# Fiscal Deficit and Interest Rate in Semi-Open Economy: Recent Econometric Evidence from India

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## Abstract

The relationship between fiscal deficit and interest rate in an economy is a matter of concern for academicians and policy makers. This is particularly so because the increase in fiscal deficit may affect the health of the economy through upward pressure on interest rate. In this paper we examine the link between fiscal deficit and interest rate in the backdrop of semi-open economy of India. We have specified simultaneous equation model with two equations related to interest rate and deficit for both pre-and-post FRBMA Periods. The model is estimated using 2SLS method. The overall conclusion can be stated as there is no constant relation between interest rate and fiscal deficit because it varies or depends upon the level of deficit, its mode of financing and financial openness. Thus, this study brings about an important policy suggestion as if there is high fiscal deficit in an economy and Government is trying to fill this gap through borrowing, Government should be able to ensure that higher public expenditure leads to higher income and thereby higher saving in the economy. Otherwise, interest rate will increase.

 **KEYWORDS:** fiscal deficit, interest rate, India, 2SLS

## Introduction

As the part of financial liberalization process, many of the developing countries including India are pursuing the policy of removing controls on interest rates to give a major role for market forces in the determination of rates of interest. In India, liberalization process started in the late 1980s and got a momentum since early nineties. The most of the interest rates were deregulated and made market determined including deposit and lending rates.

In economic literature, there are three distinct important theoretical views regarding the link between fiscal deficit and interest rate, viz, Neo-classical (see, eg, Bernheim 1989), Keynesian (see, eg, Eisner 1989) and Ricardian (Barro 1974). As per neo-classical view, increase in fiscal deficit cause to rise the interest rate in the economy whereas the Keynesians postulate that even though the rise in the fiscal deficit may cause to increase in the interest rate, it ultimately promotes saving and thereby capital formation in the economy. Another observation in this regard is the Ricardian equivalence hypothesis which states that deficit would not bring any impact on interest rate because it merely postpones present taxes to future in such a way that both tax and debt financing of deficit will have equal impact on the economy.

Even though a panoptic empirical literature has examined the deficit-interest rate linkage, it persists as one of the most debated issue in economics. A large number of studies (for example Mohanty (1997) for India; Hoelscher (1986), Zahid (1988), Cebula (1989), Cebula (1990), Belton et. al (1995), Gale and Orszag (2004), Laopodis (2012) for U.S; Burney and Yasmeen (1989) for Pakistan; Vamvoukas (1997) for

Greek; Aisen and Hauner (2012) for advanced and emerging economies;among others) observed that rise in fiscal deficit tends to put upward pressure on interest rates. However, several other studies (for example,Gupta (1989) for U.S; Chakraborty (2002), Das (2004), Das (2010) for India and Mukhtar and Zakaria (2008) for Pakistan; among others) found that fiscal deficit does not have any significant implication on interest rates.

In the context of the deregulated financial system, increased revenue expenditure in the form of increased cost of government market borrowing led to the rising trend of fiscal deficit and this in turn, caused to push market rate of interest up. Thus, after the financial sector reforms, the researchers got their attention on this issue in Indian context and showed shuffled results. See for example, studies like Patnaik (2001), Deena et. al(2001),Mohanty (1997),Chakraborty (2002), Goyal (2004) and Das (2004, 2010).Notwithstanding this ample of research, various significant aspects have not received the attention of researchers so far. Some of them we propose to address in this article. The important contribution of this paper is to extend the literature filling certain gap identified in the existing literature as follows.

Firstly, Dua and Pandit (2002) showed that the variables like foreign interest rate and forward premium may influence the domestic rate of interest in the context of semi-open economy like India and therefore, these variables are taken into consideration in this study to re-examine the effect of fiscal deficit on interest rate in Indiain contrast to the earlier studies (see for example, Mohanty 1997; Chakraborty 2002; Das (2004, 2010) and Goyal 2004. Secondly, a study by Goyal (2004) showed two-way (simultaneous relationship) causality between fiscal deficit and interest rate in India. Chakraborty (2002) also found that causality runs from rate of interest to fiscal deficit. These findings, throw doubt up on the robustness of former studies that use the single-equation model. Therefore, we attempt to study this issue using the simultaneous equation framework. Finally, we analyze the relationship between fiscal deficit and interest rates based on the high frequency recent monthly data, bifurcating the entire study period (1996 April to 2015 June) into two phases of pre (1996 April to 2005 June) and post (2006 April to 2015 June) FRBMA (Fiscal Responsibility and Budget Management Act) period. It will shed light on the effectiveness of FRBMA as a policy initiative on the part of government towards fiscal consolidation path and its spill over to the interest rates in the economy.

The paper is organized as follows: The second section discusses the overall trend of fiscal deficit and interest rate movement in India. The specification of the model, variable selection and its theoretical justification are described in third section. The fourth section reports the results of the study, and the last section concludes the paper with policy suggestion.

## 1. Fiscal deficits and interest rates: overall trends

In India, fiscal deficit showed statistically significant upward trend during the both pre and post FRBMA period (see table 1).The average monthly growth rate of fiscal deficit is Rs. 2.3crores over the period 1996 to 2005 and Rs. 15.49 crores over the period 2006 to 2015. At the same time, India's fiscal deficit has risen from Rs 10474 crores in 1996 April to Rs 22963 crores in 2005 July, and Rs 31956 crores in 2006 April to Rs 98408 crores in 2015 July which is a compound monthly growth rate (CMGR) of 0.026 Per cent and 0.04 percent respectively. The result of the trend

analysis also shows that the average monthly growth rate of fiscal deficit during the period of pre-FRBMA is less than that of post-FRBMA. It is also inferred that the compound growth rate of fiscal deficit was higher during the second phase of analysis rather than that of the same in the first phase.

**Table 1:Trend Analysis Results of Fiscal Deficit and Interest Rate in India**

**Pre-and-Post FRBMA Period (1996-97 to 2015-16)**

| Period | Average Monthly Growth Rate | Compound Growth Rate |
|---|---|---|
| Fiscal Deficit Pre-FRBMA Period (1996-97 to 2005-06) | Y= -1650096 + 2.273316 t<br><br>t = 38.02　　　$R^2 = 0.92$ | Y= -179.9062 + 0.000258 t<br>**CGR= 0.0258**<br>t = 22.9　　　$R^2 = 0.83$ |
| Fiscal Deficit Post-FRBMA Period (2006-07 to 2015-16) | Y= -11329520 + 15.49142 t<br><br>t = 53.19　　　$R^2 = 0.96$ | Y= -319.5754 + 0.000449 t<br>**CGR= 0.0449**<br>t = 25.79　　　$R^2 = 0.86$ |
| **Interest Rate** Pre-FRBMA Period (1996-97 to 2005-06) | Y= 1997.274 - 0.002722 t<br>**CGR = 0.2726**<br>t = -25　　　　　　　　　$R^2 = 0.85$ | |
| **Interest Rate** Post-FRBMA Period (2006-07 to 2015-16) | Y= -230.8390 + 0.000325 t<br>**CGR = 0.0325**<br>t = 15.35　　　　　　　　$R^2 = 0.68$ | |

**Source:** Author's estimation based on the RBI data

Before going to the analysis of interest movements, it is relevant to discuss the mode of financing fiscal deficit by Central government of India because the economic impact of fiscal deficit on interest rates depend upon how government fills the gap, especially in the present context of deficit which represents the borrowing requirement of the government. The internal and external financing are two broad methods of financing deficit in India. Internal financing include market borrowing, other borrowings and draw down of cash balances. The market borrowings refers to the dated securities and 364-day treasury bills and other borrowings contain small savings, state provident fund, special deposits, reserve funds and treasury bills excluding 364-day treasury bills etc. Prior to 1997-98, the drawdown of cash balances refers to the conventional budget deficit. The concept of conventional budget deficit has lost its relevance since April 1, 1997,with the discontinuation of the ad hoc treasury bills and 91-day tap treasury bills.

From table 2, it is understand that the largest source of financing deficit is internal. Internal financing as per cent of total financing was 84.6 during 1980-81 and increased to 97 per cent in 2014-15. The market borrowings placed the highest portion of internal financing and it increased from 38 per cent of total internal finance in 1980-81 to 85 per cent in 2015-16 that shows the significant upward trend statistically. At the same time, as a proportion of total internal finance, both other borrowings and drawdown of cash balances have come down to 12 per cent and 2 per cent respectively during 2015-16 from 26.5 per cent and 35 per cent in 1980-81.Over

the same period, external finance showed declining trend and reached to 2 per cent of total finance in 2015-16 from 15.44 per cent in 1980-81 (Estimated based on table 2).

In 1996 April, the interest rates for 91-day Treasury bill, 364-day Treasury bill and government dated security for five years maturity were 13.7 per cent, 11.17 per cent and 13.79 per cent and sharply fell to 5.31 per cent, 5.79 per cent and 6.6 per cent respectively at the end of 2015 July, showing statistically significant downward trend (Estimated based on RBI data). At the same time, interest rates for these three instruments increased to 7.32 per cent, 7.6 per cent and 8.0 per cent in 2015 July from 5.2 per cent, 6.06 per cent and 6.96 per cent in 2006 Aprilshowing statistically significant upward trend. It is inferred from the above analysis that the behavior of interest rates showed downward trend during the period of pre-FRBMA and it depicted upward trend during the period of post-FRBMA.

**Table 2: Centre's gross fiscal deficit and its financing**

(Rupees Crore)

| YEAR | GFD | External Finance | Internal Finance | | | $EF(% of GFD) | *IF(% of GFD) | #MB(% of GFD) |
|---|---|---|---|---|---|---|---|---|
| | | | Market Borrowings | Other Borrowings | DDCB | | | |
| 1980 | 8299 | 1281 | 2679 | 1862 | 2477 | 15.44 | 84.56 | 32.28 |
| 1981 | 8666 | 964 | 2913 | 3389 | 1400 | 11.12 | 88.88 | 33.61 |
| 1982 | 10627 | 1258 | 3771 | 3942 | 1656 | 11.84 | 88.16 | 35.49 |
| 1983 | 13030 | 1338 | 4038 | 6237 | 1417 | 10.27 | 89.73 | 30.99 |
| 1984 | 17416 | 1452 | 4095 | 8124 | 3745 | 8.34 | 91.66 | 23.51 |
| 1985 | 21858 | 1449 | 4884 | 10209 | 5316 | 6.63 | 93.37 | 22.34 |
| 1986 | 26342 | 2024 | 5532 | 10525 | 8261 | 7.68 | 92.32 | 21.00 |
| 1987 | 27044 | 2893 | 5862 | 12473 | 5816 | 10.70 | 89.30 | 21.68 |
| 1988 | 30923 | 2460 | 8418 | 14403 | 5642 | 7.96 | 92.04 | 27.22 |
| 1989 | 35632 | 2595 | 7404 | 15041 | 10592 | 7.28 | 92.72 | 20.78 |
| 1990 | 44632 | 3181 | 8001 | 22103 | 11347 | 7.13 | 92.87 | 17.93 |
| 1991 | 36325 | 5421 | 7510 | 16539 | 6855 | 14.92 | 85.08 | 20.67 |
| 1992 | 40173 | 5319 | 3676 | 18866 | 12312 | 13.24 | 86.76 | 9.15 |
| 1993 | 60257 | 5074 | 28928 | 15295 | 10960 | 8.42 | 91.58 | 48.01 |
| 1994 | 57703 | 3582 | 20326 | 32834 | 961 | 6.21 | 93.79 | 35.23 |
| 1995 | 60243 | 318 | 34001 | 16117 | 9807 | 0.53 | 99.47 | 56.44 |
| 1996 | 66733 | 2987 | 19093 | 31469 | 13184 | 4.48 | 95.52 | 28.61 |
| 1997 | 88937 | 1091 | 32499 | 56257 | 910 | 1.23 | 98.77 | 36.54 |
| 1998 | 113349 | 1920 | 68988 | 42650 | 209 | 1.69 | 98.31 | 60.86 |
| 1999 | 104716 | 1180 | 62076 | 40597 | 864 | 1.13 | 98.87 | 59.28 |
| 2000 | 118816 | 7505 | 73431 | 39077 | 1197 | 6.32 | 93.68 | 61.80 |
| 2001 | 140955 | 5601 | 90812 | 46038 | 1496 | 3.97 | 96.03 | 64.43 |
| 2002 | 145072 | 11934 | 104126 | 50997 | 1883 | 8.23 | 108.23 | 71.78 |
| 2003 | 123273 | 13488 | 88870 | 51833 | 3942 | 10.94 | 110.94 | 72.09 |
| 2004 | 125794 | 14753 | 50940 | 61562 | 1461 | 11.73 | 88.27 | 40.49 |
| 2005 | 146435 | 7472 | 106241 | 53610 | 20888 | 5.10 | 94.90 | 72.55 |
| 2006 | 142573 | 8472 | 114801 | 14782 | 4517 | 5.94 | 94.06 | 80.52 |
| 2007 | 126912 | 9315 | 130600 | 14168 | 27171 | 7.34 | 92.66 | 102.91 |

| 2008 | 336992 | 11015 | 246975 | 35168 | 43834 | 3.27 | 96.73 | 73.29 |
|------|--------|-------|--------|-------|-------|------|-------|-------|
| 2009 | 418482 | 11038 | 394371 | 14460 | 1386 | 2.64 | 97.36 | 94.24 |
| 2010 | 373592 | 23556 | 326399 | 17206 | 6430 | 6.31 | 93.69 | 87.37 |
| 2011 | 515990 | 12448 | 484111 | 35421 | 15990 | 2.41 | 97.59 | 93.82 |
| 2012 | 490190 | 7201 | 507445 | 26556 | 51012 | 1.47 | 98.53 | 103.52 |
| 2013 | 502858 | 5440 | 460343 | 43756 | 15000 | 1.04 | 98.96 | 87.76 |
| 2014 | 512628 | 5734 | 481304 | 26979 | 17160 | 1.08 | 98.92 | 90.61 |
| 2015 | 555649 | 11173 | 464531 | 67903 | 12041 | 2.01 | 97.99 | 83.60 |

**Source:** Author's compilation based on RBI data

$ and * stands for external, internal finance respectively and # stands for market borrowing.

**Variable selection and model specification**

**3.1 Variable selected for interest rate and deficit equations- Justification.**

Even though the objective of this study is to estimate and analyze the relationship between fiscal deficit and interest rate in India, model specification assumes importance because apart from fiscal deficit, other economic variables may also influence the movement of domestic rate of interest and deficit. Such variables should be taken into consideration while developing an econometric model to avoid specification bias. So, we select the following variables from literature and describe their linkage with both domestic interest rate and deficit as presented below.

**Interest Rate and Money Supply:**Under fixed exchange rate, purchase of securities by a central bank generates excess reserves and puts downward pressure on rate of interest and in the context of a flexible exchange rate system, open market purchase of domestic securities also results in an increase in bank reserves, a multiple expansion of money and credit, and downward pressure on the interest rate (Mundell 1963). A decline in the velocity of circulation caused by an increase in the stock of money will lead to a reduction in the rate of interest which will increase the private expenditure on investment and consumption, both directly and via the Keynesian multiplier (Fleming 1962). "The higher money supply materializes through open market operations raising bond prices and reducing the rate of interest. Monetary policy interventions in the shape of changes in reserve ratios would reflect in terms of changes in credit availability and thereby in the broad money supply. Money supply variable would thus have a negative coefficient (Dua and Pandit 2002; p.857)".

**Domestic and Foreign Interest Rate:**"Higher world interest rate would be positively associated with the domestic rate simply because the higher world interest rate would lead to an outflow of capital. This would imply a fall in the demand for domestic bonds and a rise in the domestic rate of interest (Dua and Pandit 2002; p.857)".

**Interest Rate and Forward Premium:**"Higher the forward premium (FP), higher the expected depreciation of domestic currency-higher the demand for foreign bonds relative to domestic bonds. The result would be lower domestic bond prices and a higher domestic rate of interest (Dua and Pandit 2002; p.858)".

**Fiscal Deficit and Interest Rate:**"A high interest rate worsens the overall budget balance via increasing interest expenditure on newly issued debt and on rolling debt (Tujula and Wolswijk, 2004)".

**Fiscal Deficit and Inflation Rate:**"Inflation often is included among the variables affecting the budget balance. It may have an automatic effect on government receipts and expenditures through nominal progression in tax rates and tax brackets. Itmay

also result in an increase in long-term interest rates and thus have a negative effect on investment and economic growth. On the other hand, governments might also welcome inflation as it erodes the real value of nominal government debt. Thus, the overall effect of inflation on budget balances is not a priori clear (Tujula and Wolswijk, 2004)". "The higher the level of inflation is, the higher the budget deficit volatility will be. Therefore, when the inflation rate is high, the level of economic uncertainty is large and both government spending and revenue are highly volatile, therefore, making it difficult to plan the fiscal budget (Agnello and Sousa, 2009)". Hossain (1987) conducted a study about the impact of inflation on fiscal deficit and found that the increase in fiscal deficit during inflation.

**Fiscal Deficit and Gross Domestic Product:**As per the tax-smoothing model of fiscal deficits (Barro 1979), budget deficits will emerge when output is temporarily low or when government spending is temporarily high compared to their permanent levels. A growing economy has more resources and may be in a better position to solve socio-economic distributional problems, which may help to reduce deficits. Therefore we expect gross domestic product to have a negative (-) sign. However, it is theoretically possible that gross domestic product is positively associated with the public surplus if the successful pressures for higher public expenditures accompany the growing tax revenue due to higher economic growth. Thus, the sign of the coefficient of gross domestic product is an empirical question (Woo, 2003).

To estimate and analyze the relationship between fiscal deficit and interest rate in India, we develop two equations based on the relevant theoretical and empirical literature. Therefore, the interest rate function and the equation for fiscal deficit can be specified as follows.

$$\text{LNIR} = f \left( {}_{(+)} \text{LNGFD } (-3) + {}_{(-)} \text{LNMSGR } (-3) + {}_{(+)} \text{LNFIR} + {}_{(+)} \text{LNFP} \right) \quad (3.1)$$

$$\text{LNGFD} = f \left( {}_{(+)} \text{IR } (-1) + {}_{(-/+)} \text{LNIIP } (-5) + {}_{(-/+)} \text{IFR } (-2) \right) \quad (3.2)$$

Where

> IR = interest rate; GFD = Gross fiscal deficit; MSGR = Money supply growth rate; FIR = Foreign interest rate; IFR = Inflation rate;FP = Forward premium; IIP = Index of Industrial production as a proxy variable for monthly gross domestic product

We employ the simultaneous equation model to achieve the objective of the study because there is simultaneous relationship between key variables under consideration in this study such as fiscal deficit and interest rates as discussed above. In this context, "ordinary least square (OLS) estimation becomes not only biased but also inconsistent, that is, as the sample size increases indefinitely, the estimators do not converge to their true (population) values (Gujarati et al, 2013)".Therefore, we apply the two-stage least squares (2SLS) as an alternative to OLS estimation because it is an appropriate technique for estimating an over-identified equation of a simultaneous equation system. Identification is a precondition for the application of 2SLS to equations in simultaneous systems that determine whether a particular equation in a simultaneous system has the potential to be identified. The order condition is a necessary condition for an equation to be identified is that the number of predetermined (exogenous plus lagged endogenous) variables in the system be greater

than or equal to the number of slope coefficients in the equation of interest. For the application of the 2SLS to the equations (3.1) and (3.2), the form of simultaneous equation can be specified as follows:

$$LNIR_t = \alpha_{10} + \alpha_{11}LNGFD_{t-7} + \lambda_{11}LNMSGR_{t-7} + \lambda_{12}LNFIR_{t-1} + \lambda_{13}LNFP + u_{1t}$$ (3.3)

$$LNGFD_t = \alpha_{20} + \alpha_{21}LNIR_{t-6} + \lambda_{21}LNGDP_{t-9} + \lambda_{22}IFR_{t-7} + u_{2t}$$ (3.4)

Where, the variables are the same as defined above. In this system, the LNIR and LNGFD are the two endogenous variables and the exogenous variables are MSGR, FIR, IFR, FP and the LNIIP. The both equations are over-identified. So we will apply the 2SLS method to estimate the structural parameters of the two equations of our system. In equation (3.3), interest rate is determined by seven period lagged values of both fiscal deficit and money supply along with other explanatory variables like FIR(-1) and FP.The lagged values of money supply are important as increase in money supply will bring down pressure on real interest rate with a lag, while a rise in real income will strengthen money demand and raise real interest rate in the economy (Mohanty, 1997). Like this, the process by which fiscal deficit affects the interest rate in the economy is not an instantaneous process. The priori signs of the variables included in the equations (3.1) and (3.2) are given in the brackets and its theoretical explanations are given in the section 3.1 under theoretical framework.

Before the estimation of the model, unit root test is conducted using the standard Augmented Dickey Fuller (ADF) test. The equations are estimated using the 2SLS method by bifurcating the total samples from 1996 April to 2015 June into two periods of pre (1996 April-2005 June) and post (2006 April-2015 June) FRBMA, which equals to total 222 monthly time series observations. Each equation includes a dummy variable to capture outliers caused by factors beyond the consideration of the model. Throughout the estimation process we have used the following instrumental variables which satisfy the order condition as required for the 2SLS method. Instruments (exogenous variables) include: LNMSGR (-7) LNFP LNFIR (-1) IFR (-7) LNGDP (-9) LNIR (-1) LNGFD (-7) DUM1 and DUM2.

## 3.2  Variable definition and data source

The secondary market yields on government securities are more appropriate for examining the link between interest rates and fiscal deficit because these are more representative of the market conditions in the Indian context, and Treasury bills other than 364-day do not form part of market borrowings and fund raised through lower maturities are meant for meeting short term mismatches only (Goyal 2004). Therefore, monthly data on the yield of central government dated securities for five years maturity Per cent per annum is used to represent the long term nominal interest rate in this study.

Fiscal deficit (FD):Fiscal deficit is measured as the monthly gross fiscal deficit expressed in rupees crore, and converted to natural logarithm.
Money supply (MS):Nominal money supply is measured by M3 and it is expressed in its growth rate and then converted into natural logarithm.
Foreign interest rate (FIR):Foreign interest rate is measured by the six months London inter-bank offer rate following Dua and Pandit (2002).

Inflation rate (IR):Inflation rate is measured based on the wholesale price index of India (WPI). The WPI based inflation was chosen for the study due to non-availability of nationwide retail price index measure which was introduced in 2011 only in India. Forward premium (FP):Six months monthly average interbank premia as per cent per annum is used as forward premium.

Gross domestic product: Monthly Index of industrial production (base 1993) is used as a proxy variable for the monthly data of gross domestic product due to non-availability of monthly data of the same.

All the data except foreign interest rate are taken from the Handbook of Statistics on Indian economy (various issues) published by Reserve Bank of India. The data for foreign interest rate is taken from the database of International Monetary Fund.

## 4. Empirical Results and Analysis

### 4.1 Unit Root Test Results (ADF)

| Variable | t-statistic | P-Value | inference |
|---|---|---|---|
| Pre-FRBMA Period (Regress and LN5YDS) | | | |
| D(LN5YDS) | -9.564645 | 0.0000 | I(1)*** |
| LNGFD | -8.986325 | 0.0000 | I(0)*** |
| LNMSGR | -10.35841 | 0.0000 | I(0)*** |
| D(LNFP) | -11.79906 | 0.0000 | I(1)*** |
| D(LNFIR) | -9.034507 | 0.0000 | I(1)*** |
| IFR | -8.356239 | 0.0000 | I(0)*** |
| LNGDP | -4.288639 | 0.0049 | I(0)*** |
| Post-FRBMA Period (Regress and LN5YDS) | | | |
| LN5YDS | -2.790884 | 0.0628 | I(0)* |
| LNGFD | -9.007581 | 0.0000 | I(0)*** |
| LNMSGR | -10.64420 | 0.0000 | I(0) *** |
| D(LNFIR) | -8.972640 | 0.0000 | I(1) *** |
| LNFP | -6.695459 | 0.0000 | I(0) *** |
| D(LNGDP) | -3.938897 | 0.0140 | I(1) *** |
| IFR | -6.316659 | 0.0000 | I(0) *** |

Source: Author's own work.

***, **, * indicate significance at 1%, 5%, and 10%, respectively.

### 4.2    2SLS Estimation Results

| | Pre-FRBMA | | Post-FRBMA | |
|---|---|---|---|---|
| Variable | Model 1 Dep.Variable : IR | Model 2 Dep.Variable : FD | Model 1 Dep.Variable : IR | Model 2 Dep.Variable : FD |
| LNGFD | 0.002107 | | 0.008861 | |
| | (0.0025) | | (0.0037)** | |
| LNMSGR | -0.001582 | | -0.0059 | |
| | (0.0028) | | (0.0034)* | |

| | | | |
|---|---|---|---|
| LNFIR | 0.058098 | | 0.028899 |
| | (0.0310)* | | (0.0148)** |
| LNFP | 0.014087 | | 0.018671 |
| | (0.0035)*** | | (0.0141) |
| LNIR | | 0.523579 | 1.140741 |
| | | (1.2785) | (0.6541)* |
| LNGDP | | 1.623173 | -0.444705 |
| | | (0.4537)*** | (1.0688) |
| IFR | | 0.083395 | 0.301818 |
| | | (0.1056) | (0.0950)*** |
| | | | |
| Adjusted $R^2$ | 0.68 | 0.61 | 0.79 | 0.57 |
| DW statistic | 1.6 | 1.97 | 1.8 | 1.6 |
| F-statistic | 44.9 | 39.8 | 38.8 | 34.6 |
| No. of observations | 111 | 111 | 111 | 111 |

Notes: SEs are in parentheses.

*, ** and *** indicate significance at 10, 5 and 1% levels, respectively.

In the above table, forward premium and foreign interest rate turn to be statistically significant. Significant and positive coefficient for these variables indicate thatin the pre-FRBMA Period, forward premium and foreign interest rate have influenced the movement of interest rate in India. However, the impact of fiscal deficit on interest rate is positive as expected, but insignificant. From this we can infer that during the study period, fiscal deficit did not exert any significant implication on interest rate in India, and therefore movement in interest rate cannot be explained by fiscal deficit in Indian context during the pre-FRBMA Period. In this respect, the conclusion derived by Evans (1985, p.86) in connection with the linkage between deficits and interest rates deserves importance as "economists like to think of economics as a science. In a science, however, repeated contradictions of a paradigm lead to its abandonment if there is any sensible alternative. One paradigm in economics implies that large deficits produce high interest rates. This paradigm is not supported by the facts. In over a century of U.S history, large deficits have never been associated with high interest rates". The coefficient of money supply is negative as hypothesized but statistically insignificant.

In the estimated deficit equation (pre-FRBMA period), even though not significant, six month lagged change in long term nominal interest rate shows a positive effect on fiscal deficit. Economic growth variable has highly statistically significant positive impact on fiscal deficit as expected. One per cent increase in economic growth, leads to on average 1.6 per cent increase in deficit. Similarly, inflation rate variable also depicts positive effect on fiscal deficit, but not significant. The above two models have got goodness of fit and the reported DW statistics avoid the possibility of auto correlation problem.

Of the estimated coefficients reported in model 1 and model 2 in the post FRBMA periods, five out of seven are statistically significant with expected signs. The estimated results show that in the post-FRBMA period, both domestic and foreign

factors have influenced the movement of domestic interest rate in India. The more significantly, from the point of view of the objective of this paper, the estimated coefficient of the fiscal deficit variable is positive and statistically significant and thus, it reveals that fiscal deficit has produced upward pressure on interest rate during the second phase of study period. In line with the expectation, the coefficient sign for money supply is negative and statistically significant. The estimated results of model 2 show that the effect of interest rate on deficit is positive and significant as the increase in interest rate by one per cent, increases the deficit by 1.14 per cent. The effect of economic growth is estimated to be negative and not significant in contrast to the results of the same in Pre-FRBMA Period. However, increase in inflation rate produces positive and highly significant effect on deficit in the post-FRBMA period.

## 5. Conclusion and Policy Suggestion

In this paper we have analyzed the relationship between fiscal deficit and interest rate in India under the backdrop of semi-open economy. Dua and Pandit (2002) showed that both domestic and external factors have influenced movements in the domestic interest rates in the post-reform period. This motivated us to analyze the problem extensively by filling gap identified in the existing literature as described early. In particular, we have incorporated the important external factors like foreign interest rate and forward premium in the interest rate equation. We have specified a simultaneous equation model with two equations related to interest rate and deficit for both pre-and-post FRBMA Periods. The model is estimated using 2SLS method bifurcating the entire study period (1996 April to 2015 June) into two phases of pre (1996 April to 2005 June) and post (2006 April to 2015 June) FRBMA period which equals to total 222 monthly time series observations. The study results can be concluding as follows.

> Fiscal deficit has produced upward pressure on interest rate during the second phase of the study period. However it did not create any significant impact on interest rate in the first phase.
> There is no empirical support for feedback effects among deficit and interest rate variables during the pre-FRBMA periods. However such a relationship is not rejected during the post-FRBMA periods. It can be stated as follows: a one percent increase in the deficit leads to 0.01 increase only in interest rate whereas, a one percent increase in the interest rate cause to more than one percent (1.14) increase in the deficit during the post-FRBMA periods.
> One remarkable result in the post-FRBMA period is that both domestic and external factors have influenced the domestic interest rate.
> In the pre-FRBMA Period, forward premium and foreign interest rate have influenced the movement of interest rate in India.

The overall conclusion can be stated as there is no constant relation between interest rate and fiscal deficit because it vary or depends upon the level of deficit, its mode of financing and financial openness. Thus, this study brings about an important policy suggestion as if there is high fiscal deficit in the economy and Government is trying to fill this gap through borrowing, Government should be able to ensure that higher public expenditure leads to higher income and thereby higher saving in the economy. Otherwise, interest rate will increase.

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