RELATIONSHIPS AMONG FOREIGN INSTITUTIONAL INVESTMENTS, STOCK RETURNS AND CURRENCY CHANGE-OVER RATES IN INDIA

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ABSTRACT

India from a conservative macroeconomic policy has gradually shifted focus towards attracting foreign capital. From September 14, 1992, with suitable controls, it allowed foreign investors to invest in primary and secondary capital markets in India and foreign funds started flowing from the year 1993. Foreign Institutional Investments has steadily grown from $11,268 million in March 2000 to $62,464 million in July 2009. Foreign fund flow increases demand for good stocks causing upward movement in stock prices. Currency changeover rates also influence foreign investments as Foreign institutional investors calculate returns in foreign currencies. In this study, we explored relations between foreign investment in India with that of stock prices in the domestic market and domestic currency changeover rates. Using daily data for the period January 2000 to July 2009, the study examined cause-effect relations and long-term relations among the series. Most of the studies in Indian market reported that domestic stock returns attract foreign fund flows but foreign flows do not cause stock returns in India. The results of this study using data for past nine and half years however detected bidirectional causality.

JEL: E44; G15

KEYWORDS: Causality, Cointegration, Foreign Institutional Investment

INTRODUCTION

Over the past few years, India has become a favored destination of global investors' stock investment. Foreign investments in India comes into two types: investment by foreign institutional investors (FII) made in secondary financial markets and foreign direct investment (FDI). In developing countries, enough capital is not readily available for expansion or developing new projects and thus foreign investment becomes a major source of funding for financing assets. Foreign investments made in secondary markets adds depth and liquidity to secondary markets. Further, there is an increased demand for foreign exchange in developing economies. Flow of foreign money provides much-needed foreign exchanges for the economy.

Foreign investments adds to domestic investment without increasing the foreign debt of the country. Foreign investments may perhaps increase stock prices, reduce cost of capital, and encourage investment by Indian firms. Foreign investors also speed up domestic reforms towards improving the market design of the securities markets, and strengthen corporate governance.

Currency changeover rates also influence foreign investments in domestic markets. FIIs calculate returns in foreign currency thus; return in dollar terms depends on the return on their investment in rupee terms and the currency changeover rate of the rupee and dollar. Depreciation of the rupee in the currency market can decrease return of foreign investor. For example, a 10 percent rupee return with a 5 percent depreciation of the rupee results in an effective dollar rate of return of about 5 percent. In the same way, a low rupee rate of return can be attractive in dollar terms if the rupee increases against the dollar. Therefore, FII investments are likely to go up (down) when there are prospects of domestic currency appreciation (depreciation). The objective of the study is to capture relations among FII investment, stock prices and exchange rates.

The remainder of the paper is organized as follows. Section 2 describes flow of foreign investments in India. Section 3 surveys the literature on how flows of foreign money influence domestic stock prices.

Section 4 describes methods used and draws a 'vector error correction model' using data from the year 2000 onwards and finally, section 5 provides some concluding comments.

FII INVESTMENT IN INDIA

India is the fifth largest economy in the world and has the third largest GDP in the continent of Asia based on purchasing power parity. It is also the second largest among developing nations and one of the few markets in the world, which offers high prospects for growth and earning potential in almost all areas of business. European investors believe that India is a good investment destination despite political turmoil, bureaucratic hassles, shortages of power and infrastructural bottlenecks.

Before 1980s, achieving self-reliance and reducing dependence on imports was the development approach of India. Debt and development aid provided fund needs for meeting budget shortfalls. It discouraged foreign investment or private commercial flows. Reforms introduced in the early 1990s, caused a gradual shift towards attracting foreign capital. From September 14, 1992, with suitable controls, foreign institutional investors (FIIs), nonresident Indians (NRIs), and people of Indian origin (PIOs) can invest in the primary and secondary capital markets in India through the portfolio investment scheme (PIS). Under this scheme, FIIs and NRIs can buy shares and debentures of Indian companies through Indian stock exchanges. Before investment, foreign investors need to register themselves in the country. The Government stipulates certain guidelines and eligibility conditions for registration. The Securities and Exchange Board of India announced the guidelines for registration. Table 1 given below shows the number of FII registered in India from 1992 onwards.

Table 1: Number of FII Registered in India

Financial Year	Total FII registered
1992-93	0
1993-94	3
1994-95	156
1995-96	353
1996-97	439
1997-98	496
1998-99	450
1999-00	506
2000-01	528
2001-02	490
2002-03	502
2003-04	540
2004-05	685
2005-06	882
2006-07	997
2007-08	1319
2008-09	1635
2009-10 (till July '09)	1679

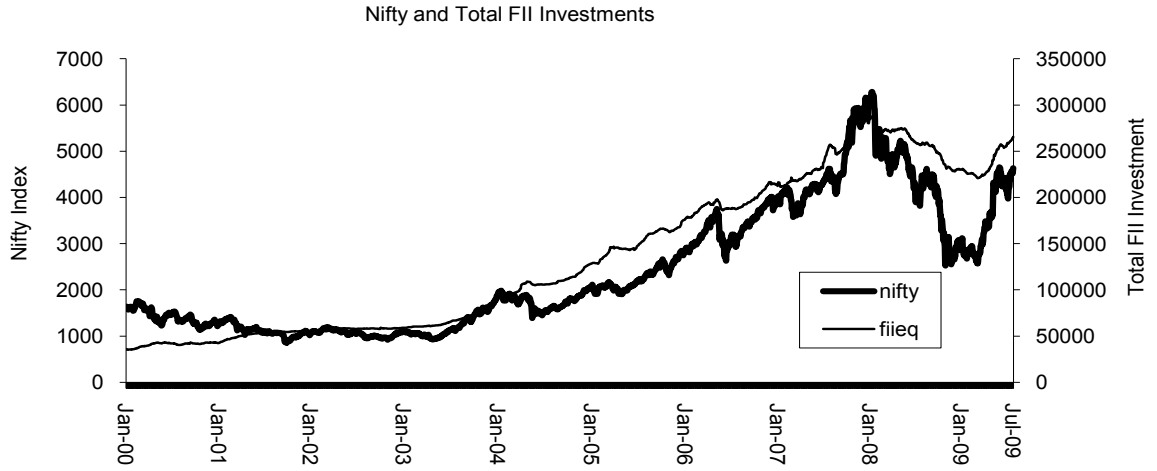
The table provides the number of foreign investors registered and allowed to invest in India according to Securities and Exchange Board guidelines. Number of FII registered in India has shown steady growth over the years. Data used in the table is available at the website of Securities and Exchange Board of India.

Investment through FIIs started flowing from January 1993. To increase and diversify the FII base, the government extended eligible categories of FIIs in the year 1996. They also gradually increased overall investment limits by FIIs, as also the types of instruments in which the FIIs can invest. Initially, FIIs could invest only in stocks, but from 1997 onwards, FIIs can invest in debt instruments having an upper limit of 30% of their investment. FIIs can also declare itself as a 100% debt FII. In March 1998, the Government accepted the L C Gupta Committee Report on Derivatives trading and allowed FIIs to buy and sell derivatives traded on stock exchanges. At the same time, the government simplified registration procedures and took steps to promote better exchange of information. It also allowed FIIs to invest in Commercial Paper from 2001.

The FIIs investing in Indian stock need to follow certain quantitative limits. The ceiling for overall investment for FIIs is 24 percent of the paid up capital of the Indian company and 10 percent for NRIs and PIOs. The limit is 20 percent of the paid up capital in public sector banks, including the State Bank of India. The ceiling for FII investment can further go up to a ceiling determined for each sector, subject to the approval of the board and the general body of the company passing a special resolution. In addition, the ceiling of 10 percent for NRIs and PIOs can increase to 24 percent subject to the approval of the general body of the company passing a resolution.

FII investment has steadily grown from $11,268 million in March 2000 to $62,464 million in July 2009. However, with the onset of global downturn in early 2008, the FII investment has started decreasing as FIIs began withdrawing from Indian markets. FII investment dwindled from the peak figure of Rs. 288,070 crore in 10th January 2008 (when Nifty stock index was 6,156.95) to Rs 220,931 crore in 13th March 2009 when Nifty index had fallen to a recent low of 2,719.25. With later upward correction of stock index, FII investments have started growing and at the end of July 2009, FII investment stood at Rs. 265,530 crore (at which time the Nifty index was 4,636.45). Figure-1 shows closing values of the Nifty Index and total FII investment for the period January 2000 to July 2009. The figures shows the relationship between flow of foreign funds and stock price movements. Table 2 presents year wise growth of FII capital flow in portfolio investment in India.

Figure-1: Nifty Index Movement and Total FII Investment in India



The figure shows total FII investment in India and movement of Nifty stock index from January 2000 to July 2009. The figures show association of flow of foreign funds and movement of stock prices. FII investment increased steadily until Jan 2008 but started declining when stock prices fell because of global meltdown in January 2008.

Table 2: Total FII Investment in India

Financial Year	Rs. crore	US ($) million
1999-00	39643	11268
2000-01	49849	13490
2001-02	57922	15186
2002-03	60449	15714
2003-04	100408	24465
2004-05	144529	34405
2005-06	193329	45404
2006-07	218565	50992
2007-08	271969	64235
2008-09	224263	53911
2009-10 (till July '09)	265784	62464

The table gives total foreign investment made in India after withdrawal of controls on foreign investments. One crore = 10 million. Data used in the table is available at the website of Securities and Exchange Board of India.

LITERATURE SURVEY

A few studies reported relations between FII investment and stock market responses in developing economies. Bohn and Tesar (1996) found that increase in US foreign investments and changes in the portfolio handled by US investors determine the consistency of investor behavior with the accepted models of international portfolio choice. By creating a model that uses data on foreign equity transactions and returns on investment, they find that buying behavior depends on more on investment opportunities in the developing world than the need to preserve balanced investments. Brennan and Cao (1997) developed a model of international equity portfolio investment flows based on differences in informational endowments between foreign and domestic investors. They found that domestic investors have an information advantage over foreign investors about their domestic market. Foreign investors buy foreign assets when the return on foreign assets is high and sell when the return is low. They tested implications of the model using data on US equity portfolio flows.

A few studies are also available in Indian context. Using a monthly data set for the period May 1993 to December 1999, Chakrabarti (2001) found that FII flows to India have steadily grown in importance since the beginning of liberalization. He analyzed these flows and their relations with other macroeconomic features and arrived at the following major conclusions. (1) While there may exist correlation between fund flows and stock returns in India, they are more likely to be the result than the cause of these returns. (2) FIIs are no at an informational disadvantage in India relative to local investors. (3) The Asian crisis marked a regime shift in the determinants of FII flows to India with the domestic stock returns becoming the sole driver of these flows since the crisis.

Mukherjee, Bose and Coondoo (2002) analyzed the relations of daily FII flows to the Indian stock market for the period January 1999 to May 2002. They explored the relations of foreign institutional investment (FII) flows to the Indian stock market with possible covariates. They identified some covariates of FII flows into and out of the Indian stock market. Their results showed followings. (1) Return in the domestic stock market influences FII flows to and from the Indian market and not the other way round. (2) Returns in the Indian stock market is an important (and perhaps the single most important) factor that influences FII flows into the country. (3) While FII sales and FII net investment influence Indian stock market movements, FII buying is not responsive to this market performance. (4) FII investors do not use the Indian stock market for diversification of their investment. (5) Return from exchange rate variation and fundamentals of the Indian economy may have influence on FII decisions, but such influences are not strong. (6) Daily FII flow shows autocorrelation but the covariates considered in the study do not explain this autocorrelation.

Gordon and Gupta (2003) found that both global and domestic reasons are important in deciding portfolio flows. They analyzed reasons that attract portfolio fund flows into India using monthly data. Flows to India are small in comparison with other developing markets, but show low volatility. The paper showed that both external and domestic reasons influence portfolio flows. Among external reasons, LIBOR and stock market returns are important, while the primary domestic determinants are the lagged stock return and changes in credit ratings. In quantitative terms, both external and domestic reasons are equally important. Suresh Babu and Prabheesh (2008) examined the relation between FII flows and stock market returns in Indian stock market. Using daily data from January 2003 to February 2007, they found the existence of bidirectional causality between FII flows and stock returns. They noted that domestic stock returns attract FII flows in line with the momentum-trading theory. Ray (2009) reported unidirectional causality between stock index and FII fund flow using daily data from January 2006 to June 2008. He found that domestic stock return attracts Foreign funds but FII fund flows do not cause stock returns in India.

METHODOLOGY

Data Source

This paper studies the impact of FII investment by using daily data for the period January 2000 to July 2009. We used the following three time series in this study. (1) Closing price of S&P CNX Nifty Stock Index (NIFTY) (2) Total FII Investment in stock markets (FIIEQ) and (3) Exchange change-over Rate in US$ to Indian Rupee (DOLLAR). The website of Securities and Exchange Board of India **(**www.sebi.gov.in/**)** makes available data related to total FII investment and exchange changeover Rate. The closing index value of S&P CNX Nifty for the period is obtainable from the website of National Stock Exchange of India (www.nseindia.co.in). This study resulted in analysis of 2,394 observations for the past nine and half years.

Causality Tests

Granger (1969) suggested a method for testing causality relations between stationary time series. To identify causal relations among FIIEQ, DOLLAR and NIFTY, we applied Granger causality test on daily dataset using Eviews software. Table 3 produces results of Granger Test.

Table 3: Pairwise Granger Causality Test Results

Null Hypothesis:	F-Statistic	Probability
FIIEQ does not Granger Cause DOLLAR	2.79558	0.06128*
DOLLAR does not Granger Cause FIIEQ	50.9822	0.00000***
NIFTY does not Granger Cause DOLLAR	57.5946	0.00000***
DOLLAR does not Granger Cause NIFTY	2.10528	0.12204
NIFTY does not Granger Cause FIIEQ	167.190	0.00000***
FIIEQ does not Granger Cause NIFTY	4.77149	0.00855***

*The table shows pairwise Granger Causality test results between Closing price of Nifty Stock Index (NIFTY), total FII Investment in stock markets (FIIEQ) and exchange change-over rate in US$ to Indian rupee (DOLLAR). The results show unidirectional causality between stock returns and exchange rate and bidirectional causality between other two pairs. Last column of the table provides t-statistic levels for rejection of null hypothesis. ***, **, * suggest significance at 1, 5 and 10 percent levels.*

From the test results, we can reject the hypothesis that FIIEQ does not Granger Cause DOLLAR at 10% level but we reject the hypothesis that DOLLAR does not Granger Cause FIIEQ at 1% level. Therefore, it appears that Granger causality runs bidirectional from DOLLAR to FIIEQ, but currency changeover rate strongly influences FII investments.

We also detected bidirectional causality between NIFTY and FIIEQ, which means rising stock price movements, attracts FIIs and simultaneously investment by FII influence stock prices in domestic markets. Most of the studies in Indian market reported unidirectional causality between market returns and foreign investments. They found domestic stock returns attract FII fund flows but FII flows do not cause stock returns in India. The results of this study using daily data for the past nine and half years however detected bidirectional causality. The tests confirm that FII investments influence both currency changeover rate and direction of movement of stock prices.

Testing for Unit Roots

It is a well-accepted fact that many financial time series contain a unit root, that is, the series are nonstationary and therefore, financial series used in the study might not be exceptions. Information related to stationarity of the time series is significant to indentify relations, as standard statistical techniques may not give correct inferences in the presence of stochastic trends. If the data is

nonstationary, ordinary least squares can produce spurious results. Therefore, before modeling any relations, we examine stationarity of the time series.

The Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests are two commonly used procedures in the empirical literature. In both the tests, the null hypothesis is that a unit root exists in the autoregressive representation of the time series. Table 4 given below tabulates the test results. Based on ADF and PP tests, we cannot reject the null hypothesis of a unit root at the level data for the selected series. The series were stationary at the first difference level. The results confirms order one I(1) integration in each of the chosen time series.

Table 4: Unit Root Test Results, p-value of ADF and PP tests

	Fisher ADF Test		PP Test	
Series	Levels	First Difference	Levels	First Difference
NIFTY	0.8882	0.0001***	0.9019	0.0001***
DOLLAR	0.6095	0.0001***	0.5538	0.0001***
FIIEQ	0.9746	0.0000***	0.9748	0.0001***

*The table provides test of stationarity on the time series using Fisher ADF test and Phillips-Perron test. ***, **, * suggest significance at 1, 5 and 10 percent levels. Though we rejected stationarity in the time series at their data, we found stationarity at their first differences*

Error Correction Model

Though ADF and PP tests determined that each time series are of order one, there may exist a special case in which a linear combination of the time series will show stationarity. Engle and Granger (1987) found that if two or more series integrated of the same order are themselves nonstationary but a linear combination of them becomes stationary, and then the series exhibits cointegration. The cointegrated time series can be used in regression equations without worrying about spurious relations.

An important idea closely linked to cointegration is, Error Correction Model (ECM). After identifying cointegration of two-time series X_t and Y_t, we can develop a matching ECM by the equation $\Delta Y_t = \beta_1 \Delta X_t + \beta_2 \left(Y_{t-1} - \gamma X_{t-1} \right) + \varepsilon_t$

When Y_t and X_t displays cointegration, $\left(Y_{t-1} - \gamma X_{t-1} \right)$ will be I(0) even though the constituents are I(1). $\left(Y_{t-1} - \gamma X_{t-1} \right)$ is the error correction term. To have an ECM, one first needs to know nature of cointegration among the selected time series. There are varieties of frameworks for testing the cointegration relations. Granger (1981) introduced the idea of cointegration. Engle and Granger (1987), Johansen (1988, 1995), and Johansen and Juselius (1990), among others developed the idea further.

Johansen's approach is more versatile than Engle and Granger's approach and therefore, we used Johansen's cointegration approach for modeling long-run equilibrium relations. This approach is available in many popular econometric software (for example GRETL, Eviews,). According to Eviews 6 User's Guide (2007), we can write a VAR of order p as follows.

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + B x_t + \varepsilon_t .$$

In the equation, y_t is a vector of I(1) time series, x_t is a vector of deterministic time series, and e_t is a vector of innovations. We can also rewrite the VAR described in above equation as follows.

$$\Delta y_t = \pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-1} + Bx_t + \varepsilon_t \text{, where: } \Pi = \sum_{i=1}^{p} A_i - I, \quad \Gamma_i = -\sum_{j=i+1}^{p} A_j$$

Estimates of Γ_i contain information on the short-run adjustments, while estimates of Π contain information on the long-run adjustments among the time series. Number of linearly independent columns in the Π matrix provides a measure for cointegration. Johansen (1988, 1995) developed a method to test the rank of Π and to find out value of other coefficients using a procedure known as reduced rank regression. Before the test using Johansen procedure, we need to decide certain related features like, lag length for the VAR and deterministic trend and intercept assumptions in the level data.

Lag of VECM Model

Estimating the VECM requires identifying a common lag length. In practice, we estimate the lag length using suitable information criteria. We used three different information criteria namely: Akaike Information criterion (AIC), Schwartz Bayesian criterion (BIC) and Hannan-Quinn criterion (HQC) to select best lag length. In this study, all three information criteria suggested lag of two days for the VAR model. We produce the respective AIC, BIC and HQC values in Table 5.

Table 5: Lag Lengths for VAR Model

Lag lengths	AIC	BIC	HQC
1	25.383386	25.412383	25.393937
2	25.087678*	25.138421*	25.106141*

To find out ideal lag length, we examined Akaike Information, Schwartz Bayesian and Hannan-Quinn values for various lag lengths. Selection of two days lag gives lowest value. Therefore, we have chosen the lag two days for following analysis.

Deterministic Trend Assumptions

According to Johansen's procedure, we need to select one of the following five deterministic trend assumptions.

1. The level data have no deterministic trends and the cointegrating equations do not have intercepts:
2. The level data have no deterministic trends and the cointegrating equations have intercepts:
3. The level data have linear trends but the cointegrating equations have only intercepts:
4. The level data and the cointegrating equations have linear trends:
5. The level data have quadratic trends and the cointegrating equations have linear trends.

There is little research available to help identify the most suitable deterministic trend assumption. Wesso (2000) suggested making the final decision by both macroeconomic theory and statistical evaluations. Eviews software provides a choice to summarize results in one table for all five choices. Table 6 provides numbers of cointegrating equations under each set of assumptions.

Table 6: Number of Cointegrating Relations by Model

	Option-1	Option-2	Option-3	Option-4	Option-5
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	1	1	0	1	1
Max-Eig	1	1	0	1	1

Table lists number of cointegrating equations using Trace test and Maximum Eigenvalue test suggested by Johansen (1995) and based on critical values estimated by MacKinnon-Haug-Michelis (1999) at 0.05 levels against five deterministic trend assumptions. Majority of the choices suggest presence of one cointegrating relation among the chosen three series.

From the results given in Table 6, we have chosen the number of cointegrating relations for the selected series to be one. Except for option 3, all choices gave identical results of one cointegrating relation in both trace and Max-Eigenvalue tests.

Equations of Vector Error Correction Model

After identifying one cointegrating relation between the selected time series, we framed a Vector Error Correction Model (VECM). Eviews software was used to estimate the VECM model. Table 7 shows the error correction equations depicting relations of one series with current and lagged values of other series and its own lagged values.

Table 7: VECM Equations with Two Lags

Part A			
Cointegrating Equation	**CointEq1**		
NIFTY(-1)	1.0000		
DOLLAR(-1)	2.2984		
FIIEQ(-1)	-0.0137		
Part B			
Error Correction:	**D(NIFTY)**	**D(DOLLAR)**	**D(FIIEQ)**
CointEq1	-0.0004	0.0000	0.0509
D(NIFTY(-1))	0.0538	-0.0006	2.9817
D(NIFTY(-2))	-0.0314	0.0000	2.2015
D(DOLLAR(-1))	-16.3766	-0.0481	-199.4813
D(DOLLAR(-2))	-6.6468	-0.0117	-104.8602
D(FIIEQ(-1))	-0.0001	0.0000	0.1840
D(FIIEQ(-2))	0.0061	0.0000	0.1394

Part-A of the table gives cointegrating equation among the time series and Part-B shows error correction terms. The forecast for next period is available using an error correction equation. In the table the subscript (-n) stands for value of the variable at (n) period ago and D(Variable(-n)) shows one period change the variable value at (n) period ago. For further interpretations and resultant VECM equations, please refer E-Views 6 User's Guide. VECM equations explain change in value of one series with current and lagged values of other series and its own lagged values. For example, the following equation gives the expected change in NIFTY movement in the current period. D(NIFTY) = - 0.0004(NIFTY(-1) + 2.2983*DOLLAR(-1) - 0.0136*FIIEQ(-1)) + 0.0537*D(NIFTY(-1)) - 0.0313*D(NIFTY(-2)) - 16.3766*D(DOLLAR(-1)) - 6.6468*D(DOLLAR(-2)) - 0.0001*D(FIIEQ(-1)) + 0.0061*D(FIIEQ(-2))*

CONCLUSION

The objective of the study was to identify relations between FII investment in India with that of stock prices in the domestic market and domestic currency changeover rate. Using daily data for the period January 2000 to July 2009, the study examined cause-effect relations and long-term relations among the time series. Using Granger's pairwise causality tests, we detected bidirectional causality between exchange changeover rate and FII investment. This confirms FII investment depends on currency changeover rate. We also found bidirectional causality between NIFTY and FIIEQ. This means FII investment causes stock price movements and simultaneously direction of stock price movements influence FII investments.

Most of the studies in Indian markets reported unidirectional causality between market returns and foreign investments. According to these studies, domestic stock returns attract FII fund flows but FII flows do not cause stock returns in India. The results of this study using daily data for past nine and half years however detected bidirectional causality. Rising stock prices attract FII investment and simultaneously FII investments do influence stock prices in domestic market. Withdrawal of FII money can and do cause downward movement in stock prices. Finally, we designed a VECM model is using Johansen's

procedure depicting relations among Stock Index movement, FII Investment and currency change-over Rate.

We analyzed data in a single dataset covering nine and half years which includes periods of expansion and recession in the economy. Prevailing social, macroeconomic and political circumstances will also influence the relation among the series and leaves enough scope of further research in the area.

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