MACRO ECONOMIC VARIABLES AND STOCK PRICES – EVIDENCE FROM INDIA

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ABSTRACT
This paper empirically examines the relationship between macroeconomic variables and stock prices. Inflation rate, unemployment rate, GDP rate and interest rate have been taken as independent variables. The CNX Nifty is taken as a proxy stock prices. For a 10 year period from 2005 to 2014 the relationship between the identified macro-economic variables and the Nifty has been analysed using Karl-Pearson's correlation co-efficient. It is found that inflation rate and unemployment rate are positively correlated with Nifty while GDP and interest rate are negatively correlated with Nifty. A model for prediction of stock index is also developed using multiple regression. This study emphasizes the need for doing a fundamental analysis of economy for taking correct investment decisions.
Key words: macroeconomic variables, Stock Prices, correlation

I. INTRODUCTION

The stock market index is an important indicator movement of stock prices for investors. Though in a short term the stock market is said to behave 90% psychologically and only a 10% logically, but it is also time tested that in the long run the stock market behaves 90% logically. Hence a though understanding of the relationship between various fundamental factors and the stock market movement is necessary for investors. The fundamental analysis involves economy, industry and the company analysis. In this paper attempt is made to empirically test the relationship between four important economic indicators – inflation rate, unemployment rate, GDP rate and interest rate and the stock market index.

II. LITERATURE REVIEW

Researchers have attempted to study the relationship between various macro economic variables and the stock market across various countries like the UK, The USA, China, Japan, Spain, Australia, India, France, Romania, Sweden, Germany, Turkey, Ghana, Thailand, Austria and Switzerland.

Francisco (2006) has made an attempt to study the real interest rate and inflation rate sensitivity of Spanish companies. He proposed an extension to the Stone's two factor and Fama and French's Three factor model by adding variations in real interest rate and expected interest rate in the model along with leverage and liquidity in to the regression analysis. He found that the sensitivity of Spanish firms to real interest and inflation rate is similar to response in other markets.

Chen , Tzang, (1988) in their study using regression analysis found that real estate investment trusts were sensitive to short and long term interest rates during different periods of time. They also found that the sensitivities of equity and mortgage real estate investment trusts were different.

Laura Ballester, Roman Ferrer, Cristobal Gonzalez (2011) made a study of interest rate sensitivity of Spanish banks using non linear (non parametric) regression technique in contrast to the traditional linear (parametric) regression technique used by the earlier researchers. They

found that the Spanish banking sector exhibits remarkable exposure to interest rate risk.

Lajeri and Dermine (1996) have studied the impact of unexpected inflation on stock returns of sample baking firms of France. Their analysis provides empirical support to the hypothesis that, in periods of volatile inflation, there exists an inflation risk factor which is independent of the well documented interest risk factor.

Geetha, Mohidin, Chandran and Chang (2011) have attempted to study the relationship between inflation and stock returns. Using cointegration test they have found that there is long run relationship between expected and unexpected inflation with stock returns but there is no short run relationship between these variables for Malaysia and the US but it exists for China.

Jareno and Talentino (2012) have studied the relationship between duration (sensitivity of stocks to interest rate changes) and the flow-through capability (ability of companies to pass inflationist shocks on to prices) of Spanish companies. They found a negative relationship between the two.

III. OBJECTIVES OF THE STUDY

The objectives of this study are

- To investigate the relationship between interest rate and stock index.
- To investigate the relationship between unemployment rate and stock index.
- To investigate the relationship between inflation rate and stock index.
- To investigate the relationship between GDP rate and stock index.

SCOPE OF THE STUDY

The study focuses on the relationship between economic variables such as inflation rate, interest rate, GDP rate and unemployment rate and share index. If the variables that affect the share index are known, it is easier for investors to forecast the changes that may occur in share index. Thereby help in increase profit for the investors. From this study, it may also enable the researcher to understand to what extent each variable affect may affect the share index.

HYPOTHESIS

The following hypothesis have been made.

1. H_0: Interest rate and stock index are not related.
   H_1: Interest rate and stock index are related.
2. H_0: Unemployment rate and stock index are not related.

H_1: Unemployment rate and stock index are related.

3. H_0: Inflation rate and stock index are not related.
   H_1: Inflation rate and stock index are related.
4. H_0: GDP rate and stock index are not related.
   H_1: GDP rate and stock index are related.

Hypothesis testing is carried out with a significance level of 0.05

IV. DATA AND METHODOLOGY

Although stock prices are impacted by many factors, the research incorporates four very basic economic indicators that affect stock prices into the multivariate model. They are Inflation rate, Interest rate, Unemployment rate and GDP.

Secondary Data is used. Economic data such as unemployment rate, inflation rate and GDP rate was taken from the official site of RBI's Data Base on Indian Economy (DBIE). The closing prices of CNX Nifty was obtained from the data base of National Stock Exchange.

Karl Pearson's correlation coefficient between each independent variable and the Stock index is computed.

The multiple linear regression model is used to control for other important variables and develop a model for prediction of stock index.

Proposed model:

SI = a+ b1 Interest Rate + b2 Inflation Rate + b3 Unemployment Rate + b4 GDP + e

SI=Stock index

a = constant of the model

b1, b2, b3, b4 = coefficients of the model

e = error term

The matrix correlation between the SI percent changes and the four predictor variables is calculated to determine the degree of relationship between the variables

V. ANALYSIS, RESULTS AND DISCUSSIONS

Table No.1

Bivariate Analysis- Correlation

	Inflation Rate (%)	Unemployment Rates (%)	GDP Rate (%)	Call Rate of 91 days T-Bill	Index
Inflation Rate (%)	1				
Unemployment Rate (%)	-0.022189076	1			
GDP Rate (%)	-0.287624468	-0.158018226	1		
Call Rate of 91 days T-Bill	-0.086239783	-0.743494984	0.148622964	1	
Index	0.585854448	0.554994268	-0.78557419	-0.440475766	1

The above table depicts the relationship between each independent variable (inflation rate, unemployment rate, GDP rate and interest rate) with the dependent variable (Stock Index). GDP rate is negatively strongly correlated with share index and Interest rate is negatively moderately correlated to share index. Inflation rate and Unemployment rate are moderately positively correlated.

Table No: 02

Multiple Regression Analysis

Regression Statistics

Multiple R	0.988290256
R Square	0.976717631
Adjusted R Square	0.958091735
Standard Error	371.2110161
Observations	10

The table shows the percentage of variability in the stock index accounted for by the identified macro economic variables. The R square value shows that there is a relationship between the macro economic variables and stock index . Summary output of the regression model shows that the R square is 97.6% which means that regression model approximated 97.6% variation in macro economic variables with standard error of 371.

Table No: 03
ANOVA

	df	SS	MS	F	Significance F
Regression	4	2890370 8.64	7225927 .16	52.4386 9408	0.00028 4677
Residual	5	688988 0924	137797. 6185		
Total	9	2959269 6.73			

Table No: 04

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1590.13 9286	1516.325 728	1.048679 223	0.342347 358	-2307.70	54879 79	- 2307.7	5487.978 658
Inflation Rate (%)	292.994 5784	48.61614 253	6.026693 257	0.001809 81	168.0228 055	417.96 64	168.02 28	417.9663 513
Unemploym ent Rates (%)	469.234 5878	91.6679 1799	5.11885 2899	0.00371 0714	233.5947 029	704.87 45	233.59 47	704.8744 727
GDP Rate (%)	- 538.817 9099	66.2380 9721	-8.13456 2022	0.00045 5789	- 709.0883 594	- 368.54 7	- 709.08 8	- 368.5474 604
Call Rate of 91 days T-Bill	35.2636 24	46.28105 798	0.76194 5071	0.48046 9636	-83.7056 2299	154.23 29	-83.70 56	154.2328 71

Interpretation and hypothesis testing.
Hypothesis 1:
The p value of the t-test (p = 0.4) for Interest rate is more than the alpha value of 0.05. Therefore, interest rate is negatively correlated to stock index.
Hypothesis 2:
The p value of the t-test (p = 0.003) for unemployment rate is less than the alpha value of 0.05. Therefore, unemployment rate is positively related to stock index.
Hypothesis 3
The p value of the t-test (p = 0.001) for Inflation rate is less than the alpha value of 0.05. Therefore, Inflation rate is positively related to stock index.
Hypothesis 4:

The p value of the t-test (p = 0.004) for GDP rate is less than the alpha value of 0.05. But the intercept is negative. Therefore GDP is negatively related to stock index.
Multiple regression equation
Stock Index = 1590.13+ (292.9*Inflation rate) + (469.24Unemployment rate)-(538.82*GDP Rate) + (35.26*Call rate of 91 days T-Bill)

VI. CONCLUSION
This study reveals that interest rate, unemployment rate, inflation rate and GDP have a relationship with the stock index. The Karl-Pearson's Correlation and Multiple Regression Analysis used on the sample data show that the stock prices are related to fundamental economic factors. This gives an indication to the investors that they need to consider the fundamental

economic factors especially while investing for long term.

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