Kunt & Levine 1996). India's economy has been one of the stars of global economies (Economywatch, 2008), as it is among the fastest growing and fourth largest economy in terms of purchasing power parity in the world. The capital investment boom in the country drives the current growth phase of the Indian economy. Presently, a large number of global players are analyzing carefully the movements of stock markets in India. Therefore, at this point, an understanding of macroeconomic variables that affect Indian stock markets may be useful for policy makers, traders, investors and all other stakeholders.

Keywords: Macroeconomic Variables, Co integration, Indian Stock Market

1. Introduction

History has shown that the price of shares and other financial assets are an important aspect of the dynamics of economic activity, performing a vital role in national economies. Stock prices can be an indicator of social mood and are used as a leading indicator of the real economic activity. Rising share prices, for instance, tend to be associated with increased business investment and vice versa. Share prices also affect the wealth of households and their consumption. Therefore, economic policy makers keep an eye on the control and behavior of the stock market, as its smooth and risk free operation is essential for economic and financial stability. Stock market is also an important factor in business decisions because the prices of shares affect the amount of fund that can be raised by selling newly issued stock to finance investment spending (Mishkin, 2013, p.46). Markets react promptly to any news, at times even any forms of instability including but not limited to escalating political tensions or even war rumors, change in regulatory environment (business), deemed as negative by the business (investing) community and interest rate fluctuations in general performance of the economy (Moneybiz, 2008). This paper explores Stationarity of selected variables to study the Cointegration and cause & effects relationship between stock market index and selected macro economic variables. Thus the paper studies the existence of short run and long run relationship among these Macro economic variables and Stock Index Using Cointegration techniques. Thus the paper aims to examine the relationship between selected macroeconomic variables and Nifty index for the period from 2005 to 2014. And have selected four macroeconomic variables which Export, Import, Gold and Multi Commodity Exchange index (Here after MCXCOMDEX) The paper will benefit policy makers, researchers, economists, could safeguard investors and traders.

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2. Methodology

Firstly descriptive statistics of the variables is studied. This study then checks stationarity using ADF tests. After that Johansen cointegration technique is used to check cointegration and find long and short run relationship. If these variables are cointegrated, they tend to move together in the long run, while experiencing short run transitory deviations from their long run relationship. From a cointegration system, we can derive an error correction model (ECM) that allows us to study both the short run dynamics and the effect of long run restrictions on stock price variations. Residual testing of models is done using Heteroskedasticity, Auto correlation and Multicollinearity tests. Also cause and effect relationship is studied using Granger Causality tests. OLS will be used to study impact of single variable on Nifty. Impulse Response function is used to check the impact of coefficients over time. Theil's U Statistics is studied to find appropriateness of the models. This study also tries to imply ARDL forecasting technique.

3. Results

3.1 Descriptive Statistics

Descriptive statistics are broken down into measures of central tendency and measures of variability, or spread. Mean, Median, skewness, kurtosis, Jarque-Bera statistics etc. can be studied using these figures. Mean of Export is 969 and standard deviation is 431, which shows its deviation from mean. The skewness and kurtosis of exports is 0.36 and 1.71 respectively. Mean of Gold is 57360 and standard deviation is 22937, which shows its deviation from mean. The skewness and kurtosis of exports is 0.06 and 1.53 respectively. Mean of import is 1478 and standard deviation is 648, which shows its deviation from mean. The skewness and kurtosis of imports is 0.165 and 1.53 respectively. Mean of Mcxcomdex is 3011 and standard deviation is 730, which shows its deviation from mean. The skewness and kurtosis of Mcxcomdex is 0.04 and 1.54 respectively. Mean of Nifty is 5079 and standard deviation is 1261, which shows its deviation from mean. The skewness and kurtosis of Nifty is 0.21 and 3.15 respectively.

3.2 Unit Root Tests

For all the variables (Exports, imports, Gold, Mcxcomdex and Nifty), the absolute values are lesser than critical values at 5%. Thus all the variables have a unit root. In addition, I also compared p-values of all variables with 5%. The p-values are all greater than 5% (96.34%, 91.86%, 47.03%, 61.09%, and 82.46%) respectively. Thus the null hypothesis of no unit root in the data cannot be rejected and is thus accepted. Now we transform the data by differencing, so we conduct ADF at first difference. For all variables (Exports, imports, Gold, Mcxcomdex and Nifty) absolute ADF test values are greater than absolute test critical values at 5%. Thus all the variables are stationary at first difference and had one unit root. Also p-values of all the variables are lesser than 5% (almost 0 for all variables).

Hence it can be concluded from ADF results at first difference that all the variables are stationary (at first difference) and can thus be further used for cointegration tests.

3.3 Granger Causality Test

Using Granger causality we can test whether dependent variable (Nifty) affect independent (macroeconomic) variables or vice versa. There is unidirectional causality from Nifty to Exports meaning that if Nifty index moves in positive direction than Exports figures of India will also move in positive direction all other things being equal. So we can use Nifty index to predict Exports' figures.

Again the results indicated unidirectional causality from Nifty to Imports meaning that if Nifty index moves in positive direction than Imports figures of India will also move in positive direction all other things being equal. So we can use Nifty index to predict or forecast Imports' figures of India. In other words, if Nifty index continue to increase in future, on the basis on this we could say that Imports and Exports numbers of India will continue to increase in future, *ceteris Paribas*.

Unidirectional relationship is also seen from Gold to Exports, Gold to Imports and Gold to Mxcomdex. Bidirectional relationship is found between Imports and Exports. So I can say that the past values of Import figures of India could be used to predict future values of Indian Export figures. Conversely, Export figures could also be used to forecast Import figures in India. In other words, we can say that if Indian Exports are consistently increasing in past than on the basis of this we can say that Indian Import figures will also increase in future and vice versa.

3.4 Cointegration Tests

There exists at most 1 cointegrating relationship among the variables Imports, Exports, Mxcomdex, Gold and Nifty.

3.5 Lag Determination

SIC showed the lowest at lag length=1. In our study we will use SIC criterion, and thus will select lag length as 1.

3.6 Testing for Correlation, Heteroskedasticity and Multicollinearity

p-value of the observed R-squared value of Breusch-Godfrey Serial Correlation LM Test is 0.7532 which is more than 0.05, meaning that null hypothesis of no serial correlation between the variables should be accepted. Thus there is no serial correlation in our model which is also a good property of our model.

Chi-square p-value of Observed R is 0.8422, which is more than 0.05, meaning that the null hypothesis stating residuals are not heteroskedastic can be accepted and thus we can say that residuals are not heteroskedastic in our model which is a desirable property in our model.

P-value of Jarque-Bera statistics is 0.14 which is greater than 0.05 , meaning that the null hypothesis is accepted (residual is normally distributed) and alternative hypothesis stating residuals are not normally distributed is rejected and thus residuals of our is Normally distributed.

Multicollinearity can be detected from R-square value. R- square value is 0.612397, which indicates that multicollinearity could be present in the residuals.

3.7 Error Correction Model

In equation estimates of VECM Model, C(1) coefficient is positive and p-value of C(1) is more than 5%(11.51%) which is insignificant and thus our error correction term become insignificant. To estimate long run relationship from error correction model, C(1) coefficient should be negative and p-value of the same should be less than 5%, but as C(1) value is positive and p-value is more than 5%(Appendix J), we can say that our variables does not have long run causality with Nifty index. Meaning Exports, Imports, Gold and Mxcomdex does not causes Nifty index in long run.

After concluding that there exists no long run relation between Nifty index and selected macroeconomic variables, we go for short run relation using unrestricted VAR model.

Short run equation from Appendix L is:

$$DNifty = 0.948958*DNifty(-1) + 0.741055*Exports(-1) + 0.004810*Gold(-1) -0.226023*Imports(-1) -0.315279*Mcxcomdex(-1) + 602.8836$$

Where C(1), C(2), C(3), C(4), C(5) are coefficients of DNifty, Exports, Imports, Mcxcomdex respectively and C(6) is Constant(Values of same are shown in Appendix L).

3.8 Residual Testing of Vector Auto Regressive Model

P-value of Observed R is 0.3312 which is more than 0.05 meaning that null hypothesis of no serial correlation between the variables should be accepted. In other words, Durbin Watson statistics is 2.12 which states no serial correlation supports F-statistics which also shows that there is no serial correlation in our model which is also a good property of the model.

Also residuals are not heteroskedastic in our model which is a desirable property in our model. Also Residuals of the Model is not normally distributed and this could be one concern area but still model can be accepted.

3.8 Impulse Response Function

One standard deviation positive shock to Exports, DNifty will respond positively for first 6 years and after that it will start decreasing in future years till 10th year.

One standard deviation positive shock to Gold, than in that respect DNifty will respond negatively for first 8 years and in 9th and 10th years it will move in positive direction.

One standard deviation positive shock to Imports, than DNifty will respond negatively for first 5 years, and thereafter positively from 6 to 10 years.

One standard deviation positive shock to Mcxcomdex, DNifty will respond negatively for next 10 years.

3.10 Fan Chart

The model equation for Nifty is

$$DNIFTY = C(1)*DNIFTY(-1) + C(2)*EXPORTS(-1) + C(3)*GOLD(-1) + C(4)*IMPORTS(-1) + C(5)*MCXCOMDEX(-1) + C(6)$$

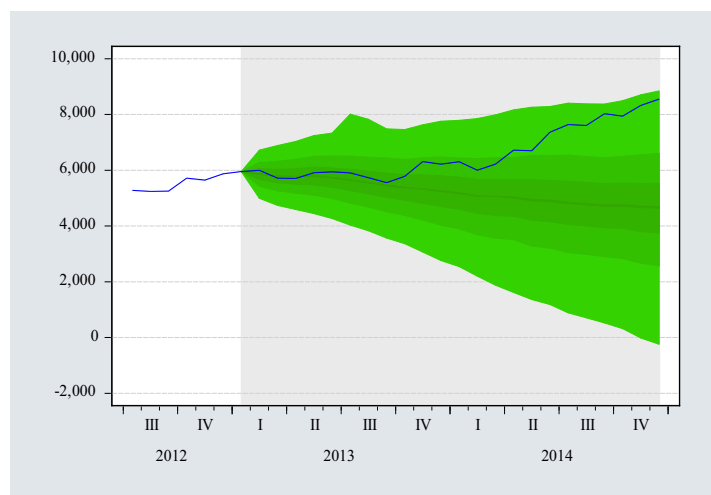
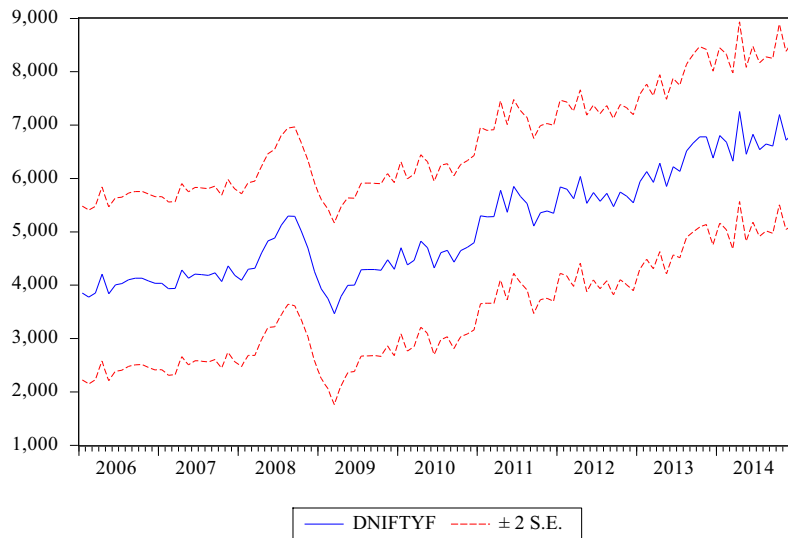


Figure 1 : Fan Chart

Forecasting



Forecast: DNIFTYF	
Actual: DNIFTY	
Forecast sample: 2006M01 2014M12	
Included observations: 108	
Root Mean Squared Error	781.5567
Mean Absolute Error	616.6245
Mean Abs. Percent Error	13.15368
Theil Inequality Coefficient	0.075101
Bias Proportion	0.000000
Variance Proportion	0.121983
Covariance Proportion	0.878017

Evaluating the static forecast, we can see that *Theil Inequality coefficient* is way less than 1 implying a good forecast. Also the forecast is “good”, as the bias and variance proportions are small with most of the bias concentrated in the covariance proportions.

4. Conclusion

The study found out that variables were stationary at first difference and had one cointegration vector among them. After that VECM model was used to develop long run relation but found that selected macroeconomic variables(Exports, Imports, Gold and Mcxcomdex) does not have any long term relationship with Nifty Index meaning these variables does not cause Nifty in the long run.

Using VAR a short run equation showing short run relation with Nifty was developed.

Also as U statistics of my model is less than 1, and no serial correlation is present, and residuals are homoscedastic so it can be said that model has good properties and is thus reliable.

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