CHAPTER I

INTRODUCTION

1.1: INTRODUCTION
1.2: REVIEW OF RELATED LITERATURE
1.3: STATEMENT OF THE PROBLEM
1.4: NEED FOR THE STUDY
1.5: SIGNIFICANCE OF THE STUDY
1.6: SCOPE OF THE STUDY
1.7: OBJECTIVES OF THE STUDY
1.8: HYPOTHESES OF THE STUDY
1.9: RESEARCH METHODOLOGY
1.10: TOOL FOR ANALYSES
1.11: CHAPTER SCHEME
CHAPTER I
INTRODUCTION

1.1: INTRODUCTION

The movement of stock indices is highly sensitive to the changes in fundamentals of the economy and to the changes in expectations about future prospects. Expectations are influenced by the micro and macro fundamentals which may be formed either rationally or adaptively on economic fundamentals, as well as by many subjective factors which are unpredictable and also non-quantifiable. It is assumed that domestic economic fundamentals play determining role in the performance of stock market. However, in the globally integrated economy, domestic economic variables are also subject to change due to the policies adopted and expected to be adopted by other countries or some global events. The common external factors influencing the stock return would be stock prices in global economy, the interest rate and the exchange rate. For instance, capital inflows and outflows are not determined by domestic interest rate only but also by changes in the interest rate by major economies in the world. Recently, it is observed that the effect of the US subprime crisis has played significant movement in the capital markets across the world as foreign hedge funds unwind their positions in various markets. Other burning example in India is the appreciation of currency due to higher inflow of foreign exchange. Rupee appreciation has declined stock prices of major export oriented companies. Information technology and textile sector are the example of falling stock prices due to rupee appreciation.

The modern financial theory focuses up on systematic factors as sources of risk and contemplates that the long run return on an individual asset must reflect the changes in such systematic factors. This implies that securities market must have a significant relationship with real and financial sectors of the economy. This relationship generally viewed in two ways. The first relationship views the stock market as the leading indicator of the economic activity in the country, whereas the second focuses on the possible impact the stock market may have on aggregate demand, particularly through aggregate consumption and investment. The former case implies that stock market leads economic activity, whereas the latter suggests that it lags economic activity. Knowledge of the sensitivity of stock market to
macroeconomic behaviour of key variables and vice-versa is important in many areas of investments and finance. This research may be useful to understand this relationship.

From the beginning of the 1990s in India, a number of measures have been taken for economic liberalization. At the same time, large number of steps has been taken to strengthen the stock market such as opening of the stock markets to international investors, regulatory power of SEBI, trading in derivatives, etc. These measures have resulted in significant improvements in the size and depth of stock markets in India and they are beginning to play their due role. Presently, the movement in stock market in India is viewed and analysed 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. The study also expects to explore whether the movement of stock market are associated with real sector of the economy or financial sector or both.

1.2: REVIEW OF RELATED LITERATURE

Varying evidences of causal links of stock returns and macro variables have been found in the literature using various asset pricing specifications. In the literature, widely popular Capital Asset Pricing Model (CAPM) has been severely challenged since returns can be predicted from other financial factors. This has led to the development and testing of various alternative asset pricing specifications, such as the Arbitrage Pricing Theory (APT) and Present Value Model (PVM). In the context of macro dynamics of stock returns, APT assumes that returns are generated by a number of macroeconomic factors. It allows multiple risk factors to explain asset returns.

Chen et al. (1986) have argued that stock returns should be affected by any factor that influences future cash flows or the discount rate of those cash flows. In an empirical investigation they found that the yield spread between long and short term government bonds, expected inflation, unexpected inflation, nominal industrial production growth and the yield spread between corporate high and low grade bonds significantly explain stock market returns. An alternative way of linking
macroeconomic variables and stock prices is the discounted cash flow or present value model (PVM). This model relates 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 discount rate by which the cash flows are discounted should have an influence on the stock price. The advantage of the PVM model is that it can be used to focus on the long run relationship between the stock market and macroeconomic variables.

In the literature, various theoretical reasons have been explained linking behaviour of stock prices and key macro economic variables. For instance, Friedman (1988) suggests ‘wealth effect and substitution effect’ as the possible channels through which stock prices might directly affect money demands in the economy. Friedman expected that the wealth effect will dominate and thus the demand for money and stock prices to be positively related. The theoretical basis to examine the link between stock prices and the real variables are well established in economic literature, e.g., in Baumol (1965) and Bosworth (1975). The relationship between stock prices and real consumption expenditures, for instance, is based on the life cycle theory, developed by Ando and Modigliani (1963), which states that individuals base their consumption decision on their expected life time wealth. Part of their wealth may be held in the form of stocks linking stock price changes to changes in consumption expenditure. Similarly, the relationship between stock prices and investment spending is based on the q’ theory of James Tobin (1969), where q is the ratio of total market value of firms to the replacement cost of their existing capital stock at current prices.

In retrospect of the literature, a number of hypotheses also support the existence of a causal relation between stock prices and exchange rates. For instance, ‘goods market approaches’ (Dornbusch and Fischer, 1980) suggest that changes in exchange rates affect the competitiveness of a firm as fluctuations in exchange rate affects the value of the earnings and cost of its funds as many companies borrow in foreign currencies to fund their operations and hence its stock price. An alternative explanation for the relation between exchange rates and stock prices can be provided through ‘portfolio balance approaches’ that stress the role of capital account transaction. Like all commodities, exchange rates are determined by market mechanism, i.e., the demand and supply condition. A booming stock market would
attract capital flows from foreign investors, which may cause an increase in the demand for a country’s currency. The reverse would happen in case of falling stock prices where the investors would try to sell their stocks to avoid further losses and would convert their money into foreign currency to move out of the country. There would be demand for foreign currency in exchange of local currency and it would lead depreciation of local currency. As a result, rising /declining stock prices would lead to an appreciation/depreciation in exchange rates. Moreover, foreign investment in domestic equities could increase over time due to benefits of international diversification that foreign investors would gain. Furthermore, movements in stock prices may influence exchange rates and money demand because investors’ wealth and liquidity demand could depend on the performance of the stock market.

Economic theories suggest causal relations between stock prices and exchange rates; existing evidence also provides relatively stronger relationship between stock price and exchange rate. Ma and Kao (1990) find that a currency appreciation negatively affects the domestic stock market for an export-dominant country and positively affects the domestic stock market for an import-dominant country, which seems to be consistent with the goods market theory.

Bahmani and Sohrabian (1992) found a bi-directional causality between stock prices measured by the Standard & Poor's 500 index and the effective exchange rate of the dollar, at least in the short run. The co-integration analysis revealed no long run relationship between the two variables. Similarly, Abdalla and Murinde (1996) investigate interactions between exchange rates and stock prices in the emerging financial markets of India, Korea, Pakistan and the Philippines. The results of the granger causality tests results show uni-directional causality from exchange rates to stock prices in all the sample countries, except the Philippines.

Ajayi and Mougoue (1996) using daily data for eight countries, show significant interactions between foreign exchange and stock markets, while Abdalla and Murinde (1997) document that a country’s monthly exchange rates tends to lead its stock prices but not the other way around. Pan, Fok and Lui (1999) used daily market data to study the causal relationship between stock prices and exchange rates and found that the exchange rates Granger-cause stock prices with less significant causal relations from stock prices to exchange rate. They also find that the causal relationship have been stronger after the Asian crisis.
Chen et al. [1986], Bodie [1976], Fama [1981], Geske and Roll [1983], Pearce and Roley [1983], Pearce [1985] and many papers have tried to show empirical associations between macroeconomic variables and security returns. Bodie [1976], Fama [1981], Geske and Roll [1983], and Pearce and Roley [1983], Pearce [1985] document a negative impact of inflation and money growth on equity values. Many experts however believe that positive effects will outweigh the negative effects and stock prices will eventually rise due to growth of money supply (Mukherjee & Naka, 1995). They argue that a change in the money supply provides information on money demand, which is caused by future output expectations. If the money supply increases, it means that money demand is increasing, which, in effect, signals an increase in economic activity. Higher economic activity implies higher cash flows, which causes stock prices to rise.

Bernanke and Kuttner (2005) argue that the price of a stock is a function of its monetary value and the perceived risk in holding the stock. A stock is attractive if the monetary value it bears is high. On the other hand, a stock is unattractive if the perceived risk is high. The authors argue that the money supply affects the stock market through its effect on both the monetary value and the perceived risk. Money supply affects the monetary value of a stock through its effect on the interest rate. The authors believe that tightening the money supply raises the real interest rate. An increase in the interest rate would in turn raise the discount rate, which would decrease the value of the stock as argued by the real activity theorists. The impact of real sector macro variables on equity returns has been much more difficult to establish.

Mukherjee and Naka (1995) reveal that co-integration relation existed and positive relationship was found between the Japanese industrial production and stock return. However, Cutler, Poterba, and Summers [1989] find that Industrial Production growth is significantly positively correlated with real stock returns over the period 1926-1986, but not in the 1946- 85 sub-period.

In Indian context, Bhattacharya and Mukherjee (2002) studied the nature of the causal relationship between stock prices and macro aggregates for the period of 1992-93 to 2000- 2001. Their results show that there is no causal relationship between stock price and macro economic variables like money supply, national income and
interest rate but there exists a two way causation between stock price and rate of inflation. Their results also indicate index of industrial production lead the stock price. As discussed above, literature reveals differential causal pattern between key macroeconomic variables and stock prices. This relationship varies in a number of different stock markets and time horizons in the literature. This paper will add to the existing literature by providing robust result, which is based on more than one technique, about causal links for the longer period.

1.3: STATEMENT OF THE PROBLEM

There have been enormous studies on the macro factors effecting sensex, stock prices. The past studies show that macroeconomic factors can predict stock market returns and has also predicted the short and long run relationships of stock prices. So there is a need to study the effect of macroeconomic variables on nifty index. And there is a need to check the linear and non linear relationship of macroeconomic variables on Standard and Poor Nifty Fifty Index. Hence the need for a study “Impact of macroeconomic variables on Standard and Poor Nifty Index” has been found. The study aims to reveal with more precision, the major influencing variables of the Indian capital market. The present study is more focused on the data of the past decade for a large number of variables from the real economy which should have relationship with the capital market.

1.4: NEED FOR THE STUDY

Indian capital market has undergone tremendous changes since 1991, when the government has adopted liberalization privatisation and globalization more seriously than ever before. As a result, there can be little doubt about the growing importance of the stock market from the point of view of the aggregate economy. It has been observed that Indian capital market has been evolved as a major source of raising resources for Indian corporate. Indian market has also drawn the attention of global investors and the dominance of foreign institutional investors has been quite pervasive in the 1990s. Not only has the stock market increased relative to the real economy, but also it appears that the inter-relationship between them has strengthened. It has always been recognized all over the world that the stock market reflects to some extent the goings on in the rest of the economy but recently there has been widespread recognition that the influence is also in the opposite direction.
dramatic events in the stock market are likely to have an impact upon the real economy.

The past had been a remarkable period in the Indian capital market. BSE sensitive index, the prime benchmark in India along with nifty in National Stock Exchange, The economy is also growing at a faster rate in the current year. Keeping all these developments in mind, a necessity has been arisen to test the link between the real economy and stock market. To be more precise, the authors felt the need to study the relationship between Standard and Poor Nifty Fifty Index and certain real economic variables like Foreign Direct Investment (FDI), Foreign Institutional Investment in the capital market (FII), Interest Rate (INT), Gross Domestic Product (GDP), Real Effective Exchange Rates (REER), Inflation (INFL), Direct Revenue (REVENUE), Index of Industrial Production (IIP), Imports (IMP), Exports (EXPORTS), Foreign Exchange Reserve (FORES), Non Resident Indian Deposits (NRIDEPO) etc. using modern techniques.

During the last three decades there have been many studies on this relationship. However, there is an acute need to apply more rigorous linear and non-linear techniques as index movement is better captured in these methods. Also, there are clearly identified direct beneficiaries of this knowledge. If academicians and practitioners know the precise macro variables that influence the index and also the nature of the relationship then understanding and predicting stock market behaviour would be much simpler with the help of these economic variables. Using this knowledge the policy-makers may try to influence the stock market or the investors, managers may make appropriate investment or managerial decisions.

1.5:SIGNIFICANCE OF THE STUDY

In the present context this study is highly significant as there are lot of uncertainties in the stock market operations and this study would help the investors to understand the precise macro variables that influence the index and also the nature of relationships which would be useful to predict stock market behavior. It is also significant as it can be useful to policy makers to influence the investors and help them make appropriate investments. This study would further help in better portfolio management.
1.6: SCOPE OF THE STUDY

The current study aims to examine the causal relationship between the macroeconomic variables and Standard and Poor Nifty Fifty indices of National Stock Exchange. It takes into consideration the data of the past decade for its analysis. This study is an attempt to achieve these objectives through the comprehensive framework.

1.7: OBJECTIVES OF THE STUDY

The study aims to achieve the following objectives

1. To investigate the causality between the macroeconomic variables and Nifty Index.
2. To examine the long run relationship between macroeconomic variables and Nifty Index.
3. To analyse the short run relationship between macroeconomic variables and Nifty Index.
4. To investigate the impact of macroeconomic variables on Nifty Index

1.8: HYPOTHESES OF THE STUDY

Following are the directional hypotheses:

H1: There exists causal relationship between the macroeconomic variables and Nifty Index.

H2: The macroeconomic variables do cointegrate in long run with Nifty Index.

H3: The macroeconomic variables do have short run relationship with Nifty Index.

H4: The macroeconomic variables do regress/impact Nifty Index.

1.9: RESEARCH METHODOLOGY

1.9.1: DATA COLLECTION

Secondary data collection through various government gazettes and publication, RBI annual reports, SEBI reports, NSE facts sheets, stock watch, Bhavcopy etc.
1.10: TOOL FOR ANALYSES

It has been proposed to use the following tools for analysis:

Augmented Dickey-Fuller (ADF) test

Phillips-Perron (PP) test

Kwiatkowski, Phillips, Schmidt. And Shin (KPSS) test

Toda and Yamamoto (t-y) Granger Causality test

Error Correction Models (ECM)

Johansen’s Maximum Likelihood Procedure for Cointegration

Regression analyses

1.10.1: Augmented Dickey Fuller Test

Augmented Dickey-Fuller (ADF) test has been carried out which is the modified version of Dickey – Fuller (DF) test. ADF makes a parametric correction in the original DF test for higher-order correlation by assuming that the series follows an AR (p) process. The ADF approach controls for higher-order correlation by adding lagged difference terms of the dependent variable to the right-hand side of the regression.

1.10.2: Phillips-Perron (PP) Test

Phillips and Perron (1988) adopts a nonparametric method for controlling higher-order serial correlation in a series. The test regression for the Phillips-Perron (PP) test is the AR (1) process. While the ADF test corrects for higher order serial correlation by adding lagged differenced terms on the right-hand side, the PP test makes a correction to the t-statistic of the coefficient from the AR(1) regression to account for the serial correlation in t u. The correction is nonparametric. The advantage of Phillips-Perron test is that it is free from parametric errors. Phillips-Perron (PP) test allows the disturbances to be weakly dependent and heterogeneously distributed. In view of this, PP values have also been checked for stationarity.
1.10.3: KPSS test,

Kwiatkowski, Phillips, Schmidt and Shin (1992)] Co-integration Test using non-stationary series, cointegration analysis has been used to examine whether there is any long run equilibrium relationship. For instance, when non-stationary series are used in regression analysis, one as a dependent variable and the other as an independent variable, statistical inference becomes problematic [Granger and Newbold, 1974]. Cointegration analysis becomes important for the estimation of error correction models (ECM)

1.10.4: Error Correction Models (ECM)

The concept of error correction refers to the adjustment process between short-run disequilibrium and a desired long run position. As Engle and Granger (1987) have shown, if two variables are cointegrated, then there exists an error correction data generating mechanism, and vice versa. Since, two variables that are cointegrated, would on average, not drift apart over time, this concept provides insight into the long-run relationship between the two variables and testing for the cointegration between two variables.

1.10.5: Johansen’s Maximum Likelihood procedure for Cointegration has been applied.

Johansen (1991) method can be illustrated by considering the following general autoregressive representation for the vector $Y_t$: $Y_t = \Delta Y_t + \sum_{j=1}^{p} B_j Y_{t-j} + \epsilon_t$ where $Y_t$ is an $n \times 1$ vector of non-stationary $I(1)$ variables, $0$ is an $n \times 1$ vector of constants, $p$ is the number of lags, $B_j$ is a $(n \times n)$ matrix of coefficients and $\epsilon_t$ is a Gaussian error term. In order to use Johansen’s test, the above vector autoregressive process can be reparametrized and turned into a vector error correction model of the form: $\Delta Y_t = \Pi Y_{t-j} + \epsilon_t$. The issue of potential co-integration is investigated by comparing both sides of equation (4). As $Y_t \sim I(1)$, $\Delta Y_t \sim I(0)$, so are $\Delta Y_{t-j}$. This implies that the left-hand side of equation (4) is stationary. Since $\Delta Y_{t-j}$ is stationary, the right-hand side of equation (4) will also be stationary if $\Delta Y_{t-p}$ is stationary. The Johansen test centers on an examination of the matrix. The can be interpreted as a long run coefficient matrix, since in equilibrium, all the $\Delta Y_{t-j}$ will be zero, and setting the error terms, $\epsilon_t$, to their
expected value of zero will leave \( t-p \) \( Y = 0 \). The test for co-integration between the Y’s is calculated by looking at the rank of the matrix via eigenvalues. The rank of a matrix is equal to the number of its characteristic roots (eigenvalues) that are different from zero. There are three possible cases to be considered: Rank ( ) = p and therefore vector \( X_t \) is stationary; Rank ( ) = 0 implying absence of any stationary long run relationship among the variables of \( X_t \) or Rank ( ) < p and therefore \( r \) determines the number of cointegrating relationships. Thus, if the rank of equals to 0, the matrix is null and equation (4) becomes the usual VAR model in first difference. If the rank of is \( r \) where \( r < n \), then there exist \( r \) co-integrating relationships in the above model. In this case, the matrix can be rewritten as \( \gamma' \) where and are \( n \times r \) matrices of rank \( r \). Here, is the matrix of co-integrating parameters and is the matrix of weights with which each co-integrating vector enters the above BVAR model. The test for the number of characteristic roots that are insignificantly different from unity can be conducted using the following two statistics, namely, the trace and the maximum eigenvalue test.

1.10.6: Toda and Yamamoto (T-Y) Granger Causality Test

The dynamic linkage is examined using the concept of Granger’s causality test (1969, 1988). A time series \( t \times x \) Granger-causes another time series \( t \times y \) if series \( t \times y \) can be predicted with better accuracy by using past values of \( t \times x \) rather than by not doing so, other information is being identical. In other words, variable \( t \times x \) fails to Granger-cause \( t \times y \) if \( t+m \) \( t \times y = Pr( y ) \) (6) Where \( t+m \) \( t \times y = Pr( y ) \) denotes conditional probability of \( t \times y \), where \( t \) is the set of all information available at time \( t \), and \( t+m \) \( t \times y = Pr( y ) \) denotes conditional probability of \( t \times y \) obtained by excluding all information on \( t \times x \) from \( t \times y \). This set of information is depicted as \( t \). The causal linkage between stock prices and macro economic aggregates in India are investigated by applying the technique of long run Granger non causality test developed by T-Y (1995). The selection of the VAR system requires an analysis of unit roots and cointegration which may cause inadequate results 1 (Blough, 1992). This can lead us to select an incorrect model for verifying the relations of causality, possibly causing a problem of over-rejection of non causal null hypothesis (Giles and Mirza, 1999). In this way, Toda and Yamamoto (1995), Dolado and Luketerpohl (1996) propose an applicable methodology independent of the integration or co-integration properties of the model. In this method a modified Wald Test is used to contrast the parameters of the VAR.
An extended VAR model is used, whose order is determined by the number of optimal lag lengths in the system (k) and the maximum number of times one must differentiate the variables (dmax). When a VAR max (k d) is predicted (where max d is the maximum order of integration to occur in the system), this test displays asymptotic chi-square distribution, it is also shown that if variables are integrated of order d, the usual selection procedure is valid whenever k d. Toda and Yamamoto test has been used to capture long-run causality pattern of stock indices and the following specification has been used to estimate.

1.10.7: Variance decomposition The vector auto regression (VAR)

By Sims (1980) has been estimated to capture short run causality between stock prices and key economic macro economic variables. Variance decomposition and impulse response function has been utilized for drawing inferences. Equation system is similar to the equations for granger causality assuming simultaneity among a set of variables and treating all the variables endogenous to system. VAR is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables. The VAR approach sidesteps the need for structural modeling by treating every endogenous variable in the system as a function of the lagged values of all of the endogenous variables in the system.

1.10.8: Artificial Neural Network

Artificial Neural Networks (ANN) are adaptive statistical models based on analogy with the structure of brain. ANNs are built from simple units called neurons by analogy. These units are interlinked by a set of weighted connections and are organized in layers namely; input layer, hidden layer/s and output layer as shown in fig. 1. Thus goal of ANN is to learn or to discover some association between input and output variables. This learning process is achieved through modification of the connection weights between units.

1.10.9: Multiple Linear Regression

Multiple linear regression attempts to model the relationship between two or more explanatory variables and a response variable by fitting a linear equation to
observed data. Every value of the independent variable \( x \) is associated with a value of the dependent variable \( y \). The population regression line for \( p \) explanatory variables \( x_1, x_2, \ldots, x_p \) is defined to be

\[
\mu_y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_p x_p.
\]

This line describes how the mean response \( \mu_y \) changes with the explanatory variables. The observed values for \( y \) vary about their means \( \mu_y \) and are assumed to have the same standard deviation \( \sigma \). The fitted values \( b_0, b_1, \ldots, b_p \) estimate the parameters \( \beta_0, \beta_1, \ldots, \beta_p \) of the population regression line.

Since the observed values for \( y \) vary about their means \( \mu_y \), the multiple regression model includes a term for this variation. In words, the model is expressed as

\[
\text{DATA} = \text{FIT} + \text{RESIDUAL},
\]

where the “FIT” term represents the expression \( \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_p x_p \). The “RESIDUAL” term represents the deviations of the observed values \( y \) from their means \( \mu_y \), which are normally distributed with mean 0 and variance \( \sigma^2 \). The notation for the model deviations is \( \varepsilon \).

Formally, the model for multiple linear regression, given \( n \) observations, is

\[
y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_p x_{ip} + \varepsilon_i \quad \text{for} \quad i = 1, 2, \ldots, n.
\]

In the least-squares model, the best-fitting line for the observed data is calculated by minimizing the sum of the squares of the vertical deviations from each data point to the line (if a point lies on the fitted line exactly, then its vertical deviation is 0). Because the deviations are first squared, then summed, there are no cancellations between positive and negative values. The least-squares estimates \( b_0, b_1, \ldots, b_p \) are usually computed by statistical software.

The values fit by the equation \( b_0 + b_1 x_{i1} + \ldots + b_p x_{ip} \) are denoted \( \hat{y}_i \), and the residuals \( e_i \) are equal to \( y_i - \hat{y}_i \), the difference between the observed and fitted values. The sum of the residuals is equal to zero. The variance \( \sigma^2 \) may be estimated by \( s^2 = \frac{\sum e_i^2}{n-p-1} \), also known as the mean-squared error (or MSE). The estimate of the standard error \( s \) is the square root of the MSE.
The present study is undertaken with the following chapter scheme:

Chapter 1: Introduction
Chapter 2: Literature review
Chapter 3: Conceptual and theoretical framework
Chapter 4: Research Methodology
Chapter 5: Data analysis and Interpretation
Chapter 6: Findings, suggestions and conclusion
Appendix
Bibliography