

Impact of Financial Integration and Foreign Portfolio Investment on Stock Prices- Study of Indian Stock Market and Stock Indices

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ABSTRACT

Financial markets in developing countries have become integrated with the rest of the world. This paper seeks to examine the degree of integration of the Indian stock market with the rest of the world. First, it looks at the impact of foreign portfolio investment on stock price movements. Second, an attempt has been made to analyse whether the local index numbers showing the fluctuations of stock prices have moved in tandem with the major stock indices in the world.

Introduction to Portfolio Investment

Portfolio investment flows from industrial countries have become increasingly important for developing countries in recent years. The Indian experience has been no different. A significant part of these portfolio flows to India comes in the form of Foreign Institutional Investors' (FIIs') investments, mostly in equities ever since the opening of the Indian equity markets to foreigners.

While it is generally held that portfolio flows benefit the economies of recipient countries, policy-makers worldwide have been more than a little uneasy about such investments. Portfolio flows – often referred to as “hot money” – are notoriously volatile compared to other forms of capital flow. Investors are known to pull back portfolio investments at the slightest hint of trouble in the host country, often leading to disastrous consequences for its economy. They have been blamed for exacerbating small economic problems in a country by making large and concerted withdrawals at the first sign of economic weakness. They have also been held responsible for spreading financial crises – causing ‘contagion’ in international financial markets. In the wake of the Asian crisis, prominent economists have, for these reasons, expressed doubts about the wisdom of the IMF view of promoting free capital mobility among countries.

International capital flows and capital controls have emerged as an important policy issues in the Indian context as well. The danger of Mexico-style ‘abrupt and sudden outflows’ inherent with FII flows and their destabilizing effects on equity and foreign exchange markets have been stressed. Some authors

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have argued that FII flows have, in fact, had no significant benefits for the economy at large.

While these concerns are all well-placed, comparatively less attention has been paid so far to analyzing the FII flows data and their impact on the economy. The broad objective of this paper is to gain a better understanding of the relationship between FII flows and the stock market returns in India with a close look at the issue of causality.

Background of Foreign Institutional Investments

International portfolio flows, as opposed to foreign direct investment, are liquid in nature and are motivated by international portfolio diversification benefits for individual and institutional investors in industrial countries. They are usually undertaken by institutional investors like pension funds and mutual funds. Such flows are, therefore, largely determined by the performance of the stock markets of the host countries relative to world markets. With the opening of stock markets in various emerging economies to foreign investment, investors in industrial countries have increasingly sought to realize the potential for portfolio diversification that these markets present. While the Mexican crisis of 1994, and the widespread ‘Asian crisis’ have had temporary dampening effects on international portfolio flows, they have failed to counter the long-term momentum of these flows. Indeed, several researchers have found evidence of persistent ‘home bias’ in the portfolios of investors in industrial countries in the 90’s. This ‘home bias’ – the tendency to hold disproportionate amounts of stock from the ‘home’ country – suggests substantial potential for further portfolio flows as global market integration increases over time.

It is important to note that global financial integration, however, can have two distinct and in some ways conflicting effects on this ‘home bias’. As more and more countries – particularly the emerging markets – open up their markets for foreign investment, investors in developed countries will have a greater opportunity to hold foreign assets. However, these flows themselves, along with greater trade flows will tend to cause different national markets to increasingly become parts of a more unified ‘global’ market, reducing their diversification benefits. Which of these two effects will dominate is, of course, an empirical issue, but given the extent of the ‘home bias’ it is likely that for quite a few years to come, FII flows would increase with global integration.

Foreign Institutional Investment in India

India opened its stock markets to foreign investors in September, 1992 and has, since 1993, received a considerable amount of portfolio investment from foreigners in the form of Foreign Institutional Investor’s (FII) investment in equities. This has become one of the main channels of international portfolio investment in India for foreigners. In order to trade in Indian equity markets, foreign corporations need to register with the SEBI as Foreign Institutional Investors (FII). SEBI’s definition of FIIs presently includes foreign pension funds, mutual funds, charitable/endowment/university funds etc. as well as asset management companies and other money managers operating on their behalf.

FII regulations by the SEBI were first introduced on November 14th, 1995, in the form of the SEBI FII

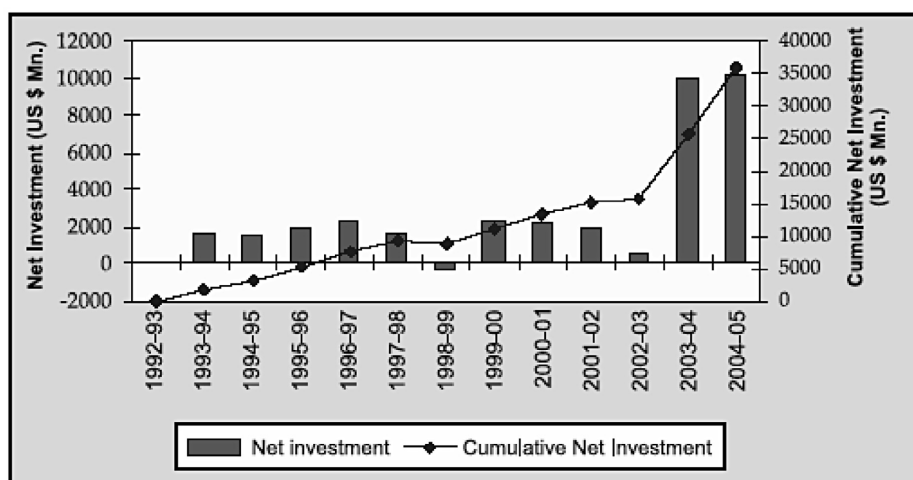
Regulations. Over the years, the SEBI and the RBI together, through a variety of measures, have been trying to improve the scope, coverage and quality of FII investment. These measures include:

- (a) widening the array of instruments in which FIIs are allowed to trade
- (b) expanding the list of the types of funds that can be registered as FIIs in India and the entities on behalf of whom they can invest
- (c) raising the caps for FII investment in different sectors and companies
- (d) easing the norms for FII registration, reducing procedural delays, lowering fees, etc.
- (e) mandating stricter disclosure norms, etc.

By March 2005, over 685 FIIs were registered with SEBI. The total amount of FII investment in India had accumulated to a formidable sum of over US \$ 35,000 million during this time (see Fig. 1). In terms of market capitalization too, the share of FIIs has steadily climbed to about 9% of the total market capitalization of BSE (which, in turn, accounts for over 90% of the total market capitalization in India).

The sources of these FII flows are varied. The FIIs registered with SEBI come from as many as 28 countries (including money management companies operating in India on behalf of foreign investors). US-based institutions accounted for slightly over 41%, those from the UK constitute about 20% with other Western European countries hosting another 17% of the FIIs (see Fig. 2). It is, however, instructive to bear in mind that these national affiliations do not necessarily mean that the actual investor funds come from these particular countries. Given the significant financial flows among the industrial countries, national affiliations are very rough indicators of the 'home' of the FII

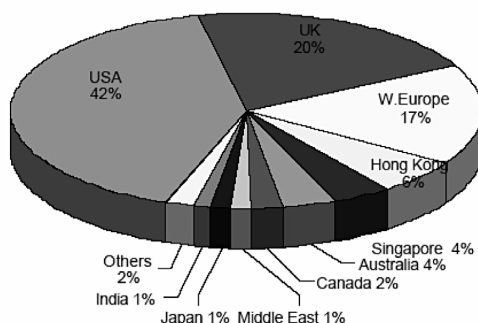
Figure 1: Trends in FII Investment



Investments. In particular institutions operating from Luxembourg, Cayman Islands or Channel Islands, or even those based at Singapore or Hong Kong are likely to be investing funds largely on behalf of

residents in other countries. Nevertheless, the regional breakdown of the FIIs does provide an idea of the relative importance of different regions of the world in FII flows.

Figure 2: Sources of FII



Objectives of Research

In this part of the report an attempt is made to study the impact that the flow of FII's in India has on Indian stock market. The subsequent sections of the report attempt to build a model which predicts the value of Indian stock market using the FII flows and attempts to see how much of the variability can be explained using the model. The hypothesis that is being used for the purpose of this analysis is:

“The FII flows have a significant impact on the Indian Stock Market”

Data for research

To carry out the analysis and determine the possible correspondence between the variables under study, the data for BSE Index and net FII flows as reported by SEBI is being used. To ensure that the analysis is comprehensive in nature, the period for which data is being used is from 1st January, 1999 to 14th March, 2006. Moreover the data being used are daily data. A brief description of the data sources used are as follows:

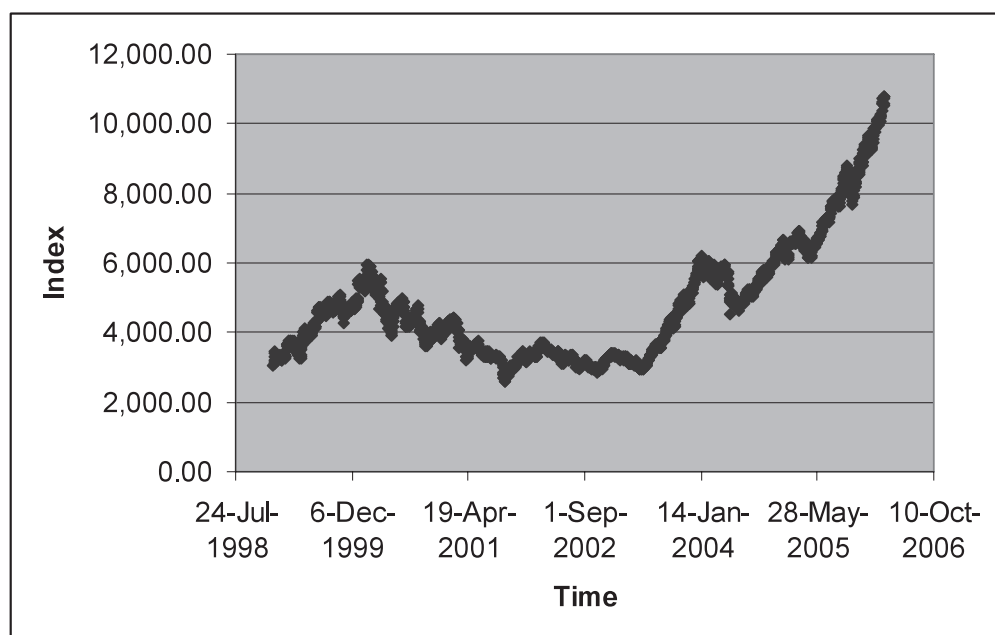
1. Indian Stock Market : BSE Sensex

The BSE SENSEX, regarded to be the pulse of the Indian stock market, is the oldest index in the country from the premier Mumbai (Bombay) Stock Exchange that pioneered stock broking activity in India. First compiled in 1986, SENSEX is a free-float market capitalization based index estimated from a basket of 30 constituent stocks representing a sample of large, liquid and representative companies. The constituent stocks are from a wide range of sectors such as Auto, Banking, Cement, Energy, Information and Entertainment, Oil and Gas, Pharmaceuticals, etc. The Index Cell of the exchange does the day-to-day maintenance of the index within the broad index policy framework set by the Index Committee. The Index Committee of the Exchange consists of experts on capital markets from all major market segments, including academicians, fund-managers, finance-journalists, market participants, Independent Governing Board members, and Exchange administration. Scrip selection takes into

account a balanced representation of the listed companies in the universe of BSE and the indexed companies should be leaders in their industry group. The scrip should have a listing history of at least one year on the BSE, figure in the top 100 companies listed by full market capitalization, have a weight of at least 0.5 per cent of the index and very high liquidity as measured by Trading Frequency, Average Daily Trades and Average Daily Turnover. The base period of SENSEX is 1978-79 and the base value is 100 index points.

The data on this variable were collected for the period from 1st January, 1999 to 14th March, 2006. The sensdex has really taken off since the IT bubble burst in the period of year 2000 and has crossed the benchmark figure of 10,000. A representation of the volatility of the market during the chosen period is given below.

Figure 3: : BSE Sensex



For the purpose of research study, we are not using the absolute value of the index. Rather the study is based on the relationship between the FII flow and the return on the market which is computed as the percentage change of the market index.

2. Foreign Institutional Inflow

FII flows to India formally began in September 1992 under the foreign portfolio investment (FPI) scheme, when the *Guidelines for Foreign Institutional Investment* were issued by the Government of India. In November 1995, the Securities and Exchange Board of India (SEBI) enforced the Securities and Exchange Board of India (Foreign Institutional Investors) Regulations, 1995, (henceforth, referred to as SEBI FII Regulations) to regulate matters relating to FII investment flows. At present, investment

by FIIs is jointly regulated by this and Regulation 5(2) of the *Foreign Exchange Management Act* (FEMA), 1999. The SEBI regulations require FIIs to register with the SEBI and also obtain approval from the Reserve Bank of India (RBI) under the FEMA for securities trading, foreign currency operations and rupee bank accounts and remitting and repatriating funds. In the entire process of FII registration and regulation, the SEBI acts as the nodal authority. The FII inflow data used for our analysis has been obtained from the data provided by SEBI.

It may be noted that since variation of FII flows is essentially a short run phenomenon, ideally a high frequency data set (say, daily data) on FII flows should be used for studying the impact of policy changes. As daily data on FII flows to India are available only for the period from January, 1999 onwards, we have limited most of our analysis to the post-1998 years as use of averaged monthly data could blur the true effects of FII policy changes on the FII flows.

The data are available in the form of daily figures and include both debt and equity components. The purchase and sales figures for both the categories are also available, but for the purpose of the analysis the net figures have been used. The variations of these net flows are summarized in the following graph. The descriptive statistics for the FII flows can be summarized as follows:

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
EqNet	1780	5621.80	-2131.30	3490.50	89.0060	253.17682	64098.50
Valid N (listwise)	1780						

This shows that on an average, the FII flow per day is in the range of Rs. 89 million. However there is a wide deviation in this flow, with the minimum flow in a day being -2131.3 million while the maximum is 3490.5 million.

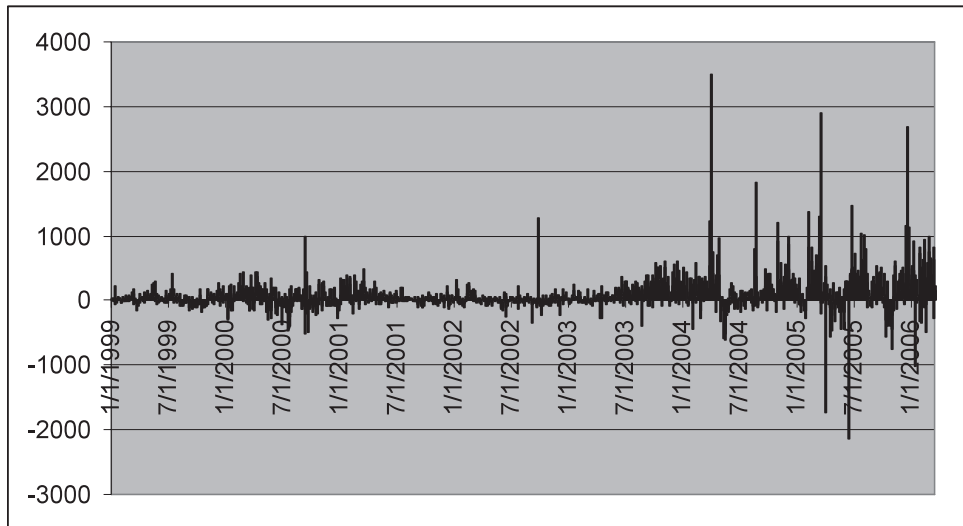


Figure 4 : FII Investments in India

Analysis of Data

The collected data for the period of over six years were analyzed through the use of a number of statistical analysis techniques. A scatter plot attempting to capture the relationship between the return on the stock market index and the FII flow is shown in Figure 5. A preliminary analysis of the same, shows that there is not much of a relationship between the two variables.

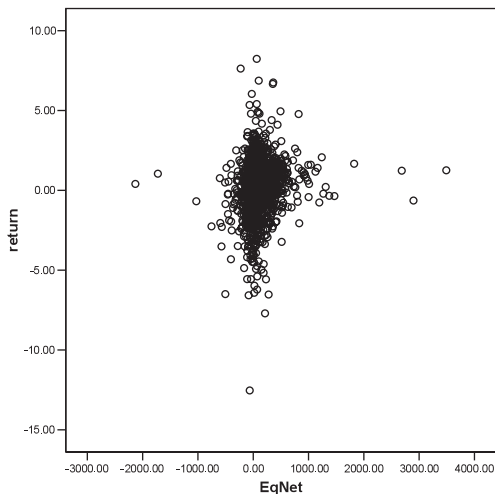


Figure 5 : Plot of Return Vs. Net FII flow

Correlation

Correlation is a tool which is used to determine the amount of the variation of one variable which can be explained by another variable. Higher the value of the correlation coefficient, higher is the amount of

variation explained. We performed this test on the data and the result obtained was:

		return	EqNet
return	Pearson Correlation	1	.152(**)
	Sig. (2-tailed)		.000
	N	1765	1759
EqNet	Pearson Correlation	.152(**)	1
	Sig. (2-tailed)	.000	
	N	1759	1780

It can be seen from the output of SPSS, the value of the correlation coefficient is **0.152** which is significant at 0.01 level of alpha. This means that there exists some degree of correlation between the stock market returns and the FII inflows. It also indicates that FII is able to account for close to 1/6th of the total variation of the stock market. Given the huge turnover in the stock markets, this would mean that FII's play a crucial role in the Indian stock markets.

Regression

Regression is used to build a model for predicting one of the variables with the help of other variables which are assumed to be independent. For the purpose of the study, the return on the stock market was assumed to be the dependent variable, while the net FII flow was assumed to be the independent variable. The regression model was then prepared. The results of both the models are explained below:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.152(a)	.023	.022	1.56713

The coefficient of determination for the model comes out to be in the range of .023. This is a rather low value for the same and would mean that FII alone is not able to explain the greater part of the variation in the returns. Other parameters of the model are:

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.025	.040		-.629	.530
	EqNet	.001	.000	.152	6.433	.000

The equation that was obtained for this model is:

$$\text{Returns} = -0.025 + 0.001 * (\text{Net FII Flow})$$

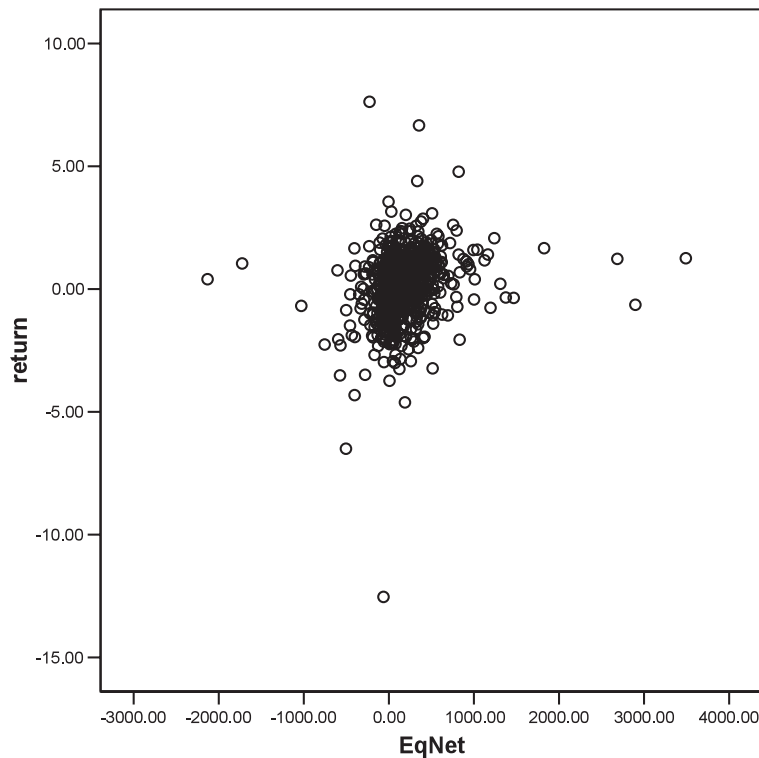
This means that without any FII investment, the Indian stock market showed a negative return of -0.025%. However this return scenario improved by .001 percent for every Rs. 1 million increase in the FII inflow. This means that for a positive return from the Indian market a minimum FII investment of about 2.5 million rupees is needed per day.

Analysis of Data from January, 2004

As the amount of variation obtained was not very significant, an attempt was made to study the equivalent data over the last couple of years. The results obtained in this case were:

Scatter Plot

The scatter plot is shown below. There appears to be a slightly higher degree of relationship in this case than in the previous one but still much noise. This can be deduced from the slightly less random structure of the plot.



Correlation

When the data for the reduced period were analysed, they showed an improved correlation coefficient (of **0.213**).

		return	EqNet
return	Pearson Correlation	1	.213(**)
	Sig. (2-tailed)		.000
	N	781	776
EqNet	Pearson Correlation	.213(**)	1
	Sig. (2-tailed)	.000	
	N	776	789

That is an improvement of over 40% in the correlation coefficient. This means that in the last 2 years, the FII has been having an increasing influence on the Indian stock market. Moreover, the amount of variability explained has risen to 1/5th of the total variance. This is again a very significant figure by any standard.

Regression

The model build was:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.213(a)	.045	.044	1.30225

Thus the coefficient of determination has also risen to 0.045. Although this is still not very significant, but it still shows a significant increase in the influence of FII's over the last couple of years.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.025	.040		-.629	.530
	EqNet	.001	.000	.152	6.433	.000

The equation that was obtained for this model is:

$$\text{Returns} = 0.004 + 0.001 * (\text{Net FII Flow})$$

This means that even without any FII investment, the Indian stock market would have shown a positive return of 0.004%. Moreover this return scenario improved by .001 percent for every Rs. 1 million

increase in the FII inflow.

Observations

From the above analysis, the observations that can be made are that the FII flows account for close to 1/6th of the total variation in the Indian stock market. Although this figure is not statistically significant, considering the volumes of transactions that take place in Indian stock market, one can conclude that FII are able to account for a significant portion of the total variance in the Indian Stock markets.

Another observation that can be made from the above data is the large amount of variability in the FII flows. It shows a range of over Rs. 5000 million in daily flows. This supports the argument that FII investment is “hot money”. Due to the liquidity of the market, it can be withdrawn at very short notice. These withdrawals would throw the markets into a downward spiral, recovery from which could take a toll on the Indian economy. Thus an attempt must be made by the government to regulate these FII flows in order to avoid such a situation.

Has Indian Stock Markets been affected by Globalization ?

One outcome of the efforts of the Indian government at liberalizing the country’s capital market has been the increased integration of the Indian stock market with international markets, through various channels such as foreign portfolio investments (FII investments) in Indian stock markets and the ADR/GDR route, whereby Indian shares are listed and traded on the US and other international stock exchanges.

This study examines the interlink/age between the Indian stock market and the major stock markets in Asia, and also the linkages of Asian with the US stock markets. Any short-term linkages between the stock prices/returns of various countries are reflected in their behavioral trends over a period of time. There is a large body of financial literature which studies the existence of interlink/ages among international capital markets since such linkages have serious effects on portfolio diversification as well as macroeconomic policies of the countries concerned. International capital market relationships also have important implications for macroeconomic policies that influence trade and fiscal balances of countries and the financial policies of different agents within the capital-importing economy. In a country like India where the stock market is undergoing significant transformation as a result of liberalization measures, an analysis of the nature of integration with other developed and regional emerging markets would not only give an idea of the possible gains to be reaped from portfolio diversification in the Indian market, but may also provide some indication of the vulnerability of the country’s stock market in case of regional financial crises and consequent reversals of capital flow from the region.

Studies on Asian Stock Market Interlinkage

The integration of global equity markets has been a well studied topic particularly since the stock market crash of October, 1987. Though most of the studies had initially been conducted for developed

markets in the US, European countries and Japan, recently, post-Asian crisis, the literature has started focusing on emerging Asian markets as well. Quite a few papers address the issue of capital-market integration in emerging economies in the Asia-Pacific basin, with evidence of mixed results, depending on the method, data, time period and/or framework used.

The US stock market is proven to have a significant influence on the Asia-Pacific markets and the integration is shown to have started after the stock market crash of 1987 and/or the Gulf War of 1991. Studies also show that though US markets undoubtedly played a role in the integration of Asian markets, the Japanese market played a more significant role. However, neither Japan nor the US had any unique influence in the integration of Asian stock markets, as markets could be co-integrated both with and without influences from these countries. Some Asia-Pacific markets are found to be individually co-integrated with either the US or Japanese stock markets, while others are not cointegrated with either. Other studies indicate that equity indices for Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand were jointly cointegrated through the 1990s with and without the US influence.

There is an overall increase in correlation coefficients from the pre-crisis to the post-crisis period. However, unlike results from short-run tests, the above study rules out the existence of a long-term equilibrium trending relationship among East Asian stock markets. The findings also show that Japan has no influence in the integration of markets both pre- and post-crisis. Analysis of stock market linkages in these emerging markets suggests that international investors have enough opportunities for portfolio diversification by investing in most of the Pacific Basin countries. For the open economies, although the linkages have increased since the late 1990s, there is still room for long-term gains by investing in these markets, as these markets are not expected to move in perfect cohesion in the long term. For the semi-open economies, although long-term diversification benefits from exposure to these markets might be limited in view of stronger integration between them, certain transitory benefits be may be reaped due to short-term volatilities in prices.

Analysis of Historical Data

In this section an attempt is made to study the historical data of stock indices around the world and to find some sort of relationship between them. For the purpose of the analysis, the daily data on indices has been collected from the period of January, 1990 till March, 2006. The indices which have been considered with a short description are:

- **NSE Sensex (India)**
- **S&P 500 (US)**
- **Nikkei 225 (Japan)**
- **HangSeng (Hong Kong)**

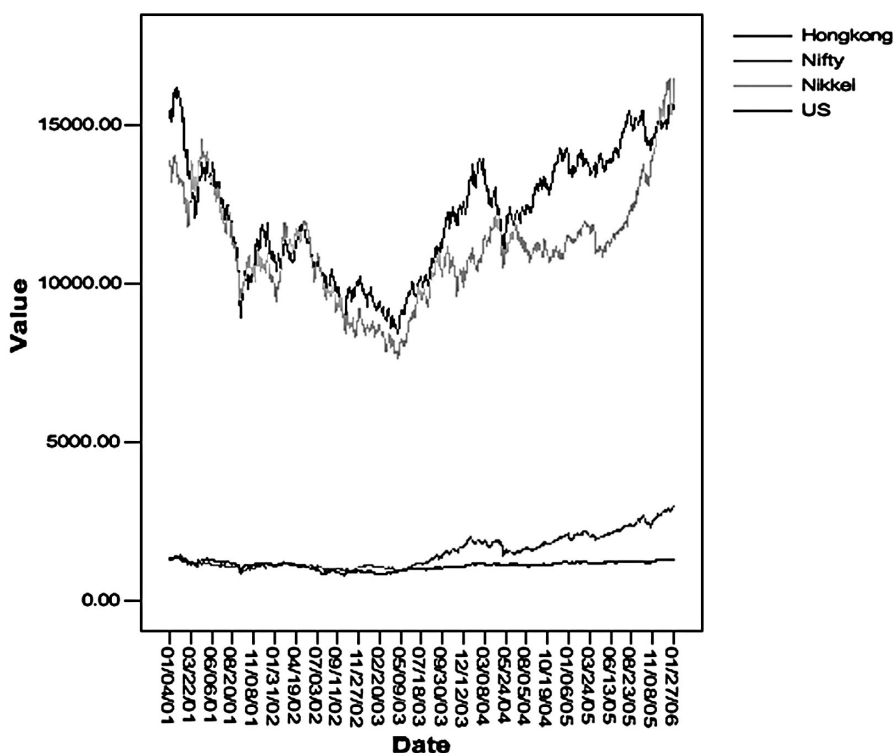
The analysis here is carried out in two parts. First of all the data from 1991 are taken into consideration. However in the second section, only the data after the tech bubble burst, i.e from year 2001 are taken into consideration. The reason for this bifurcation is that the 2001 crisis had a deep impact on Asian

economies, which changed their interrelationships to a large extent. An attempt has been made to draw out this change in dependencies.

From 1991 to 2006

In this analysis only the dates for which data on all the indices were available were considered for analysis. A representative movement of the indices against each other over the period can be seen with the help of the following graph. Some initial observations that can be made with the help of the graph are that:

- There seem to be a significant number of dependencies among the various indices since apart from the daily fluctuations, they seem to be following same long term general direction.
- In the initial period the Nikkei appears to be negatively correlated with the other indices. This was the case due to the recession that hit the country in the 1990's. However as we can see, the economy seem to be reviving in the later half of the period.



In order to further substantiate these claims, a further analysis was carried out to determine the correlation between the indices over the entire period. The results were obtained in the form of a matrix, shown on the following page. The observations that can be made from the same are:

- The Indian index, NSE, has a strong positive correlation (of the order of 0.709), with the Hongkong index. This indicates a significant amount of dependency on the Hongkong index.
- It also has a correlation, although to the lower level 0.591, with the US index. This indicates

that US markets also have significant degree of influence on the Indian markets.

- There is a negative correlation between Indian and Japanese market. This was probably due to the economic recession in Japan.

		Hongkong	Nifty	Nikkei	US
Hongkong	Pearson Correlation	1	.709(**)	-.338(**)	.802(**)
	Sig. (2-tailed)		.000	.000	.000
	N	3157	3157	3157	3157
Nifty	Pearson Correlation	.709(**)	1	-.438(**)	.591(**)
	Sig. (2-tailed)	.000		.000	.000
	N	3157	3157	3157	3157
Nikkei	Pearson Correlation	-.338(**)	-.438(**)	1	-.553(**)
	Sig. (2-tailed)	.000	.000		.000
	N	3157	3157	3157	3157
US	Pearson Correlation	.802(**)	.591(**)	-.553(**)	1
	Sig. (2-tailed)	.000	.000	.000	
	N	3157	3157	3157	3157

From the above data, it can be seen that there is a significant correlation between the indices. This suggest that it is possible to predict the Indian index on the basis of these indices. We made an attempt to build such a model by using the technique of regression analysis. The following result was obtained:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.709(a)	.502	.502	316.54911
2	.739(b)	.547	.546	302.05111
3	.744(c)	.553	.552	300.06244

This model was constructed by entering data on the other three indices. As can be seen, the amount of variability that can be explained by this model is 0.744 of the total variability of NSE index. This variation is quite significant, thus indicating an interlinkage between the global stock indices. Other parameters that were obtained from the model helped in forming the following regression equation:

$$NSE = 733.8 + 0.099 * HangSeng - 0.028 * Nikkei - 0.195 * (S\&P 500)$$

This means that for every one unit change in the Hongkong index, the NSE moves by 0.099 units, while for every one unit decrease in the Nikkei and S&P500, NSE increases by .028 and 0.195 units respectively.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	153.899	19.112		8.052	.000
	Hongkong	.095	.002	.709	56.395	.000
2	(Constant)	632.860	32.709		19.348	.000
	Hongkong	.085	.002	.633	49.674	.000
3	Nikkei	-.023	.001	-.225	-17.639	.000
	(Constant)	733.878	35.965		20.405	.000
	Hongkong	.099	.003	.738	36.150	.000
	Nikkei	-.028	.001	-.273	-18.648	.000
	US	-.195	.030	-.151	-6.553	.000

To try to build a better model for the same, we built another model after removing the constant for the equation. In this case, the model obtained was:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.968	.936	.936	319.73473
2	.968	.936	.936	319.34361

It can be seen that the predictability of the model further increased with the above analysis, thus leading to more precise prediction of the same. The other parameters of the model are:

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Hongkong	.108	.001	.968	215.252	.000
2	Hongkong	.102	.002	.908	43.671	.000
	US	.081	.027	.061	2.956	.003

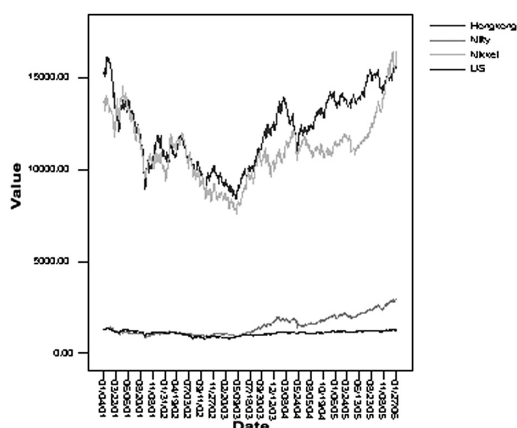
From the above data, the equation for the prediction is now transformed to:

$$NSE = 0.102 * HangSeng + 0.081 * (S\&P\ 500)$$

An important observation in this case is that the Nikkei no longer remains a significant predictor of the NSE. This may be because of the fact that Japan was hit by a recession in the early 90's. This led to a movement of the Nikkei, independently of other indices. This made Nikkei as a predictor of other indices around the world.

From 2001 to 2006

In this section, the historical data after the Asian crisis and the tech bubble burst are analyzed. The rationale behind this is that many changes have taken place in the world economy since the Asian crisis, which has altered financial markets for a long time to come. These changes would only be evident in this series period rather than over the entire 15 year period. The movement of indices over this period, is seen in the following results,



An Important observation that can be derived from these data is that all the indices show a similar movement. Even the Nikkei has come back into its own and is moving along with the world markets. To further accentuate these observations, we determined the correlations between the indices. The results obtained are:

		Hongkong	Nifty	Nikkei	US
Hongkong	Pearson Correlation	1	.800(**)	.837(**)	.892(**)
	Sig. (2-tailed)		.000	.000	.000
	N	1105	1105	1105	1105
Nifty	Pearson Correlation	.800(**)	1	.607(**)	.595(**)
	Sig. (2-tailed)	.000		.000	.000
	N	1105	1105	1105	1105
Nikkei	Pearson Correlation	.837(**)	.607(**)	1	.853(**)
	Sig. (2-tailed)	.000	.000		.000
	N	1105	1105	1105	1105
US	Pearson Correlation	.892(**)	.595(**)	.853(**)	1
	Sig. (2-tailed)	.000	.000	.000	
	N	1105	1105	1105	1105

In the above matrix, there appears to be a strong correlation between all the indices. Specifically, the correlations of the NSE with these indices are 0.800 for the Hangseng, 0.607 for the Nikkei and 0.595 for the S&P 500. It means that they all move together in the same direction. Based on this observation we again made an attempt to create a model for predicting the NSE from the other stock indices. The results obtained were as follows:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.974	.949	.949	358.11079
2	.984	.969	.969	281.89970

The coefficient of determination for this model is 0.969, thus indicating that the model can account for a large amount of deviation in the dependent variable, i.e. the NSE index. This means that the NSE index in the period has become more dependently linked to these global indices than in the past. Other parameters of the model reveal the following model for predicting NSE dex value.

$$NSE = 0.362 * HangSeng - 0.2.632 * (S\&P\ 500)$$

Note that the negative value for US index is not due to its negative correlation, but rather to the very high correlation between the Hongkong and US markets. The parameters of the model are specified below.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Hongkong	.126	.001	.974	143.958	.000
2	Hongkong	.362	.009	2.799	39.845	.000
	US	-2.632	.101	-1.830	-26.050	.000

Conclusion

This study has looked at the integration of the Indian stock market with some major Asian markets and the US stock market over a period when much of the Indian market movements were perceived to be induced by FIIs, which continually move funds across global markets in search of the best possible returns. The series of daily stock prices, for Asian markets and the US, were analyzed. Overall, it was found that following the post-Asian crisis up to mid-2004, the Indian stock market certainly did not function in relative isolation from the rest of Asia, and the US. Stock returns in India were highly correlated with returns in major markets such as Hong Kong. Though the lowest correlations are observed with the US and Japanese returns, the connection with the US market seems to arise through other Asian markets having had close linkages with markets in both the US and India. Considering the role of information leadership between markets, stock returns in India in recent times have been led by major stock index returns in the US as measured by the DJIA and the S&P500, the Japan markets, as

well as other Asian markets such as those of Hong Kong. A key aspect to note is that FII investments are “hot money”. Due to the liquidity of the market, these can be withdrawn at very short notices. Any withdrawal would throw the markets into a downward spiral, recovering from which could take toll on the Indian economy. Thus an attempt must be made by the government to regulate FII flows to avoid such a situation. More importantly, returns on the Indian BSE Sensex were also seen to exert some influence on stock returns in major markets such as Japan and Korea, along with Taiwan and Malaysia. This implies that any drastic reversal in the performance of the Indian market could well lead to fall in prices/returns in other major markets too.

Further, despite existing restrictions on capital flows, the Indian market is seen to belong to the group of Asian markets cointegrated within themselves and with the US market. As for India’s role in the integration of stock markets, there is significant evidence that India has played a unique role in the integration of major Asian markets in recent times. These results are in fact in line with studies which have found that capital market liberalisation is not the sole condition for close international financial market linkages. Other factors such as information availability, accounting standards, investor protection and liquidity, political or currency risks might exert an important effect on the degree to which a country’s stock market is integrated with global markets.

Consequently, solely from the point of view of market integration, there is still much scope for reaping benefits of portfolio diversification by investing in emerging Asian and Indian markets. As integration of these markets is still partial, it leaves sufficient room for switching between mature markets like the US or Japan and the emerging Asian markets, including India. Since the Indian market is also not perfectly integrated with any of the other Asian markets with which it has close links, it implies that FII portfolio inflows to India are not constrained by the extent of its integration with other regional markets. Further improvements in trading and legal infrastructures in the stock market could help to divert more FII funds into the country and ensure the sustainability of such inflows.

References

- ❖ Working of the Stock Exchange, Mumbai – S. T. Gerela, BSE Training Institute, Mimeo
- ❖ Economic Survey 2004-05, Chapter 4, Securities Market, Government of India
- ❖ Options and Futures in an Indian Perspective – D.C. Patwari
- ❖ Derivatives Markets in India – Tata Mc Grawhill Series. Editor Dr. Susan Thomas IGIDR, Mumbai.
- ❖ SEBI Annual Report, Various issues
- ❖ Capital Market – Magazine Various Issues
- ❖ Business Standard (June 2001 and October 2002)
- ❖ The Week – India’s No. 1 Weekly Magazine – August 2001
- ❖ L.C. Gupta Report on Derivative Trading
- ❖ Ajay Shah writing for the mass media (1997) – “Equity Derivatives -an interview” which appeared in Business Standard on 15 September 1998. kw - L. C. Gupta committee, index

futures, policy problems.

- ❖ Justin Paul (1999): Financial Derivatives- New Saga of Business, Development Review, University of Calicut Journal
- ❖ Justin Paul (2006): Capital and Stock Indicators, Chapter in Business Environment , McGraw-Hill

Internet:

www.karvy.com/drvtives/drvinindia.html
www.icfaipress.org
www.bseindia.com
www.nseindia.com
www.wikipedia.com
www.nasdaq.com
www.bigcharts.marketwatch.com
www.sebi.gov.in
www.imf.org