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CONTENTS

INFLOWS OF FOREIGN CAPITAL AND ECONOMIC GROWTH – A CAUSALITY ANALYSIS WITH INDIAN DATA

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Abstract

This study investigates the relationships between the flow of foreign capital and real economic growth over the period April-1994 to December-2015 in context of Indian economy. Brief theoretical justifications capture the inter-relation between financial sector and real economy. Vector Auto Regressive (VAR) model have been applied to explore causal relationship among the variables. Monthly data of the above stated variables are taken for the data analysis. In empirical analysis seasonality removed from the variables and unit root test for the stationarity analysis incorporated structural break, if any. The analysis reveals that relationship exists between inflow of foreign capital and economic growth. Bidirectional causal relationship is found between inflow of foreign institutional investment and industrial production.

Keywords: Financialisation, Capital flows, economic growth, causality, India.
JEL Classification: E24, E44, G10, G21, O16.

1. INTRODUCTION

Liberalization policy signifies free movement of capital across countries which could be used as investable capital for productive activity that leads to economic growth. The amounts of capital inflow and outflow depend on many circumstances including government policies relating to monetary, fiscal and exchange rate, global economic and financial environment, political circumstances and contagion policy of the home country with other countries and development of the financial sector of the domestic country (Eichengreen (2001)). Capital flows to developing countries increased dramatically since the early 1990s following major restructuring of their economies and adoption of more liberal policies. In developed countries inflow of foreign capital increase economic growth by proper utilization of productive activity as in general channelization of financial investment is improved in developed ones (Levine (1991)). Whereas in developing countries financial sectors are less developed leading to suboptimum channelization of financial investment and lower economic growth. Against this background, the

objective of this study is to examine how foreign capital affects domestic financial markets and ultimately economic growth.

Underdeveloped financial market or institution cannot properly mobilize available savings for investable productivity in the economy. Thus suboptimal supply of financial investment hinders economic growth. In developing countries there is also a tendency to restrict cross country capital account transaction because of scarcity of domestic savings, which is more needed for domestic investment. Thus in a less developed country there is also more restrictions on capital flows. Contagion effect is also an important event along with the capital account liberalization policy. Due to these effect countries in a peer group are more likely to move together (Eichengreen (2001)). The inflow or outflow of capital between the home country and its trade partners depends largely on the government policies of the home country. Exchange rate also determines the amount of inflow and outflow of funds from one country to another.

This study tries to reexamine the relationship between the inflow of foreign capital and economic growth in case of emerging country India. How the changing pattern of inflow of foreign capital has influenced the growth momentum of the Indian economy is a serious cause of concern in the context of openness of the domestic economy to the world economy that was initiated in the early 1990s. Another related research question is how exchange rate is influenced by the foreign capital movement and market capitalization of Indian economy through the contagion. The rest of the paper is organized as follows. Section 2 gives brief description of theoretical justification along with some selected literature review. Data source and methodology used in this study are described in section 3. The empirical results are reported and discussed in section 4. Finally section 5summarizes and concludes.

2. THEORETICAL JUSTIFICATION AND LITERATURE REVIEW

Financial institutions transfer economic resources or loanable funds into profitable projects that could enhance economic growth. A well-functioning financial system can motivate higher economic growth by mobilizing savings into investment (King and Levine 1993). The countries with developed financial sector generally have higher economic growth. A sound and healthy banking system and financial institutions are directly related to economic growth and development (Levine 1991). The effects of capital account liberalization are also conditioned by a country's stage of financial and institutional development (Arteta et al (2001)).Thus developed countries with improved financial institution generally have higher economic growth as a result of capital account liberalization than the developing countries.

The well-developed financial system helps to mitigate the risk associated with individual projects, firms, industries, region and countries through

diversification of risk (Levine (1991, 1992)). Risk diversification occurs through improving resource allocation and encouraging savings with the technological advancement of financial sector (Saint-paul1992a, 1992b). Bencivenga and Smith (1991) discussed the intermediation of banking system in the financial sector as important financial institutions, which allocate resources of individuals in productive activity. Whereas Levine (1991) observed positive correlation between financial market activity and growth when stock market encourages firm investment and enhances growth by reducing the liquidity risk. Capital account liberalization diversifies risk by portfolio assets movement of foreigners and domestic residents across countries. Greater opportunities for risk sharing also occur when both capital inflow and outflow happens. Improved opportunities for risk diversification enable agents to undertake riskier projects with higher returns resulting higher economic growth (Kraay (1998)).

The causal relationship between financial development and economic growth can occur in two different ways; the supply leading approach and demand flowing approach to financial development. One hand, an improved financial sector motivates the real sector for higher production which leads to higher per capita income and thus real economic growth. On the other hand, economic growth renders the development of intermediation systems for more productive activity (Patrick (1966)). Whether financial development causes economic growth or whether it is a consequence of increased economic activity has been debated since long years back.

The effects of capital account liberalization are period-specific (Arteta et al (2001)). The effects of capital account liberalization on growth may vary due to time specific reason. Sometime capital flows may depress by debt crisis or trade distortions, again sometime large scale portfolio of capital flows in to the domestic economy after governments' favorable plans. When more amount of inflow of capital occur it increase the amount of investable capital which leads to higher economic growth and lower inflow of capital reduce the amount of investable capital resulting decrease in economic growth. The changes in growth pattern of domestic economy due to amount of inflow of foreign capital dynamism is an interesting issue to explore.

Some previous studies found capital account liberalization did not influence domestic GDP growth; some other studies found inflow of foreign capital enhanced real economic growth of a country. Kraay (1998) cross country analysis found that capital account liberalization did not appear to have much of a statistically significant effect on growth, investment and inflation. Whereas Quinn (1997) study using data from 64 countries for the time period 1958 to 1989 in analyzing relationship between financial liberalization and economic growth found that capital account liberalization is robustly and positively associated with economic growth. Arteta et al also (2001) found positive association between capital account liberalization and economic growth.

A few number of studies attempted to look into the issue in India. Chakraborty (2008) and Pradhan (2009) analysed the impact of financial deepening on growth in post-reform India and found a strong effect. Kar and Mandal (2012) studied the relative significance of banks and stock markets in the finance-growth relationship. But these studies have focussed mainly on the effects of financial deepening by taking domestic capital only. This study re-examines the nature of causality between financialisation and economic growth by incorporating the impact of foreign capital on economic growth in India since the early 1990s. Foreign institutional investment increased significantly in India after initiating the policies of financial openness. Market capitalization of Bombay Stock Exchange has also been increased significantly after financial sector reforms in India. The objective is to locate the direction of causality, if any, between inflow of foreign capital and growth, and also between the dynamics of market capitalisation and growth with monthly time series data in analysis framework.

3. DATA SOURCES AND ESTIMATION METHOD

We are using market capitalisation at the Bombay Stock Exchange on monthly basis as representative for financial deepening. Financial openness is captured by the flow of foreign portfolio investment in India. While GDP per capita is widely used to measure economic growth, the index of industrial production (IIP) is used as a proxy for real sector growth, because IIP is available in monthly frequency in official statistics in India. While GDP includes value added both from the real as well as the financial sectors, IIP is generated solely from the non-financial sector. Thus, in finding out the relation between the performances of the financial sector and the real sector, IIP may be the better choice as a proxy for real sector performance. Moreover, the IIP explains more return variation than GDP. To incorporate the impact of the external sector on financial sector performance, we have the Monthly average rates of real effective exchange rate of the Indian rupee with US dollar.

The empirical part of this study is based on the monthly series of the variables mentioned above ranging from April-1994 to December-2015, comprising of 262 data points. The monthly time series of IIP and exchange rate obtained from Handbook of Statistics on Indian Economy (2016) published by the Reserve Bank of India. From period April-1994 to December -2014 data of market capitalisation at the Bombay Stock Exchange on monthly basis is taken from the Handbook of Statistics of the Indian Securities Market (2013) published by the Securities and Exchange Board of India. Again remaining data January to December, 2015 of market capitalisation at the Bombay Stock Exchange on monthly basis is collected from Handbook of Statistics on Indian Economy (2016) published by the Reserve Bank of India. Data of Financial openness is taken from the Handbook of Statistics of the Indian Securities Market (2015) published by the Securities and Exchange Board of India.

The current series of IIP is based for the year 2004-05. To extend this series back to April-1994, we have combined the current series with the earlier series with base period 1993-94. The choice of the study period is to capture the scenario of post-liberalization period based on availability of data series. All variables are converted into natural logarithmic form for smoothing out the series to some extent.

As the data used in this study are time series, we have applied time series econometrics. Any monthly macroeconomic series is composed of four components; trend (T) cyclical (C) seasonal (S) and irregular (I) component1. As series are monthly series they have similar fluctuation on common interval. Seasonality presents in the data series. We converted each data series in to de-seasonalized2 data series with their natural logarithm.

To examine the existence of causality among variables we use Vector Auto Regressive test or VAR test for analyzing the causality and the direction of causality among variables. In VAR, a causality test, which is also called multivariate generalization of the Granger causality test, examines whether the lags of one variable X1enter into the equation for another variable X2. More precisely, a variable X1is said to Granger-cause another X2 if the present value of X2 can be predicted not only by using past values of X2 but also past values of X1.Granger-causality basically means a correlation between the current value of one variable and the past (lags) value of others. If X1Granger-causes X2, then the causality is called unidirectional from X1to X2 or one way causal relationship. On the other hand, if both variables Granger-cause each other, then it can be stated as bi-directional causality or two way causal relationship.

VAR model, popularized by Sims (1980), estimated by considering the simple bivariate system is following:

$$X_{1t} = b_{10} - b_{12}X_{2t} + \gamma_{11}X_{1t-1} + \gamma_{12}X_{2t-1} + \varepsilon_{1t}$$

$$X_{2t} = b_{20} - b_{21}X_{1t} + \gamma_{21}X_{1t-1} + \gamma_{22}X_{2t-1} + \varepsilon_{2t} \quad (1)$$

Where, (i) both X_{1t} and X_{2t} are stationary. (ii) ε_{1t} and ε_{2t} are uncorrelated white-noise disturbances.

[1]The trend component shows the permanent growth in the series due to structural factors like technological change or/and improvement in total resources in the economy. The cyclical component shows ups and downs in the economy due to temporary factors like demand side imbalances. Seasonality occurs when the time series exhibits regular fluctuations during the same month (or months) every year, or during the same quarter every year. And the random term shows some unpredictable events in the economy.

[2]For de-seasonalization each logarithmic data series regressed on the time variable and then subtracted the seasonal component from each data series.

We apply VAR if the variables in the system of equation are not integrated of same order. To find out the order of integration of the variables, we have performed the Augmented Dickey-Fuller (ADF) unit root test. We have using an autoregressive (AR) model[3] to find out whether a time series variable is non-stationary or stationary. This test is important as it shows the number of times the variable has to be differenced to arrive at a stationary value. In general, economic variables which are stationary are called I (0) series and those which are to be differenced once in order to achieve a stationary value are called I (1) series.

The ADF unit root test is performed by estimating the following model (Dickey and Fuller, 1981):

$$\Delta x_t = \phi_0 + \rho x_{t-1} + \sum_{i=1}^{p} \phi_i \Delta x_{t-i} + \beta t + \varepsilon_t \qquad (2)$$

The hypothesis to be tested is

$H_0 : \rho = 0$

$H_1 : \rho < 0$

Rejection of H_0 means that the series does not contain unit root and it follows difference stationary process.

The Dickey Fuller unit root tests are biased toward non-rejection of the unit root null when there are structural breaks in the series. Perron (1989) showed that a standard Dickey-Fuller (1979) (DF) type unit root test is not consistent if the alternative is that of a stationary noise component with a break is present in the slope of the deterministic trend. His main point is that the existence of an exogenous shock which has a permanent effect will lead to a non-rejection of the unit root hypothesis even though it is not true. Break point implies if there is any change of the series with respect to time. If the value of the coefficient of the time variable significantly changes at a particular time, then that particular time is the break point. Perron used a modified Dickey-Fuller (DF) unit root tests that includes dummy variables to account for one known, or exogenous structural break. The break point of the trend function is fixed (exogenous) and chosen independently of the data. Perron's (1989) unit root tests allows for a break under both the null and alternative hypothesis.

Based on Perron (1989), the following three equations are estimated to test for the unit root. The equations take into account the existence of three kinds of structural breaks: a 'crash' model (3) which allows for a break in the level (or intercept) of series; a 'changing growth' model (4), which allows for a break in the

[3]Order criterion must be selected for each series to incorporate the number of augmented term in model formation of augmented dickey fuller unit root test. AIC tends to be more accurate for monthly data.

slope (or the rate of growth); and lastly one that allows both effects to occur simultaneously, i.e. one time change in both the level and the slope of the series (5).

$$x_t = \alpha_0 + \alpha_1 DU_t + d(DTB)_t + \beta t + \rho x_{t-1} + \sum_{i=1}^{p} \phi_i \Delta x_{t-1} + e_t \qquad (3)$$

$$x_t = \alpha_0 + \gamma DT_t^* + \beta t + \rho x_{t-1} + \sum_{i=1}^{p} \phi_i \Delta x_{t-1} + e_t \qquad (4)$$

$$x_t = \alpha_0 + \alpha_1 DU_t + d(DTB)_t + \gamma DT_t + \beta t + \rho x_{t-1} + \sum_{i=1}^{p} \phi_i \Delta x_{t-1} + e_t \qquad (5)$$

Where the intercept dummy DU_t represents a change in the level; $DU_t = 1$ if $(t > TB)$ and zero otherwise; the slope dummy DT_t (also DT_t^*) represents a change in the slope of the trend function; $DT^* = t - TB$ (or $DT_t^* = t$ if $t > TB$) and zero otherwise; the crash dummy $(DTB) = 1$ if $t = TB + 1$, and zero otherwise; and TB is the break date. Each of the three equations has a unit root with a break under the null hypothesis, as the dummy variables are incorporated in the model.

4. EMPIRICAL RESULT AND INTERPRETATION

As the time series data are used in this study we need to examine first the stochastic behavior of the series we have used. The behavior of the series can be looked at, although grossly, simply by plotting the data against time. The graphical depictions of each series are given the visual concept for further analysis (Fig1 to Fig 4).

We found that these series have regular fluctuation and have some upward movement or permanent growth in the series. Thus the series market capitalization at Bombay Stock Exchange (mkt_cap_bse), foreign portfolio investment (fii_purchase), index of industrial production (iip), and exchange rate (exrt) (Fig 1 to Fig 4) incorporate seasonal component and trend component[4]. Each series of

[4]A non-stationary series exhibits trend. Trend may be of two types; deterministic trend and stochastic trend. A time series with deterministic trend follows trend stationary process (TSP), while a non-stationary time series showing stochastic trend is a difference stationary process (DSP). In a series following TSP, cyclical fluctuations are temporary around a stable trend, while for DSP any random shock to the series has a permanent effect. The cyclical components of a TSP originate from the residuals of a regression of the series on the variable time, and a DSP involves regression of a series on its own lagged values and time. A TSP has a trend in the mean but no trend in the variance, but a DSP has a trend in the variance with or without trend in the mean.

market capitalization at Bombay stock exchange (mkt_cap_bse), foreign portfolio investment(fii_purchase), index of industrial production (iip) and exchange rate (exrt) are seasonally adjusted for removing the seasonal component from each series (Fig 1 to Fig 4 in appendix section).

We have examined the trending behavior or random walk behavior of the individual series by carrying out unit root test after incorporating break, if any, in the series.

Table 1. *Break point years of different series:*

Series Name	Andrews Break Point	Significance Level
Ln_mkt_cap_bse	May-2003	0.01
Ln_fii_purchase	December-2005	0.00
Ln_iip	November-2006	0.00
Ln_exrt	September-2011	0.00

Source: Handbook of Statistics of the Indian Securities Market (2013, 2015), SEBI and Handbook of statistics on Indian Economy2016, RBI.

We have carried out the testing for structural break by assuming break point is determined endogenously as mention in the methodological part. Table 1 displays the major break points in different series. Here as the data is monthly data, break point of a series is a particular month of a year for which the coefficient of the time variable month changes. A series may have one or more than one break points. Here we have used Andrews's break point test, which repots the most significant break point. Market capitalization at Bombay Stock Exchange series breaks in May-2003. BSE Sensex followed upward trends since around April-May 2003. This coincidence may be explained as a partial reflection of high growth of Indian economy and improved performance of listed companies in terms of sales growth, value of production and gross profits (Takeshi and Hamori (2015)). Break point for the foreign institutional investment series is found in month December, 2005. As India had emerged as an important destination for global investment there was large net equity investment by FIIs, particularly in the second half of 2005-2006. Index of industrial production series break point was in November-2006. This occurred may be due to growth in the manufacturing sector, which has the highest weight in the index of industrial production basket. Thus industrial output got the highest growth in November-2006. Exchange rate break occurred in September-2011. This may because of the uncertainty about India's commitment to economic reform.

Government had forced to postpone foreign investment or take money out of Indian market resulting drop in the exchange rate in September 2011.

The order of integration of the series has been determined by carrying out ADF unit root test after incorporating the break point in the series. Unit root test on relevant economic variable is in order to determine time series characteristics. Tables 2 shows the results of Unit root test. The values of the coefficients are written in the second column in the tables with their significance (p-value) denoted by (*).

Table 2. *Results of the unit root test of the seasonally adjusted series*

Series Name	**Coefficient value**
Ln_mkt_cap_bse	-0.07***
Δ Ln_mkt_cap_bse	-0.94***
Ln_fii_purchase	-0.37***
Ln_iip	-0.35***
Ln_exrt	-0.02**
Δ Ln_exrt	-0.77***

Source: Handbook of Statistics of the Indian Securities Market (2013,2015), SEBI and Handbook of statistics on Indian Economy2016, RBI.
Note: *** implies significant in 1% level, ** implies significant in 5% level,* implies significant in 10% level and the rest are insignificant.

In case of market capitalization of bse sensex and exchange rate, it is shown that in level form all coefficient values are significant in 1% and 5% level respectively and the vales of coefficients are close to zero. It implies there is unit root for each series in the level form and thus each series is non-stationary in level. But when the series are converted in first difference form their coefficients become negative means less than zero and also significant in 1% level implies stationarity of each series. Whereas coefficient values of foreign institutional investment and IIP series are significantly less than zero in 1% level implies stationarity of each series in level form.

The series market capitalization of bse sensex and exchange rate (exrt) is non-stationary in level but stationary in the first difference is sufficient to show that series are I (1).Foreign institutional investment (fii) and index of industrial production (iip) are stationary in level implies integrated of order zero i.e., I (0).

Now to examine the existence of causality among variables we use vector auto-regression model or VAR test for analyzing the causality and the direction of causality among variables. Thus we found how relationships exit between inflow of foreign capital and the economic growth. In multivariate context all variables under consideration are not found to be of same orderly integrated. For this purpose we are taken the stationary form of all series. As market capitalization of bse sensex and exchange rate (exrt) are difference stationary then we are used first difference form of these series for the purpose of VAR analysis. Whereas foreign institutional investment (fii) and index of industrial production (iip) are stationary in level then

we are used level stationary series of foreign institutional investment and IIP for VAR analysis.

Table 3. *Results of vector auto-regression model*

Independent Variables	**Dependent Variables**			
	Δ Ln_mkt_cap_bse	Ln_fii_purchase	Ln_iip	Δ Ln_exrt
Δ Ln_mkt_cap_bse	0.05	0.26	0.02	-0.04***
Ln_fii_purchase	0.00	0.82***	0.01*	0.00
Ln_iip	0.01	0.78***	0.97***	0.01
Δ Ln_exrt	-0.75***	-1.38	0.08	0.19***
Constant	0.01***	0.02	0.00***	0.00***

Source: Author's estimation based on data from Handbook of Statistics of the Indian Securities Market (2013, 2015), SEBI and Handbook of statistics on Indian Economy2016, RBI.

Note: *** implies significant in 1% level, ** implies significant in 5% level,* implies significant in 10% level and the rest are insignificant. Equation numbers are in parenthesis ( ).

From table 3 it is found that market capitalization of bse sensex is negatively affected by previous period exchange rate. Past period decrease in exchange rate increases the current stock price. If the real dollar exchange rate rises, firm's profit falls and so does the firm's share price and vice versa. Thus exchange rates affect stock prices (Asprem (1989)).Current period inflow of foreign institutional investment is positively influenced by previous period inflow of foreign institutional investment and past industrial production. If past period industrial production is high, economic growth is also high; it increases inflow of foreign institutional investment in motive of making higher profit return. Present industrial production is positively influenced by past period inflow of foreign capital and previous industrial production. Availability of large amount of investable capital increases the amount of industrial production of current period. There exists inverse relation between current period change in exchange rate and the previous market capitalization of bse sensex. Exchange rate is inversely related with stock price return. If the stock price decreases then people in state of investment in the share market like to hold money in hand. Excess money supply increases the price level and thus the exchange rate. Present exchange rate is also affected by past period exchange rate.

Both way causal relationship exists between inflow of foreign institutional investment and industrial production. Inflow of foreign capital increases industrial production. In the other direction previous period high industrial production also positively influences current inflow of foreign capital. But we found no causal

relation exists between market capitalization of bse sensex and industrial production. Thus financial deepening has no influencing effect on economic growth. Again two way causality found between market capitalization of bse sensex and exchange rate. Therefore financial deepening negatively affects the exchange rate and vice versa.

5. CONCLUSION

This paper has examined the question whether financialisation and financial openness have significant causal effect on real sector growth in India since the early 1990s. This issue has been significant in the context of financial sector reforms in India.

The empirical results suggest that the relationship between real sector growth and financial development exists in India as supported by the other studies as mentioned above. While financialisation has no significant causal effect on real sector growth, financial openness measured by net inflow of foreign institutional investment has causal effect on the high growth in India. The empirical findings support the hypothesis that financial openness has a significant impact on economic growth.

In an emerging country like India where the linkage effect of financial sector to real sector is very week, financial deepening in terms of market capitalization does not influence the performance in the real sector. In case of a developing country India foreign investable capital is important because of insufficiency of domestic capital. Therefore financial openness in terms of foreign capital investment is influencing the economic growth and in the other way higher growth rate is also inviting large amount of foreign investable capital.

REFERENCES

Arteta, C., Eichengreen, B., & Wyplosz, C. (2001). *When does capital account liberalization help more than it hurts?*. (Working paper), Graduate Institute of International Studies, Geneva.

Asprem, M. (1989). Stock prices, asset portfolios and macroeconomic variables in ten European countries. *Journal of Banking and Finance, 13*, 589-612.

Bencivenga, V. R. & Smith, B. D. (1991). Financial intermediation and endogenous growth. *The Review of Economic Studies*, *58*(2), 195-209.

Chakraborty, I. (2008). Does financial development cause economic growth? The Case of India. *South Asia Economic Journal*, *9*(1), 109–139.

Dickey, D., & Fuller, W. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*(366), 427-431.

Eichengreen, B. (2001). Capital account liberalization: What do the cross-country studies tell us. *World Bank Economic Review, 15*, 341–365.

Kar, S., & Mandal, K. (2012). *Reexamining the finance–growth relationship for a developing economy: A time series analysis of post-reform India*. (IEG Working Paper No. 313: 1-24).

King, R. G. & Levine, R. (1993). Finance, entrepreneurship, and growth: Theory and evidence. *Journal of Monetary Economics*, *32*, 513-542.

Kraay, A. (1998). In search of the macroeconomic effects of capital account liberalization. (Unpublished manuscript), The World Bank (October).

Levine, R. (1991). Stock markets growth and tax policy, *Journal of Finance*, *46*(4), 1445-1465.

Levine, R. (1992). Financial intermediary services and growth. *Journal of Japanese and International Economics*, *6*, 383-405.

Patrick, H. T. (1966). Financial development and economic growth in under developed countries. *Economic development and cultural change*, *14*(2), 174-189.

Perron, P. (1989). The great crash, the oil price shock, and the unit root hypothesis. *Econometrica*, 57(6), 1361-1401.

Pradhan, R. P. (2009). The nexus between financial development and economic growth in India: Evidence from multivariate VAR model. *International Journal of Research and Reviews in Applied Sciences*, *1*(2), 141-151.

Quinn, D. (1997). The correlates of changes in international financial regulation. *American Political Science Review*, *91*(3), 531-551.

Saint-Paul, G. (1992a). Technological choice, financial markets and economic development. *European Economic Review*, *36*, 763-781.

Saint-Paul, G. (1992b). Technological dualism, incomplete financial markets and economic development. *The Journal of International Trade & Economic Development: An International and Comparative Review*, *1*(1), 13-26.

Takeshi, I., & Hamori, S. (2015). *Indian economy: Empirical analysis on monetary and financial issues in India.* World Scientific Publishing Co. Pte. Ltd., Singapore.

APPENDIX

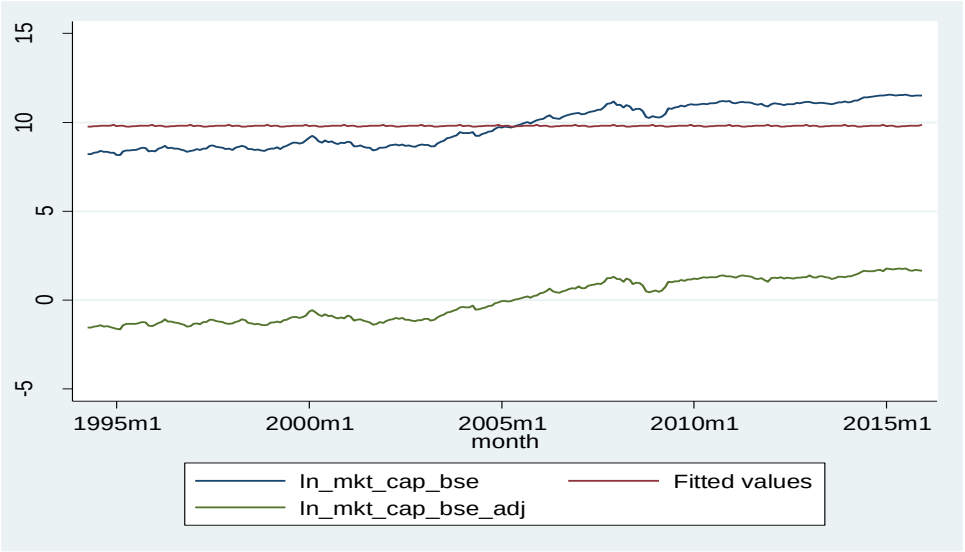

Figure 1. *log series, seasonally adjusted series and trend series of market capitalisation at Bombay Stock Exchange*

Source: Handbook of Statistics of the Indian Securities Market (2013), SEBI and Handbook of statistics on Indian Economy2016, RBI.

Figure 2. *log series, seasonally adjusted series and trend series of foreign portfolio investment*

Source: Handbook of Statistics of the Indian Securities Market (2015), SEBI.

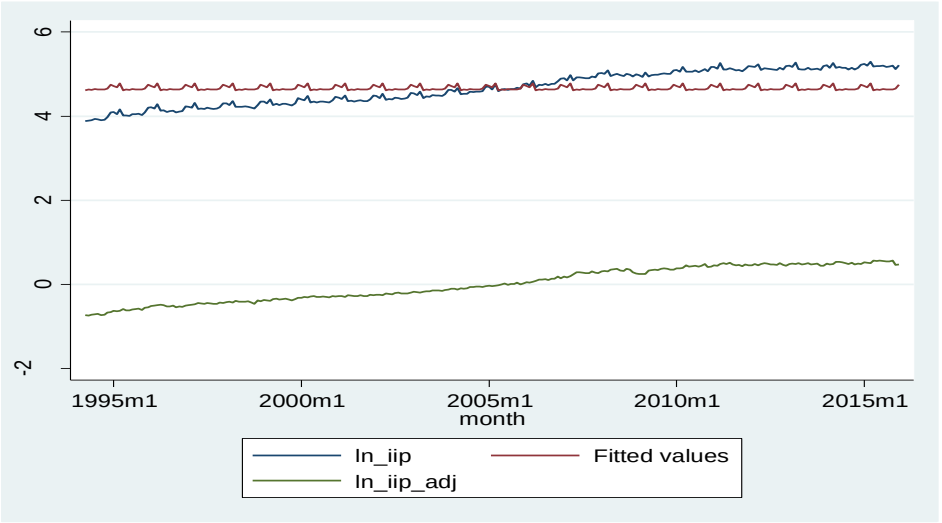

Figure 3. *log series, seasonally adjusted series and trend series of IIP (index of industrial production)*
Source: Handbook of statistics on Indian Economy2016, RBI.

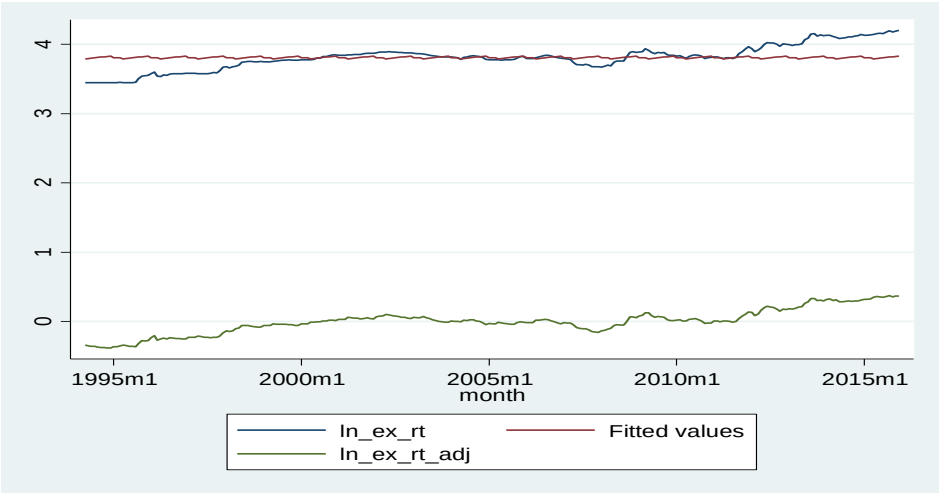

Figure 4. *log series, seasonally adjusted series and trend series of Exchange Rate*
Source: Handbook of statistics on Indian Economy2016, RBI.

Table I. *Unit root test of market capitalization of bse in level form*

Dependent variable	D.ln_mkt_cap_bse_adj		
Independent variables	Coef.	t-statistic	P-value
L1.ln_mkt_cap_bse_adj	-0.07	-3.45	0.00
DL_ln_mkt_cap_bse	0.09	3.47	0.00
DP_ln_mkt_cap_bse	0.00	0.02	0.98
DT_ln_mkt_cap_bse	0.00	1.47	0.14
time	0.00	0.93	0.35
constant	-0.09	-2.80	0.01

Source: Handbook of Statistics of the Indian Securities Market (2013), SEBI and Handbook of statistics on Indian Economy2016, RBI.

Table II. *Unit root test of market capitalization of bse in 1st difference form*

Dependent variable	D.d1_ln_mkt_cap_bse_adj		
Independent variables	Coef.	t-statistic	P-value
L1.d1_ln_mkt_cap_bse_adj	-0.94	-14.92	0.00
DL_ln_mkt_cap_bse	0.03	1.53	0.13
DP_ln_mkt_cap_bse	0.05	0.61	0.54
DT_ln_mkt_cap_bse	0.00	-0.65	0.52
time	0.00	-0.20	0.85
constant	0.01	0.48	0.63

Source: Handbook of Statistics of the Indian Securities Market (2013), SEBI and Handbook of statistics on Indian Economy2016, RBI.

Table III. *Unit root test of fii_purchase in level form*

Dependent variable	D.ln_fii_purchase_adj		
Independent variables	Coef.	t-statistics	p-value
L1.ln_fii_purchase_adj	-0.37	-5.98	0.00
ln_fii_purchase_adj_d	0.00		
ln_fii_purchase_adj_d2	0.15	2.37	0.02
DL_ln_fii_purchase	0.14	1.98	0.05
DP_ln_fii_purchase	-0.07	-0.28	0.78
DT_ln_fii_purchase	0.00	-4.19	0.00
time	0.01	4.98	0.00
constant	-0.77	-4.87	0.00

Source: Handbook of Statistics of the Indian Securities Market (2015), SEBI.

Table IV. *Unit root test of iip in level form*

Dependent variable	D.ln_iip_adj		
Independent variables	Coef.	t-statistic	P-value
L1.ln_iip_adj	-0.35	-5.59	0.00
ln_iip_adj_d	0.00		
ln_iip_adj_d2	0.17	2.69	0.01
DL_ln_iip	0.04	3.75	0.00
DP_ln_iip	-0.05	-2.23	0.03
DT_ln_iip	0.00	-4.32	0.00
time	0.00	4.26	0.00
constant	-0.12	-4.02	0.00

Source: Handbook of statistics on Indian Economy2016, RBI.

Table V*. Unit root test of exchange rate in level form*

Dependent variable	D.ln_ex_rt_adj		
Independent variables	Coef.	t-statistics	P-value
L1.ln_ex_rt_adj	-0.02	-1.95	0.05
ln_ex_rt_adj_d	0.00		
DL_ln_ex_rt	0.01	2.08	0.04
DP_ln_ex_rt	0.02	1.27	0.21
DT_ln_ex_rt	0.00	-0.33	0.74
time	0.00	0.49	0.62
constant	0.00	-0.32	0.75

Source: Handbook of statistics on Indian Economy2016, RBI.

Table VI. *Unit root test of exchange rate in 1st difference form*

Dependent variable	D.d1_ln_ex_rt_adj		
Independent variables	Coef.	t-statistics	P-value
L1.d1_ln_ex_rt_adj	-0.77	-12.53	0.00
ln_ex_rt_adj_d	-0.03	-2.38	0.02
DL_ln_ex_rt	0.01	1.57	0.12
DP_ln_ex_rt	0.02	0.88	0.38
DT_ln_ex_rt	0.00	0.06	0.95
time	0.00	0.95	0.35
constant	0.00	-0.84	0.40

Source: Handbook of statistics on Indian Economy2016, RBI.