RBI's Monetary Policy, Fiscal Deficits and Financial Crowding Out in India: An Empirical Investigation

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Abstract

Using high-frequency macrodata from a financially deregulated regime, the paper examines whether there is any evidence of financial crowding out in India. The macroeconomic channel through which financial crowding out occurs is the link between the fiscal deficit and interest rate determination. Using ARDL models, it is established that the interest rate is affected by inflationary expectations, not by the fiscal deficit. The term structure of interest rates in India is also incorporated into loanable fund models to analyze the transmission mechanism of the links between long-term and short-term interest rates, which is found to be affirmative, and the financial markets in India are not highly segmented. This result has significant policy implications for interest rate determination in India, especially when fiscal policy has remained accommodative for economic growth recovery through high public capital expenditure investment.

Key words: fiscal deficit, interest rate determination, asymmetric vector autoregressive model, financial crowding out

JEL codes: E62, C32, H6

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Introduction

In the context of emerging economies like India, it is widely believed that actual fiscal imbalances prevent monetary policy from properly managing interest rates, fearing the occurrence of financial crowding out. However, the high interest rates set by central banks can affect public debt management, making debt servicing costlier. Therefore, the setting of both monetary and fiscal policies needs to be reassessed within a comprehensive framework of sound and stable fiscal balances over the medium term, for the economic growth recovery process (Auerbach, A. and L. Kotlikoff , 1987 ; Auerbach, A. J. 2003; Blanchard, 2019). This is especially significant when fiscal policy has remained accommodative in India, focusing on high capex investment for economic growth recovery.

The re-dominance of fiscal policy stance is crucial, especially when monetary policy is constrained in its impact on growth, as it is primarily focusing on price stability as the single mandate of central banks, as per the new monetary policy framework in India. High deficits and debt in India have created debates regarding fiscal risks emanating from maintaining an accommodative fiscal stance. However, India has followed a fiscal glide path cautiously, linking high deficits to capex formation in the economy. Credit rating agencies are worried about high deficits due to their potential macroeconomic consequences, primarily their impact on interest rate management. However, credit rating agencies are becoming increasingly confident of the insignificant link between deficits and interest rates, especially when the RBI determines interest rates based on a rules-based inflation-targeting framework. The timely fiscal deficit in India is articulated in a positive manner, by linking it to capex formation for the growth recovery process. This paper contributes to the empirical evidence from India, further substantiating that the timely fiscal deficit is not the culprit behind rising interest rates, and it is crucial to keep fiscal policy accommodative for capex and growth recovery process. Timely fiscal deficit is not detrimental to economic growth, as it does not induce financial crowding out.

It is interesting to recall the seminal paper by Blinder and Solow (1973) titled “Does fiscal policy matter?” which discusses three levels of crowding out at theoretical level. The first level of crowding out occurs when public investment displaces private investment broadly on a dollar-for-dollar basis. This level of crowding out occurs irrespective of the mode of financing the deficit.

The second level of crowding out is based on the notion that deficit spending not accompanied by new issuances of money carries with it the need for government to float debt issues which compete with the private debt instruments in financial markets (Tanzi, 1985; Blinder and Solow, 1973). The resulting upward pressure on interest rates will reduce any private expenditure, which is interest rate sensitive. In other words, this financial side effect of crowding out occurs via rate of interest (that is, bond financing of deficit causes market rate of interest to rise and in turn crowds out private investment). As discussed by Blinder and Solow (1973), there is no theoretical controversy over this second level of crowding out; the only contested issues are empirical.

The rationale for third level of crowding out is that any government deficit requires the issuance of some sort of debt instrument –outside money or interest bearing bonds – and this increase in private wealth will have further reverberations in the economy (Blinder and Solow, 1973; Barro, 1974). In other words, debt financing of deficit simultaneously results in the creation of bonds, which is considered as net wealth in the private sector (Chakraborty, 2016). It is a matter of debate whether bonds are considered as net wealth in the context of India, and this third level of crowding out may be beyond the scope of the study in the context of India.

The period of analysis is 1996M04 to 2020M12 in the paper, which includes the new monetary policy regime since 2016 as well. Using the high frequency data models, the second level of crowding out – the financial crowding out - is the focus of this paper. Against the backdrop of deregulated financial regime in India, the macroeconomic channels in which the financial crowding out is operated is analysed in the paper. Till mid-1990s, the rate of interest was administered in India, and the rate of interest remained non-varying for longer stance. The post-pandemic monetary policy stance of interest rate determination the period of accommodative stance and the subsequent withdrawal of accommodative stance - will be analyzed as a sequel in the next paper, using the high frequency data models.

The paper is organized into 4 sections. Section 1 analyses the theoretical framework, while section 2 briefly presents the empirical literature. Section 3 presents the empirical models and draws inferences. Section 4 concludes with policy implications.

1. The Analytical Framework

Following Chakraborty (2016), the analytical framework for the study is derived from an extended version of Sargent's (1969) model, which is flexible enough to incorporate the macroeconomic link that may operate in the determination of interest rates (Chakraborty, 2016). Sargent (1969) expressed the nominal rate of interest as a combination of three components: the equilibrating rate of interest, the spread between market rate of interest and the equilibrating real rate of interest and the spread between nominal rate of interest and market rate of interest. It can be expressed as follows.

$$r_{n(t)} = r_{e(t)} + [r_{m(t)} - r_{e(t)}] + [r_{n(t)} - r_{m(t)}] \quad (1)$$

In equation (i), $r_{n(t)}$ is the nominal rate of interest, $r_{e(t)}$ is the real rate of interest which equilibrates desired savings and desired investment; $r_{m(t)}$ is the nominal rate of interest adjusted for the expected rate of inflation. Each of the three specific components is determined in turn by specific macroeconomic variables.

The logical step that follows is to identify the determinants of each of the three terms in equation (1). The derivations of determinants of each term in the model are drawn from Gupta and Moazzami (1996). But as the objective of our study was not to test the validity of alternative paradigms of link between deficit and rate of interest across countries and to distinguish between the short term and long impact of deficits on rate of interest, we have not drawn heavily on the derivations of the determinants of the model; rather we improvise the specification according to our purpose to undertake the financial crowding out in the context of India, irrespective of the paradigm-specific details and dichotomy of transitory and permanent effects of deficits on rate of interest.

One of the significant determinants of the first term, $r_{e(t)}$, which is the real rate of interest that equilibrates desired savings and desired investment, is the deficit of the government. The other determinants of term (i) in Gupta-Moazzami model constituted government consumption expenditure, national income, private consumption expenditure, private savings etc, which we omit in our specification due to multicollinearity problems and moreover, these explanatory variables are not required for our analysis as we have not gone into testing of validity of each of the alternative paradigms of fiscal deficit and rate of interest in the context of India; rather our prime concern was to assess the role of fiscal deficit on rate

of interest to understand the transmission channel of crowding out phenomenon (Chakraborty, 2016).

Following Chakraborty (2016), the determinant of the second term, [$r_{m\,(t)} - r_{e\,(t)}$], is taken as the rate of growth of high powered money. In the open economy model, capital flows also determines the spread between the market rate and the equilibrium real rate of interest, which is beyond the scope of present paper. The real exchange rate can also be inserted in the equation (3) to capture the effect on interest rate, in an open economy macro model, a scope of future research. In the present model, we confine to high powered money (HPM), whose components are inclusive of net RBI credit to government and net FOREX reserves.

$$r_{e(t)} = \alpha + \beta_1 (def_t) + \mu_t \qquad (2)$$

Assuming linearity, we thus have:

$$r_{m(t)} - r_{e(t)} = \lambda + \beta_2 (\Delta M_3)_t + \beta_3 (K_r)_t + \delta_t \qquad (3)$$

Where, $(\Delta M_3)_t$ = changes in high powered money,

The last term of equation (1) is assumed to depend linearly and positively on the inflationary expectations.

$$r_{n(t)} - r_{m(t)} = \theta + \beta_4 (\pi_t^e) + \upsilon_t \qquad (4)$$

Where, $\pi_t^e = Expected\ \ Rate\ of\ \ Inflation$

Now by substituting equation (ii), (iii) and (iv) in equation (i) we get equation (5)

$$r_{n(t)} = \varphi + \beta_1 (def_t) + \beta_2 (\Delta M_3)_t + \beta_3 (K_r)_t + \beta_4 (\pi_t^e) + \omega_t \qquad (5)$$

According to equation (5), rate of interest is a function of fiscal deficits, change in high powered money, capital flows and expected inflation.

2. The Empirical Literature

Akram, Tanweer and Khawaja Mamun, (2024) has neatly summarized the recent empirical literature on term structure of interest rates and deficits in the context of

emerging economies including India (Gabrisch 2021; Kim , 2021; Rahimi, 2014; Simoski, 2019). In this paper, we focus on the review of studies related to India. The real crowding out is important to analyze in the context of developing countries like India because of the large share of public investment in gross capital formation and moreover, the nature of public investment (whether infrastructure or non-infrastructure) itself can affect private investment differently (Vinod, Karun and Chakraborty,2020 ; Vinod, Chakraborty and Karun, 2014; Chakraborty, 2016, Chakraborty, 2010). However, there is a rare set of empirical literature in India which looks into the financial crowding out. Chakraborty (2002) has made an attempt to address this empirical link between rate of interest and deficits; and concludes that deficit does not induce rise in rate of interest in India, rather the causality is the other way round. Two years later, incorporating the monetary variables, the model by Chakraborty (2002) was reexamined by a study from RBI by Goyal (2004) and found the results in consistent with the former. Though Chakraborty (2007) revisited the question of crowding out in India, the aspects of the 'financial' crowding out channel via the interest rate mechanism was not analysed in the context of capital flows, rather the focus of the paper was on 'direct' crowding out. However, the study found that fiscal deficit is not a determinant of interest rate in India.

It is to be noted that the empirical literature on fiscal deficit and interest rate link is largely confined to developed countries. To start with, in the context of US, Tanzi (1985) examined the relationship between fiscal deficit and interest rate. He observed that for the period between 1960 and 1984, the sensitivity of interest rate to fiscal deficit came down over the years. Tanzi pointed out that the plausible explanation beneath this phenomenon is the growing global integration of financial markets in recent years and correspondingly increasing flow of global capital to finance the domestic deficit. On the basis of the multivariate Loanable Funds Model (which incorporates the effect of term structure of rate of interest), Cebula (1990) and Correia, et al (1995) showed that deficit, inflation, short run rate of interest, percentage change in GDP and capital flows Granger cause nominal long term rate of interest and hence crowd out private investment.

The advantage of Loanable Funds model is that in addition of capturing the monetary and fiscal variables like real deficit, real money stock, government spending, expected inflation rate etc., it also captures the term structure of interest rates. In other words, loanable funds model framework allows the combination of the characteristics of the term-structure with the fiscal and monetary policy variables influencing the interest rate (Chakraborty, 2016).

Chakraborty (2012) takes the literature forward by incorporating the capital flows in the macro model of interest rate determination. The theoretical literature identifies two variants of crowding out in an economy – real and financial. The *real* crowding out occurs when the increase in public investment displaces private capital formation, which is also termed as *direct* crowding out (Chakraborty, 2016). The phenomenon of partial loss of private capital formation in the economy, due to the increase in the interest rates emanating from the pre-emption of real and financial resources by the government through bond-financing of fiscal deficit is termed as *financial crowding out*. The *financial* crowding out occurs due to the upward pressures on rate of interest induced by the debt financing of fiscal deficit (interest rate effect).

Chakraborty (2007) though established nil evidence of *direct* crowding out of private corporate investment in India, the absence of direct crowding out does not necessarily imply the absence of *financial* crowding out. The *financial* crowding out may occur due to the upward pressures on the rate of interest induced by the debt financing of fiscal deficit. In other words, even if public sector investment does not crowd out private corporate investment, the private capital formation in the economy may suffer due to the increase in the interest rates arising due to the pre-emption of real and financial resources by the government to finance the increasing fiscal deficits. In this paper, we examine the plausibility of fiscal deficit affects interest rate. It is all the more important to examine such a link in the present context, as Chakraborty (2007) found that the rate of interest is a significant determinant of private corporate investment. If increase in fiscal deficit increases the rate of interest, it would imply financial crowding out.

The common analogy of latter set of studies is that, in a growth economy with accumulation, increasing budget deficits may create over the long term a shortage of funds available for investment. If this potential imbalance between the supply of funds and intended investment is not met, long-term rate of interest react as economic agents anticipate the shortage of funds (Chakraborty, 2016). The former set of studies, which observed no link between interest rate and fiscal deficit emphasizes that in the context of global integration of financial markets, the supply of funds curve is infinitely elastic. Also, some studies under this category, tried to explain their findings under the paradigm of Ricardian Equivalence Theorem (hereafter RET).

3. Econometric Modeling and the Results

The data is organised from the high frequency series of macro variables from the Reserve Bank of India publications. Selection of appropriate interest rate from the available spectrum of interest rates in India for an elaborate analysis of link between rate of interest and fiscal deficit is the crucial step in data mining (Chakraborty, 2016).

Having selected the relevant rates of interest for the analysis, the next task is to transform these rates of interest into ex ante real rate of interest. According to Fisher hypothesis, nominal rate of interest (γn) is given by

$$\gamma^n = \gamma^r + \pi^e \quad (6)$$

where γ^r is the real rate of interest and π^e is the expected rate of inflation. The real rate of interest in any period, thus, is postulated to evolve as a deviation between nominal rate of interest and the expected inflation. Correia, et al (1995) used the low frequency component of consumer price changes as generated by Hodrick-Prescott [HP] filter to model *expected* inflation. We use HP filter for computing expected inflation. Apart from HP filter method, various other econometric methods have also been employed to construct appropriate proxies for the market's expectations of future inflation. Tanzi (1985) used surveys of inflationary expectations such as Livingston index to generate series on expected inflation in the context of US. Autoregressive models have also been used to generate series of expected inflation.

HP filter has good mathematical properties in order to extract the unobservable variable of expected inflation out of the observed series. The expected inflation series computed using HP filter contains both forward and backward looking information on inflation rates, which makes it relevant in rational expectations framework.. Past information is necessary to adjust prices from a disequilibrium position, while information regarding future trends is also required because rational economic agents look forward in time to form expectations about the future inflation rate (Correia, et al, 1995). Using HP filter, how to capture expected inflation from the observed series? Let us assume that observed inflation π contain both expected π^e and unexpected components π^u.

$$\pi = \pi^e + \pi^u. \quad (7)$$

The HP filter decomposes observed inflation into a stationary cyclical component and a smooth trend component (π and π^e denote the logarithms of observed and expected inflation respectively) by minimising the variance of cyclical component subject to a penalty for the variation in the second difference of the trend component. This results in the following constrained least square problem.

$$\text{Min} \quad \sum_{T=1}^{i} (\pi - \pi^e)^2 + \sum_{t=2}^{T} [(\pi^e_{t+1} - \pi^e_t) - (\pi^e_t - \pi^e_{t-1})]^2$$

The same procedure through the HP filter methodology is also used to derive at the unanticipated component in the reserve money as well as the money supply, by decomposing the series into cyclical and structural components.

Using ARDL (Autoregressive Distributed Lag) methodology, the interest rate determination models are estimated. The twin objectives of models are to analyse whether term structure of interest rates operates in India and also to test the link between deficits and interest rates. Using the Phillips-Perron test and ADF tests, the variables are tested for the order of integration and identified that the variables are integrated of order one.

Lag decision is the next crucial step. The frequency of data is monthly, and with an upper bound of six, the lag lengths are tried out. The appropriate parametrisation of all the variables was done using Akaike Information Criteria and Schwarz-Bayesian information criterion. All variables are not of equal lag length. After the pre-tests, the ARDL model estimation starts with regression analysis to estimate the basic model, which is tested for cointegration (if any) and subsequently estimate long-run and short-run coefficients. The test for cointegration using the ARDL bound test (F-test) to determine if there is a long-run relationship between the variables. If cointegration is detected, estimate the long-run coefficients (β's) and short-run coefficients (γ's) using the ARDL models.

The dependent variable in our models is the long term government securities (G-Sec) rates. The ARDL model for the term structure of interest rates is tested using call money rates, and found the inference in affirmative (Table 1). The long run coefficients confirmed that there is no link between interest rate and deficits as well (Table 2).

Table 1: ARDL Model for the Term Structure of Interest Rates with Call MoneyRate

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(def)	0.001660	0.021053	0.078834	0.9372
D(inf)	0.042537	0.019098	2.227343	0.0267
D(m_s)	-0.025997	0.017047	-1.524963	0.1284
D(m_s (-1))	0.047632	0.021369	2.229023	0.0266
D(m_s (-2))	-0.030045	0.017080	-1.759096	0.0796
D(C_Sr)	-0.010099	0.010805	-0.934664	0.3508
D(C_Sr(-1))	0.002830	0.011721	0.241415	0.8094
D(C_Sr (-2))	-0.048097	0.010877	-4.421782	0.0000
CointEq(-1)	-0.048355	0.011507	-4.202235	0.0000

Longrun Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
def	0.034324	0.435754	0.078769	0.9373
inf	0.298567	0.141652	2.107750	0.0359
gm_3	0.020316	0.114910	0.176803	0.8598
C_Sr	0.864976	0.222245	3.892000	0.0001
cons	-0.631485	6.694464	-0.094329	0.9249

Source: (Basic data), RBI and Union Budget documents (various years)

However as call money market rates showed high volatility, we re-estimated the models with the cut off yield rates of 91 day Treasury Bill (T_Sr), which can be an ideal reference rate of interest as it is not too sticky or too volatile (Table 3), with the optimal parametrisation of the model with the lags ARDL(1, 0, 0, 3, 2). In the 91 day Treasury bill models, the results remained the same.

Table 2: ARDL Model for the Term Structure of Interest Rates with 91 day Treasury Bill Rate

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(def)	-0.002279	0.019450	-0.117187	0.9068
D(inf)	0.010734	0.006145	1.746854	0.0817
D(gm_3)	-0.023102	0.015675	-1.473802	0.1416
D(gm_3 (-1))	0.049263	0.019650	2.507006	0.0127
D($gm_{3(}$-2))	-0.031187	0.015650	-1.992826	0.0472
D(T_Sr)	0.193717	0.021404	9.050473	0.0000
D(T_Sr(-1))	0.042625	0.021548	1.978088	0.0489
CointEq(-1)	-0.035972	0.012742	-2.823060	0.0051

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
gfd	-0.063363	0.540432	-0.117245	0.9067
inf	0.298388	0.179854	1.659057	0.0982
gm_3	0.016130	0.142529	0.113171	0.9100
T_Sr	0.612669	0.279177	2.194555	0.0290
cons	2.414784	8.268042	0.292062	0.7705

Source: (Basic data), RBI and Union Budget documents (various years)

The 91 day Treasury Bill models were re-estimated by integrating high powered money instead of money supply variables to understand the effect of reserve money on interest rate determination (Table 3). The two important components of high powered money are the net RBI credit to the government and the net FOREX reserves. The results remained the same, with term structure of interest rate operating in India, and no link between the deficits and the interest rates.

Table 3: ARDL Model for the Term Structure of Interest Rates with 91 day Treasury Bill

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GSEC(-1))	-0.103690	0.057497	-1.803395	0.0724
D(GSEC(-2))	0.073468	0.052050	1.411490	0.1592
D(def)	-0.005241	0.019560	-0.267960	0.7889
D(inf)	0.011528	0.005765	1.999723	0.0465
D(hpm)	-0.001051	0.001945	-0.540113	0.5895
D(T_Sr)	0.196527	0.021498	9.141771	0.0000
D(T_Sr(-1))	0.065268	0.024135	2.704304	0.0073
CointEq(-1)	-0.035884	0.012491	-2.872892	0.0044
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
def	-0.146061	0.545516	-0.267748	0.7891
inf	0.321254	0.160226	2.005002	0.0459
hpm	-0.029280	0.054388	-0.538350	0.5908
T_Sr	0.591042	0.283332	2.086043	0.0379
cons	4.251764	8.273584	0.513896	0.6077

Source: (Basic data), RBI and Union Budget documents (various years)

The interest rate determination is affected by inflationary expectations and not by the fiscal deficit in all the models. All the models also reconfirmed the term structure of interest rates functional in India, and the short term rates of interest and long term rates of interest are inked and there is no significant evidence that financial markets are segmented. The financial crowding out happens through the interest mechanism if there is a link between the rates of interest and deficit. The pre-emption of loanable funds to finance the deficits has not led to the financial crowding out as it is closely tied to capex formation in the Indian economy.

4. Conclusion

The paper examined whether there is any evidence of financial crowding out in the recent years of financially deregulated interest rate regime. Using the high frequency macrodata, we found quite contrary to the popular belief that increase in fiscal deficit induces a rise in the rate of interest, that no significant relationship between the two. The conclusion drawn from the ARDL models revealed that rate of interest is affected by the expected inflation and not by the fiscal deficits. This empirical evidence refutes the plausible evidence for financial crowding out in Indian context. As the inflationary expectations affect interest rate

determination, whether fiscal deficit is inflationary, is a sequel research question. The Fiscal Theory of the Price Level (FTPL) states that the price level is sometimes determined by fiscal policy rather than monetary policy. However, the early causality tests refute that fiscal deficits are inflationary for the period under investigation. The financing pattern of deficits have shifted from seigniorage financing to bond financing under the period of investigation, and the interest rates are market-linked under the financially deregulated regime. The research on inflation determination model incorporating the fiscal deficit, along with the monetary variables and supply shocks is the sequel to this paper.

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