CHAPTER II
REVIEW OF LITERATURE

This chapter reviews various empirical studies related to the linkages between the stock prices and the exchange rates. This review has been divided into two sections. The first section deals with studies related to empirical validity of market integration hypothesis with reference to foreign exchange market and stock market and inter-relationship between the two at the international level. The second classification deals with studies pertaining to the validity of market integration hypothesis in foreign exchange market and stock market and inter-relationship between the two at the national level. This classification is done to examine the various empirical issues of the relation between foreign exchange rates and stock prices. This classification again helps us to find the studies which are giving conflicting results, and also to identifying the gap with special reference to India. Besides, the studies which are giving conflicting results and have not received due importance should be considered for further empirical research. With these objectives in mind the empirical studies have been discussed below:

International-level Studies

Eur and Resnick (1988) tried to develop ex ante portfolio selection strategies to realize potential gains from international diversification under flexible exchange rates. For the empirical analysis the Morgan Stanley Capital
International Perspective daily stock index values for the United States and the other six countries were adopted. The stock indices of United States, Canada, France, Germany, Japan, Switzerland, and the U.K. were value weighted and it was a representative of a domestic stock index fund. The data series were provided in both the United States and the local currencies for the period from December 31, 1979, through December 10, 1985. Methods such as correlation, variance and covariance have also been employed to know the changes in stock market across the countries.

The analysis reveals that exchange rate uncertainty is a largely non-diversifiable factor adversely affecting the performance of international portfolios. The authors have suggested two methods such as multi-currency diversification and hedging via forward exchange contracts for reducing the exchange rate risks.

Ma and Kao (1990) examined the stock price reactions to the exchange rate changes. The authors have studied the case of six developed countries namely United Kingdom, Canada, France, West Germany, Italy and Japan. Monthly stock indices and monthly exchange rates are gathered from the Exchange Rates and Interest Rates Tape Provided by the Federal Reserve. The sample period was from January 1973 to December 1983, and a two factor model was adopted for the empirical analysis.

The paper demonstrates two possible impacts of changes in a country’s currency value on stock price movements. Firstly, the financial effects of
exchange rate changes on the transaction exposure. Secondly, the economic
effect from exchange rate changes suggests that, for an export-dominant
country, the currency appreciation reduces the competitiveness of export
markets and has a negative effect on the domestic stock market. On the other
hand for an import dominated country, the currency appreciation will lower
import costs and generate a positive impact on the stock market.

Jorion (1991) examined the pricing of exchange rate risk in the United
States (US) stock market, by using two-factor and multi-factor arbitrage
pricing models. For the purpose of empirical analysis, monthly data are
collected for a period ranging from January 1971 to December 1987. The data
on the trade-weighted exchange rate is derived from the weights in the
Multilateral Exchange Rate Model (MERM) computed by the International
Monetary Fund (IMF). Monthly data on the Stock market return are collected
from the University of Chicago’s Centre for Research in Security Prices
(CRSP) database. An ordinary least squares (OLS) regression method was
employed for examining the objective.

The study reveals that United States (US) industries display significant
cross-sectional differences in their exposure to movements in the dollar.
However, the empirical results do not suggest that exchange rate risk is priced
in the stock market. The conditional risk premium attached to foreign
currency exposure appears to be small and never significant.
Bartov and Bodnar (1994) re-examined the anticipated changes in the dollar and equity value. The period of study ranges from the fiscal year 1978 and runs through the fiscal year 1989. The authors have used the COMPUSTAT Merged-Expanded Annual Industrial File and Full Coverage File for firms that reported significant foreign currency gains or losses on their annual financial statements. The data on stock prices were collected either the Centre for Research in Security Prices (CRSP) New York Stock Exchange (NYSE)/American Stock Exchange (AMEX) Daily Return File or the National Association of Security Dealers Automated Quotation (NASDAQ) Daily or Master Files.

The results of the study show that contemporaneous changes in the dollar have little power in explaining abnormal stock return. This finding is consistent with the failure of prior research to document a contemporaneous relation between dollar fluctuations and firm value and suggests that problems with sample selection technique are not a complete explanation for their failure.

Choi and Prasad (1995) estimated a model of firm valuation to examine the exchange risk sensitivity of firm value. For the empirical analysis monthly time-series of stock returns were obtained from the University of Chicago Centre for Research in Security Prices (CRSP) tapes and COMPUSTAT database. The period of study was from January 1978 to December 1989. The nominal exchange rate variable was the United States (US) dollar value of one
unit of foreign currency, where foreign currency was the multilateral trade-weighted basket of ten major currencies as published in the Federal Reserve Bulletin. The ordinary least squares (OLS) and the generalized least squares (GLS) methods were employed for examining the objective of the study.

The study reveals that approximately 60 per cent of the firms with significant exchange risk exposure benefited, and 40 per cent lost, with a depreciation of the dollar. It is also found that the exchange rate factor is less important in explaining the industry portfolios.

Prasad and Rajan (1995) investigated the impact of exchange rate fluctuation on equity valuation in Germany, Japan, the United Kingdom and the United States. They also evaluated the existence of exchange risk premia in these four markets. For the empirical analysis, monthly data on United States (US) stocks were collected from the Centre for Research in Security Prices (CRSP) tapes and the data for other countries came from the Morgan Stanley Capital International Perspective for the period from January 1981 to December 1989. The exchange rate variable is defined as the home currency value of one unit of foreign currency, where foreign currency is defined as a trade – weighted basket of 16 currencies. The basket of currencies was derived using 1981 trade weights computed by the International Monetary Fund using the Multilateral Exchange Rate Model (MERM). The exchange risk exposure coefficients are estimated using the Seemingly Unrelated Regression (SUR) procedure. The pricing coefficients were estimated jointly with the sensitivity
coefficients using the iterated non linear seemingly unrelated (ITNLSUR) procedure.

The study finds evidence of exchange rate risk sensitivity in each of the four markets to varying degrees, with the German and the United States (US) markets yielding a maximum number of industries with significant exchange rate exposure. Export-oriented industries gaining from a depreciation of the home currency and import-dominated industries gaining from an appreciation for the home currency.

Bartov et al (1996) attempted to reveal the relation between exchange rate variability and stock return volatility for United States (US) multinational firms. Tests cover two five-year periods i.e., five years of fixed rates prior to the break-down of the Bretton Woods system (1966-1970) and first five years following the arrival of fluctuating exchange rates (1973-1977). For the empirical analysis, a sample of 109 firms with foreign operations was identified. Monthly return data of all firms were collected from the Centre for Research in Security Prices (CRSP) New York Stock Exchange (NYSE) or American Stock Exchange (AMEX), Monthly Returns and Master File. The exchange rate index is a weighted index of the United States dollar against the other G-7 countries, and it was collected from the Multilateral Exchange Rate Model (MERM) of the International Monetary Fund (IMF). Chi-squared test statistic was employed to evaluate the significance of the change in stock return variance for each sample across the two periods.
Further, regression technique has been adopted for the purpose of estimating monthly return to firms.

The analysis confirms that the increase in total stock return volatility for multinational firms is significantly larger than that of other firms. The result also supports the weak existing empirical evidence that exchange rates play an important role in the stock price behaviour of United States (US) multinational firms.

Chamberlain et al (1997) examined the foreign exchange exposure of a sample of United States (US) and Japanese banking firms. In constructing the United States (US) sample, both daily and monthly stock returns of thirty bank holding companies that were traded over the entire sample period from 1986 to 1992 on the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX) were selected from the Centre for Research in Security Prices (CRSP). For Japanese bank samples, monthly observations of the largest 110 Japanese bank returns were collected from Worldscope data, and daily bank returns were considered from extel Research data. The authors estimated the sensitivity of returns to the exchange rate in the context of an augmented market model.

The analysis reveals that the stock returns of approximately one-third of thirty large United States (US) bank holding companies appear to be sensitive to exchange rate changes. Whereas few Japanese bank return, appear to be sensitive to exchange rate changes. The authors leave the causes for the
difference between the exchange rate sensitivities of Japanese and United States (US) banking firms to the future research.

Mookerjee and Yu (1997) tested for the presence of informational inefficiencies in the Singapore stock market using a subset of macroeconomic variables, including nominal exchange rates, which are pertinent in the context of a small open economy. All monthly data used in the study were from October 1984 through April 1993. Tests of nonstationarity have been conducted using both the Augmented Dickey Fuller (ADF) and KPSS test statistics. The authors employed the techniques of cointegration, causality and forecasting equations to explore the nexus between Singapore stock returns and its four macro variables.

The study found that exchange rates do not exhibit a long run equilibrium relationship with stock prices. Tests of causality and forecasting equations yield different results. While the causality test approach has revealed market efficiency with respect to exchange rates, the forecasting equation approach has demonstrated market inefficiency. Hence, the analysis concluded that the results based on only one or the other approach should be viewed with caution.

Antonious et al (1998) investigated the behaviour of the equity market risk premium for the London Stock Exchange prior to and during Sterling membership of the Exchange Rate Mechanism (ERM). The authors have used monthly data from January 1980 to August 1993 for both the macroeconomic
variables and the individual security returns on the 69 companies traded on the London Stock Exchange. All necessary information, including the Pound Sterling/Deutsch Mark (£/DM) exchange rate were collected from the Datastream database. The Arbitrage Pricing Theory (APT) was used as the model of the equity risk premium for empirical analysis.

The authors observed that the membership of the Exchange Rate Mechanism (ERM) and the resultant increased convergence between Britain and the other member states were beneficial to the United Kingdom with a reduction in both the exchange rate risk premium and the total equity market risk premium. The study conveys the importance of a policy of convergence and exchange rate stability maintained through a fixed exchange rate regime in terms of a reduction in uncertainty. Experience of United Kingdom prior to and during sterling membership of the European Exchange Rate Mechanism (ERM) clearly reveals the above idea.

Malliaropulos (1998) investigated the link between international stock return differentials relative to the United States and deviation from relative Purchasing Power Parity. The end-of-quarter stock indices for the G5 countries and nominal United States dollar exchange rate, from DATASTREAM, and consumer price indices from the Organisation for Economic Co-operation and Development (OECD) Quarterly National Accounts database were collected for a period from the first quarter of 1973 to the third quarter of 1992. In order to account for the endogeneity of the
regressor and small sample bias in the context of regression with overlapping 
observations, the author has estimated sampling distribution of slope 
coefficients and t-statistics using a distribution – free bootstrap technique 
based on the Vector Auto Regressive (VAR) model.

The empirical results indicate that there is strong evidence of a negative 
relationship between international stock return differential, and changes in the 
real exchange rate for France and weaker evidence for Japan and United 
Kingdom. The practical implication is that long-horizon return of United 
States equity funds are likely to out perform comparable funds in other 
countries when the dollar is overvalued relative to Purchasing Power Parity.

Morley and Pentecost (1998) enunciated the relationship between the 
foreign exchange risk premium and excess returns in the national and foreign 
equity markets in G-7 countries using both the United States dollar and the 
United Kingdom pound as base currencies. All monthly time series data on 
exchange rates for the period January 1982 to January 1994 were extracted 
from Datastream database. Bilateral exchange rates are all measured against 
the United States dollar and taken from International Financial Statistics. 
Share prices of all the G-7 countries were taken from the corresponding stock 
market indices for the same period. Analysis has been carried out by using the 
cointegration methodology with an Error Correction Model (ECM) framework 
to capture the timeseries dynamics. Seemingly Unrelated Regression (SUR)
system estimation approach of Zellner (1962) was also used to improve the efficiency of the estimated short-run parameters.

The results show that in equilibrium, the foreign exchange market risk premium is positively related to the domestic excepted equity premium and negatively related to the foreign equity premium for all countries against both exchange rates.

Vansconcellos and Kish (1998) analysed the influence of macroeconomic variables, including the exchange rates on the number and direction of cross-border acquisition between firms in the United States and each of four European Countries, namely, Germany, Italy, the United Kingdom and France. The data for the dependent variable and the explanatory variables were obtained on a quarterly basis from 1982 through 1994. The number of completed acquisitions was obtained from the several issues of ‘Mergers and Acquisitions’. The data for exchange rates were downloaded from the Datastream database. The logit model and the ordinary least squares (OLS) regression are used to analyse select factors affecting cross-border merger.

The study reveals the importance of exchange rate as a significant explanatory variable of acquisitions for the first three countries except France. A strong United States dollar may persuade firm to acquire a foreign firm because the initial acquisition price is favourable when measured in dollar
terms in a net present value calculation. The authors conclude underlining the role of exchange rate as a predictor of trends in acquisition.

Wetmore and Brick (1998) made an attempt to estimate various risk components of commercial bank stock returns. They argue that over time, the relative significance of interest rate risk has given way to foreign exchange risk and more recently to the basis risk. For the empirical analysis weekly stock return data of a sample of 66 commercial banks for the period January 1, 1986 through June 30, 1995 were collected from Standard and Poor's Daily Stock Price Record. Foreign exchange risk was proxied by the index of weighted average exchange value of a dollar against ten currencies. For this purpose monthly reported data published by the Federal Reserve Bulletin were interpolated to generate weekly data. To get the explanatory power of different variables including the exchange rate, an equation was estimated using ordinary least square (OLS).

The results of the study appear quite interesting. All commercial banks showed significant interest rate sensitivity before October 20, 1987. After October 20, interest rate sensitivity gave way to foreign exchange risk sensitivity. Between November 27, 1989 and January 7, 1991, foreign exchange risk increased for all the banks. The authors concluded emphasising the importance of significant basis risk component after June 10, 1994 for all banks.
Bodart and Reding (1999) examined the behaviour of domestic daily returns on bond and stock markets with the objective of identifying whether there exist significant differences in the patterns of volatilities and international correlations between European Exchange Rate Mechanism (ERM) and non-European Exchange Rate Mechanism (ERM) countries. For the empirical analysis countries were divided into two groups. The first group is composed of hardcore European Monetary Systems (EMS) countries (Germany, France and Belgium) which have maintained a fixed bilateral exchange rate during the whole sample period; the other set includes ‘drop-out countries’ (Italy, the United Kingdom and Sweeden) which abandoned the peg with the Deutschmark (DEM) in fall 1992 and which have been on a float thereafter. All necessary information came from Datastream, stock prices were obtained from the six different indices. All prices and exchange rates are daily closing prices and are expressed in domestic currency. Data were collected over the period from January 2, 1989 to December 19, 1994. Estimates of conditional variances were obtained by estimating over the whole sample period a univariate Generalised Autoregressive Conditional Heteroskedasticity (1,1) model for each series of daily returns. The extent to which changes in the exchange rate regime affect the conditional international correlations among asset markets also has been analysed.

The analysis failed to detect a marked linkage between the pattern of volatilities on the stock market and the exchange market. However, the degree
of exchange rate variability exerts an influence on international bond and stock correlations.

Ding et al (1999) used transaction data for the Kuala Lumpur Stock Exchange (KLSE) and the Stock Exchange of Singapore (SES) for a major Malaysian conglomerate, Sime Darby Berhad, and intraday exchange rate data to examine whether to what extent each exchange contributes to price discovery. The Stock Exchange of Singapore transaction data were downloaded from a United States commercial vendor. The Kuala Lumpur Stock Exchange transaction data of Sime Darby Berhad were obtained for the period from May 22, 1996 to July 17 1996. Data on Singapore dollar / Malaysian ringgit exchange rates at four times during the trading day have been collected from a brokerage firm. To test the presence of a unit root in the individual series the augmented Dickey Fuller (1981) test was employed. The reduced rank regression procedure of Johansen (1988) was also employed to test for possible cointegration.

The empirical results reveal that the price series of stock exchange and exchange rate for both Malaysian and Singapore are cointegrated. Arbitrage opportunities that appear to be present using unadjusted price series are adjusted for exchange rates.

January 1975 to December 1995 have been used in the study. Return data was obtained from Worldscope, 1996, Datastream, and the Pacific Basin Capital Market (PACAP) Database. The Stopford Dictionary of Multinations was used to determine firms multinational status. The end-of-month exchange rate for the Japanese Yen against the United States dollar (bilateral) and a real, moving, trade-weighted exchange rate (multilateral) published by the Bank of England were retrieved from Datastream. Both factors - sensitivities and risk premia - were estimated using the Iterated Nonlinear Seemingly Unrelated Regression Equation (INSURE) procedure.

The tests reveal that the foreign exchange risk premium is a significant component of Japanese stock returns. The currency-risk exposure commands a significant risk premium for multinationals and high – exporting Japanese firms, whereas it is less in case of low – exporting and domestic firms.

Kwon and Shin (1999) examined the cointegration and causality between macroeconomic variables, including the exchange rate, and stock market returns in Korea. The data for the analysis were from monthly stock prices of the value-weighted Korea composite Stock Prices Index (KOSPI) and small size stock price index (SMLS) for the period from January 1980 to December 1992 (156 monthly observations), and these date information were collected from various issues of the securities statistics yearbook. The stock prices are the closing prices of the last trading day in each month. The macroeconomic variables considered for the analysis are monthly data for the same
period collected from various issues of the monthly Bulletin published by the Bank of Korea. The Augmented Dickey Fuller (ADF) test was employed to test the unit root hypothesis. The Vector Error Correction Model (VECM) was employed to test the presence of cointegration between the variables.

The analysis concluded that a set of variables are cointegrated with stock market indexes, even though there is no cointegration between stock prices indexes and any macroeconomic variables. The study also reveals that the past changes in exchange rate significantly affect current changes in Korea composite Stock Prices Index (KOSPI).

Friberg and Nydahl (1999) examined the exchange rate exposure of national stock markets. The authors have investigated the relationship between the valuation of the stock market and a trade weighted exchange rate index for 11 industrialized countries. For the analysis, monthly data for the period 1973-1996 were considered. The Morgan-Stanley stock market indexes and world market index were from Morgan-Stanley. Data on nominal exchange rates and local stock market data were collected from the Ecowin database. The analysis is carried out using an ordinary least squares (OLS) regression.

The study has established a positive relationship between stock market exposure to exchange rates and the openness of a country for 11 industrialized countries in the post Bretton-Woods period. It is also revealed that the more
open the economy, the stronger is the relationship between return on the stock market and the exchange rate.

Amain and Hook (2000) investigated the relationship between the exchange rate of Malaysian ringgit in terms of United States dollar and stock prices in Kuala Lumpur Stock Exchange (KLES) using the single-index and multi-index models. The authors have used 256 weekly closing stock price indices and the Malaysian Ringgit/United States Dollar (RM/US$) exchange rate spanning from September 1993 to July 1998. The data were collected from the Daily Diary published by Kuala Lumpur Stock Exchange (KLSE). The study period was divided as a cycle of a strong ringgit (September, 93-January, 97) and a cycle covering a weak ringgit (July, 97-July, 98). Besides an ordinary least square (OLS) method was employed to identify the relationship between stock prices and exchange rate.

The results of the study indicate no significant relationship between the exchange rate and the Kuala Lumpur Stock Exchange (KLSE) stocks during strong ringgit period. But for the weak ringgit period a weak relationship exist between the two.

Choi and Kim (2000) empirically examined several major determinants of American Depository Receipts (ADRs) and their underlying stock returns. The end-of-week closing American Depository Receipts prices for the period of 1990-1996 were obtained from the Centre for Research in Security Prices (CRSP) database. To get the Morgan Stanley Capital International Perspective
Index, exchange rates and underlying stock prices, the Datastream database also has been employed. In order to examine the behaviour of American Depository Receipts and the underlying stock returns overtime, the total period was divided into two subperiods. They are: (i) 1990-1993, and (ii) 1994-1996. The effect of changes in exchange rate on American Depository Receipts returns was examined using the regression technique.

The analysis reveals that the behaviour of the American Depository Receipts can be explained better using the exchange rates. By and large, exchange rate shows a significant negative correlation with American Depository Receipts returns. The authors concluded by observing that the United States investors are discouraged about investing in American Depository Receipts, when the dollar is strong. This is due to the fact that weak foreign local markets with the strong dollar may adversely affect local firms issuing American Depository Receipts. The strong dollar reflects a sound United States economy, and United States investors have less incentive to invest in American Depository Receipts, especially when the value of foreign firms denominated in the United States dollar declines.

Gao (2000) attempted to examine the effects of unexpected exchange rate movements on the stock returns of United States multinationals. For the empirical analysis monthly returns on individual stocks traded in the New York Stock Exchange or American Stock Exchange over the period from 1/1988 to 9/1993 were selected from the Centre for Research in Security
Prices (CRSP) 1993 Master File. Monthly Standard and Poors 500 stock index returns were used for the market portfolio returns. Exchange rates between the dollar and foreign currencies came from the National Trade Data Bank. For each industry, the exchange rate used in the estimations is a detrended log export weighted exchange rate. The ordinary least square method was adopted for estimation purpose. Levinsohn and Mackne – Mason’s two stage estimation procedure was also employed because of the biased and inconsistent estimates of the one-step method.

The empirical study suggests that the stock market correctly reveals the profitability effects of unanticipated exchange rate changes. A depreciation shock of the United States dollar has significant positive effects on the abnormal returns on the stocks of the multinationals whereas, an appreciation causes a negative returns of the stocks.

Iorio and Faff (2000) enquired the foreign exchange exposure of the Australian equities market, being one of the most established markets in the Asia-Pacific. The data employed were continuously compounded daily and monthly returns on 24 Australian industry indices, and it was obtained from Datastream database. The period of the analysis involves 2280 (108) daily (monthly) observations from January 1988 to December 1996. The exchange rate factor’s return was based on Australian dollar/United States dollar exchange rate. For the empirical analysis, an augmented market model which
consists of the return on the market index and the return on the exchange rate factor as independent variable has been tested.

The study reveals that while employing daily data, there is some evidence of significant exchange rate exposure of the predicted signs in nine industries. As far as the monthly data is concerned, results are found less encouraging.

Kearney (2000) enquires how volatility is transmitted to national stock markets from their international counterparts as well as from domestic business – cycle variables. The author has used low – frequency data consisting of end monthly observations on stock market indices for five countries (Britain, France, Germany, Japan and the United States) over the period from July 1973 to December 1994. The stock market indices employed in the study are The Financial Times All Share Index (FTSE), the Paris General index, the Frankfurt index, the Nikkes 225 index and the Dow Jones 30 composite index. The indices are converted into United States dollar at the prevailing end of month spot bilateral exchange rates taken on the last stock market trading day. All data have been extracted from the Datastream International Database. The time series properties of the data were examined by employing Dickey – Fuller and Phillips – Perron tests. The Johansen multivariate cointegration technique and error correction model (ECM) was considered for examining the nexus between the two. Besides, the volatility
transfer between the World, European, and Japan/United States stock markets was estimated by employing the generalised least squares (GLS) method.

The study reveals that the national stock market indices are multivariate cointegrated with their domestic business cycle variables. Britain is found more volatile to the exchange rate and United States has the lowest volatility.

Penttinen (2000) analysed the devaluation risk related peso problem in stock returns. The author aims at providing a rational explanation for the longer non-random negative trend in the Finnish stock market in the 1989-1992 period. For the empirical analysis, daily data were collected from the Helsinki stock exchange. Data on Finnish Markka came from the Bank of Finland. The author has used cross-sectional regression analysis on the individual firm level.

The analysis reveals that the seemingly anomalous negative trend in the Finnish stock market from June 1989 to the devaluation of the Finnish markka (FIM) in November 1991. It was partially caused by devaluation-risk-related peso problem in individual stocks.

Tai (2000) investigated the role of exchange rate risk in pricing a sample of the United States commercial bank stocks by estimating and testing a three-factors model under both unconditional and conditional framework. The author has taken weekly sample of 31 commercial bank stock, traded on the New York and American stock exchanges. Then it was divided into three groups namely, the money Center bank, the large bank and the regional bank.
The world market risk was measured as the United States dollar return of the Morgan Stanley Capital International (MSCI) world equity market in excess of 7-day eurodollar deposit rate the exchange rate risk was measured as the log first difference in the trade – weighted United States dollar price of the currencies of 10 industrialised countries. All the data were obtained from DATASTREAM. The empirical estimation and testing were conducted by using three econometric methodologies, namely, Nonlinear Seemingly unrelated Regression (NLSUR) via, Hansen’s Generalised Method of Moment (GMM), Pricing Kernel approach and the multivariate Generalised Autoregressive Conditional Heteroskedasticity in mean (MGARCH-M) model. The pricing kernel approach reveals a strong evidence of exchange rate risk in both large bank and regional bank stocks. For the regional banks world market risk was also found positive. Finally, estimation based on the multivariate Generalised Autoregressive Conditional Heteroskedasticity in mean (MGARCH-M) approach shows strong evidence of time – varying exchange rate risk premia and weak evidence of time varying market risk premia for all three bank portfolios.

Koch and Saporoschenko (2001) examined the sensitivity of individual and portfolio stock returns for Japanese horizontal Keiretsu financial firms to unanticipated changes in market returns, bond returns, exchange rate changes and nominal interest rate spread changes. For the empirical analysis, weekly stock returns from January 14, 1986 through December 29, 1992 were
collected. Weekly traded weighted yen exchange rate return innovation was estimated using data from the JP Morgan economic department for the same period. Generalised Autoregressive Conditional Heteroskedasticity (GARCH) model has been employed to examine the stock return sensitivity of Japanese horizontal Keiretsu financial firms to exchange rates. The results indicate that Keiretsu financial firms have insignificant exposure to exchange rate changes.

Nagayasu (2001) analysed empirically the Asian financial crisis by using high – frequency data of exchange rates and stock indices of the Phillippines and Thailand. Daily data on benchmark stock indices and exchange rates covering the period from 11-15-1996 to 12-31-1998 were obtained from the Bloombery dataset. To analyse the relationship between exchange rates and stock indices, the author focused on causality among these variables using the method developed by Granger (1969). The robustness of findings was examined using the threshold auto-regression. The Granger non causality test in two subsets of data has been conducted in order to take into account a possible regime shift.

The analysis shows the importance of the banking and financial sector in explaining the Asian crisis. The result from the threshold method provide evidence for a negative relationship between the exchange rate and the stock indices i.e. a fall in stock prices is associated with currency depreciation. This paper also identifies contagion effect running from Thailand to Phillippines.
Nieh and Lee (2001) explored the dynamic relationship between the stock prices and the exchange rates, for each G-7 countries. The data were collected from Dow Jones News/ Retrieval provided by Dow Jones, Inc, for the sample period from October 1, 1993 to February 15, 1996, of daily closing stock market indices and foreign exchange rates. To test stationarity of the data authors have employed the Augmented Dicky Fuller and the multiple – unit – root test suggested by Dickely and Pantula respectively. They adopted the cointegration test to avoid the spurious regression problem. For which Engle and Granger two - step methodology and Johansen Multivariate Maximum Likelyhood cointegration test were also conducted. To capture both the short – run dynamic and the long-run equilibrium relationship Vectors Error Correction model (VECM) was also employed.

The findings reject any long-run significant relation between stock prices and exchange rates. But one day's significant shorterm relationship has been found in certain G-7 countries. Analysis also reveals that the difference in the results among G-7 countries might be due to the influence of many other country specific factors in addition to the two financial assets.

Sadorsky (2001) studied the stock returns of Canadian oil and gas industry using a multi-factors market model which allows for several risk premiums including that of the exchange rates. The data collected for the study are on monthly basis and they cover the period from April 1983 to April 1999. All economic data were obtained from the Statistics Canada economic
database. Oil price shares are measured using the Toronto Stock Exchange oil and gas index. The monthly United States dollar / Canada dollar exchange rates also have been collected for the analysis. Both the Dickey Fuller (1979) and the Phillips and Person (1988) tests were employed to test the stationarity of the data. Standard error for the parameter estimates were computed using the Newey and West heteroskedasticity and autocorrelation coefficient consistent covariance matrix.

The author indicates that oil and gas stock returns are sensitive to several risk factors including the exchange rate. It has also been found that an increase in exchange rate decreases the return to Canadian oil and gas stock prices. Hedging exchange rate risk will allow the oil and gas industry more flexibility through better management of cash flow.

Wu (2001) investigated macroeconomic exposure including the exchange rate, of a major Asian Stock index namely, the Straits Times Industrial Index (STII) of Singapore. The study was conducted for both the 1997-98 Asian financial crisis and the pre-crisis periods. The authors employed monetary approach to analyze the asymmetric asset-price movements (exchange rate and stock prices) in Singapore, a small open economy with managed exchange rate targeting. The Primask Datastream provided the data on the bilateral Singapore dollar exchange rate vis-à-vis its major trade partner's currencies, with the data ranging from January 22, 1990 to December 12, 1997. The distributed lag model and the Vector
Autoregression (VAR) approach have been employed to analyze the macroeconomic exposure.

Analysis reveals that monetary policy does not play a significant role in such a small economy with exchange rate targeting. But fiscal revenue as well as fiscal expenditure exerts positive influence on the Straits Times Industrial Index (STII). It is also found that the Singapore dollar exchange rates vis-à-vis the developed countries’ currencies are negatively related with the Straits Times Industrial Index (STII) both before and during the 1997-1998 crisis period, whereas the exchange rate in relation to the Malaysian ringgit is positively related to the Straits Times Industrial Index (STII).

Baharumshah et al (2002) tested an augmented monetary model that includes the effect of stock prices on the bilateral exchange rates. The model was employed to the ringgit / United States dollar (RM/USD) and ringgit / Japanese yen (RM/JY) exchange rate. The quarterly data on exchange rates as well as the macroeconomic variables were collected for a period from the first quarter of 1976 to the last quarter of 1996. The stock market is represented by the main stock index. The exchange rates were obtained from the International Monetary Fund’s International Financial Statistics (IFS) and Malaysia is regarded as the home country. Stock indices were from Morgan Stanley Capital International. All the variables apart from interest rates are expressed in logarithmic differentials. The standard Augmented Dickey – Fuller and Phillips – Perron tests were employed to test for the order of integration of all
The Johansen (1988) maximum likelihood technique was also used to test for long-run cointegration.

The empirical findings reveal that the equity market is significant in affecting the exchange rate and in explaining at least in part the parameter instability evidenced in the cointegrating system. The authors conclude that models of equilibrium exchange rate should be extended to include equity markets, in addition to bond markets.

Chang (2002) attempted to investigate industry – level currency risk of Taiwan’s stock market around the Asian financial crisis. By dollar value of transaction, the Taiwan stock market is ranked third in the world. The data used in this study consists of daily New Taiwan Dollar (NTD)/United States Dollar (USD) bilateral exchange rates, trade weighted effective New Taiwan Dollar (NTD) rates and industry level stock indexes from 1 January, 1996 to 31 October, 1998. The bilateral New Taiwan Dollar/United States Dollar (NTD/USD) exchange rates quoted by the Bank of Taiwan were retrieved from the Taiwan Economic Journal. The trade weighted effective New Taiwan Dollar, calculated from the exchange rates of 17 countries was considered from the Council for Economic Planning and Development. The daily stock returns retrieved from the Taiwan Economic Journal consist of firms listed in the Taiwan Stock Exchange (TSE) and over-the counter (OTC) securities exchange. The impact of exchange rate exposure on index returns was
discussed using a Generalised Autoregressive Conditional Heteroskedasticity (GARCH) regression framework.

The analysis reveals that over 50 per cent of industries have statistically significant currency exposure over the entire sample period, when bilateral New Taiwan Dollar (NTD)/United States Dollar (USD) exchange rates were used as currency risk factors. The author concludes by pointing out that exchange rate risk is less for larger firms than for smaller firms.

Chen and So (2002) examined the effect of Asian financial crisis on the sensitivity of United States multinational firms to United States stock market. The companies have been divided into sample group and control group. The sample group was comprised of multinational firms with sales in Asia-Pacific region and control group was comprised of multinational firms with overseas sales outside Asia-Pacific region. The study period was from January 1996 to December 1998. This was again divided into the sub-period of 1½ years before and after crisis. Weekly data on exchange rate between the United States dollar and foreign currencies have been collected from the DATASTREAM. The annual measures of foreign sales and foreign assets for each sampled company were collected from the COMPUSTAT data base. Weekly return on individual stocks of the firm in the sample group and the market portfolio were also obtained from the DATASTREAM. Firms in the control group also came from the COMPUSTAT data base. A continuous weekly stock return index of control firms were also collected from the
DATASTREAM. The authors tested the difference in stock return variance between the two sub-periods, by employing the $\chi^2$ statistic. They also performed a non-parametric Wilcoxon Signed-rank test and compared the median of stock return variance across the two sub-periods. The model employed for the analysis was based on the Capital Asset Pricing Model (CAPM).

The study found that the variance of stock returns for the sample firms increased dramatically during the second sub-period when the exchange rates of Asian currencies were unusually volatile. The variance of the control firms was not dramatic as that of the sample firms. It again reveals that United States multinational firms with sales in Asia-Pacific region showed a significant increase in market risk corresponding to the increase in exchange rate variability across the two sub-periods before and after the Asian financial crisis.

Iorio and Faff (2002) examined the pricing of foreign exchange risk in the Australian equities market. The period of study was from 1 January 1988 to 30 September 1998. The authors have employed both daily and monthly returns data. For the daily analysis 2723 observations were used. Whereas 128 observations were analysed for the monthly returns. All data were obtained from DATASTREAM. To test the stationarity of the data employed, Augmented Dickey Fuller (ADF) testing procedure was applied. Phillips–Perron (PP) test was also used to test the robustness of the results. In addition
to this a basis two factor ‘market and exchange rate’ asset pricing model, a ‘zero-beta’ version of the two-factor model and an orthogonalised two-factor model were also employed to examine the objective.

The analysis shows that foreign exchange risk is priced for the full sample period 1988-1998. It is also revealed that foreign exchange risk is more prominent in the two sub periods viz; 1990-1993 and 1997-1998. In these two periods both the Australian economy and the Australian dollar were relatively weak and uncertain.

Patro et al (2002) studied the significance as well as the determinants of foreign exchange risk exposure for equity index returns of 16 Organisation for Economic Co-operation and Development (OECD) countries. Weekly observations of equity index prices were obtained from Morgan Stanley Capital International (MSCI) for 16 Economic Co-operation and Development (OECD) countries. Sample on returns starts in January 1980 and covers up to December 1997 for a period of 18 years. Weekly dollar exchange rates for these countries were obtained from the Federal Reserve Board for the same period. A generalised autoregressive conditional heteroskedasticity (GARCH) specification was used to find the significant time — varying foreign exchange risk exposure. A generalised least square (GLS) regression has been employed to examine the impact of exchange rate betas on specific macro economic variables. To improve estimation efficiency, data for all 16 countries were pooled and ran a panel regression.
The analysis reveals a significant time-varying currency betas for country equity index returns. It has also been found that the exchange rate risk exposures are related to a country's macroeconomic aggregates.

Wongbanpo and Sharma (2002) investigated the interdependence between stock market, and fundamental macroeconomic factors including the exchange rate, in Association of South East Asian Nations-5 (ASEAN-5) countries i.e. Indonesia, Malaysia, Philippines, Singapore and Thailand. The authors have collected monthly data from 1985 to 1996 from the World Stock Exchange Fact Book, Datastream, and the June 1999 volume of International Financial Statistics. All series were transformed into natural logs prior to the empirical analysis. To test the stationarity of each of the series Dickey – Fuller, Augmented Dickey – Fuller (ADF) and Phillips and Penron tests were employed. Besides, they also employed the maximum likelihood based $\lambda_{max}$ and $\lambda_{trace}$ statistics introduced by Johansen (1988, 1991) and Johansen and Juselius (1990) to test the number of significant cointegrating vectors. The likelihood tests were done to determine the lag length of the vector auto regressive system. The study found that the effect of exchange rate is positive in Indonesia, Malaysia and Philippines, and it is negative in Singapore and Thailand.

Abid et al (2003) tested for evidence of contagion between the stock markets of eleven Asian countries as an important cause for the spread of the Asian crisis. They also examined cross-country co-movement among the
rates of returns of currency markets and stock markets. Weekly data on stock
returns of United States and eleven Asian stock markets were drawn from the
International Financial Corporation (IFC) database published in the ‘Financial
Times’ for the period from 1 September 1989 to 29 October 1999. Data on
weekly foreign exchange rate of returns for Asian currencies against the
United States dollar were available on the OANDA database, published on
internet, for the period from January 1, 1990 to October 29, 1999. An
empirical analysis has been carried for the entire period and for the two sub-
periods i.e. the sub-period before the Asian crisis and the sub-period during
and after the Asian crisis, by using the univariate Generalised Autoregressive
Conditional Heteroskedasticity (1, 1) model to study the conditional volatility
time varying in financial and foreign exchange market.

The authors find evidence of an increased level of co-movements in
cross-country excess return in the sub-period that encompassed and followed
the Asian crisis as compared to before the crisis. The findings also underline
the presence of cross-border contagion in both currency and equity market.

Bailey et al (2003) tested the impact of switching between silver, gold
and paper money standards on stock returns from seven small open
economics. The sample was collected for a period from December 1872 to
November 1941. End of month stock prices were collected from principal
national, colonial or metropolitan news papers. The authors have translated all
stock prices into pounds using end-of-month exchange rate, and then its log
differences were also computed. To perform three diagnostic tests Engle and Ng Generalised Autoregressive Conditional Heteroskedasticity (GARCH) specification was used.

The analysis reveals that the paper money regimes are more likely to be associated with heightened stock market volatility and correlation between stock indexes. Under the traditional silver regime stock markets did not draw closer. It is also found that correlations between index returns and China’s exchange rate weaken when China was on paper regime. This shows that conditions and events beyond the currency system affect the variances and correlations.

Bin et al (2003) considered the role of exchange rate as a pricing factor for American Depository Receipts (ADRs). The sample of American Depository Receipt consists of 125 issues grouped into 11 country specific portfolios were obtained from the Internet Search engine provided on the Bank of New York Depository Receipts Directory Website. Weekly returns of each sample American Depository Receipts were collected from the centre for Research in Security Prices (CRSP) data tape covering the span between 1 January 1990 and 31 December 2000. Weekly observations of foreign equity market indices, bilateral spot exchange rates and United States/foreign money market rates came from Datastream International. In order to value American Depository Receipts portfolio, a modified version of the Arbitrage Pricing Theory (APT) model formulated by Ross (1976) has been adopted. For the
purpose of estimation the authors employed both Generalised Autoregressive Conditional Heteroskedasticity (GARCH) and Seemingly Unrelated Regression (SUR) models.

The study reveals the importance of foreign exchange rates as a determining factor of American Depository Receipt pricing. Therefore, the exchange rate risk premium matters in investment decisions involving American Depository Receipts. It is also found that the outbreak of a foreign financial crisis has a negative effect on the pricing behaviour of American Depository Receipts originating in the country or region.

Johansen and Soenen (2003) investigated the factors that affect the level of economic integration and stock market co movement between the United States stock market and eight American equity markets, namely, of Argentina, Brazil, Chile, Mexico, Canada, Colombia, Peru and Venezuela. For the empirical analysis, Morgan Stanley Capital International’s daily closing stock index values were collected for all nine national equity markets. Data were taken for the period 1988-1999, except for Colombia, Peru and Venezuela, for which it was only available from 1993 to 1999. All other necessary information including that of the exchange rate was obtained from Datastream. The Geweke measures of feedback were estimated to analyse the significance of factors affecting the level of economic integration and stock market co movement.
The authors observe that a higher share of international trade in terms of exports and imports with the United States have a strong positive effect on stock market co-movements between country pairs. Increased bilateral exchange rate volatility in the United States relative to other countries contributed to lower co movement.

Kiymaz (2003) investigated the foreign exchange exposure of firms traded on the Istanbul Stock Exchange (ISE). The study period was from January 1991 to December 1998. It was further divided into the pre-crisis period from January 1991 to February 1994 and the post – crisis period from May 1994 to December 1998. The author has taken a sample of 109 firms from the Istanbul Stock Exchange for analysis. Based on the firms' industry affiliation sub-samples were also constructed namely, chemical/petroleum, food/beverage, machinery/ equipment, basic metal, non-metal/ cement, wood/ Paper products, textiles, financials and service / trade. The sample was again classified based on the foreign involvement of the firms. To measure the foreign exposure of firms a foreign exchange basket composed of 1 United States Dollar and 0.77 European Currency Unit was constructed. The exchange rate exposure has been estimated using a time series regression.

The analysis reveals that the firms are highly exposed to foreign exchange risks. The level of exposure is more pronounced for the textile, machinery / equipment, chemical / petroleum and financial industries and less in the food/beverage, service/ trade and non-metal / cement industries. It is
also found that the post-crisis exposure tends to be lower than that of the pre-crisis period. This shows more attention given by the firms to the foreign exchange exposure after the crisis.

Lin et al (2003) scrutinized the hypothesis that the euro has become a major influence on international stock markets. All data used in the study were weekly data between 1 January 1999 and 31 December 2002 and they are collected from datastream. The Financial Times Stock Exchange (FTSE) 100 Index was used as a proxy for the London Stock Market. A technique of zero-non-zero (ZNZ) patterned vector auto regressive modelling was employed to examine the causal relation between the euro and the London Stock market.

The findings indicate that movements in the euro are related to movements in the London market. It is also observed that both a current shock and a lagged shock to the euro’s forex market impacts on the movements of both local London stock market and forex market.

Shamsuddin and Kim (2003) attempted to study the extent of stock market integration between Australia and its two leading trading partners, the United States and Japan. In addition, this study determines whether the extent and nature of stock market integration in the period of the post-Asian crisis differs from that of the pre-Asian crisis. The data used in this study are the end-of-week closing stock price indexes for Australia, Japan and the United States, and the Australian dollar value of the Japanese yen and United States dollar. The national stock indexes used were the Standard and Poors 500
composite index for the United States, the Tokyo Stock Price Index (TOPIX) for Japan and the All Ordinaries Index (AOI) for Australia. The pre-Asian crisis period covers two sub-periods i.e. from January 1991 to December 1993 and from January 1994 to July 1997. The post-Asian crisis period covers from January 1998 to May 2001. All data were collected from Data stream. Augmented Dickey Fuller (ADF) test for unit root was adopted to test the stationary property of each variable. Co-integration technique was employed to examine long-run co-movement of stock prices for Australia, Japan and the US, and the Australian dollar value of the Japanese yen and US dollar. To understand the dynamic linkages among national stock prices as well as the interaction between stock prices and exchange rates, a Vector Error Correction Model (VECM) was employed for two sub periods, and Vector Autoregressive (VAR) model in first difference was employed for the post-Asian crisis period.

The authors concluded that there was a stable long-run relationship among the Australian, United States and Japanese market prior to the Asian crisis, but this relationship disappear during the post-Asian crisis period. It is also found that following the Asian crisis, the influence of United States on the Australian market diminished while the influence of Japan remained at a modest level.

Bartram (2004) investigated the linear and nonlinear foreign exchange rate exposure of German nonfinancial corporations. For the purpose of
analysis the data on stock prices came from the Datastream International. The exchange rates French Franc (FRF), Dutch Guilder (NLG), Italian Lira (ITL), British Pound (GBP), United States Dollar (USD), Belgian Franc (BEF), Swiss Franc (CHF), Australian schilling (ATS) and Japanese Yen (JPY) were available from the Deutsche Bundesbank. For the empirical examination a regression model was estimated.

The empirical evidence does not indicate that the economic foreign exchange rate exposure is primarily driven by the currency of determination. Firms with more international sales exhibit systematically larger and more significant foreign exchange rate exposures.

Chen et al (2004) investigated the firm value sensitivity to exchange rate fluctuation by focusing mainly on individual firms and also looked at the differing rate of sensitivity between currencies. For the empirical analysis a sample of 161 New Zealand Stock Exchange (NZSE) listed firms were considered. Monthly share return indexes were obtained from the Global Datastream database for the period from January 1993 to December 2000. The New Zealand (NZ) dollar, trade – weighted Index (TWI), the exchange rates for US dollar and Australian dollar were obtained from the web page of Reserve Bank of New Zealand. The trade – weighted Index (TWI) is calculated using the rates of the five currencies of New Zealand’s five main trading partners (Australian Dollar - 38 per cent, Japanese Yen - 24 per cent, United States Dollar - 22 per cent, Great Britain Pound Sterling - 10 per cent
and Euro - 6 per cent). Test was conducted using a residual regression model. The cross sectional analysis was done by employing the multivariate regression model.

The estimation results reveal strong evidence that exchange rate movements affect the value of the listed New Zealand firms. It is also observed that firms are on average positively related to the movement of the United States dollar and negatively related to the movement of the Australian dollar i.e. firms gain in value when the New Zealand dollar appreciates against the United States dollar and depreciates against the Australian dollar.

Grammig et al (2004) examined exchange rates along with equity quote's for 3 German firms from New York (NYSE) and Frankfurt (XETRA) during overlapping trading hours to know where price discovery occurs and how stock prices adjust to an exchange rate shock. The three German firms considered for the study are Daimler – Chrysler (DCX), Deutsche Telecom (DT) and SAP. Data were taken for the period from August 1 to October 31, 1999. The New York Stock Exchange (NYSE) quotes data were taken from the TAQ set available from the New York Stock Exchange. The XETRA quote data came from the Frankfurt Stock Exchange. Information on the exchange rates is tick – by tick quotes on the dollar prices of the euro as reported on the Reuters indicative quoting screen. This was obtained from Osten and Associates, Zurich. Augmented Dickey – Fuller test was conducted for stationarity. Johansen cointegration tests were performed for the presence
of cointegrating vectors among the variables. The Schwarz Information Criterion (SIC) has been employed to identify the appropriate lag length. The estimation precision was also assessed by employing the bootstrap method suggested by Li and Maddala.

The study shows that price discovery occurs largely in the home market. It is also revealed that exchange rate innovations have a large impact on the New York (NYSE) price but a very small effect on the Frankfurt (XETRA) price.

Priestley and Odegaard (2004) explored the pricing of exchange rate risk while simultaneously analysing the effect of long swings in dollar on the price of exchange rate risk. The authors used both the dollar Yen (JPY) and dollar European Currency Unit (ECU) rates because of their large weights in United States imports and exports. To capture the source of systematic risk in the economy excess return on the aggregate United States stock market portfolio and four macroeconomic factors such as the changes in industrial production, the change in inflation, the term spread and the default spread were also included. The monthly data on stock market return were collected from Kenneth French. The data on macroeconomic factors were obtained from the Federal Reserves. The period of study was from 1979 to 1990. To jointly estimate the parameters of the asset pricing model a Nonlinear Seemingly Unrelated Regression (NLSUR) framework was used.
The study found that the Yen and European currency unit are both priced and the prices of risk are different under different regimes. This is due to the extent of export and import to the European Union and Japan. The analysis again reveals the importance of the changes in exchange rate regimes for the firms. When the dollar appreciates, investors would demand a premium to hold stocks of companies that are exporters. At the same time investors in importing firms would be willing to pay premium to hold the stocks. This is important from the point of view of risk management.

National-level Studies

Apte (1998) addressed the question of whether stock markets face exchange rate risk. For the analysis main source of data was the Centre for Monitoring Indian Economy (CMIE) corporate database which provided data on individual stock prices as well as on the Sensitive Index (SENSEX). For the exchange rate factor, data on nominal and real effective exchange rates were obtained from the Reserve Bank of India bulletin. The period of study was from May 1990 to May 1997. The empirical test was carried out using a two factor model, for which an ordinary least squares (OLS) regression technique was employed.

The study reveals the presence of exchange rate risk as a systematic risk factor over and above market risk for a number of Indian companies. The main determinant of a firm’s exchange rate exposure appears to be the
importance of exports in its total turnover. Import intensity of its operation also shows some influence but it is not statistically significant.

Jithendranathan et al (2000) attempted to evaluate the market segmentation and its effect on the pricing of cross listed securities using Indian Global Depository Receipts (GDRs). For the purpose of analysis the Skindia Global Depository Receipts index as a market index proxy for the performance of the Indian Global Depository Receipts, was collected for the period from 1995 to 1998. This index consists of 18 actively traded Global Depository Receipts. Monthly Global Depository Receipts dollar prices and the premiums on the same were obtained from Skindra Finance Private, India. Monthly Standard and Poors 500 index returns and Financial Times 100 Index returns have also been used from the index values provided by Commodity Systems. Both single index models and multi-factor models have been adopted to test the effect of both domestic and foreign factors on the Global Depository Receipts returns and the underlying security returns.

The authors observed that Global Depository Receipts index returns are affected by both foreign and domestic factors, while the underlying Indian securities are influenced only by domestic factors. It is also found that Global Depository Receipts are priced at a premium over the exchange rate adjusted prices of the underlying Indian securities.

Damele et al (2004) attempted to analyse the market integration based on the stock market and the exchange market. For the analytical purpose the
indices such as Bombay Stock Exchange Sensex, Bombay Stock Exchange National and Nifty have been adopted as the representative of Capital market. The Rupee Dollar exchange rate was considered to see the movement in Forex market. All these data were collected from the various issues of Economic Times. The period of study was form 1991 to 2002. The empirical analysis was carried out by using the techniques such as the coefficient of variance and the regression analysis.

The empirical results about the price integration between stock prices and exchange rates lead to the conclusion that there exists some degree of price integration between these markets is India.

**Conclusion**

From the review of relevant literature, it is observed that for the last one and a half decade, a number of studies have taken place to examine the relationship between foreign exchange market and the stock market. Based on the classification of empirical studies discussed earlier, it is found that most of the studies are at the international level. In the international context, authors such as Mao and Kao (1990), Jorion (1991) Bartov and Bodnar (1994), Choi and Prasad (1995), Prasad and Rajan (1995), Bartov et. al (1996), Chamberlin et. al (1997), Mookerjee and Yu (1997), Antonious et. al (1998), Malliaropulos (1998), Bodart and Reding (1999), Ding et. al (1999), Kwon and Shin (1999), Choi and Kim (2000), Iorio and Faff (2000), Koch and Saporoschenko (2001), Bailey et. al (2003), Chen et. al (2004) etc. empirically
examined the inter-linkages between the foreign exchange market and the stock market. Most of the studies show mixed results. Some studies have found a significant positive relationship between stock prices and exchange rates, while others have reported a significant negative relationship between the variables.

Some of the studies like Solnik (1987) and Smith (1992) have reported a significant positive relationship between the stock prices and the exchange rates, while other studies such as Eun and Rensik (1988) have found a significant negative relationship. At the same time, studies like Franck and Young (1972) have revealed very weak association between stock prices and the exchange rates.

In addition to the above studies, some other studies examined the causation between the stock prices and the exchange rates. When studies such as Morley and Pentecost (1998) have reported causation from exchange rates to stock prices, other studies have found causation from stock prices to exchange rates [eg: Ajayi and Mougoue (1996)]. On the other hand, Bahmani-Oskooee and Sohrabian (1992) claimed bidirectional causation between stock prices and exchange rates in the short run.

The earlier literature again reveals that majority of the studies are in the context of developed economies. Not only that many of the empirical studies are giving different and conflicting results also. Some studies found positive effect of foreign exchange rate on stock prices, while some others are showing
negative impact on it. It is also found that most of the studies have adopted general stock market indexes for the analysis, instead of analysing the case of firms or industries separately.

From the methodological point of view, the majority of the studies have used one directional analysis. For this purpose authors have employed econometric models such as ordinary least squares (OLS) and generalized least squares (GLS). Only very few studies have examined the market integration with reference to stock market and foreign exchange market. Besides, much emphasis has not been given in the literature to examine the inter-relationship between stock market and foreign exchange market. Not only that, for the above purposes most of the authors have adopted methods such as Granger Causality test, and it assumes that time series are stationary in level, which can be highly restrictive for stock price or exchange rate time series. But, the techniques such as Johansen's co-integration, Vector Autoregressive model and Vector Error Correction models are underlining the problem of non-stationary of the data with unit roots. The present study is an earnest attempt in this direction.

Another important lacuna of the existing literature is that in the case of India very few studies have taken place. The liberalisation and the globalisation of 1990s in India again show the importance of a re-examination of the linkages between foreign exchange market and the stock market. Liberalized exchange rate system, opening up of the capital account for
international investment, the advent of floating exchange rates, the development of 24-hour screen based global trading, the increased use of national currency outside the country, innovation in internationally traded financial products, recent spurt in the Foreign Institutional Investments (FII), and the introduction of American Depository Receipts (ADR) and Global Depositors Receipts (GDRs) after 1992, are multiplying the relevance of a detailed analysis in the above mentioned direction in Indian context.

On the basis of the above observations, the present study attempts to examine the validity of market integration with reference to foreign exchange market and stock market and its inter-relationship in India. For a clear understanding of the interrelationship between the exchange rates and the stock prices study has been carried out both at the firms and at the industry levels. In addition to this, for a meaningful comparison analysis has also been carried out by employing the market index (BSE Sensex).