Changing Patterns of Capital Flows and Macroeconomic Impact of FDI in India

Aishwarya Jain
Officer Trainee
Indian Economic Service, 2021

Supervisor: Prof. Pravakar Sahoo

Abstract:

The paper seeks to analyse changing trend and composition of capital flows to India in the post global financial crisis (GFC) period, i.e., 2007-08 to 2020-21, in terms of volume of flows, composition, route of entry, equity profile, source countries and destination sectors. The objective is to understand the inter-dynamics of FDI with different macroeconomic variables. For a preliminary understanding of the macroeconomic impact, the paper looks at trends and decomposition of gross capital flows. To establish the association and identify causality between foreign direct investment (FDI) and select macroeconomic indicators like broad money (M3), gross domestic product (GDP), rate of interest (ROI) and USD to INR exchange rate (ER); Granger causality test has been used. A bi-directional causality is found between FDI & M3, and GDP & M3; along with unidirectional causality from GDP to FDI. Upon testing for stationarity, test of cointegration has been used, and vector error correction model (VECM) model has been applied to analyse the error correction term (ECT). One cointegrating equation has been is found between the selected variables, and VECM results for both dependent variables (M3 and FDI, separately) show existence of a statistically significant error correction term (ECT), with value < 0. This implies a push back to equilibrium in the long run. Finally, technique of impulse response function has been used to know the nature of impulse response of selected variables to FDI.

Key words: capital flows, FDI, broad money, GDP

Introduction:

The global financial crisis (GFC) was an event of great importance in the advancement of understanding of open macroeconomy theory. The event lay open the magnitude of vulnerability that all open economies, especially the developing economies face in light of gradual and continuous liberalisation of capital flows. The period following the GFC has also been a time for policy makers to adopt a combination of fiscal and monetary policy tools to mitigate the aftermath of the crisis, along with enhancing the potentially positive impacts of an open global economy. It is in this light that the paper aims at understanding and analysing the linkages between foreign capital inflows and various macroeconomic variables. It is only with a sound understanding of the composition of capital flows and the inter-dynamics of foreign direct investment and macroeconomic indicators that one can discern the desired policy mix. The study is relevant to comprehend the policy decisions taken in the aftermath of the GFC, as well as discover the ways in which policy is likely to evolve over time.

The study is done for a period from financial year 2007-08 quarter 1 to 2020-21 quarter 1, that is, for a total of 57 quarters. Secondary data from Reserve Bank of India's database on Indian economics has been used. To check for the stationarity of the different data series, unit roots are calculated using the Augmented Dickey-Fuller test. Further, upon establishment of existence of cointegration among the variables using the Johansen Cointegration test, Vector error correction model (VECM) is used to look at the inter-dynamics between foreign direct investment and chosen macroeconomic variables, i.e., broad money, GDP growth, rate of interest and USD to INR exchange rate. Further, pairwise Granger Causality tests have been used to establish the causality between foreign direct investment and other macroeconomic variables. Finally, impulse response is assessed for the dependent variable, given an impulse in the independent variable.

The paper is structured to first introduce the reader with the objective of the study. This is followed by a review of the existing literature on the subject matter. The following content is divided into two parts: Part 1 comprises of an analysis of the changing pattern of capital flows.

Objectives of the study:

The study aims to observe the changing trend and composition of capital flows in India in post global financial crisis (GFC) period, i.e., 2007-08 to 2020-21. It also intends to understand the inter-dynamics of FDI with different macroeconomic variables, such as broad money (M3), Gross Domestic Product (GDP), rate of interest (ROI), and USD-INR exchange rate (ER). Identifying the nature of causality between FDI and other variables becomes imperative to the aforementioned analysis. Finally, the study aspires to know the nature of impulse response of selected variables to FDI, using the impulse response function technique.

Literature Review

Macroeconomic theory is full of literature contesting for the benefits of capital flows. **Horn & Narita, 2021** observe that capital flows to less developed countries can supplement the scarce domestic savings, and stimulate private credit through financial deepening in such capital constrained nations. Underlying understanding here is that in a developing country like India, banks form a dominating segment in credit creation, because of underdeveloped domestic financial markets. The channel of transmission of capital flows to financial development, and eventually growth is through increases in bank loans, deposits, and wholesale funding. **Banerjee and Duflo, 2014** also note that in developing economies, credit extension due to capital inflows can be welfare enhancing through employment generation.

At the same time, however, it is also noted that financial openness and increased K inflow can lead to macroeconomic vulnerability. **Reinhart & Reinhart, 2009, and Ghosh, Ostry, and Qureshi, 2016** also note that emerging market economies are vulnerable to triggers in boom-and-bust cycles in case of volatile capital flows. Testing for this perceived vulnerability, Horn & Narita, 2021 found only modest signs of a build-up in financial vulnerabilities attributed to capital flows. They also noted that financial risks cannot be assessed ex ante, hence implying a need for ex-post policy follow up on observed stress in the economy.

To capture the real vulnerability that an economy faces in view of liberal capital flows, it is imperative to lay focus on the domestic fundamental strength of an economy. **Horn & Narita, 2021** in their pursuit of finding the relative importance

of domestic pull versus global push factors in growth, point out the importance of domestic factors in causing credit creation, and hence growth. Their work finds a stronger causality between domestic policies and situation on credit uptake, vis-à-vis global push factors such as capital flows. On role of pull factors in inflow of capital flows, it is found in economic literature that the stable component of capital inflow, that is broadly the FDI is relatively determined by domestic macroeconomic factors and policy, as compared to the volatile component, i.e., portfolio investment, which is anchored by global liquidity.

On the question of impact of capital flows on growth cycle, based on the theory of Mundell Fleming Model, **Blanchard et al, 2015** notes that for an unchanged monetary policy rate, capital flows lead to an appreciation of domestic currency and hence a decline in net exports, causing a contraction in output. It is only in case of sufficient decline in policy rate that capital flows can be expansionary for an economy. However, this results in a policy dilemma, as a rise in policy rates might limit the output growth directly. **Dinh et al, 2019** in their study on developing and lower-middle-income countries find that FDI helps stimulate growth in the chosen countries in the long run, however, has a negative impact in the short run growth. Similar observations were made by **Koojaroenprasit, 2012** and **Shahbaz & Rahman, 2010** for Korea and Pakistan respectively. **Blanchard et al, 2015** also conclude that different combinations of policy tools are required to enhance the positive macroeconomic impact of capital inflows, based on the nature of such flows. **Chhetri et al, 2018** also find GDP to be the most significant variable impacting inflow of foreign investment. Their results also establish inter dynamics amongst the chosen macroeconomic variables as found in this study. Results from Mansaray, 2017 also establish a long-term relationship between FDI and other macroeconomic variables. **Ghosh et al, 2017** use a sample of 50 emerging market economies (EMEs) find that policy makers in EMEs respond positively to capital flows, hence hinting to the endogeneity of policy to the capital flow equation.
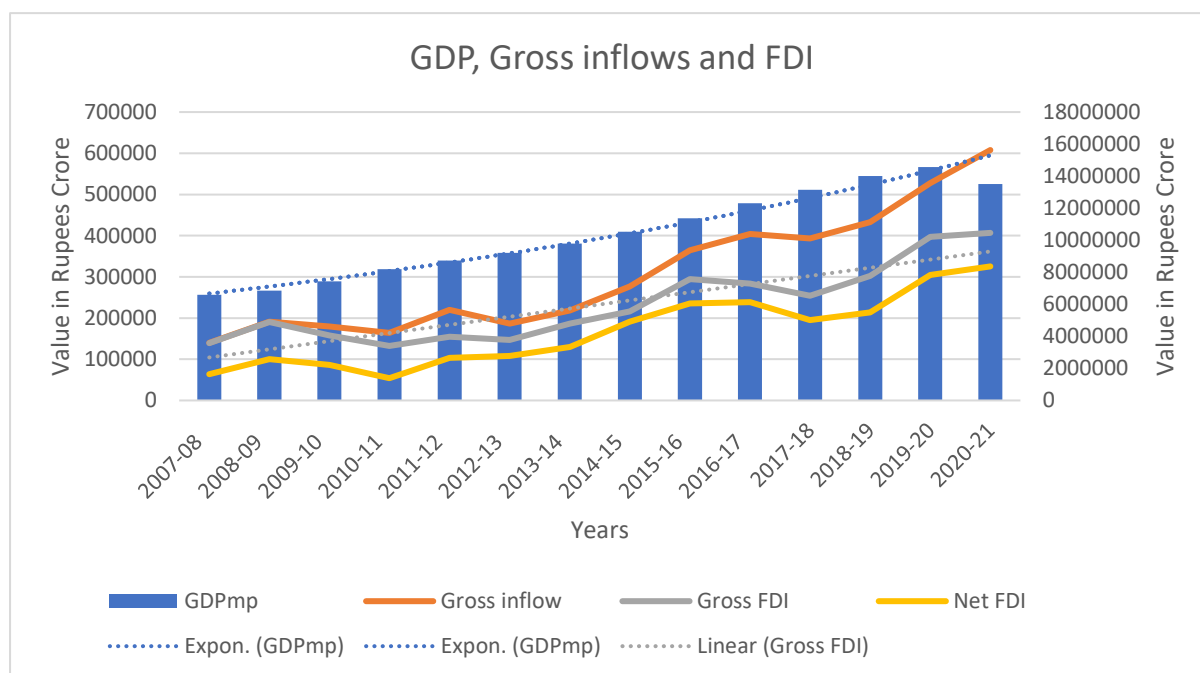
Part I: Changing patterns of Capital flows:

For a preliminary understanding of the macroeconomic impact, the paper looks at trends and decomposition of gross capital flows. Before looking at the trend and composition, it would be good to start with the data classification of foreign capital flows.

Data classification of foreign capital flows

- Foreign Investment inflows = Net FDI + Net FPI
- Net FDI = FDI to India – FDI by India
- FDI to India = Gross inflows – Repatriation/ Disinvestment
- Gross Inflows = Equity + Reinvested earnings + Other capital
- Repatriation = Equity + Other capital
- Equity = Government + RBI + Acquisition of shares + Equity of unincorporated bodies
- FDI by India = Equity + Reinvestment earnings + Other capital – Repatriation/ Disinvestment
- Net Portfolio investment = GDRs/ADRs + FIIs + Offshore funds and others – Portfolio investments by India

1.1 Changing Pattern of Capital flows: GDP & Foreign Inflows

1.2 Changing Pattern of Capital flows: FDI & Exchange Rate

FDI and Exchange rates
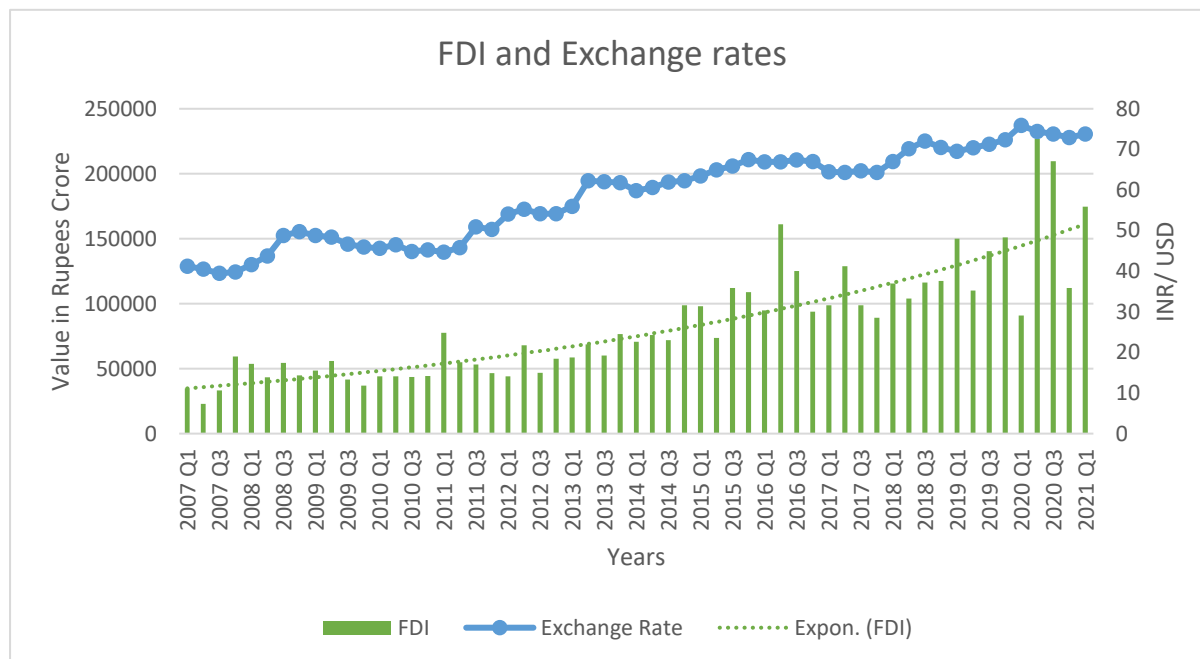
Quarterly data from 2007: Q1 to 2021: Q1 suggests an overall rising trend in gross FDI, as well as exchange rate between INR and USD. Periods of high gross FDI volatility are met with considerably fixed ER. This implies the significant role of "managed" float in India's exchange rate regime.

1.3 Changing Pattern of Capital flows: Decomposition of Gross investment inflows

Decomposition of Gross inflows
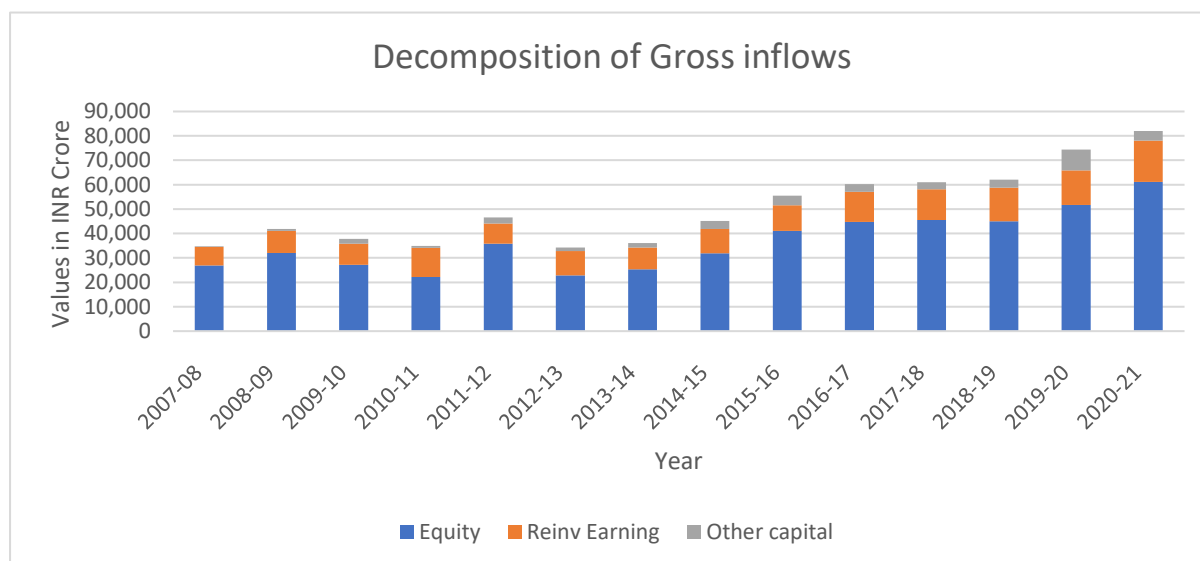
- Equity forms the highest share in gross investment inflow, hovering around 72%

- For two years, i.e., 2010-11 and 2012-13, share of equity investment inflows declined; an uptick in reinvested earnings was observed.

- Overall, the profile of gross investment inflows has remained stable.

Decomposition of Gross inflows

1.4 Changing Pattern of Capital flows: Decomposition of Gross Equity investment inflows
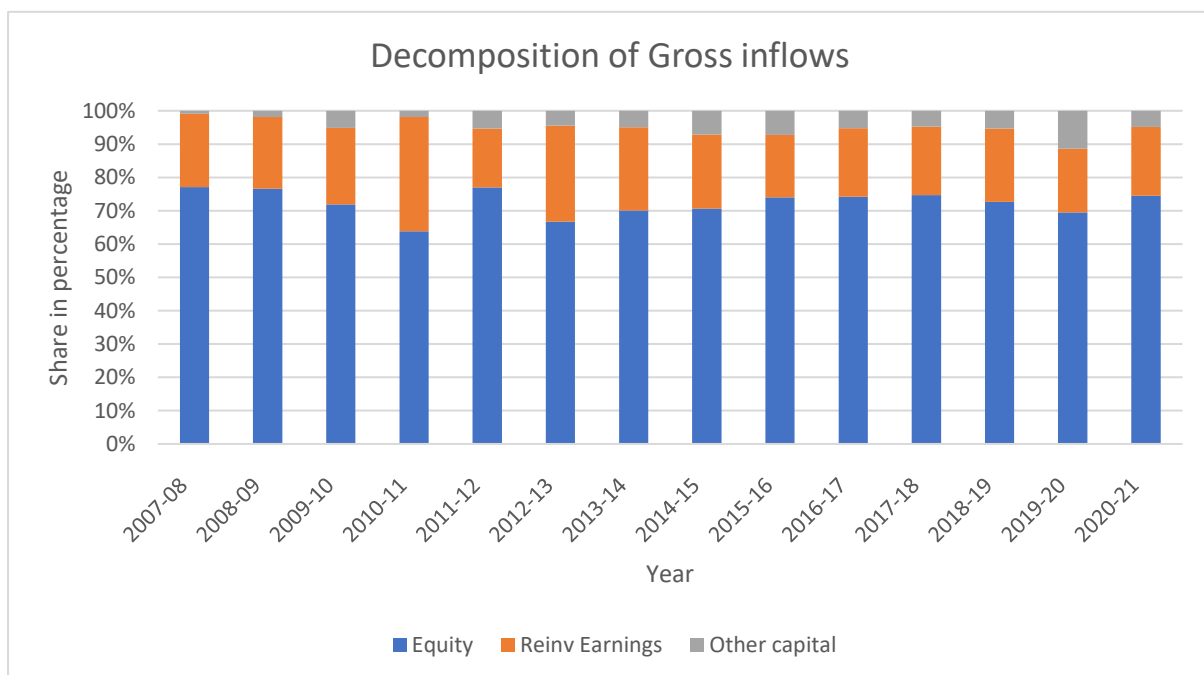
Decomposition of Gross Equity investment inflows
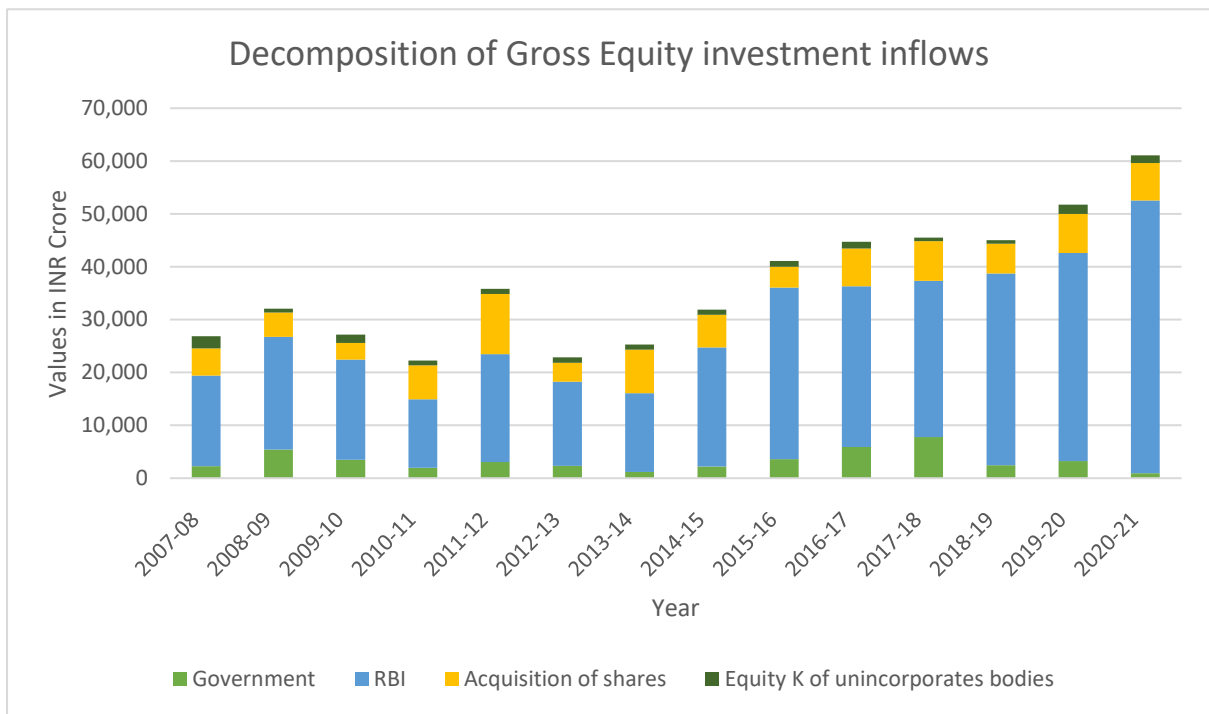
- Automatic route of entry of investment inflows dominated the entry route, with about 67% share post 2007-08

- However, this was further increased to approximately 85% in 2020-21

Decomposition of Gross Equity investment inflows
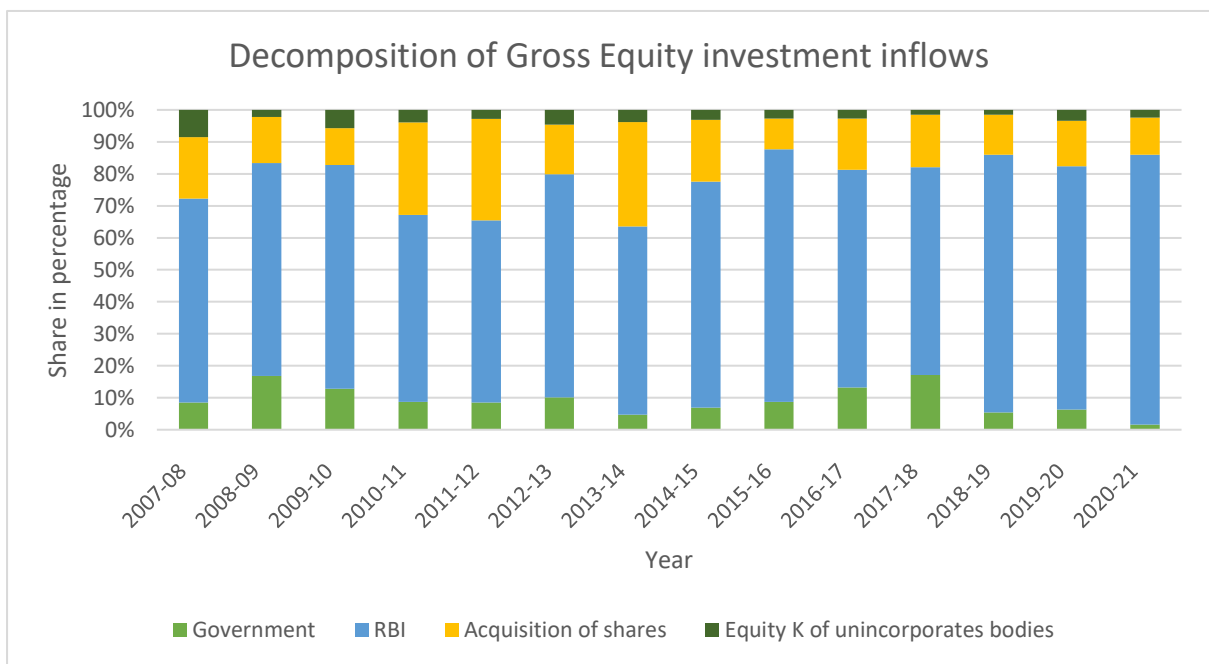
1.5 Changing Pattern of Capital flows: Decomposition between Net FDI and Net FPI
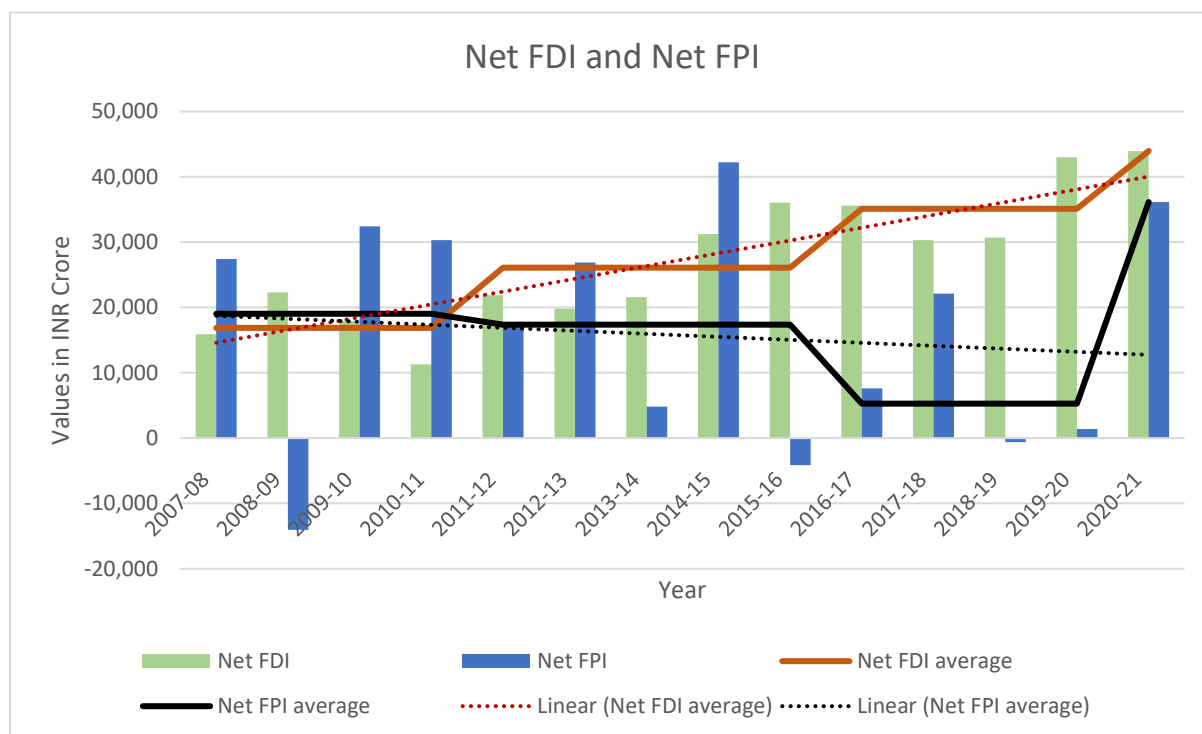
- As seen in macroeconomic theory, Net FPI flows show greater volatility, compared to Net FDI

- Periodic averages of Net FDI and Net FPI show a growing divergence; with maximum gap between 2016-17 and 2019-20.

1.6 Changing Pattern of Capital flows: Decomposition of Gross FPI inflows

DECOMPOSITION OF GROSS FPI INFLOWS

Legend: GDRs, ADRs — FIIs — Offshore funds
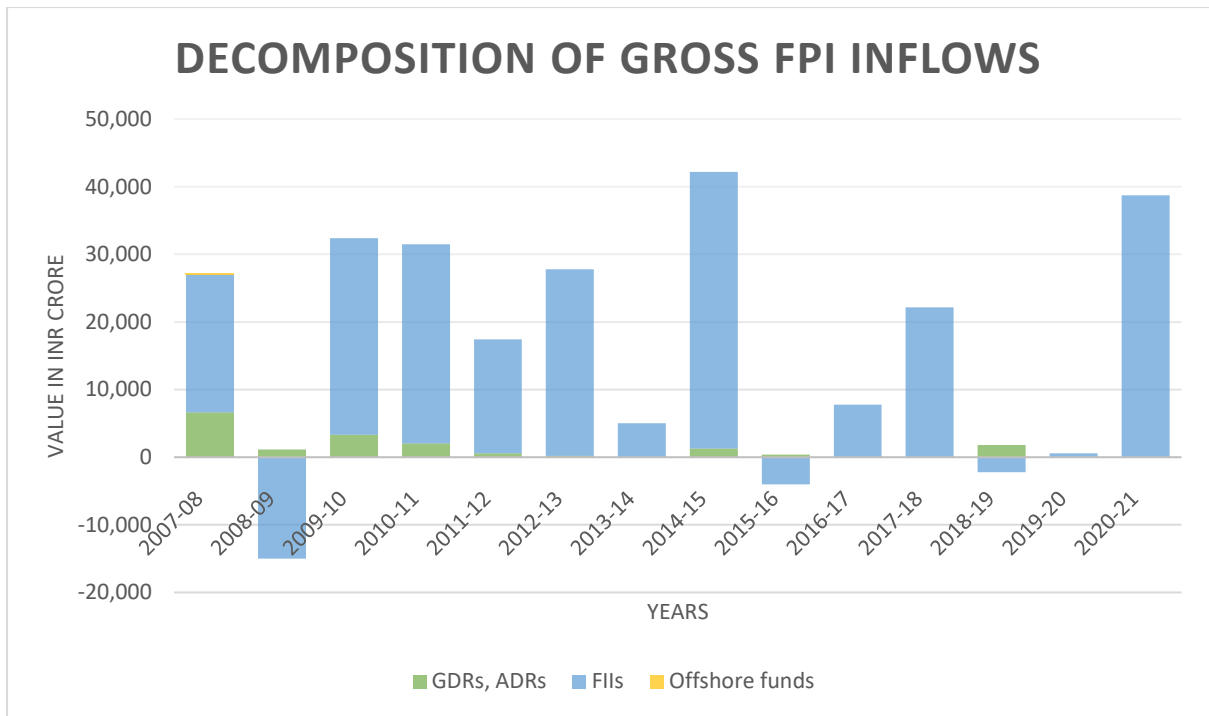
- Foreign Institutional investors continue to dominate Gross FPI inflows

- 'Offshore funds and others' has been zero since 2008-09 onward

1.7 Changing Pattern of Capital flows: Source country of FDI

Source country of FDI

Legend: Singapore — US — Mauritius — Cayman Islands — Japan — UK
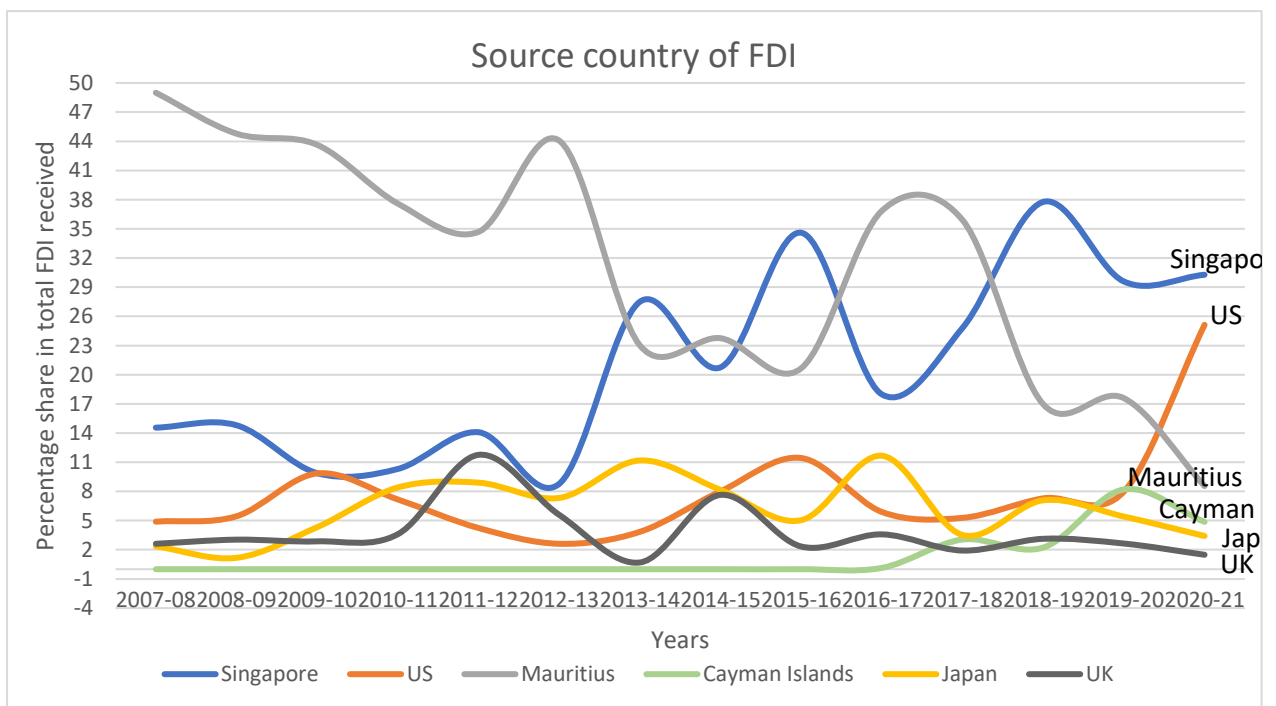
- **Singapore's** share in total FDI inflow has increased gradually from an average of 12% till 2012-13 to an average of 28% in the following years.

- Opposite trend was found in FDI flowing from **Mauritius-** fall from 43% to 23% in same time periods.

- Prominence of **Cayman Island** in overall shares has increased since 2015-16

- **US** and **UAE** saw a sharp rise in their respective shares in 2020-21

1.8 Changing Pattern of Capital flows: Destination sector receiving FDI

Sectors receiving FDI
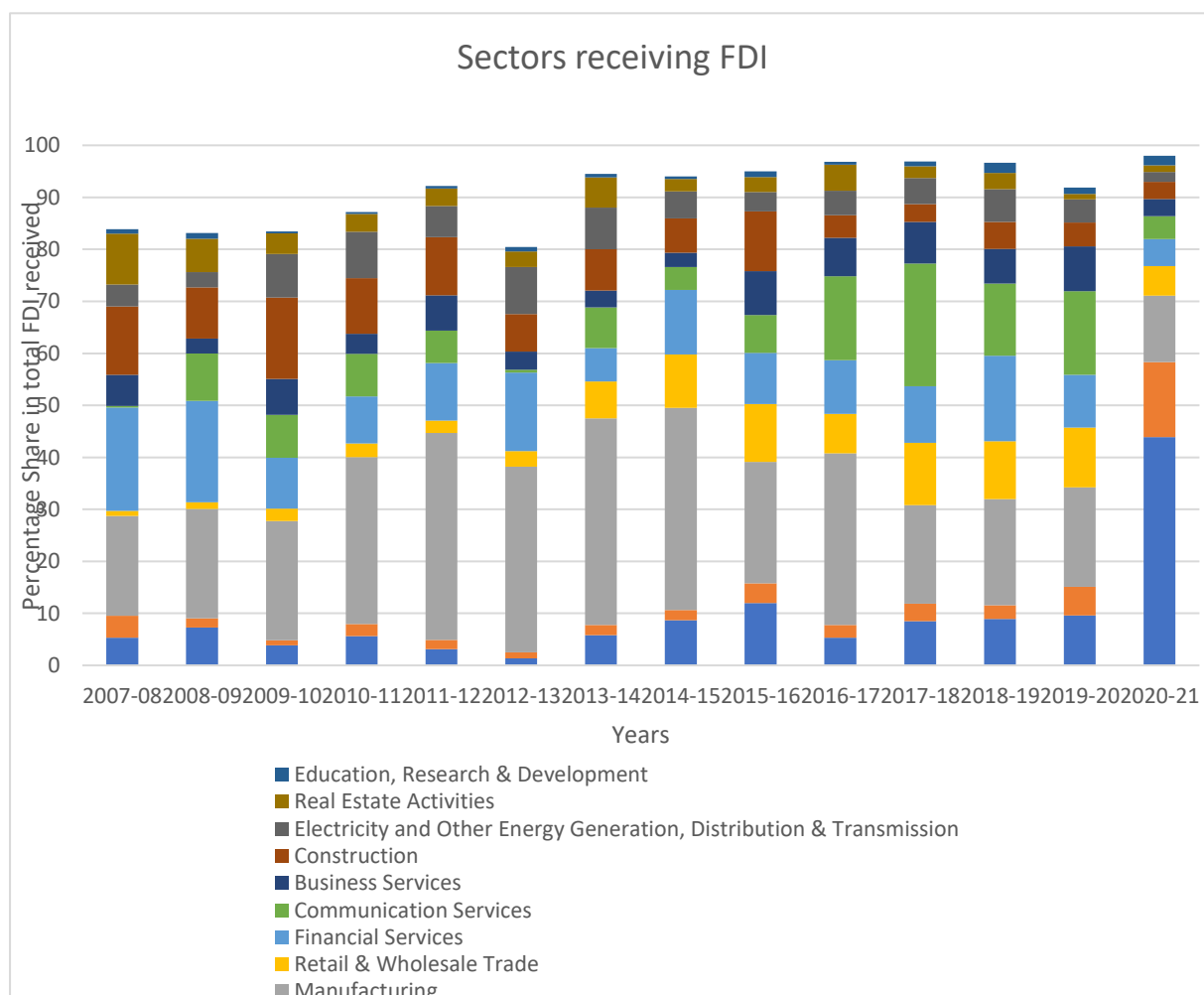
- Sharp rise in **share of 'computer service' to 44% in 2020-21** due to FDI received by **Jio Platform** in December 2020; along with increase in prominence of **digital economy based FDI**

- Share of **Manufacturing** increased from an average of **24% in 2007-11** to average of **35% till 2016-17**, now receiving an average of **18% from 2017-18 to 2020-21**

- **Construction sector's** share has been **depleting post 2015-16**. This is in sync with the lower **private investment** in the economy. Also explains why government is looking to **relax FDI rules** in this sector.

Part 2: Macroeconomic Impact of capital flows:

2.1 Data and Variables:

Factor	Variable	Symbol
Economic growth	GDP at market price (constant prices) Base year: 2011-12	GDP
Foreign Capital inflows	Gross Foreign direct investment	FDI
Monetary aggregate	Broad money	M3
Appreciation/ Depreciation of currency	USD to INR Exchange rate	ER
Monetary policy rate	Interest rate	ROI

Descriptive Statistics of the selected variables:

Variable	Obs	Mean	Std. Dev.	Min	Max
FDI	57	84852.77	44224.19	22854	226877
GDP	57	2619613	687493.3	1529398	3917725
ER	57	58.50647	11.02824	39.46439	75.8744
ROI	57	6.771053	1.431344	4.25	9.5
M3	57	92730.54	58974.13	13546.72	276303.2

Where,

Broad money (M3) = Narrow money (M1) + Time deposits
= Currency with public + Others' deposits with RBI + Demand deposits + Time deposits, and

Gross FDI Inflows = Equity + Reinvested earnings + Other capital

2.2 Methodology:

To determine the stationarity of time series of selected variables through **unit root tests**, the paper uses **Augmented Dickey Fuller (ADF) test**. **Granger causality test** has been used to determine pairwise causality between selected variables. **Johansen Cointegration test** has been used to know if there exists a cointegrating equation between the selected variables in the long run. **Vector Error Correction Model (VECM)** has been used to study the short run dynamics of the relationship between selected variables. It also yields the **error correction term (ECT)** which, if < 0, works to push dependent variable back to the equilibrium in the long run. **Impulse Response Function (IRF)** has been used to understanding the change (impulse response) in our model's variables in reaction to a shock in one or more variables. The response of each variable is being observed for a time horizon of ten periods, given a positive shock. Each **IRF graph** shows the dynamic path of a variable returning to its long run mean, after a one-time shock in all other variables, one at a time.

2.3 Results:

2.3.1 Test of Stationarity:

To determine the stationarity of time series of selected variables through unit root tests, the paper uses Augmented Dickey Fuller (ADF) test. Time series of selected variables was found to be non-stationary at their level form, and stationary at first differences, using the Augmented-Dickey Fuller test.

At Level form			
Variable	**t value**	**prob**	**Result**
GDP	-0.63051	0.8546	Non-stationary
FDI	-0.08256	0.9458	Non-stationary
ER	-0.8364	0.80072	Non-stationary
ROI	-0.99707	0.7485	Non-stationary
M3	0.598908	0.988415	Non-stationary
At first difference form			
Variable	**t value**	**prob**	**Result**
GDP	-11.6137	9.53E-12	Stationary
FDI	-13.2133	7.88E-12	Stationary
ER	-6.16151	2.24E-06	Stationary
ROI	-8.15696	3.51E-09	Stationary
M3	-9.16895	3.88E-10	Stationary

Author's calculations at 5% level of significance

Time series of selected variables was found to be non-stationary at their level form, and stationary at first differences, using the Augmented-Dickey Fuller test, at 5 per cent level of significance.

2.3.2 Granger Causality test:

The test enables establishing pairwise causality between selected variables. Null hypothesis is that one variable does not Granger cause the other variable. Decision rule to reject the null is based on p-value.

```
Null Hypothesis:                      Obs  F-StatisticProb.
=============================================================
GDP does not Granger Cause M3          53   3.85559   0.0090
M3 does not Granger Cause GDP               4.3200B   0.0049
=============================================================
FDI does not Granger Cause M3          53   3.94293   0.0081
M3 does not Granger Cause FDI               4.47971   0.0040

=============================================================
FDI does not Granger Cause GDP         53   1.07894   0.3785
GDP does not Granger Cause FDI              5.39500   0.0013
=============================================================
```

Bi-directional causality is found between FDI & broad money (M3). Also, bi-directional causality is found between GDP & M3. Unidirectional causality found between GDP and FDI, such that GDP causes FDI. The results are consistent with open macroeconomy theory.

2.3.3 **Johansen Cointegration Test :** The notion of cointegration, which was given a formal treatment in Engle and Granger (1987), makes regressions involving I(1) variables potentially meaningful. (Woolridge, 2013)

```
Unrestricted Cointegration Rank Test (Trace)
===============================================================
Hypothesized                    Trace         0.05
No. of CE(s)  Eigenvalue     Statistic  Critical Value  Prob.**
===============================================================
  None *        0.472698      71.81328      69.81889     0.0344
 At most 1      0.329917      38.53421      47.85613     0.2792
 At most 2      0.173465      17.71579      29.79707     0.5871
 At most 3      0.112833      7.809089      15.49471     0.4860
 At most 4      0.029994      1.583566      3.841466     0.2082
===============================================================
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
```

One cointegrating equation between the variables found at 5% level of significance. This implies a long-term relationship between the selected variables. If the selected variables are cointegrated, they can be used to specify more general dynamic models.

2.3.4 Vector error correction model (VECM):

VECM results for both dependent variables (M3 and FDI, separately) show existence of a statistically significant error correction term (ECT), with value < 0. This implies a push back to equilibrium in the long run.

2.3.4.1. M3 as dependent variable:

$\Delta M3 = \alpha_1 * (M_{t-1} - 0.04\ GDP_{t-1} + 2.18\ FDI_{t-1} + 16887.37\ ROI_{t-1} - 6482.72\ ER_{t-1} + 100728.52) + \Sigma_1^4 C_{11k} * \Delta M3_{t-k} + \Sigma_1^4 C_{12k} * \Delta GDP_{t-k} + \Sigma_1^4 C_{13k} * \Delta FDI_{t-k} + \Sigma_1^4 C_{14k} * \Delta ROI_{t-k} + \Sigma_1^4 C_{15k} * \Delta ER_{t-k} + \beta_1$

$\Delta M3 = \boldsymbol{\alpha_1 * (ECT_{t-1})} + \Sigma_1^4 C_{11k} * \Delta M3_{t-k} + \Sigma_1^4 C_{12k} * \Delta GDP_{t-k} + \Sigma_1^4 C_{13k} * \Delta FDI_{t-k} + \Sigma_1^4 C_{14k} * \Delta ROI_{t-k} + \Sigma_1^4 C_{15k} * \Delta ER_{t-k} + \beta_1$

Speed of adjustment = 0.936%

```
==================================================================================
 Cointegrating Eq:      CointEq1
==================================================================================
      M3(-1)            1.000000

      GDP(-1)          -0.042976
                       (0.02494)
                       [-1.72322]

      FDI(-1)           2.187454
                       (0.37457)
                       [ 5.83993]

      ROI(-1)           16887.38
                       (4722.32)
                       [ 3.57608]

      ER(-1)           -6482.723
                       (2006.29)
                       [-3.23120]

         C              100728.5
==================================================================================
 Error Correction:     D(M3)       D(GDP)       D(FDI)       D(ROI)       D(ER)
==================================================================================
   CointEq1           -0.936001    0.125195    -0.497272    -6.14E-07    4.57E-05
                      (0.31503)   (1.83495)    (0.23930)    (7.3E-06)    (2.1E-05)
                      [-2.97114]  [ 0.06823]   [-2.07799]   [-0.08386]   [ 2.19609]
```

D(M3) = C(1)*(M3(-1) - 0.0429764048098*GDP(-1) + 2.18745389592*FDI(
        -1) + 16887.3751963*ROI(-1) - 6482.72346883*ER(-1) +
        100728.523564) + C(2)*D(M3(-1)) + C(3)*D(M3(-2)) + C(4)*D(M3(
        C(5)*D(M3(-4)) + C(6)*D(GDP(-1)) + C(7)*D(GDP(-2)) + C(8)*D(GD
        -3)) + C(9)*D(GDP(-4)) + C(10)*D(FDI(-1)) + C(11)*D(FDI(-2)) +
        *D(FDI(-3)) + C(13)*D(FDI(-4)) + C(14)*D(ROI(-1)) + C(15)*D(RO
        C(16)*D(ROI(-3)) + C(17)*D(ROI(-4)) + C(18)*D(ER(-1)) + C(19)*
        -2)) + C(20)*D(ER(-3)) + C(21)*D(ER(-4)) + C(22)

```
================================================================
                  CoefficientStd. Errort-Statistic  Prob.
================================================================
     C(1)         -0.936001    0.315031   -2.971137   0.0058
```

D(M3) = C(1)*(M3(-1) - 0.0429764048098*GDP(-1) + 2.18745389592*FDI(
        -1) + 16887.3751963*ROI(-1) - 6482.72346883*ER(-1) +
        100728.523564) + C(2)*D(M3(-1)) + C(3)*D(M3(-2)) + C(4)*D(M3(
        C(5)*D(M3(-4)) + C(6)*D(GDP(-1)) + C(7)*D(GDP(-2)) + C(8)*D(GD
        -3)) + C(9)*D(GDP(-4)) + C(10)*D(FDI(-1)) + C(11)*D(FDI(-2)) +
        *D(FDI(-3)) + C(13)*D(FDI(-4)) + C(14)*D(ROI(-1)) + C(15)*D(RO
        C(16)*D(ROI(-3)) + C(17)*D(ROI(-4)) + C(18)*D(ER(-1)) + C(19)*
        -2)) + C(20)*D(ER(-3)) + C(21)*D(ER(-4)) + C(22)

```
================================================================
                  CoefficientStd. Errort-Statistic  Prob.
================================================================
     C(1)         -0.936001    0.315031   -2.971137   0.0058
```

2.3.4.2. FDI as dependent variable:

$\Delta FDI = \alpha_2 * (FDI_{t-1} - 0.01 + 2.18\ GDP_{t-1} + 0.45\ M3_{t-1} + 7720.10\ ROI_{t-1} - 2963.59\ ER_{t-1} + 46048.29) + \Sigma_1^4 C21k * \Delta M3_{t-k} + \Sigma_1^4 C22k * \Delta GDP_{t-k} + \Sigma_1^4 C23k * \Delta FDI_{t-k} + \Sigma_1^4 C24k * \Delta ROI_{t-k} + \Sigma_1^4 C25k * \Delta ER_{t-k} + \beta_2$

$\Delta FDI = \mathbf{\alpha_2 * (ECT_{t-1})} + \Sigma_1^4 C21k * \Delta M3_{t-k} + \Sigma_1^4 C22k * \Delta GDP_{t-k} + \Sigma_1^4 C23k * \Delta FDI_{t-k} + \Sigma_1^4 C24k * \Delta ROI_{t-k} + \Sigma_1^4 C25k * \Delta ER_{t-k} + \beta_2$

Speed of adjustment = 1.087%

```
================================================================================
Cointegrating Eq:     CointEq1
================================================================================
    FDI(-1)           1.000000

    GDP(-1)          -0.019647
                      (0.01227)
                     [-1.60145]

    M3(-1)            0.457152
                      (0.15638)
                     [ 2.92336]

    ROI(-1)           7720.106
                      (1820.01)
                     [ 4.24180]

    ER(-1)           -2963.593
                      (796.988)
                     [-3.71849]

      C               46048.30
================================================================================
 Error Correction:    D(FDI)      D(GDP)      D(M3)       D(ROI)      D(ER)
================================================================================
    CointEq1         -1.087761    0.273858   -2.047460   -1.34E-06    9.99E-05
                     (0.52347)   (4.01388)   (0.68912)   (1.6E-05)   (4.5E-05)
                     [-2.07799]  [ 0.06823]  [-2.97114]  [-0.08386]  [ 2.19609]
```

```
D(FDI) = C(1)*( FDI(-1) - 0.0196467705628*GDP(-1) + 0.457152492158
        *M3(-1) + 7720.105657*ROI(-1) - 2963.59318974*ER(-1) +
        46048.2955788 ) + C(2)*D(FDI(-1)) + C(3)*D(FDI(-2)) + C(4)*D(F
        + C(5)*D(FDI(-4)) + C(6)*D(GDP(-1)) + C(7)*D(GDP(-2)) + C(8)*D
        -3)) + C(9)*D(GDP(-4)) + C(10)*D(M3(-1)) + C(11)*D(M3(-2)) + C
        *D(M3(-3)) + C(13)*D(M3(-4)) + C(14)*D(ROI(-1)) + C(15)*D(ROI(
        C(16)*D(ROI(-3)) + C(17)*D(ROI(-4)) + C(18)*D(ER(-1)) + C(19)*
        -2)) + C(20)*D(ER(-3)) + C(21)*D(ER(-4)) + C(22)
=============================================================
                 CoefficientStd. Errort-Statistic  Prob.
=============================================================
     C(1)        -1.087761   0.523469  -2.077986   0.0464
```

2.3.5 Impulse Response Function results:
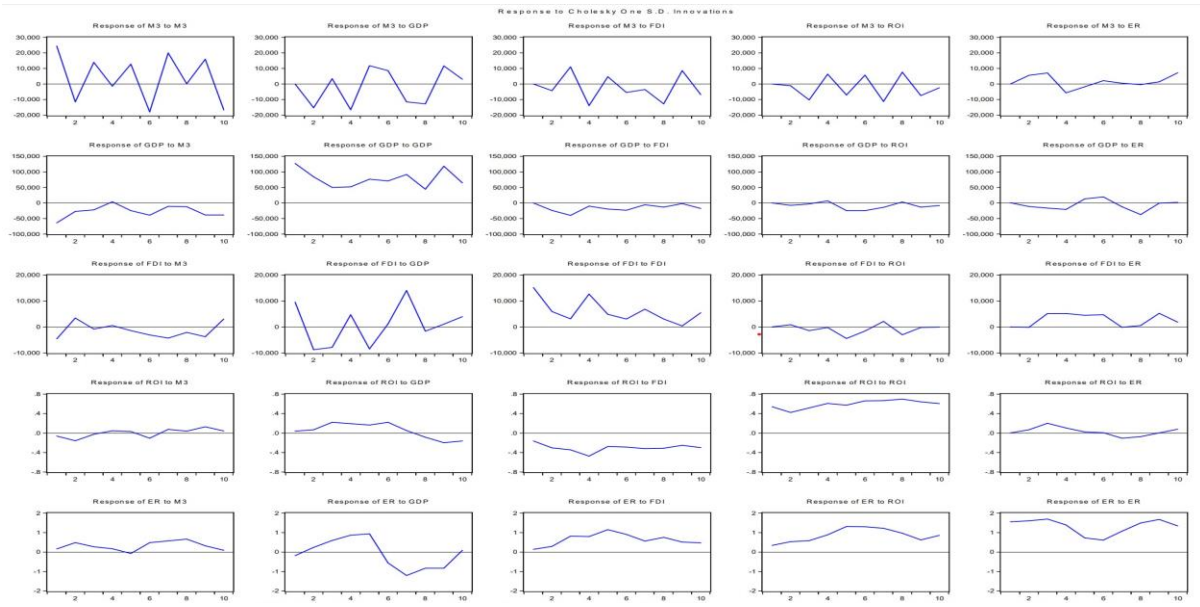
```
Impulse Response to Cholesky (d.f. adjusted) One S.D. Innovations
================================================================
================================================================
 Response of M3:
 Period   M3          GDP         FDI         ROI         ER
================================================================
    1     24420.31    0.000000    0.000000    0.000000    0.000000
    2    -11424.25   -15215.03   -4326.272   -1112.349    5554.674
    3     13921.36    3465.359    11042.63   -10193.73    7067.743
    4    -1412.579   -16502.01   -13832.52    6384.666   -5662.594
    5     12773.28    11817.03    4718.071   -7069.967   -1729.058
    6    -17882.12    8565.090   -5364.171    5641.034    2153.794
    7     19973.57   -11517.80   -3487.565   -11208.33    490.1267
    8     156.1377   -12763.65   -12794.40    7591.072   -426.1111
    9     15897.11    11586.67    8575.214   -7492.205    1399.658
   10    -16704.26    3048.353   -6757.036   -2386.951    7224.361
================================================================
 Response of GDP:
 Period   M3          GDP         FDI         ROI         ER
================================================================
    1    -64026.88    127015.1    0.000000    0.000000    0.000000
    2    -27759.60    83791.89   -24154.68   -7989.910   -11482.69
    3    -22509.17    49679.90   -40348.21   -3380.244   -16574.22
    4     3625.058    51738.16   -10652.11    6514.877   -21196.23
    5    -25185.77    76252.09   -20080.75   -25147.45    12758.41
    6    -39726.41    70332.56   -24042.75   -25136.95    19566.73
    7    -11017.44    91632.53   -6135.884   -14079.36   -12117.59
    8    -12394.90    44188.50   -13723.83    2563.129   -37498.31
    9    -38648.02    117756.1   -2466.245   -13320.05   -683.8082
   10    -39170.15    64133.46   -17857.53   -8737.915    1850.170
================================================================
 Response of FDI:
 Period   M3          GDP         FDI         ROI         ER
================================================================
    1    -4603.805    9567.682    15211.03    0.000000    0.000000
    2     3459.485   -8772.092    5943.953    888.8580   -124.8710
    3    -830.8172   -7816.424    3180.403   -1429.436    5164.710
    4     595.2953    4770.478    12657.28   -172.0930    5207.941
    5    -1424.753   -8442.396    4859.615   -4447.008    4479.495
    6    -3090.616    1139.635    3072.427   -1540.063    4733.670
    7    -4253.527    14038.03    6851.497    2175.415   -119.0205
    8    -2055.516   -1614.166    3030.826   -2960.965    599.8755
    9    -3739.870    1124.871    422.9948   -181.1840    5302.647
   10    3056.283     3959.586    5523.844   -3.526336    1881.140
================================================================
```

```
Response of ROI:
 Period    M3          GDP         FDI         ROI         ER
=================================================================
     1   -0.063140    0.036857   -0.164216    0.537963    0.000000
     2   -0.160720    0.065353   -0.303454    0.421384    0.066048
     3   -0.026854    0.219905   -0.347170    0.514051    0.198096
     4    0.046725    0.192405   -0.475140    0.606843    0.102053
     5    0.031230    0.164028   -0.278713    0.570740    0.021515
     6   -0.106401    0.221586   -0.290470    0.661798    0.007565
     7    0.073207    0.048713   -0.319385    0.666222   -0.107339
     8    0.038303   -0.086806   -0.311119    0.697168   -0.075024
     9    0.125305   -0.199298   -0.253493    0.640728    0.000763
    10    0.042109   -0.163481   -0.303011    0.604835    0.078376
=================================================================
Response of ER:
 Period    M3          GDP         FDI         ROI         ER
=================================================================
     1    0.157744   -0.184218    0.140795    0.338931    1.550825
     2    0.480057    0.234014    0.290277    0.527502    1.600166
     3    0.266762    0.594145    0.814535    0.578204    1.692999
     4    0.171060    0.865177    0.793202    0.888786    1.389652
     5   -0.079448    0.938035    1.147399    1.306346    0.725862
     6    0.481026   -0.557894    0.899317    1.294792    0.606163
     7    0.568322   -1.209665    0.557078    1.215447    1.061647
     8    0.657766   -0.829795    0.748578    0.963757    1.486822
     9    0.319838   -0.838331    0.513783    0.620144    1.667869
    10    0.087023    0.087622    0.465526    0.855168    1.339738
=================================================================
Cholesky Ordering: M3 GDP FDI ROI ER
=================================================================
```

2.3.5.1. Response of M3 to FDI


Response of M3 to FDI
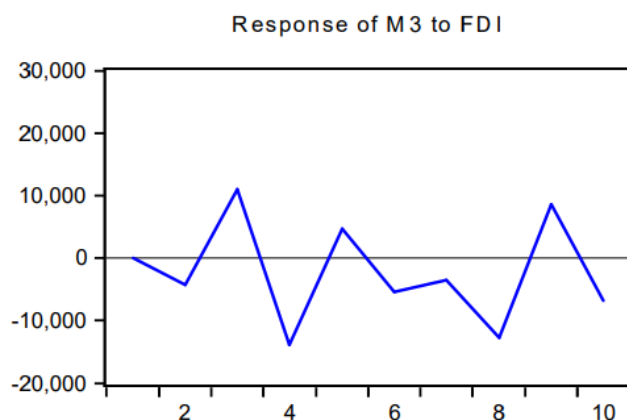
- No response of M3 to FDI observed in period 1.

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- Alternating impulse response of M3 observed till period 6, with the decline continuing till period 8, to finally expand again by period 9.

- Finally a decline seen in period 10.

- The declining trend is in sync with the practice of absorbing excess liquidity through policies like open market operations (OMOs), in the face of excess foreign capital inflow.

2.3.5.2. Response of GDP to FDI

Response of GDP to FDI
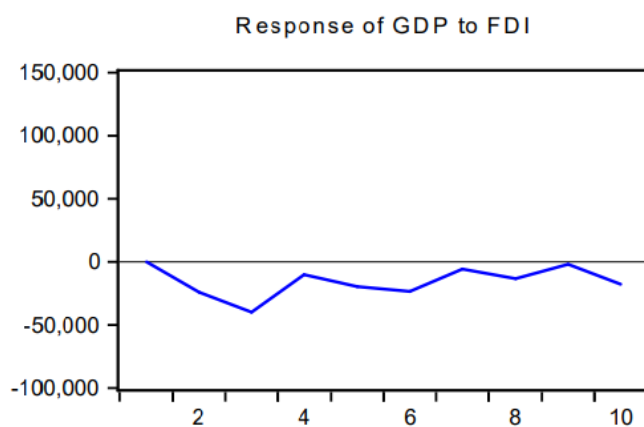
- GDP doesn't respond to a positive shock in FDI in the 1st period,; continues to fall till 3rd period. Upticks in period 4, 7 and 9; but overall negative impulse observed.

- Possible explanation comes from open macroeconomic theory (Mundell, 1963): Capital flows → currency appreciation at a given monetary policy rate → decline in exports → contractionary impact on GDP

- However, Blanchard et al (2015) reject this theory for developing countries.

2.3.5.3. Response of FDI to FDI

Response of FDI to FDI
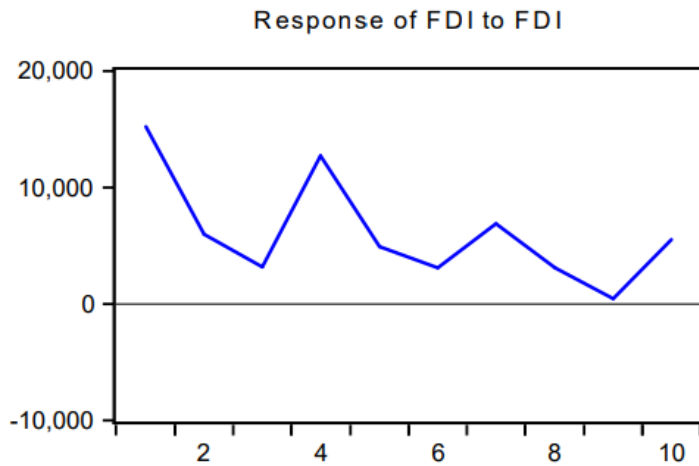
- Positive and large impulse response observed on FDI with an initial positive shock to FDI.

- Possible explanations: Virtuous cycle of FDI causing more investments in productive sectors→ economic growth → attracting more FDI.

- Agglomeration economies, external economies and positive spill-over effects on other sectors also possible reasons.

2.5.3.4. Response of ROI to FDI

Response of ROI to FDI
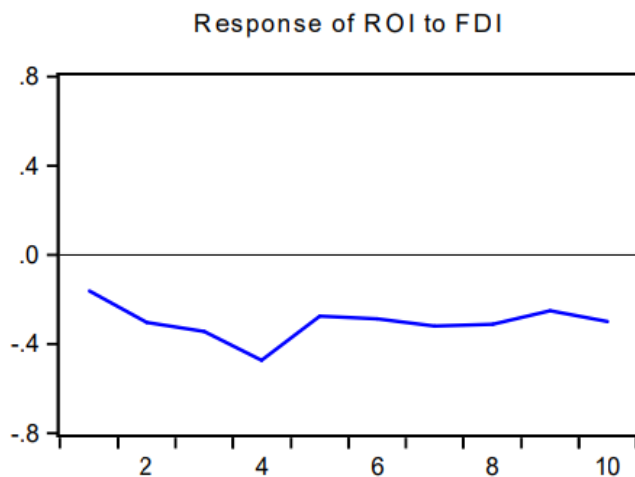
- A fall and negative trend of impulse response is observed for rate of interest.

- Blanchard et all (2015) argue that in view of the contractionary impact of capital inflows, i.e., capital inflow → appreciation of currency →

contraction of net export and output; if policy rates are decreased sufficiently, capital inflows can be expansionary.

2.5.3.5. Response of ER to FDI

Response of ER to FDI
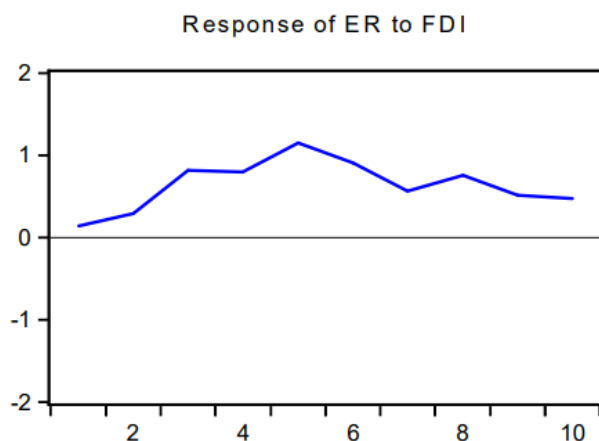
- Response in period one is mild, but continues to be positive throughout, tapering slightly towards the end.

- Theory suggests that positive FDI shock entails appreciation of currency, hence causing negative impact on net exports.

- However, in case of managed float of exchange rate, the central bank can intervene to hold the exchange rate stable, using the foreign exchange reserves.

2.5.3.6. Response of FDI to GDP

Response of FDI to GDP
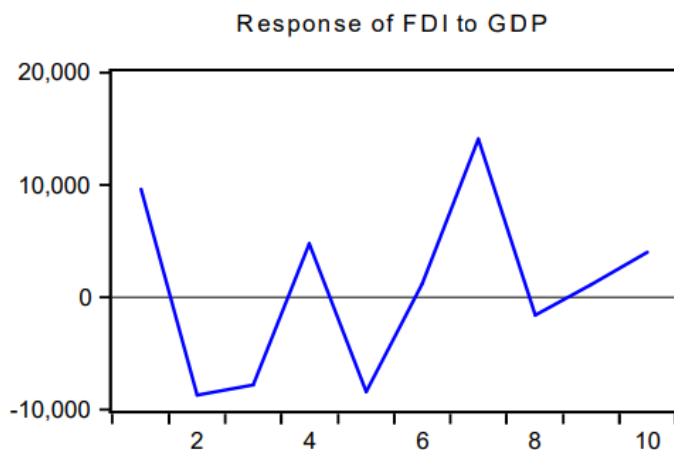
- A strong positive impulse response is observed in period 1, which declines to negative range in period 2 and 3, before recovering in period 4.

- In longer run, i.e., after period 5, the response is positive except for period 8.

- Short run decline can be rooted in the following macroeconomic theory: Rise in GDP → inflationary impact → fall in real rate of return on assets → lower incentive for foreign capital to flow inward

Conclusion:

The results found in the study, although not all-inclusive, are indicative of the long-term impact of FDI on an economy, in the form of various linkages and channels. Risk of currency appreciation, costs of absorbing excess liquidity from the system, shrinking monetary policy space, impact of crowding out, and pro-cyclical nature of FDI are some of the potential risks noted in the paper. The debate on domestic versus global factors affecting foreign capital flows is ongoing. It is observed that FDI is relatively more affected by domestic economy's fundamentals, whereas, FPI is driven more by global liquidity. India's record capital inflows in 2020-21 are a case in point. Foreign capital inflows, definitely enhance the capital base in an economy, especially if received in the form of FDI. However, due to **strong endogeneity** between macroeconomic indicators, a **constant policy watch** is crucial.

References:

Blanchard O., Ostry J.D., Ghosh A.R., Chamon M., 2015. Are Capital Inflows Expansionary or Contractionary? Theory, Policy Implications, and Some Evidence. *IMF working paper WP/15/226.* October 2015.

Chhetri A., Raju G.R., June 2018. An econometric analysis of foreign investment flows into India. *Indian Journal of Economics and Development, Vol 6 (6)*, June 2018

Shahbaz M., Rahman M.M., June 2012. The Dynamic of Financial Development, Imports, Foreign Direct Investment and Economic Growth: Cointegration and Causality Analysis in Pakistan, Global Business Review.

Koojaroenprasit, Sauwaluck. 2012. The impact of foreign direct investment on economic growth: A case study of South Korea. *Int. J. Bus. Soc. Sci. 3: 8–19*

Trang Thi-Huyen Dinh, Duc Hong Vo, Anh The Vo and Thang Cong Nguyen. Foreign Direct Investment and Economic Growth in the Short Run and Long Run: Empirical Evidence from Developing Countries. 25 November 2019. Journal of Risk and Financial management

Mansaray M.A., Macroeconomic Determinants of Foreign Direct Investment Inflows and Impulse Response Function. International Journal of Academic Research in Business and Social Sciences 2017, Vol. 7, No. 10 ISSN: 2222-6990

Igan D., Kutan A.M., Mirzaei A., 2016. Real Effects of Capital Inflows in Emerging Markets. IMF Working Paper WP/16/235.

Sebastine A.I. et al. Impulse-Response Function Analysis of Money Supply and Real Money Balances in the Era of Financial Innovation. AAYE Policy Research Working Paper Series. Issue: 16_ 031 / Year: Nov. 2016

Roy S., Roy J., Gupta K., Changing Dynamics of foreign direct investment in India. Article in RBI Bulletin January 2022

Ghosh A.R., Ostry J.D., Qureshi M.S., 2017. Managing the Tide: How Do Emerging Markets Respond to Capital Flows? IMF Working Paper. WP/17/69

Kohli R., Capital flows and their macroeconomic effects in India. March 2001. ICRIER, Working Paper NO. 64

Lama R., Medina J.P., 2020. Shocks Matter: Managing Capital Flows with Multiple Instruments in Emerging Economies. IMF Working paper WP/20/97.