DECISIVE ECONOMIC AND STOCK MARKET INDICATORS ON FOREIGN INSTITUTIONAL INVESTMENTS: EVIDENCE FROM INDIA

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Introduction
Macroeconomic instability has stunted growth in many developing economies during the past two decades. As a result, the governments of these economies are looking for ways to better manage the economic factors that contribute to instability. Encouraging the creation of diverse financial markets, characterized by a wide range of financial institutions, may be one such option for better macroeconomic risk management (Weller and Zulfiqar, 2013). But the higher level of globalization of economies resulted in liberalized foreign capital flows across the world. This sensation has resulted in the deeper participation of Foreign Portfolio Investments (FPI) especially, Foreign Institutional Investments (FIIs) in the stock market. Emerging economies started receiving huge foreign portfolio flows from the advanced economies which create healthy currency exchange rates for emerging economies apart from facilitating smoother macroeconomic management. Portfolio investments in the form of Foreign institutional investments are welcomed by the developing countries as these are not debt-creating and leads to improvement in the functioning of the stock markets, which in turn results in increased trade volume and market capitalization as foreign portfolio investors intend to invest on the basis of well-researched strategies and realistic stock valuation (Bodla and Kumar, 2009). Similarly, FII inflows in the stock market enhance the foreign exchange reserve for the recipient country.

Available empirical evidence also specifies that FIIs inflows and outflows are by and large influenced by the performance of stock markets and macroeconomic aggregates of the host country. Thus, FIIs investments are pulled toward an economy with sound macroeconomic factors, high returns, lesser risk and growing stock markets in terms of rising market capitalization and turnover. FIIs give due consideration to risk-return characteristics in the home country while investing in emerging markets. The profit booking tendency of FIIs depends on the difference in the home country risk-return and host country risk-return. Besides this, official policies of the host and home country i.e. degree of financial liberalisation, also determine the size of FIIs inflows. India, one of the largest emerging markets, is presently a significant destination for FDI and FII inflows. FII investments are considered as an enormous source of fund in the Indian stock market. FIIs presence makes the market more competitive and helps the financial system of the host country to come in the line with international standard. FIIs have steadily made their position stronger in the Indian market and since 2003-04, they are actively participating in the trading at stock exchanges. Net investments by foreign institutional investors into India in 2014 has reached $10-billion level, while their cumulative total inflows into the country is nearing $200-billion mark (www.business-standard.com, 2014). The total turnover of the FIIs in the equity market constituted 19.0 percent of the total turnover on the BSE.
and the NSE in 2012–13. Foreign institutional flow assists in attaining a higher degree of liquidity in Indian stock markets. They raise Price to Earning (P/E) ratios and subsequently reduce the cost of capital for investment. Lower cost of capital and growing stock market can inspire new equity issues. India, among the global investors, is said to be a worthy investment destination in spite of bureaucratic hassles and infrastructural deficiencies. India’s GDP and foreign investment are growing at a healthier rate.

The country’s fundamentals are stronger with mounting foreign exchange reserves of US$ 313.5 billion as on June 13th 2014 (www.rbi.org.in) and controllable fiscal deficit of around 5 per cent. 11.7% increase in India’s Per Capita Income (PCI) with Rs.68.747 at current prices during 2012-13 compared to Rs.61.564 during 2011-12 Central statistical Office (CSO), India and the International Monetary Fund’s (IMF) expected GDP growth rate of 5.4% for FY 2014-15 shows that economy is reviving back to its growth path. Apart from rising industrial and service sectors, several Indian firms have listed their stocks (Infosys, GAIL, ICICI Bank, Reliance Industries, SBI, TATA Motors etc.) on global markets in the form of ADR and GDR which are now actively traded. The revival of economy is further supported by a strong political stability in the centre and the combined market capitalization of India’s all public listed companies crossing the landmark of $1.5 trillion in June 2014. As the global economies are more and more integrating, the impact of global economic and stock market variables cannot be ignored. The important external factors influencing the FIIs include stock market returns in investing developed economies such as US and UK, the interest rate (LIBOR) and the exchange rate etc. It is a very well accepted fact that 2008 subprime crisis in U.S. had a significant impact on the movement in the FII flows across the world including India, as foreign hedge funds unwind their positions in various markets to meet their obligations in U.S. The increased spread of globalization of economies has opened up their doors for overseas capital flows world over. Foreign institutional investments in the form of portfolio investments are welcomed by the developing countries as these are not debt-creating. It is expected that FPI leads to improvement in the functioning of the stock markets, which in turn results in increased trading volume and market capitalization.

This paper undertakes a realistic examination of FII investment flows to India and the role of Economic and Stock market variables in both investing country and home country which causes FII flows in India. Considering the fact that India is one of the most ideal destinations for global investment, it is highly relevant to address factors causing foreign investments, particularly FIIs as they are the single largest source of foreign investment.

**Literature review**

Bodla and Kumar (2009) found that the net investment made by the foreign institutional investors in Indian stock market proved as a casual force of Market Capitalization but in case of trading volume, FIIs investment turned as a result of trading volume. Singh and Paliwal (2010) investigate the Impact and Issues of Liberalization of FIIs in India and established that FII flows influenced the economic growth in the country. Mohanasundaram and Karthikeyan (2012) explored the impact of Institutional investments and Macroeconomic variables in the Indian Equity market. They concluded that FIIs are having a strong positive relationship with IIP rate and
negative association with USD-INR exchange rate. Raju and Kumar (2011) inspected the transmission effect of exchange rate viz. Dollar, Euro, Pound and Yen on FIIs in India. The results show that dollar exhibit bi-directional relationship whereas pound and yen have one sided influence on net foreign institutional investments. Kulshrestha (2014) evaluated the impact of FIIs on Indian capital market. The outcome of the research is that stock market movement and FIIs flows are closely correlated. FIIs along with other economic variables affect the Indian capital market. Kaur and Dillon (2010) examined the determinants of FIIs in India and identified that returns on Indian stock market has positive impact. The study concludes that FIIs inflows in India are determined by both stock market characteristics and macroeconomic factors. Bohra and Dutt (2011) figured out the reason for indifferent responses of BSE Sensex due to FII inflows. Johri et al. (2012) studied the investment pattern and Impact of FIIs on Indian stock market returns and concluded that FII flows significantly affect the market returns. Srinivasan and Kalaivani (2013) explored the determinants of FIIs in India through the Autoregressive Distributed Lag (ARDL) bounds testing approach and found that FII inflows to India are essentially determined by exchange rate, domestic inflation, domestic equity market returns and risk associated with U.S. equity market. Puneet (2007) studied determinants and Impact of FIIs in India and found the possibility of existing bi-directional relationship between FIIs and Stock market variables. Jain et al. (2012) examined the contribution of FIIs in SENSEX and explored a close correlation between Sensex and FIIs.

Rai and Bhanumurthy (2004) analysed the role of Return, Risk and Inflation in determining FIIs in India. The study concluded that stabilizing stock market volatility and minimizing ex-ante risk would help to attract more FII flows as they depend on Stock market returns, domestic and foreign inflation rates and ex-ante risk. Chakrabarti (2001) analysed FII flows and their and their relationship with other economic variables and established FII flows are highly correlated with the equity returns in India and they are likely to be the effect than the cause of these returns. Rajkumar and Gupta (2010) examined the factors affecting the investment decisions of FIIs during 1995-96 to 2006-07 and concludes that the FIIs are affecting the market for their own interest and the return at the Indian stock market and the risk at the international market have emerged as major drivers of FII inflows to India. Dasgupta (2014) and Mohanasundaram and Karthikeyan (2014) found that domestic stock market returns, domestic macroeconomic fundamentals, and India-specific stock market-driven factors have been the most influential determinants of FIIs.

Ekeocha (2012) ascertained the long run determinants of foreign portfolio investment (FPI) in Nigeria. The study discovered that FPI has a positive long-run relationship with market capitalization, and trade openness in Nigeria. Mukherjee et al. (2002) explores relationship of foreign institutional investment (FII) flows to the Indian equity market and found that return in the Indian equity market is indeed an important factor that influences FII flows into the country. Return from exchange rate variation and fundamentals of the Indian economy may have influence on FII decisions, but such influence does not seem to be strong. Bhupender Singh (2005) argued about the role of financial sector of an economy in attracting the Foreign Institutional Investment inflows. The study examined the effect of inflation and exchange rate on Foreign Institutional Investment in India and revealed the existence of significant relationship among them.
**Methodology and Framework**

**Research Gap**

Most of the previous studies consider only host country’s (Country which receives investment) Economic and Stock-market variables as a determining factor for FII flows into the country. However in reality, just the change in economic and Stock-market variable of host country alone may not determine the FII flows, as equal change in the home country (Country which makes investment) on those variables eliminates the scope of shift in investment. A very few studies only considered both host country and home country Economic and Stock-market variables to find out the determinants of FII flows. Even in such case, almost all the previous studies considers only US economic and Stock-market data as home country variables which has an impact on FII flows in India. However, it is observed that, there is also a significant FII contribution from United Kingdom. The FII Index for 2014 from Security Exchange Board of India (SEBI) shows that 50% of FIIs registered are from USA (35%) and UK (15%). Hence, the study considers both US and UK Economic and Financial indicators as home country variables. Also, the present research considers wide range of variables as potential determinants of Foreign Institutional Investment flows. Bearing these factors in mind, the researchers intend to fill the research gap by undertaking a study on role of Macro-economic and Stock-market variables on FII flows.

**Research Questions and Contribution**

The main research questions addressed in this study are as follows;

- What nature of association exists between dependent variable (FII flows) and independent variables (Economic and Stock-market)?
- Which are all the vital foreign and domestic economic and stock-market variables influence FII flows in India?
- Whether FII flows are more sensitive to the specific variable among the selected independent variables?

**Variables and Data**

This present study exposes the linkage between Foreign Institutional Investments with macroeconomic and stock-market variables. The study also analyses the impact of global and domestic macroeconomic and stock-market variables on Foreign Institutional Investments. The data used in this paper comes from several sources. The monthly data is used in the study for all variables except GDP of USA and UK where, quarterly data is used. The data for the study are obtained from official and other authenticated websites and publications. All the data included in the study covers the period from 1st January 2002 to 31st December 2014.

Even though, there are several variables which may have its influence on FII flows, the researcher has confined only with the selected macroeconomic and stock-market variables based on the extensive reviews gone through. The independent variables used in the study are categorized in to Host country variables and Home country variables.

**Host (Domestic) Country Variables**

a. Macro-economic variables
i. Index for Industrial Production (IIP) as a proxy for economic growth
ii. Wholesale Price Index (WPI) representing inflation level
iii. Exchange rate of Indian Rupee against USD (ERS)
iv. Exchange rate of Indian Rupee against GBP (ER£)
b. Stock-market variables
i. Returns on Nifty (RN):

\[ RN = \ln \left( \frac{N_t}{N_{t-1}} \right), \]  

where \( N_t \) = Closing price of Nifty at time-period ‘t’; \( N_{t-1} \) = One time-period lagged closing price of Nifty

ii. Market Capitalization (MC) of NSE

*Home (Foreign) Country Variables*

I. USA Variables
a. Macro-economic variables
i. Gross Domestic product (GDP) as a proxy for economic growth of USA
ii. Producers Price Index (PPI) representing inflation level of USA
iii. US 3-month T-bill (FUSTB) representing interest rate in USA:

\[ FUSTB = TB_t - TB_{t-1}, \]  

where \( TB_t \) = Interest rate of US 3-month T-bill at time-period ‘t’; \( TB_{t-1} \) = One time-period lagged value of US 3-month T-bill

b. Stock-market variables
i. Returns on S&P 500 Index (RSP):

\[ RSP = \ln(S&P \ 500_t / S&P \ 500_{t-1}), \]  

where \( S&P \ 500_t \) = Closing price of S&P 500 in time-period ‘t’; \( S&P \ 500_{t-1} \) = One time-period lagged closing price of S&P 500

II. UK Variables
a. Macro-economic variables
i. Gross Domestic product (GDP) as a proxy for economic growth of UK
ii. Consumer Price Index (CPI) representing inflation level of UK
iii. UK 3-month T-bill (FUKTB) representing interest rate in UK:

\[ FUKTB = TB_t - TB_{t-1}, \]  

where \( TB_t \) = Interest rate of UK 3-month T-bill at time-period ‘t’; \( TB_{t-1} \) = One time-period lagged value of UK 3-month T-bill

b. Stock-market variables
i. Returns on FTSE 100 Index (RFTSE):

\[ RFTSE = \ln(FTSE \ 100_t / FTSE \ 100_{t-1}), \]  

where \( FTSE \ 100_t \) = Closing price of FTSE 100 in time-period ‘t’; \( FTSE \ 100_{t-1} \) = One time-period lagged closing price of FTSE 100.
Table 1. Data Description

<table>
<thead>
<tr>
<th>Variable – Data series</th>
<th>Frequency</th>
<th>Units</th>
<th>Source cited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net FII Investment</td>
<td>Monthly</td>
<td>Indian Rupee Crore (10 million)</td>
<td><a href="http://www.sebi.gov.in">www.sebi.gov.in</a></td>
</tr>
<tr>
<td>Index for Industrial Production (IIP)</td>
<td>Monthly</td>
<td>Index, Base 2004-2005=100</td>
<td><a href="http://www.rbi.org.in">www.rbi.org.in</a></td>
</tr>
<tr>
<td>Wholesale Price Index (WPI) of India</td>
<td>Monthly</td>
<td>Index, Base 2004-2005=100</td>
<td><a href="http://www.rbi.org.in">www.rbi.org.in</a></td>
</tr>
<tr>
<td>Exchange rate: USD–INR(ERS)</td>
<td>Monthly</td>
<td>Rate (INR / US$)</td>
<td><a href="http://www.rbi.org.in">www.rbi.org.in</a></td>
</tr>
<tr>
<td>Exchange rate: GBP–INR(ER£)</td>
<td>Monthly</td>
<td>Rate (INR / £)</td>
<td><a href="http://www.rbi.org.in">www.rbi.org.in</a></td>
</tr>
<tr>
<td>Returns on Nifty(RN)</td>
<td>Monthly</td>
<td>Percentage (from Index, Base 1995 =1000)</td>
<td><a href="http://www.nseindia.com">www.nseindia.com</a></td>
</tr>
<tr>
<td>Market Capitalization (MC) of NSE, India</td>
<td>Monthly</td>
<td>Indian Rupee (Billion)</td>
<td><a href="http://www.nseindia.com">www.nseindia.com</a></td>
</tr>
<tr>
<td>Gross Domestic Product of USA(USGDP)</td>
<td>Quarterly</td>
<td>USD (Trillion)</td>
<td>U.S. Department of Commerce: Bureau of Economic Analysis</td>
</tr>
<tr>
<td>Gross Domestic Product of UK(UKGDP)</td>
<td>Quarterly</td>
<td>GBP (Million)</td>
<td>Office for national statistics (<a href="http://www.ons.gov.uk">www.ons.gov.uk</a>)</td>
</tr>
<tr>
<td>UK3-month T-bill (FUKTB)</td>
<td>Monthly</td>
<td>Percent</td>
<td>Bank of England</td>
</tr>
<tr>
<td>Return on S&amp;P 500 (RSP)</td>
<td>Monthly</td>
<td>Percentage (from Index, Base 1941–43 = 10)</td>
<td><a href="http://finance.yahoo.com">http://finance.yahoo.com</a></td>
</tr>
</tbody>
</table>

Note: The Indian IIP and WPI data prior to the year 2004-05 were taken from 1998-99 series and linked to 2004-05 series using linking factor given by Government of India.

Rationale in Selection of Exogenous Variables

IIP\textsubscript{IND} > 0: An increase in the industrial production certainly indicates the positive economic growth of a country. So, it is expected that FII flows increase with the higher Index for Industrial Production (IIP) in India.

WPI\textsubscript{IND} < 0: When inflation in the domestic country increases, the purchasing power of the funds Invested declines. Hence, investors will withdraw from the domestic market.

ERS and ER£< 0: It is expected to have a negative relationship between FII flows and Exchange rate as depreciation (appreciation) of INR against USD and GBP lowers (improves) the value of FII investments.

RN > 0: An increase in Nifty Return will attract more foreign investments. So it is believed that FII flows and Returns on Nifty will have positive relationship.

MC > 0: Higher Market Capitalization of a leading stock exchange in domestic
country portrays the wealth accumulation and growth of the corporate sector. With surge in Market Capitalization of NSE, it is anticipated that FII flows increase.

USGDP and UKGDP < 0: Virtuous growth in foreign economy deters the investment flow out of the country. Thus, greater the US and UK GDP, lower may be the FII flows.

USPPI and UKCPI > 0: Higher inflation in home country erodes the return earned by the investment made there. Hence, it is assumed that higher inflation in USA and UK brings more FII flows to India.

FUSTB and FUKTB < 0: Upward change in home country T-Bills rate is expected to encourage their own debt market investment and discourage the foreign equity investment. It is presumed that higher T-Bills rate in USA and UK affects FII flows to India negatively.

RSP and RFSTE< 0: It is expected that bullish trend in S&P 500 and FSTE 100 will have negative relationship with FII flows in India. This is because; better return on stocks in USA and UK averts investors in investing Indian stocks.

Theoretical Framework

The daily stock index returns and exchange rates are continuously compounded rate of return, computed as the first difference of the natural logarithm of the daily stock index and Exchange rate values. The continuously compounded daily return (Rt) is defined as:

\[ Rt = \ln \left( \frac{P_t}{P_{t-1}} \right), \]  

where \( P_t \) is the closing price of the variables on the time-period ‘t’; \( P_{t-1} \) is the closing price of the variables on the time-period ‘t-1’. The tests- namely, Unit root test, Correlation test and Autoregressive Distributed LAG model test- were conducted with the help of Eviews (version 7.1) and Microfit (Version 4.1) software.

Unit Root Test

Whenever two or more time-series data are used in regression analysis, we frequently find a high R² despite without any expressive relationship among the selected variables. In few time-series variables, regression of one on other variable(s) show a significant relationship between them despite one expects no relationship. This occurrence demonstrates the problem of spurious regression (Gujarati, 2004). Thus, the regression of one non-stationary time series variable on another may produce a spurious regression. Therefore, Unit root test is conducted on all data-series variables considered for the study to ensure stationarity property of the time series.

Even though, all the variables does not essentially should be integrated at the same order (I₀ or I₁), the variables integrated of order I₂ or more will crashes out the ARDL estimation as the computed F-statistic under bounds test approach are based on the assumption that variables are either I₀ or I₁. Thus, employing unit root test is still necessary in ARDL bounds test approach to ensure none of the variables are I₂ or higher. The presence of any Unit root in the data series is checked by employing the Augmented Dickey-Fuller (ADF) test. Time series data should be stationary for analysing i.e. statistical properties of the series should be constant for putting the data in to use. Sadananda (2009) stated, a series is stationary, called I(0), denoting “integrated of Zero”, when the linear properties exist and are time-invariant. If a series
needs differencing ‘d’ times to become \( I(0) \), it is called integrated of order ‘d’, denoted by \( I(d) \). Augmented Dickey-Fuller (ADF) test controls for higher order correlation by adding lagged difference terms of the dependent variable to the right-hand side of the regression (Khan et al., 2010). The Augment Dickey Fuller specification used here is as follows:

\[
\Delta Y_t = b_0 + \beta Y_{t-1} + \mu_1 \Delta Y_{t-1} + \mu_2 \Delta Y_{t-2} + \ldots + \mu_p \Delta Y_{t-p} + u_t
\]

(7)

where \( Y_t \) represents time series to be tested, \( b_0 \) is the intercept term, \( \beta \) is the coefficient of interest in the unit root test, \( \mu_p \) is the parameter of the augmented lagged first difference of \( Y_t \) to represent the \( p^{th} \) order auto regressive process and \( u_t \) is the white noise error term.

**Linear Correlation**

The linear correlation shows the strength of association between dependent and explanatory variable:

\[
r = (n \sum xy - (\sum x)(\sum y))/\sqrt{(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)}.
\]

(8)

**Autoregressive Distribution Lag (ARDL)**

To discover various determining economic and financial indicators on FII flows in India, Autoregressive Distribution Lag (ARDL) model using bounds test approach is employed. The ARDL model was initially developed by Pesaran and Shin (1999) and it was advanced by Pesaran et al. (2001). ARDL model is built on Unrestricted Error Correction Model (UECM) and relishes numerous benefits over other cointegration techniques. First, it simultaneously estimates the short-run and long-run components of model after removing autocorrelation problems. Second, it provides unbiased estimates of the long-run model and valid t-statistic even when some of the regressors are endogenous (Harris and Sollis, 2003). Third, ARDL can be applied to small sample size study Pesaran et al. (2001).

ARDL model used in the present study is as follows:

\[
\Delta FII_t = \beta_0 + \sum_{i=0}^{p} \delta_1 \Delta FII_{t-i} + \sum_{i=0}^{p} \delta_2 \Delta ER\$_{t-i} + \sum_{i=0}^{p} \delta_3 \Delta RN_{t-i} + \sum_{i=0}^{p} \delta_4 \Delta USGDP_{t-i} + \sum_{i=0}^{p} \delta_5 \Delta USPPI_{t-i} + \sum_{i=0}^{p} \delta_6 \Delta FUKTB_{t-i} + \sum_{i=0}^{p} \delta_7 \Delta RFTSE_{t-i} + \sum_{i=0}^{p} \delta_8 \Delta MC_{t-i} + \beta_1 FII_{t-i} + \beta_2 ER\$_{t-i} + \beta_3 RN_{t-i} + \beta_4 USGDP_{t-i} + \beta_5 USPPI_{t-i} + \beta_6 FUKTB_{t-i} + \beta_7 RSP_{t-i} + \beta_8 RFTSE_{t-i} + \beta_9 MC_{t-i} + \varepsilon_t,
\]

(9)

where ‘\( \beta_0 \)’ is an intercept; \( \Delta \) is the first order difference; ‘\( t \)’ is the time dimension and ‘\( \varepsilon_t \)’ is a white noise error term. The first and foremost step in the ARDL bonds test approach is to estimate the above equation (9) by ordinary least squares to test for presence of long run relationship among the variables by carrying out F-test for the joint significance of the coefficients of the variables as stated below:

**Null Hypothesis** (\( H_0 \)): \( \delta_1 = \delta_2 = \ldots = \delta_4 = \delta_5 = \delta_6 = \delta_7 = \delta_8 = \delta_9 = 0 \);

**Alternative Hypothesis** (\( H_1 \)): \( \delta_1 \neq \delta_2 \neq \ldots \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq \delta_8 \neq \delta_9 \neq 0 \).

Critical value bounds for F-statistic with two sets are created by Pesaran et al. (2001). If the calculated F-statistic is below the lower bound critical value, the null hypothesis of no cointegration cannot be rejected. Whereas, if the calculated F-statistic
is above the upper bound critical value; the null hypothesis is rejected, meaning that there is a long-run cointegration relationship between the variables in the ARDL model. In case, if the calculated F-statistic falls between the upper bound and lower bound, the result of existence of any cointegration relationship is unsure. After estimating equation (9) to test long-run relationship, the next step is to estimate the conditional ARDL long-run model for $FII_t$ as mentioned in equation (10):

$$FII_t = \beta_0 + \sum_{i=0}^{n} \delta_1 \Delta FII_{t-i} + \sum_{i=0}^{n} \delta_2 \Delta ER$ \_t_{-i} + \sum_{i=0}^{n} \delta_3 \Delta RN_{t-i} + \sum_{i=0}^{n} \delta_4 \Delta USGDP_{t-i} + \sum_{i=0}^{n} \delta_5 \Delta USPPI_{t-i} + \sum_{i=0}^{n} \delta_6 \Delta FUKTB_{t-i} + \sum_{i=0}^{n} \delta_7 \Delta RSP_{t-i} + \sum_{i=0}^{n} \delta_8 \Delta RFTSE_{t-i} + \sum_{i=0}^{n} \delta_9 \Delta MC_{t-i} + \varepsilon_t. \quad (10)$$

In the last step, by estimating an Error Correction Term (ECT) connected with the long-run estimates, we attain the short-run dynamic factors. The short-run dynamics of ARDL model is stated in equation (11):

$$\Delta FII_t = \beta_0 + \sum_{i=0}^{n} \delta_1 \Delta FII_{t-i} + \sum_{i=0}^{n} \delta_2 \Delta ER$ \_t_{-i} + \sum_{i=0}^{n} \delta_3 \Delta RN_{t-i} + \sum_{i=0}^{n} \delta_4 \Delta USGDP_{t-i} + \sum_{i=0}^{n} \delta_5 \Delta USPPI_{t-i} + \sum_{i=0}^{n} \delta_6 \Delta FUKTB_{t-i} + \sum_{i=0}^{n} \delta_7 \Delta RSP_{t-i} + \sum_{i=0}^{n} \delta_8 \Delta RFTSE_{t-i} + \sum_{i=0}^{n} \delta_9 \Delta MC_{t-i} + \phi ECT_{t-i} + \varepsilon_t, \quad (11)$$

where $\delta_1, \delta_2, ..., \delta_9$ are the short-run coefficients of the model’s convergence to equilibrium, $\phi$ is the speed of adjustment factor and ECT is the error correction term.

**Empirical Results and Discussions**

**Unit Root Test**

Before carrying ARDL approach, the data series are tested for stationarity. The presence of non-stationary variables in time series analysis leads to misleading inferences (Libanio, 2005). Further, unit root test is useful to check the order of integration and is a vital requirement for the existence of cointegration links (John et al., 2007). Augmented Dicky-Fuller (ADF) test is applied to check the presence of unit root and to determine the order of integration. Table 2 discloses the result of the ADF test.

**Table 2. Augmented Dickey-Fuller Test Results**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Levels</th>
<th>First Difference</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>FII</td>
<td>-3.2382**</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td>ER$</td>
<td>-</td>
<td>-4.4390*</td>
<td>I(1)</td>
</tr>
<tr>
<td>ER£</td>
<td>-</td>
<td>-9.7736*</td>
<td>I(1)</td>
</tr>
<tr>
<td>FUKTB</td>
<td>-4.8268*</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td>FUSTB</td>
<td>-10.1747*</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td>MC</td>
<td>-</td>
<td>-12.0002*</td>
<td>I(1)</td>
</tr>
<tr>
<td>RFTSE</td>
<td>-6.1616*</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td>RN</td>
<td>-5.5681*</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td>RSP</td>
<td>-5.2907*</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td>UKCPI</td>
<td>-</td>
<td>-6.3129*</td>
<td>I(1)</td>
</tr>
<tr>
<td>USPPI</td>
<td>-</td>
<td>-5.8818*</td>
<td>I(1)</td>
</tr>
<tr>
<td>IIP</td>
<td>-</td>
<td>-3.1239**</td>
<td>I(1)</td>
</tr>
<tr>
<td>UKGDP</td>
<td>-</td>
<td>-3.4051**</td>
<td>I(1)</td>
</tr>
<tr>
<td>USGDP</td>
<td>-</td>
<td>-4.1277*</td>
<td>I(1)</td>
</tr>
<tr>
<td>WPI</td>
<td>-3.3685**</td>
<td>-</td>
<td>I(0)</td>
</tr>
</tbody>
</table>

Note: *, ** - indicates significance at the 1% and 5% level, respectively. Optimal lag length is determined by the Akaike Information Criterion (AIC)
The result indicates that all the variables are not integrated at the same order. The variables such as FII, FUKTB, FUSTB, RFTSE, RN, RSP and WPI are integrated at the order of zero. On the other hand, variables such as ERS, ER£, MC, UKCPI, USPPI, IIP, UKGDP and USGDP are integrated at the order of one.

**Linear Correlation**

Correlation analysis is undertaken among the independent variables and Net FII investment flows. The outcome of correlation analysis is exhibited in the Table 3.

### Table 3. Correlation between Net FII Investment flows and Independent variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Net FII Investment flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange Rate (USD-INR)</td>
<td>0.167**</td>
</tr>
<tr>
<td>Exchange Rate (GBP-INR)</td>
<td>0.115</td>
</tr>
<tr>
<td>Index for Industrial Production (IIP) – India</td>
<td>-0.066</td>
</tr>
<tr>
<td>Gross Domestic Product (GDP) – USA</td>
<td>0.317**</td>
</tr>
<tr>
<td>Gross Domestic Product (GDP) – UK</td>
<td>0.234</td>
</tr>
<tr>
<td>Wholesale Price Index (WPI) – India</td>
<td>-0.132</td>
</tr>
<tr>
<td>Producer Price Index (PPI) – USA</td>
<td>0.210*</td>
</tr>
<tr>
<td>Consumer Price Index (CPI) – UK</td>
<td>-0.081</td>
</tr>
<tr>
<td>NIFTY Returns</td>
<td>0.523*</td>
</tr>
<tr>
<td>S&amp;P Returns</td>
<td>0.487*</td>
</tr>
<tr>
<td>FTSE 100 Returns</td>
<td>0.517*</td>
</tr>
<tr>
<td>3Month Treasury Bills – USA</td>
<td>0.148</td>
</tr>
<tr>
<td>3Month Treasury Bills – UK</td>
<td>0.232*</td>
</tr>
<tr>
<td>External Debt to Gross Domestic Product - India</td>
<td>0.462</td>
</tr>
<tr>
<td>NSE Market Capitalization</td>
<td>0.348**</td>
</tr>
</tbody>
</table>

Note: *, ** - Correlation is significant at the 0.01 and 0.05 level respectively (2-tailed)

### Bounds F- test for Co-integration

The variables displaying considerable association at either 1% or 5% significance are selected for the ARDL model. To select the number of lags for the test, VAR lag order selection criterion was used. Having FII as an endogenous variable and all economic and stock market variables as exogenous variables, lag order selection has carried out. Most criterion such as LR, FPE, AIC and HQ indicates number of lags to be selected as 6. Hence number of lags used for the study is 6. To determine whether the FII and the selected exogenous variables have co-integration relationship or not, Bound Testis used. FII flows and its regressors consisting ERS, RN, USGDP, USPPI, FUKTB, RSP, RFTSE and MC have been estimated on the basis of equation (10). The result of F-test is presented in the Table 4.

### Table 4. Bounds Test Approach to Cointegration

<table>
<thead>
<tr>
<th>Variables</th>
<th>F-statistic</th>
<th>Probability</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>F_FII (FII/ERS, RN, USGDP, USPPI, FUKTB, RSP, RFTSE, MC)</td>
<td>3.8638**</td>
<td>0.00</td>
<td>Co-integration</td>
</tr>
</tbody>
</table>

Critical value | Lower Bound | Upper Bound |
---------------|-------------|-------------|
1% significance level | 2.79 | 4.10 |
5% significance level | 2.22 | 3.39 |
10% significance level | 1.95 | 3.06 |

Note: ** shows that computed F-Statistic falls above the upper bound critical value at 5% significance level. The bounds test critical values are attained from Pesaran et al. (2001, pp. 300). Table C1 (iii) Case III: Unrestricted intercept and no trend (k=8)
The calculated F-statistic is 3.8638. This is higher than upper-bound critical value of 3.39 at 5% level of significance. Thus, the null hypothesis of no cointegration is rejected, showing there is a long-run cointegration relationship among FII flows and its exogenous variables consisting ER$, RN, USGD$P, USPPI, FUKTB, RSP, RFTSE and MC. After establishing the existence of long-run relationship, the long-run coefficient estimates using ARDL model based on equation (11) have been carried out. Table 5 displays the result of long-run coefficients using ARDL approach.

### Table 5. Estimated Long-run Coefficients using ARDL Approach

<table>
<thead>
<tr>
<th>Regressors</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>Prob. Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>681.5381</td>
<td>1.0138*</td>
<td>0.010</td>
</tr>
<tr>
<td>ER$</td>
<td>-0.4858</td>
<td>-3.9115*</td>
<td>0.002</td>
</tr>
<tr>
<td>RN</td>
<td>4601.55</td>
<td>1.9182**</td>
<td>0.037</td>
</tr>
<tr>
<td>USGD$P</td>
<td>-1.2579</td>
<td>-2.56</td>
<td>0.215</td>
</tr>
<tr>
<td>USPPI</td>
<td>0.3755</td>
<td>-2.437**</td>
<td>0.026</td>
</tr>
<tr>
<td>FUKTB</td>
<td>-0.4418</td>
<td>-2.8915</td>
<td>0.435</td>
</tr>
<tr>
<td>RSP</td>
<td>0.4858</td>
<td>1.7514***</td>
<td>0.067</td>
</tr>
<tr>
<td>RFTSE</td>
<td>1.3988</td>
<td>2.9764</td>
<td>0.105</td>
</tr>
<tr>
<td>MC</td>
<td>0.7113</td>
<td>1.4326</td>
<td>0.238</td>
</tr>
</tbody>
</table>

R² = 0.68          Adj.R² = 0.62    DW = 1.96

Note: *, **, *** - represents significance at 1%, 5% and 10% level respectively

The table result reveals that the exchange rate USD (ER$) has adverse and significant (at 1% level) influence on FII flows to India in the long-run. This result is identical with the outcome of Srinivasan and Kalaivani (2013), i.e. depreciation of currency tend to lowers the value of foreign institutional investments in India. This indicates that any depreciation of INR against USD likely to lower the value of FIIs investment in India. Host country stock market return represented by RN (Nifty Returns) is positive and significant (at 5% level), showing FII flows follow Indian stock market trend (positive feedback) in long-run. The estimated coefficients of USA inflation (USPPI) has positive significant influence (at 5% level) on FII flows to India, revealing that higher inflation in USA brings more FII investments to Indian equity market. This outcome is similar with the result of Kaur and Dillon (2010) and Rai and Bhanumurthy (2004), i.e. US Producer Price Index has significant and positive influence on FII investment in India.

Return on S&P 500 index has a direct and significant (at 10% level) link with FII flow to India demonstrating growth in USA stock market increases the FII flow to India which is against our assumption that higher return in USA averts FIIs to invest in India. Perhaps, higher stock market return in USA may motivate the FIIs to invest more in the fast growing developing economies like India.

The short-run estimates of ARDL process has been worked out and the results of short-run estimates connected with long-run relationships are attained from the ARDL-ECM equation. The empirical result shows that exchange rate USD-INR has significant influence at 5% level (i.e. appreciation of INR brings more FII flows to India and depreciation of INR reduces FII flows to India) on FII flows in the short-run. Nifty returns have a positive and significant influence (at 5% significance level).
Diagnostic Tests for Serial Correlation and Stability

Breusch-Godfrey serial correlation LM test has been conducted with the null hypothesis of no serial correlation to check the presence of any serial correlation in the model. The test outcome shows that null hypothesis of no serial correlation cannot be rejected as the P-value is higher than 5%. Thus, the model does not have any serial correlation. The stability of long-run coefficients along with short-run dynamics is verified by applying CUSUM (Cumulative Sum of Recursive Residuals) test for the framed model. The CUSUM plot for the model is shown in the Figure 1.

![CUSUM Plot](image)

**Figure 1. Plot of Cumulative Sum of Recursive Residuals**

If the CUSUM test statistic falls within the critical bounds of 5% level of significance, the null hypothesis of all coefficients in the specified regression model are stable and cannot be rejected.

Conclusion

The study discovers the impact of decisive economic and stock-market variables on Foreign Institutional Investors (FIIs) investment using Autoregressive Distributed Lag (ARDL) bounds testing approach along with the association between FIIs and its exogenous variables using correlation analysis. The Augmented Dicky-Fuller (ADF) unit root test proves that all the data sets used in the study are either integrated at I(0) or I(1) and none are integrated at the higher order level of I(2) or more which is essential to carry out any econometric tests. The correlation analysis reveals that USA Producers Price Index (PPI), Returns of NIFTY, S&P 500, FTSE 100 and 3-month UK Treasury Bills (FUKTB) have significant association with FII flows at 1% level. Exchange rate USD-INR, USA-GDP and NSE Market Capitalization (MC) are significantly associated with FII flows at 5% level. The bounds test approach to cointegration reveals that the ARDL model consisting exogenous variables such as ER$, RN, USGDP, USPPI, FUKTB, RSP, RFTSE, MC is having long-run relationship with FII flows. Long-run coefficients using ARDL model shows ER$ is significant negative impact at 1% level and RN and USPPI have significant positive impact at 5%
level. This specifies depreciation of INR against USD will reduce the FII flows to India in long-run. Superior returns in NIFTY and higher inflation in USA will bring more FII flows to India. In short-run, INR depreciation against USD had negative impact on FII flows whereas, NIFTY returns registers a positive impact on FII flows to India.

References


DECISIVE ECONOMIC AND STOCK MARKET INDICATORS ON FOREIGN INSTITUTIONAL INVESTMENTS: EVIDENCE FROM INDIA

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Abstract

This study explores the determinants of Foreign Institutional Investors (FIIs) investment in India and further more examines the association between FIIs investment and selective economic and stock market variables in both home (USA and UK) and host (India) countries using quarterly time-series data from January 2002 to December 2014. The Bounds F-test for cointegration indicates there is a long-run cointegration relationship among FII investments and its exogenous variables. The outcome of long-run coefficient estimate shows that exchange rate USD-INR has negative and significant impact on FII investments in India both in long-run and short run. NIFTY returns are having significant positive impact on FII investment flows both in long-run and as well as in short-run. Producer Price Index (PPI) of USA reveals positive relationship with FII investments to India only in long-run. Thus, FII investment in India is primarily decided by USD-INR exchange rate, NIFTY returns and USA’s Producer Price Index.

Keywords: foreign institutional investments, exchange rate, inflation, NIFTY returns, cointegration, autoregressive distributed lag