FACTORS AFFECTING MOVEMENT OF INDIAN STOCK MARKET: A STUDY WITH SPECIAL REFERENCE TO CNX NIFTY

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ABSTRACT

Stock markets are often referred to as barometer of an economy. Stock market indices not only tell us about the condition of stock markets but in a way they also reflect the health of an economy. Stock prices do not move in vacuum rather they are affected by a large number of factors. The objective of the study is to identify the factors affecting the movement of Indian stock market and the impact of these factors on the same. For the purpose of this study, CNX Nifty has been used to represent the movement of Indian stock markets. CNX Nifty is a well-diversified index consisting of 50 large cap companies representing most of the important sectors of Indian economy. The study deals with the time series data and consists of eleven variables i.e. Oil Prices, S&P 500, Nikkei, FTSE, NASDAQ, Wholesale Price Index as a proxy for inflation, Index of Industrial Production, Foreign Exchange Rate, Current Account Deficit, FII Investment and CNX Nifty. The study has been conducted over a period of 32 quarters from financial year 2005-06 to 2012-13. Researchers have used Principal Component Analysis and Regression Analysis for conducting the study and drawing the conclusions. All these variables have been clubbed into two factors namely Macroeconomic Factors and International Factors. The study revealed that both these factors i.e. macroeconomic factors as well as international factors have significant impact on movement of CNX Nifty.

Keywords: Indian Stock Market, CNX Nifty, Macro Economic Factors, International Factors, Principal Component Analysis, Regression Analysis, Arbitrage Pricing Theory.

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INTRODUCTION

Stock market has a strong relationship with real and financial sectors of economy (Hossain, Hossain, & Sadi, 2013). In financial economics a set of macroeconomic variables can predict the stock market returns (Mukhopadhyay & Sarkar, 2003). The Arbitrage Pricing Theory (APT) developed by Ross (1976) and Chen (1986) showed that stock market returns are affected by changes in large number of economic variables. It is a common wisdom that inflation affects the performance of stock market. As the prices of commodities increase, investors will leave with little disposable income in their hand to invest. Thus, the inflation affects the stock market also through the output link (Fama, 1981).

It has been studied that a strong cause and effect relation exists between stock market and exchange rate (Granger, Huang, & Yang, 2000). The fluctuations in exchange rate affect firm's exports, the cost of raw material imported and other production inputs which will ultimately affect the stock prices.

According to the study by Hondroyiannis & Papapetrou (2001) and Joshi (2012), there exist a strong relation between crude oil prices and stock returns. The volatility in crude oil prices affect both, the cost of production as well as the transportation cost which has a negative effect on profitability of firm and in turn affect the stock returns. The rise in petroleum prices lead to increase in production cost for non-oil producing companies. And the production cost has a negative relationship with the major determinants of stock prices including corporate profits and dividends. Furthermore, the rising oil prices will leave investors with low amount of disposable income to spend on other goods and services as a consequent the profitability of non-oil producing companies will go down so does the stock prices of the same. The study suggests that crude oil and stock markets are integrated rather than segmented and there exist a feedback relationship between crude oil prices and stock market (Anoruo, 2011).

The world markets are interrelated with the development of communication technology. The globalization and liberalization policy has increased the activities of multinational corporations in India. The international integration with other countries linked the domestic stock market with world's economic and financial conditions. Foreign investment in the developing countries is also playing a crucial role in restructuring these economies (Froot, O'Connel, & Seasholes, 2001).

With the deregulations and liberalization of Indian economy, international investors can be benefitted by diversification of their portfolio. International investors can diversify their portfolio not only in stocks but also by allocating their funds across the geographical regions (Bilson, Brailsford, & Hooper, 2001).

Current Account Balance has a bearing on determination of exchange rate, which influences the foreign investment and lead to stock market (Singh, 1995). Industry outputs also affect the stock returns as the study done by Abugri, (2008). The industry performance is measure by IIP. It shows the healthy position of industries which attract more investment to stock market. For few countries IIP has positive and significant effect on stock prices while for some it does not have any significant effect on stock prices.

This study is an attempt to identify the important factors affecting the movement of Indian stock market. The researchers also tried to measure the impact of these factors on the same.

The further section of the paper progresses as follow: Section 2 reviews the past literature and describes the research issues. Section 3 deals with the Research Methodology including tools and techniques followed by data analysis and interpretation in Section 4. Lastly, section 5 deals with the findings and conclusions of the study.

LITERATURE REVIEW

Various studies have been conducted by researchers from time to time to examine the relationship between Indian stock market and various factors affecting the movement of stock market. Some of the important studies are as follows:

Naik (2013) investigated the impact of macroeconomic factors on Indian stock market. Result showed that macroeconomic variables and the stock market index are co-integrated and there exist a long run relationship between them. The Indian stock market is positively related to the money supply and index of industrial production but that is negatively related to inflation. While it was found that the exchange rate and short term interest rate had an insignificant relationship with stock prices.

Hossain et al. (2013) explored the long and short-run relationship between economic growth of Malaysia and stock market of the same. Result showed that the long and short-run relationship exist between stock market index and economic growth. It was found that Stock market index can be a predictor to future economic growth of Malaysia but economic growth cannot predict the movement of stock market index.

Sangmi and Hassan (2013) analyzed the effect of macroeconomic variables on the Indian Stock Market in the APT framework. Result showed that macroeconomic factors have significant impact on stock price.

Singh (2012) studied the nature of relationship between nifty index and key macroeconomic variable. A comprehensive analysis was done to qualitatively compare the S&P CNX Nifty with macroeconomic variables. The analysis was done to find the correlation between economic variable and market performance, and to identify and classify the indicators into leading, lagging and co-incident categories. The study suggests the volatility of stock index is due to the behaviour of key macroeconomic variable along with the movement in other macro factors in the economy.

Kumar (2011) explored the relationship between key macroeconomic variables representing real and financial sector of the Indian economy and stock prices. Results showed that boom period of stock market were not supported by the real economic fundamentals. It implies that stock market return does not depend on real economic activity rather it depends on some other external factors.

Sahu and Dhiman (2011) explored the causal relationship between macroeconomic variables and stock market indicator of India. Result showed that no causal relationship exists among stock market indicator, Sensex and real gross domestic product of India. So, we can infer from study that India's growth and development cannot be indicated by Sensex.

Tripathy (2011) studied the relationship between stock market and the selected macroeconomic variables. Result showed that Indian stock market is influenced by exchange rate, inflation rate and the prevailing interest rate in the economy. So, it can be inferred that macroeconomic variables can be used as predictor to variations in Indian stock market.

Anoruo (2011) studied the relationship between crude oil price changes and stock market returns with reference to United States. He found that crude oil prices and stock markets are integrated and there exist a feedback relationship between oil price changes and stock markets returns.

Singh (2010) studied the causal relation among Sensex and the three macro-economic variables i.e. index of industrial production (IIP), wholesale price index (WPI) and exchange rates. Result showed that the stock market index has a strong correlation with IIP and WPI but not with Exchange rate. Sensex and IIP showed a bilateral causal relationship which means that movements of Sensex can be predicted by IIP results.

Mukhopadhyay and Sarkar (2003) examined the influence of macroeconomic variables in explaining variation in Indian stock market. It was found that variables like real economic activity, inflation, growth in money supply, foreign direct investment and foreign capital market activity have significant effect on stock market in post liberalization period while in pre-liberalization period only exchange rate had significant effect on Indian stock market.

RESEARCH METHODOLOGY

The study deals with the time series data and consists of eleven variables namely Crude Oil Prices, S&P 500, Nikkei, FTSE, NASDAQ, Wholesale Price Index, Index of Industrial Production, Foreign Exchange Rate, Current Account Deficit, FII Investment and CNX Nifty. CNX Nifty has been used as a representative of Indian stock market. The data related to all the variables have been collected from various sources like websites of NSE, SEBI, RBI, CMIE etc. Natural Logarithms of all the variables have been taken to bring all the variables at same level. The data for the study have been collected on quarterly basis from the financial year 2005-06 to 2012-13.

Statistical Tools and Techniques

The variables selected in the study contribute to the growth and development of Indian stock market. There could be an inter linkage between these variables which may create a problem of multi co linearity. To deal with this we have used Principal Component Analysis to categorize many variables into few factors. Further, the correlation and regression analysis have been applied to examine the impact of these factors on CNX Nifty. Correlation coefficient measures the positive and negative association between two variables. Its value lies between -1 to +1. Regression analysis is a technique applied to examine the dependence of one variable on two or more independent variables. SPSS 16.0 version has been used to analyze the data and finding out the results.

DATA ANALYSIS

Data analysis has been divided into two parts: first part emphasizes upon the results of principal component analysis whereas second part involves the results of the Regression Analysis.

Principal Component Analysis and Interpretation

The principal component analysis with Varimax rotation has been performed on ten variables. The criteria used for factor extraction is the variables with factor loadings of 0.50 and above (Hair et al., 1998). According to Kaiser-Meyer-Olkin (KMO) measure of adequacy and Bartlett's test of Sphericity, the result revealed a high KMO of 0.710 (Table 1) which is more than 0.50 indicating that the sample used is appropriate for this study. On the other hand, Bartlett's measure of sphericity test reveals the relationship among the variables. In the study the value as per Bartlett's sphericity test is found to be significance at 5% level of significance indicates that there is an existence of relationship among the variables and the data are not identical. The Cronbach's Alpha evaluates the internal reliability of a given scale, i.e. the extent to which the variables included in the study are correlated. High values of Cronbach's Alpha indicate that there are very strong correlations among all the items included in the scale. Further, it indicates that the items are measuring the same thing and the latent variable measure though the items are very strong (DeVellis, 2003) shown in Table 2. Hence, with the increase in the average inter-item correlation, Cronbach's Alpha will also increase. In this study, a cut-off value of 0.5 has been used to indicate an acceptable level of internal consistency (Hair et al., 1998). Factor loadings of 10 variables (Table 2) of the study produced two factors initially, that explained 86.33% of the total variance. These two factors were further subjected to reliability analysis to check internal consistency between items.

Table 1: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.710
Bartlett's Test of	Approx. Chi-Square	546.611
Sphericity	df	45
	Sig.	.000

Table 2 represents the loading of variables. In table 2, the variables Wholesale Price Index, Index of Industrial Production, Current Account Deficit, Foreign Exchange Rate and Foreign Institutional Investment are loaded on Factor 1 and have been named as Macro Economic Factors. The Cronbach's alpha score for Factor 1 is 0.841. The variables loaded on Factor 2 are Crude Oil Prices, S&P 500, FTSE and NASDAQ which has been named as International Factors. The Cronbach's alpha score for Factor 2 is 0.848. Nikkei has been dropped because of negative factor loading of -0.820.

Table 2: Factor Loadings and Reliability Analysis				
S.No.	Factors	Variables	Factor Loadings	Cronbach's Alpha
1	Macro-Economic Factor (MEF)	Wholesale Price Index	0.979	0.841
		Index of Industrial Production	0.904	
		Current Account Deficit	0.932	
		Foreign Exchange Rate	0.736	
		Foreign Institutional Investment	0.941	
2	International Factor (INF)	Crude Oil Prices	0.599	0.848
		S&P 500	0.971	
		FTSE	0.956	
		NASDAQ	0.885	
	Nikkei (dropped)		-0.820	

Regression Analysis and Interpretation

Hypothesis and Model Building

In the study a model is framed, considering CNX Nifty as dependent and Macro-Economic and International factor as independent variables to find out the impact of Macro-Economic (MEF) and International factor (INF) on CNX Nifty.

The following equation is drawn from the suggested model:

$$logNifty = C + alogMEF + blogINF + e$$

Table 3: Description of Hypotheses	
Null Hypothesis	**Alternate Hypotheses**
H_{01} : There is no significant impact of Macro Economic Factor on CNX Nifty	H_1 : There is significant impact of Macro Economic Factor on CNX Nifty
H_{02} : There is no significant impact of International Factor on CNX Nifty	H_2 : There is significant impact of International Factor on CNX Nifty

The correlation coefficients in Table 4 offer bivariate relationship among the variables. As per the result, the predictor variables (MEF & INF) are positively correlated with criterion (CNX Nifty) variable. There is high degree of positively relationship between MEF and CNX Nifty (.713). Whereas, moderate degree of positive relationship between INF and CNX Nifty (.586). The variables are found to be stationary either at 5% level of significance.

Table 4 : Correlation Matrix			
	CNX Nifty	**MEF**	**INF**
CNX Nifty	1.000		
MEF	.713*	1.000	
INF	.586*	.333*	1.000
Note: *p<.05			

Before applying regression analysis, it is important to diagnose the co-linearity problem among the variables. There are two statistics, Tolerance and VIF to examine the co linearity. A value of VIF should be less than 10, and tolerance should be more than 0.2 (Sultana & Pardhasaradhi, 2012). In our study both the values are satisfying the underlying condition. It means that there is no co linearity problem among the variables and data is appropriate for regression analysis.

The F-value in table 5 indicates that the combination of independent variable significantly predict the dependent variable or not. The value of F=26.409 at P<0.001 indicates about the acceptability of model at the higher significance level of 0.1%.

Table 5: Results of Regression Analysis						
					(Dependent Variable: CNX Nifty)	
Independent Variables	**Std. Error**	**Beta**	**t**	**Sig.**	**Co linearity Statistics**	
					Tolerance	**VIF**
MEF	293.029	0.583*	4.972	0.000	0.889	1.125
INF	635.040	0.392*	3.343	0.002	0.889	1.125
F-Value = 26.409, p<0.001 R-Value = 0.830 R^2 = 0.646 Adjusted R-Square = 0.621						
Note: *p<0.05						

Beta coefficient reflects the impact on the dependent variable for change in the each unit of independent variables (Hair et al., 2013). It predicts the relative strength of independent variables within the model. In the table 5, MEF (Beta=0.583, p<0.05) and INF (Beta= 0.392, p<0.05) have largest beta coefficient which is found to be significant at 5% significance level. Table 5 has given the value R2 which indicates the correlation coefficient and degree of association between dependent (CNX Nifty) and independent variables (MEF & INF). The explanatory power of the model can be explained though the R2 and adjusted R2 values. It will increase with the higher R2 value (Hair, 2013; Ghosh et. al, 2012). In this study, the value of R2 is 0.646, indicates that 64.6% of the variance in CNX Nifty can be predicted through MEF and INF. The value of adjusted R2 is 0.621 and it indicates the fitness of the model. Finally, the final regression model has been drawn on the basis of data analysis to test the hypotheses and reach the conclusion (Figure 1).
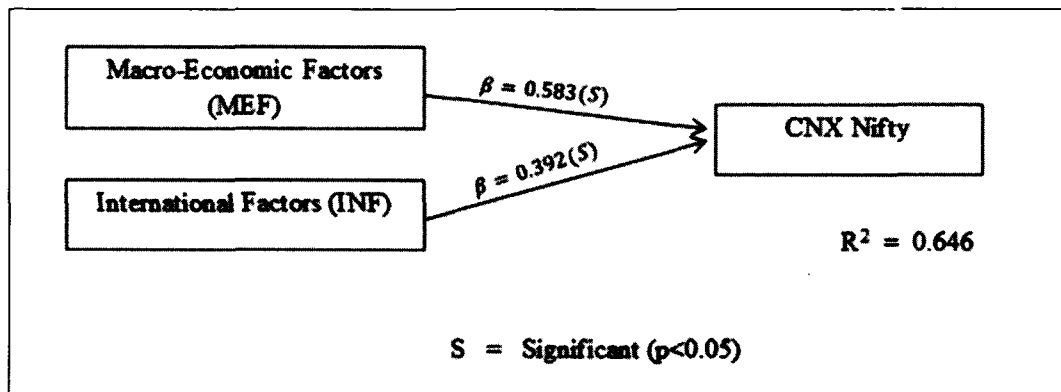

Figure 1: Regression Model

On the basis of Table 5 and Figure 1, it is concluded that our both null hypotheses H01 and H02 have been rejected whereas alternate hypotheses H1 and H2 have been accepted in the study. The p-value should be less than its acceptable significance level; in this study the beta values of both the independent variables are found to be significant at 5% level of significance. Thus it is concluded that Macroeconomic and International Factors are significant predictors of CNX Nifty.

FINDINGS AND CONCLUSION

CNX Nifty consists of stocks of 50 top companies in terms of free float market capitalization from almost all the important sectors of Indian economy. CNX Nifty is a true indicator of movement of Indian stock markets. There are many variables that affect the movement of CNX Nifty. This study deals in ten such important variables. Entire analysis in this study can be divided into two parts. First part deals with the principal component analysis to identify the factors while the second part deals with finding the impact of these factors on CNX Nifty. Here are the important findings of this analysis:

i. Principal Component Analysis:

The principal component analysis has reduced these ten variables i.e. Oil Prices, S&P 500, Nikkei, FTSE, NASDAQ, Wholesale Price Index, Index of Industrial Production, Foreign Exchange Rate, Current Account Deficit and FII Investment into two broad factors namely Macro-Economic Factors and International Factors.

Macroeconomic Factors contain five variables i.e. Wholesale Price Index, Index of Industrial Production, Current Account Deficit, Foreign Exchange Rate and Foreign Institutional Investment whereas International Factors include four variables and they are Crude Oil prices, S&P 500, NASDAQ and FTSE.

Nikkei has been excluded from factors due to negative factor loading.

ii. Impact of Macro-Economic Factors and International factors on CNX Nifty:

Regression analysis used to examine this impact reveals that both these factors i.e. macro-economic factors and international factors have a significant influence on CNX Nifty. The beta factor for macro-economic variables comes out to be 0.583 while for international factors it is 0.392. The value of R2 is 0.646 which indicates that 64.6% of the variance in CNX Nifty can be explained through variance in macro-economic factors and international factors.

In other words we can say that, the movement of Indian stock market depends upon the behavior of these factors. Thus the null hypotheses H01 and H02 have been rejected whereas alternate hypotheses H1 and H2 have been accepted in the study.

Finally, it can be concluded that there is significant impact of macro-economic and international factors on CNX Nifty.

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