



The Effect of Macroeconomic Variables on Stock Prices in Emerging Stock Market : Empirical Evidence From India

KEYWORDS

Stock Market Index, Macroeconomic Variables, Multiple Regression Analysis, Co-relation.

Dr.V.Ramanujam

Assistant Professor, Bharathiar School of Management and Entrepreneur Development, Bharathiar University, Coimbatore – 46, Tamil Nadu, India.

Mrs. L.Leela

Ph.D., Research Scholar, Bharathiar School of Management and Entrepreneur Development, Bharathiar University, Coimbatore – 46, Tamil Nadu, India.

ABSTRACT *This paper analyzes long term relationship between CNXNIFTY and macroeconomic variables, vis-s-vis, change in exchange rate, index of industrial production and gross domestic product. The multiple regression equation model (Galton, 1877) in order to investigate the relationship among these factors. The period of the study is January 2004 to June 2013. Results reveal that gross domestic product and exchange rate highly affect the stock prices.*

I. INTRODUCTION

Stock Market plays a vital role in economy. The movement of stock indices is highly sensitive to the changes of fundamentals of economy and to the changes in expectations about future prospects. An investment is a commitment of funds made in the expectation of some future returns. In investment in securities is a key factor in an economy. Investors prefer to invest their money in industrial securities rather than bank deposits because investment in equity shares gives higher rate of return than other investments. India is in the midst of an era of liberalization, deregulation and globalization of its economy and financial markets. It is attracting the investors to invest their surplus money in the securities market. As a result, the number of share holding households in the country is estimated to have increased to 15 millions in 1990 from just 2 millions in 1980. The growing number of investors both individuals and institutional has also led to stock return fluctuations. The volatility of stock market has increased due to economic indicators like Gross Domestic Product, Index of Industrial Production and Exchange rate. Burning example in India is the appreciation of currency due to higher inflow of foreign exchange.

The IIP and stock prices are positively related because increase in IPI results in increase in production of industrial sector that leads to increase in the profit of industries and corporations. As dividend increases, it results in increase of share prices, therefore, it is expected to have positive relationship between IPI and share price according to economic theory. Currency depreciation will have an adverse impact on a domestic stock market. As Indian currency depreciates against the U.S. dollar, products imported become more expensive. As a result, if the demand for these goods is elastic, the volume of imports would increase, which in turn causes lower cash flows, profits and the stock price of the domestic companies. Thus, a negative relationship is expected between foreign exchange rate and stock returns. Changes in information about the future course of real GDP may cause prices to change in the stock market. The rationalization for the linkage between the stock market and real GDP growth is that changes in stock prices will reduce firms' asset positions and affect the cost of their borrowing. When it costs more for firms to borrow money, they borrow and invest less, and when firms invest less, real GDP growth slows. According to this view—referred to by some as balance-sheet effects and others as the credit channel— stock prices will change because of changes in real economic conditions or some other factor, but the credit channel may impact the

severity and length of recessions.

Presently, the movement of stock market in India is viewed and analyzed carefully by large number of global players. Understanding macro dynamics of Indian stock market may be useful for policy makers, traders and investors. Results may reveal whether the movement of stock prices is the outcome of something else or it is one of the causes of movement in other macro dimension in the economy. We use the regression equation model in order to investigate the relationship among these factors. Gross Domestic Product and Exchange rate to affect the entire CNXNIFTY Stock prices. There is 75.8% correlation of Gross Domestic Product with stock price and exchange rate has 82.2% correlation with stock price. Independent variables except Index of Industrial Production have a significant relation with stock price. On the other hand negative correlation exists between Stock price and Index of Industrial Production.

II. REVIEW OF LITERATURE

Chen(1986) have argued that stock return should be affected by any factor that influences future cash flows or the discount rate of those cash flows by using discounted cash flow or present value model (PVM) the researcher tries to relate the stock price to future expected cash flows and the future discount rate of the cash flows. Again, all macroeconomic factors that influence future expected cash flows or the discounted rate by which the cash flows are discounted should have an influence on stock price. Darrat (1990) examines the effect of monetary and fiscal policy on share returns in Canada and concludes that budget deficit and long term bond rate and interest rate volatility and industrial production determine share returns. Ray (1993) attempt to unravel the relationship between the real economic variables and the capital market in Indian context by using modern non-linear technique like VAR and Artificial Neural Network researcher finds out that certain variables like the interest rate, output, money supply, inflation rate and the exchange rate has considerable influence in the stock market movement in the considered period, while the other variables have very negligible impact on the stock market.

By applying the techniques of unit-root tests, co integration and the long-run Granger non-causality test recently proposed by Toda (1995) finds out that there is no causal linkage between stock prices and the variables. Ajayi (1996) showed that an increase in stock price has a negative short term effect on domestic currency but in the long term this effect is positive,

while currency depreciation has short and long term effect on the stock market. Bhattacharya (2002) investigate the nature of the causal relationship between stock prices and macroeconomic aggregates in the foreign sector in India. Amber Ozair (2006) examined the direction of causality as well as short-run dynamics and long run equilibrium relationship between stock prices and exchange rate. The empirical result reveal that there is no causal linkage and no co integration between stock prices and Exchange Rates. Mohamed Abdelaziz (2008) examined stock price with Exchange rate and Oil Price in Middle East countries. They found that oil prices have a long run positive effect stock on stock market in each country. Noel Dilrukshan Richards (2009) examined the interaction between Exchange rate and stock prices and showed that stock price movements cause change in the exchange rate. Gagan Deep Sharma, (2010) also investigated impart of Macro Economic Variables on stock prices in India. The results of the empirical study reveals that exchanging rate and gold prices highly effect the stock prices on the other hand the influence of the Foreign exchange reserves and inflation on the stock prices is up to limited extend only. T.Sampath (2011) investigated the effect of macroeconomic variables such real effective exchange rate, Whole Sale Price and Industrial Production Index on stock price in the post liberalization period in India. The overall results of the study suggested that significant positive relationship between economic growth and stock prices in India. Samuel Antwi, (2012), applied VAR approach to model the relationship between the macroeconomic variables and Ghana stock returns. They found that in the short-run, effects of interest rate and exchange rate volatility on Ghana stock exchange are nearly imaginary. Keithwade (2013) analyze the relationship between GDP growth and equity market returns. The result showed that the correlation between GDP growth and equity market returns does appear to be unstable over long time horizons.

III. RESEARCH METHODOLOGY

Data required for the present study is secondary in nature. The quarterly data of Macroeconomic variables have been used. The data were collected from websites and related sources. The macroeconomic variables considered for the purpose of the study include Gross Domestic Product, Exchange Rate and Index of Industrial Production were taken quarterly for analysis, for the period from January 2004 to December 2013. For December took only first 2 quarter data because of availability. Regression analysis was used to study the impact of Macroeconomic variables on CNXNIFTY in India. Further correlation Analysis was used to study the relationship between Macroeconomic variables and CNXNIFTY by using SPSS 15 Version. With three independent variables the prediction of Y is expressed by the following equation:

$$Y'_i = b_0 + b_1 X_{1i} + b_2 X_{2i} + b_3 X_{3i}$$

The "b" values are called regression weights and are computed in a way that minimizes the sum of squared deviations

$$\sum_{i=1}^N (Y_i - Y'_i)^2$$

- Y_i' = is the return on stock portfolio i,
- X_{1i} = is the change in Gross Domestic Product
- X_{2i} = is the change Exchange Rate
- X_{3i} = is the change in Index of Industrial Production

**Table 3
REGRESSION MODEL FOR INDEX OF CNXNIFTY**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|-------|------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .871 | .758 | .751 | 14939.27992 | .758 | 112.857 | 1 | 36 | .000 |
| 2 | .906 | .822 | .811 | 13011.79890 | .063 | 12.456 | 1 | 35 | .001 |

IV) ANALYSIS AND INTERPRETATION

Table -1 DESCRIPTIVE STATISTICS

| | N | Minimum | Maximum | Mean | Std. Deviation |
|-------------|----|----------|-----------|------------|----------------|
| GDP | 38 | 6907.79 | 14707.82 | 10733.2487 | 2274.59457 |
| EX.RATE | 38 | 2446.89 | 3425.15 | 2810.5358 | 244.57439 |
| IIP | 38 | 171 | 999 | 646.96 | 169.073 |
| Stock Price | 38 | 34849.23 | 132940.30 | 86363.4784 | 29964.91692 |

Table 1 presents descriptive statistics for the variables used in our estimates. The depended variable which is CNXNIFTY shows the low of 34849.23 and high of 132940.30 during the last 10 years, mean value of depended variable is 86363.48 and standard deviation is 29964.92 which show the high fluctuation in this variable. The average of Index of Industrial production is 646.96 while the minimum is 171 and the maximum is 999 which were observed in 2010 and 2006 respectively. The standard deviation of the variable is 169.073 which is due to lower corporate sales and profits. Exchange rates touch the low of 244.89 and the peak of 3425.15 in the last 10 years. This increase is mainly due to increase in inflation and unemployment rate of the country. Mean value shows the value of 2810.5358 and the standard deviation of 244.57 which suggest that there is moderate variability in Exchange rate.GDP mean is 10733.25 and standard deviation is 2274.59. It shows that there is moderate variability in GDP.

Table – 2 CORRELATION FOR CNXNIFTY AND MACRO-ECONOMIC VARIABLES

| | | Stock Price | Gross Domestic Product | Exchange Rate | Index of Industrial Production |
|---------------------|--------------------------------|-------------|------------------------|---------------|--------------------------------|
| Pearson Correlation | Stock Price | 1.000 | .871 | .346 | -.116 |
| | Gross Domestic Product | .871 | 1.000 | .624 | -.181 |
| | Exchange Rate | .346 | .624 | 1.000 | -.335 |
| | Index of industrial Production | -.116 | -.181 | -.335 | 1.000 |
| Sig. (1-tailed) | Stock Price | . | .000 | .017 | .245 |
| | Gross Domestic Product | .000 | . | .000 | .138 |
| | Exchange Rate | .017 | .000 | . | .020 |
| | Index of industrial Production | .245 | .138 | .020 | . |

Table 2 shows correlation of stock price with the Gross Domestic Product, Exchange rate and Index of Industrial Production. Index of Industrial Production is -.116 showing that Index of Industrial Production has low negative correlation with stock price. This variable doesn't influence the stock price. Gross domestic product correlation of 0.871 has a positive correlation with stock price. Exchange rate correlation with stock price is 0.346 implying that the exchange rate has a moderate correlation with stock price. The relation between Gross domestic product and Index of Industrial Production is 0.138 which is shows that low positive relation between them. There is no relation between Gross Domestic Product and Exchange rate. There is 0.020 relations between Exchange rate and Index of Industrial Production which shows that there is very low positive relation between them.

R² is a statistic that will give some information about the goodness of fit of a model. In regression, the R² coefficient of determination is a statistical measure of how well the regression line approximates the real data points. An R² of 1.0 indicate that the regression line perfectly fits the data. The range of R² is from 0 to 1. In model 1 Gross Domestic Product coefficient of correlation is 0.871. It shows very high positive correlation between Stock Price and Gross Domestic product. R² indicates the 75.1% Gross Domestic Product has relation with stock price. The impact of exchange rate on stock price is Significant. In Model 2, coefficient of correlation (R) is 0.906 indicating that very high positive correlation between stock price and Exchange rate. R² is 82.2%. The result shows in model 2 Exchange rates has 82.2% impact on stock price. There is a significant relation between stock price and Gross Domestic Product and Exchange rate. Adjusted R² is a modification of R² that adjusts for the number of explanatory terms in a model. Unlike R², the adjusted R² increases only if the new term improves the model more than would be expected by chance. The adjusted R² can be negative and will always be less than or equal to R². Adjusted R Square in model first is 0.751 which is less than R Square. In model 2 Adjusted R Square is 0.811 which is less than R Square.

d) ANALYSIS OF VARIANCE: Table 4.1 and 4.2 examines the difference in the value of dependent variable i.e. stock price associated with the effect of controlled independent variables.

TABLE 4.1

ANALYSIS OF VARIANCE OF REGRESSION OF INDEX OF CNXNIFTY FROM JANUARY 2004 TO JUNE 2013

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|-----------------|----|-----------------|---------|------|
| 1 | Regression | 25187606058.454 | 1 | 25187606058.454 | 112.857 | .000 |
| | Residual | 8034555047.417 | 36 | 223182084.650 | | |
| | Total | 33222161105.871 | 37 | | | |
| 2 | Regression | 27296419236.038 | 2 | 13648209618.019 | 80.612 | .000 |
| | Residual | 5925741869.833 | 35 | 169306910.567 | | |
| | Total | 33222161105.871 | 37 | | | |

- a. Predictors: (Constant), Gross Domestic Product
- b. Predictors: (Constant), Gross Domestic Product, Exchange rate
- c. Dependent Variable: Stock Price

Table 4.2

| Model | | Coefficients | | | | Sig. |
|-------|------------------------|-----------------------------|------------|---------------------------|--------|------|
| | | Unstandardized Coefficients | | Standardized Coefficients | t | |
| | | B | Std. Error | | | |
| 1 | (Constant) | -36754.019 | 11839.947 | | -3.104 | .004 |
| | Gross Domestic Product | 11.471 | 1.080 | .871 | 10.623 | .000 |
| 2 | (Constant) | 45810.857 | 25566.516 | | 1.792 | .082 |
| | Gross Domestic Product | 14.119 | 1.203 | 1.072 | 11.735 | .000 |
| | Exchange Rate | -39.492 | 11.190 | -.322 | -3.529 | .001 |

Table 4.2 examines the difference in the value of dependent variable i.e. stock price associated with the effect of

controlled independent variables. Results show that there is a significant relation between Gross Domestic Product and Stock price. Because f calculated value is greater than the table value. The corresponding 'F' statistics is 112.857 and the corresponding P value is 0.000. Further the study indicates that in model 2 there is a significant relation between dependent variable and independent variable.

V. SUGGESTIONS

The study suggests that Indian Stock Market is influenced by Gross Domestic Product and Exchange rate. It can be used to predict the stock market price fluctuations. So investors in India obtain abnormal returns using historical data of stock prices, and macroeconomic indicators. This may enable the traders and investors to work out profitable strategy for trading or to take investment decision.

VI. CONCLUSION

The main objective of the study is to determine the lead and lag interrelationships between the stock price and macroeconomic variables. A number of studies have found that a relationship exists between macroeconomic variables and equity market returns. The relationship between stock returns and macroeconomic factors is well documented for developed countries [Chen, Roll and Ross (1986), Chen (1991), Clare and Thomas (1994), Mukherjee and Naka (1995), Gjerde and Saettem (1999), Flannery and Protopapadakis (2002) and East-Asian (Bailey and Chung (1996), Mookerjee and Yu (1997), Kqon and Shin (1999), Ibrahim and Aziz (2003). These studies have provided different results. The results of the previous studies have changed according to the macroeconomic factors used. This study extends the literature by considering the effects of macroeconomic variables on stock price. In this study, a multiple regression model is employed to test for the effects of 2004 to June 2013. Macroeconomic variables used in this study are, change in exchange rate, Index of Industrial Production and Gross Domestic Product. In the regression models, stock prices are used as dependent variables, while the macroeconomic variables are used as independent variables. Empirical result reveals that Gross Domestic Product and Exchange rate to affect the entire CNXNIFTY Stock prices. There is 75.8% correlation of Gross Domestic Product with stock price and exchange rate has 82.2% correlation with stock price. Independent variables except Index of Industrial Production have a significant relation with stock price. On the other hand negative correlation exists between Stock price and Index of Industrial Production.

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