CHAPTER VI

SUMMARY AND CONCLUSIONS

In emerging markets, market capitalisation, volatility, and returns have increased dramatically in recent years. While emerging markets are more volatile than developed markets, they tend to be relatively uncorrelated with each other and with developed markets. Many global investors choose to diversify their funds across these markets to reduce portfolio risk. Unfortunately financial crisis characterized by dramatic fluctuations in stock and foreign exchange markets has been a common phenomenon in recent years in emerging countries. This fact reveals the need to investigate the integration and interlinkages between stock market and foreign exchange market.

A market is said to be integrated if it is efficient. Therefore, the concept of market efficiency is important. A financial market is said to be efficient, if current prices of the market reflect all available relevant information.

A stock market is efficient when security prices reflect all available public information about the economy, financial markets, and the specific company involved. The implication is that market prices of individual securities adjust very rapidly to new information.

The concept of market efficiency in foreign exchange market is similar to that of the stock market. In the foreign exchange market, even though the
current fundamentals may be quite sluggish and insensitive to current events, expectations about future value of the fundamentals can be very sensitive to current information. Consequently any new information may lead to a "jump response" in current exchange rate and, as expectation are altered, the exchange rate can fluctuate rather widely in the short-run.

If markets are inefficient information regarding one market will not disseminate to the other market. Among such markets, market integration is difficult. When market integration is not present, arbitragers can make use of the imperfections in the market and can make huge profit. This may adversely affect the interests of small investors and institutions. In this context, one of the issues of the present study is that how far stock market and foreign exchange market are integrated?

Against this background, attempts were made to test the validity of market integration hypothesis between the foreign exchange market and the stock market. But as far as the available studies are concerned, they are mainly in the context of developed countries rather than developing countries. Not only that in case of Indian economy, negligible amount of studies only is available.

In India after the introduction of liberalisation and globalisation in 1990's many changes have been taken place in these two markets. In 1992, the liberalized exchange rate system introduced the convertabilities of current account and, particularly since 1997, capital account kept open 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). These changes will have an impact on the
validity of market integration hypothesis and inter-relationship between the
foreign exchange market and the stock market. Therefore, another issue of the
present study is that how far these changes will have an impact on the validity
of market integration hypothesis with reference to the foreign exchange
market and the stock market, and its inter-relationship between the two.

Thus, on the above background we attempted to investigate the
following objectives:

i) To sketch the earlier literature pertaining to the study area and to
identify the gap of the study.

ii) To examine the economic fundamentals of the selected companies.

iii) To identify the validity of market integration hypothesis with
special reference to the stock market and the foreign exchange
market in India.

iv) To investigate the inter-relationship between the foreign exchange
rate and the stock prices, and

v) To suggest the policy implications of the study.
Summary

The present study consists of six chapters. By introducing the concept of market integration, the first chapter briefly explains historical background and objectives of the study. Under methodology of the study, ratio, per cents and linear growth rates were considered to examine the economic fundamentals of the selected companies. In order to examine the existence of market integration hypothesis, Augmented Dickey-Fuller and Phillips-Perron tests were employed. Further, Johansen’s bivariate cointegration technique was applied to test the presence of cointegration between the variables. Wherever cointegration is present vector error correction models were used to identify the inter-relationships between the foreign exchange market and the stock market. If cointegration is not revealed vector autoregression model was employed as the best tool to identify the inter-relationship between the two.

To examine the validity of market integration hypothesis, Indian Rupee (INR)/United States Dollar (USD) exchange rate, share prices of 53 companies, 7 industry indices such as Health Care, Auto, Metal, Capital Goods, Oil and Gas, FMCG and Information Technology, and BSE Sensex were considered. Rupee/Dollar exchange rate is adopted due to the dominant role of United States dollar in international trade. In India sizable amount of the international transactions are carried out in United States dollar. Further, the United States dollar is still playing a dominant role in the world economy. The firms were selected on the basis of having more than 20 per cents of the
total sales as foreign exchange transactions. This is because of the notion that firms with substantial amount of foreign exchange rate exposure could be affected by the exchange rate fluctuations. The data on stock prices of firms, industry indices, and BSE Sensex were collected from the PROWESS online industry database maintained by the Centre for Monitoring Indian Economy (CMIE). The information was collected on the basis of daily data series, which covers the period from 1st January 1992 to 31st December 2004. This is because of the fact that in India both the foreign exchange market and the stock market started developing chiefly under the liberalisation era. All the 53 firms have been selected from the BSE 200, based on their foreign exchange transactions. The seven different industries were taken from the BSE industry indices. For the exchange rate, bilateral Indian Rupee (INR)/United States Dollar (USD) exchange rate was considered from the Pacific Basin Exchange rate Services maintained by the Columbia University, USA, and the OANDA database, USA. These two are online database provided by the respective sources.

The earlier literature pertaining to relationships between the foreign exchange market and the stock market was dealt in the second chapter. For the sake of conciseness, the earlier literature have reviewed under two sections namely; international level studies and national level studies. Most of the studies were at the international level. Among these, majority of the studies were in the context of developed economies rather than developing. Not only
that majority of the studies have adopted general stock market indexes for the analysis, instead of analyzing the case of firms or industries separately. The important thing was that in case of India very few studies have been taken place.

Many of the studies adopted weekly data for the purpose of analysis, instead of using daily data, which was more appropriate one. Most of the earlier empirical studies were giving different and conflicting results also. Some studies found positive effect of foreign exchange rate on stock prices, while some others were showing negative impact of it. Very few studies found causal nexus between the foreign exchange market and the stock market.

The third chapter analysed the theoretical and methodological issues related to market efficiency and market integration hypotheses. The chapter discussed various theoretical backgrounds of the corporate foreign exchange risk exposure and the interlinkages between foreign exchange market and stock market. The techniques employed to measure the relationship between these two markets were detailed in this chapter. Some of the important techniques employed were Ordinary Least Square (OLS), Generalised Least Squares (GLS), Seemingly Unrelated Regression (SUR) model, and, Generalised Autoregressive Conditional Heteroscedasticity (GARCH) Model, and Cointegration. The present chapter concludes with a critical evaluation of all these econometric tools.
The methods like Ordinary Least Square, Generalised Least Squares, Seemingly Unrelated Regression model, and Generalised Autoregressive Conditional Heteroscedasticity Model are mainly used to examine one directional relation. Finding Granger causality in an empirical model does not necessarily entails “causal links” – in the sense of genuine influences in the real world – nor does the empirical absence of Granger causality entails no link. In case of Engle-Granger cointegration technique, there could be a simultaneous equation bias if the causality between two variables runs in both directions.

The fourth chapter analysed per cent contribution and trend of economic fundamentals such as net worth, net profit, total sales, total foreign exchange earnings, and total foreign exchange spendings of all the selected companies, industries, and BSE Sensex. The linear growth of exchange rate, share values of all the selected companies, industry indices, and BSE Sensex were also examined. In addition to this the per cent wise foreign exchange transactions to sales of all the selected companies were also examined.

The validity of market integration and the inter-relationship between the foreign exchange market and the stock market was empirically tested in the fifth chapter. The analysis has been carried out at three levels such as companies, industries, and BSE Sensex. The daily data of exchange rate, share values of all the selected companies, industry indices, and the BSE Sensex for January 1992 to December 2004 were collected for the purpose of analysis.
Augmented Dickey-Fuller and Phillips-Perron tests were conducted to know the stationarity of the variables and examination of market integration hypothesis. Johansen’s bivariate cointegration technique was employed to verify the existence of cointegration between the foreign exchange market and the stock market. After obtaining cointegration between the exchange rate and the stock prices, the inter-relationship between the two were tested with the help of vector error correction model. Wherever cointegration is not present vector autoregression model was adopted for the analysis. Further, a correlation matrix has also been incorporated to examine the nature of relationship between the casual results of exchange rate and the stock market price index with the selected economic fundamentals.

The last chapter summarises arguments of the thesis and explores policy implications and future agenda of research.

Findings of the Study

The main findings of the present study are:

(i) Most of the studies pertaining to market integration and interrelationship between stock market and foreign exchange market are at the international level. These studies are mainly in the context of developed countries rather than the developing countries.

(ii) By and large earlier studies revealed 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 two. In case of causation, when some studies have reported causation from exchange rates to stock prices, other studies have found causation from stock prices to exchange rates. At the same time very few studies claimed bidirectional causation between stock prices and exchange rates.

(iii) From the methodological point of view, studies employing modern techniques such as bivariate cointegration test to examine the cointegration between foreign exchange market and stock market, vector error correction models and vector autoregression models to identify the existence of inter-relationship between the markets are limited in the earlier literature pertaining to the capital and foreign exchange market.

(iv) Critical evaluation of all the econometric techniques reveals that Johansen's bivariate cointegration technique is superior to other techniques to test the validity of market integration hypothesis and inter-relationship between stock market and foreign exchange market.

(v) In case of net worth out of all the selected companies, the per cent contribution of Reliance Industries Ltd. to total net worth of all the selected companies is revealed to be the highest during the period of study. It is also noted that per cent contribution of companies from the Pharmaceutical, and Information Technology Industries are
increasing faster than the other companies over the years. The linear growth rate of net worth of Wyeth Laboratories Ltd. is found to be the highest, and it is 99.8 per cents per year.

(vi) The per cent contribution of net profit of Tata Iron and Steel Co. Ltd. to the total net profit was found to be the highest in 1992. But in 2004 Reliance Industries Ltd. is having the largest per cent share to the total net profit. The linear growth rate of net profit is found to be the highest for Nestle India Ltd., and it is 99.3 per cents per year.

(vii) In case of total sales, the per cent contribution of Reliance Industries Ltd. to the total sales of all the selected companies was highest during the period of study. The linear growth rate of total sales is found to be the highest for Cipla Ltd., and it is 99.8 per cents per year.

(viii) In 1992, the per cent wise foreign exchange earnings to total foreign exchange earnings of all the selected companies were highest for Tata Iron and Steel Co. Ltd. In 2004, the per cent contribution of Reliance Industries Ltd. to total foreign exchange earnings is found to be the greatest.

(ix) In the year 1992, the per cent contribution of foreign exchange spendings of Kochi Refineries Ltd. to total foreign exchange spendings of all the selected companies was the highest. But in
2004, it is the Reliance Industries Ltd. which is having the highest per cent foreign exchange spendings to the total.

(x) Industry level examination gives a clear trend towards the domination of Oil & Gas industry. This could be because of the increased demand for petroleum products over the years. In addition to this, the demand for fuel is more or less inelastic. In case of linear growth rate, trend is very clear towards the growth of Health Care and Information Technology based companies. Abrupt boom in these industries is due to the increased health consciousness of the people, process outsourcing especially in Information Technology, and changed investment environment during the liberalization period.

(xi) The economic fundamentals of BSE Sensex are showing very high rate of growth. But at the same time, sensitive index is showing 32.3 per cent rate of growth per year over the study period.

(xii) Among all the selected companies, foreign exchange earnings as per cent of total sales are highest for Himatsingka Seide Ltd., and it is 96.39. In case of total foreign exchange spendings it is highest for Moser Baer India Ltd., and it is 93.25 per cents of the total sales. The per cent of total foreign exchange transactions to total sales is found to be the highest for Moser Baer India Ltd., and it is 178.11 per cents of the total sales. As far as the net foreign exchange
Earnings to total sales are concerned, Tata Tea Ltd. is at the top with 80.20 per cents.

(iii) Dickey-Fuller and Phillips-Perron test results show that exchange rate, share values of all the selected companies, industry indices, and BSE Sensex are integrated of order one. This reveals that in India both the foreign exchange market and the stock market are integrated during the liberalization era. The possible reasons are the introduction of reforms such as dismantling of various price and non-price controls in financial markets, permission to foreign institutional investors to invest in the Indian capital market, introduction of full convertibility of Indian rupee on the current account etc.

(iv) Johansen’s bivariate cointegration results exhibit a long run relationship between the foreign exchange rate and the stock prices in case of most of the companies, industries, and BSE Sensex during the period of our study. This reveals that information is disseminated between the foreign exchange market and the stock market, and the presence of long-run equilibrium relations between the stock prices and the exchange rate in case of all these firms, industries and the Sensex. In other words both the stock prices and the exchange rate are moving together. But in case of few companies and industries absence of cointegration shows the
absence of information dissemination, even though the companies are having exchange rate exposure.

(xv) The vector error correction and vector autoregression model results demonstrated the interrelationship between the stock prices and the exchange rate. Out of 53 firms the impact of exchange rate on stock prices alone is found significant for 31 firms and 2 industries. The influence of stock prices on exchange rate alone is revealed significant for 7 firms and 1 industry. The bidirectional causation is evident only for 11 firms and 1 industry. Whereas the stock prices and the exchange rate are found independent for 4 firms and 3 industries. The analysis based on Sensex reveals the influence of stock prices on the exchange rate. By and large the study supports the influence of exchange rate on stock market prices, mixed results and impact of stock market prices on exchange rate at firms, industries and macro level respectively.

(xvi) In the case of firm level analysis, the relationship between the stock prices of the firms and the exchange rate satisfies the 'goods market approaches'. Mixed level results are revealed at the industry level analysis. Besides, the 'portfolio balance approach' is valid at the macro level. Therefore, it can be deduced that to a certain extent both the 'goods market approaches' and the 'portfolio balance approaches' are proved in case of industry level analysis. The
possible reason for the conflicting results of firm, industry and Sensex level may be due to the fact that in case of industry indices and Sensex both exporting and importing firms with different levels of exposures are taken in to consideration. The exchange rate exposure of both the exporting and importing firms can be cancelled each other and this will be reflected in the industry level analysis in the form of mixed relations between the exchange rate and the stock market price index. The liberalization of foreign exchange and investment policies, and the increased integration of the Indian economy with the world economy especially after the liberalization also may have different degrees of influence across firms, industries and sensex level.

(xvii) The results of correlation matrix reveal that company fundamental is not having high degree of correlation with the casual nexus between exchange rate and the stock prices.

Policy Implications

1. The present study shows that both the stock market and the foreign exchange market are integrated. Moreover, the impact of foreign exchange market on the stock market is very evident. If the financial markets are integrated the monetary policy may become speedy and effective. This is because, monetary policy has wide and multiple consequences. It is well known that a change in money supply and
inflation has impact on the exchange rate. Further, in emerging markets like India, stock market is influenced much by the exchange rate fluctuations. Therefore, government may take into consideration the movement of both the stock prices and the exchange rates while formulating the monetary policies.

2. The study manifests that both the stock market and the foreign exchange market are efficient in India during the liberalization period. Therefore, the present study strongly supports the continuation of the present policies such as the relaxation of foreign investment restrictions, allowing Indian Rupee to be determined by market forces etc. by the concerned authorities with respect to the stock market and the foreign exchange market.

3. Since the analysis reveals the influence of foreign exchange rate on the stock market at the firms level, the investors may take into consideration the impact of foreign exchange market on the stock market to reduce their risk and formulate the proper hedging strategies.

4. According to the present study the effect of foreign exchange market on the stock market at the firm level is very clear. Therefore, impulses in stock market may be affected by the impulses in foreign exchange market. Thus, impact of the foreign exchange market on the stock market can be used to predict the future trends of the stock market.
Future Agenda of Research

The agenda for future research in the present area are:

a) The impact of exchange rate on the conditional volatility of stock prices can be tested by employing recent methodologies such as ARCH and GARCH.

b) Since stock prices and exchange rates are highly volatile, very high frequency data series such as hourly data can be adopted for the further examination of the present kind of study.

c) Study can be conducted by adopting other hard currencies such as Pound Sterling, Deutsche Mark, French Franc, and Japanese Yen. This may throw light on the casual nexus between the foreign exchange market and the stock market that is sensitive towards the type of currency selected for the study.

d) Analysis may be performed by classifying companies and industries into different groups based on the per cent of their foreign exchange transactions to total sales. This will enable us to identify the degree of foreign exchange rate exposure is having any impact on the results of casual nexus between foreign exchange market and stock market.