IMPACT OF FISCAL DEFICITS ON REAL INTEREST RATES

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The study tries to uncover the relationship between fiscal deficits and real interest rates using the Vector Auto Regressive Model. The relationship is estimated using three variants of nominal interest rates. It results suggest that the direction of causality runs from real interest rates to fiscal deficit. Further, there is no financial crowding out effect in case of India .Hence, the argument of public expenditure crowding out private investment by making borrowing more expensive cannot be used as argument for cutting down on the much needed investments in various public infrastructure. The findings also indicate that it is difficult to isolate the effect of fiscal deficit from other influences in the economy.

Keywords*: Fiscal Deficit, Interest Rate*

JEL classification: H6,E43

1. Introduction

Managing fiscal deficit has been at the fulcrum of discussion for policy makers in India and the first step towards this has been the FRBM Act, 2003 which has set a fiscal deficit target of 3 per cent of GDP. The government is criticised for running fiscal deficits on account of the fear of a crowding-out effect on private investment and also for the improper allocation of public resources on consumption expenditure of the government, rather than investment.

This study attempts to look for the presence of a crowding-out of the private sector investments in India due to budget deficit financed expenditure of the Central Government. An analysis of this link is of interest because of two reasons. The first reason is that if fiscal deficits lead to an increase in the real interest rates, it may lead to a crowding-out of the interest sensitive component of private investment. The second is that such a relationship would point to the link between fiscal and monetary policy. In such conditions a reduction of the budget deficit could moderate upward pressure on interest rates and provide monetary policy additional degrees of free in interest rate management. (Chakraborty, 2012)

From a theoretical perspective crowding-out may manifest itself as real (direct) crowding-out effect or depending on the mode of financing the deficit, it may lead to a

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financial crowding-out effect or an adverse impact on inflation . Real or direct crowding out occurs when public investment displaces private investment on a one to one basis irrespective of the mode of financing it and financial crowding-out can occur due to an increase in demand for money for transaction purposes leading to an increase in interest rates. Financial crowding-out occurs independently of real crowding-out and can exist even if the economy is not at full-employment level. This happens due to partial loss in interest sensitive private investment caused by increase in interest rates due to the financing of the budget deficit through government debt instruments and the increase in demand for funds by the Private sector due to the expansionary effect of public spending in a credit constrained economy. This leads to a trade-off between short-run advantages of increase in income due to government spending and long-run benefits from private capital investment on production capacity.

The budget deficit can also be financed through monetization; however, this leads to a rise in the money supply which causes an increase in the level of inflation and this adversely affects the poor in the country (Das, 2004).

This study focuses on the financial crowding-out effect and tries to establish the direction of causality between budget deficits and real interest rates. The study is organized into four sections. The first section reviews the existing literature and theoretical models which discuss financial crowding-out. The second section will describe the methodology for the study and discuss the data and sources. The third section will set up an econometric model and try to explain the link between real interest rate and fiscal deficit of the Central Government. The fourth section will conclude the findings and discuss policy implications of the study.

2. Literature Review

This section will review existing literature on financial crowding-out and try to arrive at the methodology for the study.

Financial crowding-out is rise in interest rates caused by the increase in economic activity by increase in government spending and the financing of the expenditure through government debt. This rise in interest rate will crowd-out interest sensitive private investments. The various theories and their critiques are discussed in this section.

2.1 The 'treasury view'

The 'treasury view' argues that at any point of time in the economy there exists a fixed pool of savings. Any increase in government expenditure can never increase output as any increase in output due to government spending necessarily crowds-out an equal amount of interest sensitive private investment. The fallacy of this argument was exposed by Richard Kahn in his 1931 paper. The model implicitly assumes that the economy is at full employment with a fixed pool of savings. The other assumptions are that prices are kept constant and that the interest rate is determined by the savings-investment equality. If savings are independent of interest rates, an increase in investment demand by an increase in public spending will fully crowd-out the investment with a rise in interest rate to maintain the savings-investment equality. According to the fixed pool of savings view, an increase in public investment will not raise output as the economy is already at its full employment level. But if we consider the case of a developing country like India, it will be unrealistic to assume full-employment level of output in the economy and hence unrealistic to assume a fixed pool of savings.

If we now assume that savings are a positive function of interest rates and income, with investment continuing to be a negative function of interest rates, a rise in public spending will partially crowd-out investment due to a rise in interest rate if the stock of savings is assumed to be fixed. If the economy is now assumed to have unemployment, with resources lying idle in the economy, a rise in public spending will raise investment and utilize the idling resources. Kahn (1931) showed that the rise in investment will raise income and employment until private savings rises by an amount equivalent to the increase in public spending. Here the higher investment demand due to increased public spending can be satisfied without any rise in interest rate. Hence, the argument of the 'Treasury view' that higher fiscal deficits will raise interest rates and crowd-out private investment is logically fallacious.

It is often argued that monetization of the government deficits leads to inflation. However, post 2004 automatic monetization of the fiscal deficit through ad hoc treasury bills was discontinued. But a fiscal deficit might have an inflationary impact even without monetization and this happens due to forced saving (Friedman, 1978; Patnaik, 2001; Das, 2004). The forced savings mechanism works when a rise in prices reduces the real income of consumers and raises the real income of the producers who have a higher propensity to save out of their incomes and this increases the supply of savings in the

economy. If the economy is assumed to be at full-employment level of output, it does not necessarily imply that an increase in public spending will raise interest rates and crowd-out private investment, if the savings-investment ratio is maintained by a rise in prices leading to forced savings. The increase in supply of savings will meet the increased investment demand without impacting interest rates.

2.2 The Loanable Funds Theory

The Loanable Funds Theory by Dennis Robertson takes into consideration the dynamics of the flow and stock equilibrium (Das, 2004). The theory assumes that individuals hold wealth in two forms. One is in the form of capital or claims to capital in the form of bonds and equity and the second is in the form of a stock of money, called hoarding of money. The supply of loanable funds in any period is equal to the sum of savings out of income and cash dishoarded in that period and this is a positive function of interest rate. The demand for loanable funds is equal to the investment and the cash hoarded in that period, which is a negative function of interest rate. The equilibrium rate of interest in any period is determined by the intersection of the supply and demand schedules of the loanable funds. If it is assumed that the government is the preferred borrower, a rise in the demand for loanable funds due to an increase in debt financed government spending will raise interest rate.

In this model, saving is a function of interest rate and income. Hence, the argument that there will be a rise in interest rate due to debt financed expenditure by the government will be valid only if we assume that the economy is at full-employment level with income and saving being at a fixed level. When we do away the assumption of full-employment, an increase in fiscal deficits will raise income and saving and the higher demand for loanable funds due to increased government spending can be met with without any increase in interest rate. Hence this model, like the previous model, cannot be used for criticizing fiscal deficits of the government for having a crowding-out impact on private investments in the case of India. Nonetheless, this model is an improvement over the 'Treasury View' in a sense that by introducing the concept of hoarding and dishoarding of cash, it assumes that the circulation of money in economy is endogenous and determined by the interest rate.(Das, 2004)

2.3 Fixed Pool of Bank Credit Theory

The Fixed Pool of Bank Credit theory assumes that banks can only create a certain pool of loanable funds in every period and if there is higher demand for loans by the government to finance its fiscal deficit then there will be less of loanable funds available for the private sector (Das, 2004). This implicitly assumes that loans to the government are safer than loans to the private sector and hence the private sector can access funds only if there is excess funds after loans to the government or if the private sector pays a higher real interest for the loans. A fixed pool of bank credit would imply that banks can only create a certain amount of credit in a period and that they will have no underutilized capacity if there is demand for credit. There cannot be any underutilized capacity as, had there been any underutilized capacity, the bank could have easily expanded credit and earned an interest on it. Patnaik (2001), Das (2004) and Das (2010) argue that in the Indian economy there does not seem to be any competition for funds between the government and the private sector as Scheduled Commercial Banks (SCBs) have, on an average, invested 28 per cent of incremental deposits in government securities between 2003-04 to 2010-11[2], which is higher than the Statutory Liquidity Ratio (SLR) of 24 per cent. The scheduled commercials banks would not have to invest their excess capacity in government bonds had there been credit worthy borrowers in the private sector. Since there is a lack of demand from the private sector, it cannot be that they are paying a higher interest rate on their loans due to lack of supply of credit from banks due to their preference for government securities. If ***r*** is the interest rate on government bonds, the interest rate on credit and ***c*** the cash reserve ratio (CRR), then banks would never hold excess of government securities if . This assumes that commercial banks expand credit in a coordinated manner and that they take into consideration the multiplier effect of credit expansion(Patnaik, 2001). This is best illustrated by an example by Patnaik (2001), who supposes that banks hold only three types of assets: cash, government securities and loans to commercial enterprises. The banks are required to maintain a Cash Reserve Ratio (CRR) of 10 per cent and an SLR of 24 per cent. Suppose, to start with, the banks have Rs.100 of which Rs.10 is held as reserve, Rs.28 is held as government securities and Rs.62 as credit. If there is excess demand for credit then by selling Rs.1 of the government securities to RBI, the banks can collectively expand its assets to Rs.11 of reserves, Rs.27 of government securities and Rs.72 of credit. This means that if banks have the motive of maximizing their profit, they will hold excess of government

[2] RBI databank, Handbook of Indian Statistics ,www.rbi.org.in

securities only if r exceeds 10 times τ, where 10 is 1/CRR. It is erroneous to believe that the banking sector in India has a fixed pool of credit as it can always utilize its excess holding of government securities to expand credit. Even if the banks do face a shortage of funds, they can use the refinancing facility of the RBI and borrow funds at the repo rate. This implies that, technically there need not be any shortage in the supply of credit and, therefore, there is no reason for credit worthy private borrowers to pay a higher interest rate on credit when compared to the government. However, it is essential to point out that the banking sector in India is dominated by state owned banks, with seventy per cent of the total banking assets being held by them as of 2007 (Gupta et al 2011), and this is despite the increase in share of private and foreign banks in total assets in recent years. Gupta et al (2011) have found that public sector banks have behaved in a markedly different fashion when compared to their private sector counterparts in redeploying the financial resources that were freed up with the liberalization of the banking sector in the 1990s. Their empirical study shows that public sector banks have voluntarily allocated relatively more resources to finance the government's fiscal deficit. The higher investments in government securities has been shown not to be due to the objective of maximizing profit or due to the lower risk profile of their asset or due to the lack of demand for credit from the private sector, but the ownership in itself appears to be a major determinant of lending out to the government to finance its deficit. In effect, this too leads to a crowding out of private sector credit at the bank level. Another study by Banerjee et al (2004) shows that Indian firms are credit constrained and they characterize the nationalized banks as "lazy". This is because they do not lend adequately to the private sector and their lending decisions are based primarily on past turnovers and outlays of the borrowers rather than their current or expected profitability. This behaviour leads to the banks over-investing in government securities as according to their criteria for lending, there is a lack of demand for credit from credit worthy borrowers. This will be especially true in the States, where, for various institutional reasons, it might be particularly difficult and costly to scrutinize the private sector's applications for credit.

These studies tell us that there is a possibility that there is rationing of credit to the private sector by the public banks and hence higher interest on loans to them. But this still does not mean that there will be lack of credit available to the private sector from private banks if there is demand for it. This is because the private sector banks are solely driven by the motive of profit and are free of socio-political obligations. If we look at the statement of assets and liabilities of Scheduled Commercial Banks available in the Real-

Time Handbook of Statistics on the Indian Economy, RBI, we see that on an average from 2005 to 2011,private sector banks have also invested 28 per cent of their incremental deposits in government securities which is still higher than the SLR of 24 per cent. This means that there is actually a lack of demand for credit worthy borrowers; otherwise there is no reason why private banks would settle for the lower returns obtained from investing in government securities over and above the SLR.

2.4 The Keynesian Approach

The Keynesian approach for analysing the impact of increased government spending uses an IS-LM framework. The case under consideration is of a closed economy with fixed prices. The money supply is exogenously determined in the economy. Aggregate demand is a positive function of output and a negative function of interest rate. The money demand is a positive function of output and interest rate. An increase in government spending raises aggregate demand in the economy and this raises the demand for money. Given that money-supply is fixed, there must be some factor which will reduce the demand for money so that the money market clears. Since the demand for money is sensitive to interest rates, the required offset for money demand is achieved by an increase in interest rate. This leads to a decline in interest sensitive private investments and there is partial crowding-out of the rise in aggregate demand. As a result, the increase in interest rate that maintains the equilibrium in the money market will also erode the income expansionary impact of government spending.

In the post liberalization period, India has been a partially open economy with a floating exchange rate. The economy is only partially open in a sense that the capital account is not fully convertible. Thus it will be more appropriate to analyse the IS-LM framework for an economy with partial capital mobility and a floating exchange rate. In this framework an increase in fiscal deficit due to higher government expenditure will raise both output and interest rates. (Khatkhate et al, 2001)

The increase in the interest rate hinges on the assumption that money supply is fixed and there is supply constraint on credit. To assume that bank credit is supply constrained would mean that banks are unable to raise credit as the demand for credit rises. However, as discussed in the previous section, the Indian banking sector is not supply constrained as it can be seen from its choice to hold government securities in excess of the SLR. The banking sector can always sell its excess holdings of government securities to the RBI to raise additional credit. This means that if money demand were to increase due to a rise in

government spending, then the money-supply can be expanded to meet the demand without impacting the interest rate. This would allow the economy to settle at a higher level of output without crowding-out any interest sensitive private investment.

If in the same model, if money-supply is assumed to be endogenous and we assume that the monetary policy is implemented using interest rates, an increase in government expenditure will have no impact on interest rates and the economy settles at a higher level of output (Das, 2004). Thus, for an economy like India, which is demand constrained both in the commodities as well as credit markets, the government should utilize the excess capacity of the banks to raise output as this will have no impact on interest rates.

It often argued that when the fiscal deficit is financed through open-market operations, an increase in the supply of government bonds will lower the price of government securities and hence lead to an increase in interest rates. However this argument implicitly assumes that the demand for government securities is fixed. An increase in government spending in a demand constrained economy like India will raise income and output in the economy and hence it will also lead to a rise in private saving in the economy. This increase in private saving will raise the demand for various financial assets, which will either directly or indirectly include the government securities as well. The direct rise in demand comes from higher demand for government securities by primary dealers, while the indirect demand comes from scheduled commercial banks which have to maintain a mandatory SLR of 24 per cent of incremental deposits. If money-supply is endogenous, the central bank will stand by the government to raise cash by converting government securities into money in order to maintain a constant interest rate. Hence an increase in the level of fiscal deficit not only raises the supply of government securities but also their demand. (Das, 2004)

2.5 Empirical Studies

Chakraborty (2002) covers the period from January 1993 to December 1999. The study uses Hsiao's (1981) asymmetric vector autoregressive model to determine the direction on causality between real interest rate and fiscal deficits. The results show that the fiscal deficits have no impact on real interest rate. However, it is seen that real interest rates impact fiscal deficits by increasing the interest burden on borrowings. In a subsequent paper, Chakraborty (2007) stated the reasons for the absence of financial crowding-out as: a pattern of savings in the economy which has moved in favour of financial assets**; t**he Private sector being able to raise funds for investment through capital markets in addition

to credit from banks and the liquidity in the system being adequate enough to support the higher demand from corporate investment.

Goyal (2004), uses a vector auto-regressive model (VAR) to analyse the impact of fiscal deficit on interest rates. The variables used in the analysis are Gross Fiscal Deficit, Secondary Market yield for residual maturity of 10 years and reserve money for the period April 1996 to September 2001. The paper finds a two-way causality between ex-ante long term real interest rate and the fiscal deficit. This means that an increase in government spending financed through debt instruments puts an upward pressure on interest rates and the increases in interest rates in turn raise the fiscal deficit through the additional interest burden.

Das (2004) uses basic time series analysis to see whether any relationship exists between interest rates and fiscal deficit to GDP ratio. A regression is run between various interest rates such as government bond yields, deposit rates, lending rates, 91 and 364 days treasury bills and call money rates and the fiscal deficit to GDP ratio for the period of 1990-91 to 2000-01. The study finds no linkage between interest rates and fiscal deficit in the post liberalization period.

The previous literature leaves the link between fiscal deficit and interest rates rather unclear. In the following section we try to describe the methodology that we will use to analyse the relationship between fiscal deficit and real interest rate.

3. Variables and Data Sources

The estimation is done using three alternative measures of nominal interest rate viz. 91 days Treasury-Bill, 1 year government securities and 10 year government securities. The paper therefore tests if the relationship between fiscal deficit and real interest rates is robust to different measures of interest rate. Since the empirical exercise is based on real interest rates, measures of expected inflation are also required. We use WPI inflation for this study. The inflation forecasts are generated using Hodrick-Prescott (HP) filter (Chakraborty, 2002; Goyal, 2004) using the Ravn and Uhlig frequency rule (2002).

The measure of fiscal deficit used is the monthly gross fiscal deficit of the Central Government. The liquidity in the economy is an important determinant of interest rates and this is measured by deducting required reserves from reserve money. The gross fiscal deficit of the Central Government and the liquidity in the system are deflated by WPI to get the real variables.The analysis is carried out using monthly data from January 2001 to

December 2012. All data for this analysis has been taken from the RBI databank, Handbook of Indian Statistics.

4. Econometric Methodology

A review of the existing literature given in the previous section show that there is uncertainty in determining whether fiscal impact real interest rates and also if a reverse relationship exists. The paper will use VAR analysis to uncover the relationship between or interest variables. The first step of the analysis will be to check for the order of integration of the interest variables. The second step will be run a Granger causality test on real interest rates and fiscal deficit to get a preliminary idea of the direction of causality. The third step will be to estimate a VAR model with real interest rate and fiscal deficit. The fourth step will be to include other variables like forward premium, inflation rate and money supply in the VAR framework to see if the results in the bi-variate VAR are robust.(Chakraborty, 2002)

4.1 Test for Nonstationarity

The first econometric step is to test if the series are nonstationary. The classical regression model requires that the dependent and independent variables in a regression be stationary in order to avoid the problem of what Granger and Newbold (1974) called 'spurious regression.'(Dua and Pandit, 2001) We use three tests to check if the series are stationary. These are the Augmented Dickey-Fuller (**ADF**) test, the Dickey Fuller GLS (**DFGLS**) test and the Kwiatkowski–Phillips–Schmidt–Shin (**KPSS**) test. The unit root testing is done using a sequential procedure used to test for the presence of a unit root when the form of the data-generating process is unknown which is by Doldado, Jenkinson, and Sosvilla-Rivero (1990). (dua and pandit, 2001; dua and Raje, 2010)

The ADF and the DFGLS test have their null hypothesis as- the variable has unit root, while KPSS test has the null hypothesis that – the variable is stationary. We decide on the order integration if two of the three tests agree with a certain order of integration. Table 1 summarizes the results of the unit root tests.

From Table 1 provided in the Appendix we infer that all our variables are integrated of order zero.

4.2 Granger Causality Test

If we have two stationary time series *x* and *y*, the Granger (1969) approach to the question of whether *x* causes *y* is to see how much of the current *y* can be explained by past values of *x*, while keeping all other factors constant,and then to see whether adding lagged values of *x*will improve the explanation. *y* is said to be Granger-caused by *x*if *x* helps in the prediction of *y*, or equivalently if the coefficients on the lagged *x*'s are statistically significant. It is important to note that the statement "*x* Granger causes *y*" does not imply that *y* is the effect *x* or the result of *x*. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term. Table 2, Table 3 and Table 4 summarize the results of the Granger Causality tests.

The Granger Causality tests show that the direction of information flow is from real gross fiscal deficit of the Central Government to the real rates of interest.

Table 2

Pairwise Granger Causality Tests
Date: 04/01/13 Time: 16:05
Sample: 2000M01 2012M12
Lags: 12

Null Hypothesis:	Obs	F-Statistic	Prob.
r() does not Granger Cause FD	130	0.64358	0.8005
FD does not Granger Cause r()		2.27202	0.0132**

Table 3

Pairwise Granger Causality Tests
Date: 04/01/13 Time: 16:03
Sample: 2000M01 2012M12
Lags: 12

Null Hypothesis:	Obs	F-Statistic	Prob.

r()does not Granger Cause FD	130	1.22598	0.2753
FD does not Granger Cause r()		2.74144	0.0029**

Table 4

Pairwise Granger Causality Tests
Date: 04/01/13 Time: 16:09
Sample: 2000M01 2012M12
Lags: 12

Null Hypothesis:	Obs	F-Statistic	Prob.
r() does not Granger Cause FD	126	0.80563	0.6439
FD does not Granger Cause r()		1.61255	0.0998*

* and ** stand for 10% and 5% level of significance

.4.3 Bivariate Vector Auto Regressive (VAR) Analysis of Real Interest Rates and Fiscal Deficit

The review of literature shows us that fiscal deficits might increase the level of real interest rates either by varying the level of aggregate demand in the economy or by an increase in borrowing by the government. However, the fiscal deficit may itself not be entirely independent of the level of interest rates. A VAR model is an ideal tool to analyse this two-way relationship. The first step will be to run a bivariate VAR model with the real interest rate and real gross fiscal deficit as the variables. We add dummy variables for each month to account for seasonal fixed effects. The Lag length for the three models is selected using SIC criteria. The results are summarised in Table 5.

Analysing Table 5, we see two way causality between gross fiscal deficit of the Central Government and real interest rate in all three models.

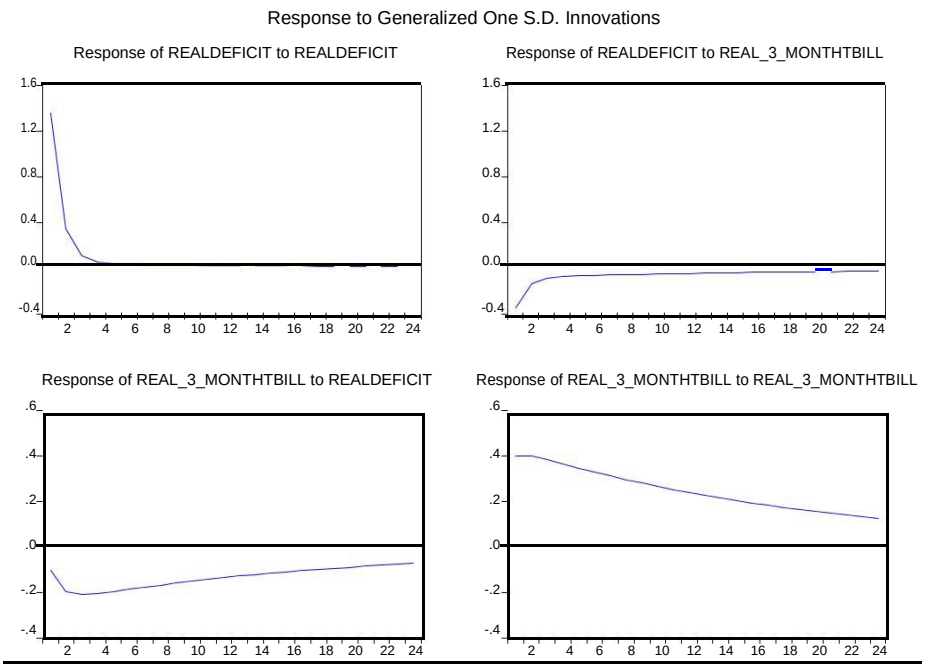
Table 5		
Standard errors in ( ) & t-statistics in [ ]		
Variables	r()	FD
r()[-1]	0.934942** (0.02063) [45.3211]	-0.127710* (0.06970) [-1.83226]
FD [-1]	-0.074278** (0.02584) [-2.87454]	0.245367** (0.08731) [2.81043]
C	-0.016117 (0.12177) [-0.13235]	2.194492** (0.41145) [5.33360]
R-squared	0.948294	0.375357
F-statistic	179.1705	5.870476
Schwarz criterion	5.172861	
Variables	r()	FD
r()[-1]	0.924733** (0.02248) [41.1283]	-0.194144** (0.07399) [-2.62396]
FD [-1]	-0.060570** (0.02658) [-2.27877]	0.215513** (0.08747) [2.46392]
C	0.017529 (0.12407) [0.14128]	2.282679** (0.40829) [5.59077]
R-squared	0.939475	0.391817
F-statistic	151.6390	6.293749

Schwarz criterion 5.206183		
Variables	r()	FD
r()[-1]	0.934340** (0.02030) [46.0304]	-0.221769** (0.08295) [-2.67365]
FD [-1]	-0.025197 (0.02179) [-1.15627]	0.197821** (0.08905) [2.22147]
C	0.093600 (0.10131) [0.92388]	2.455037 (0.41399) [5.93012]
R-squared	0.951373	0.399339
F-statistic	185.1139	6.290340
Schwarz criterion 4.737599		
* and ** stand for 10% and 5% level of significance		

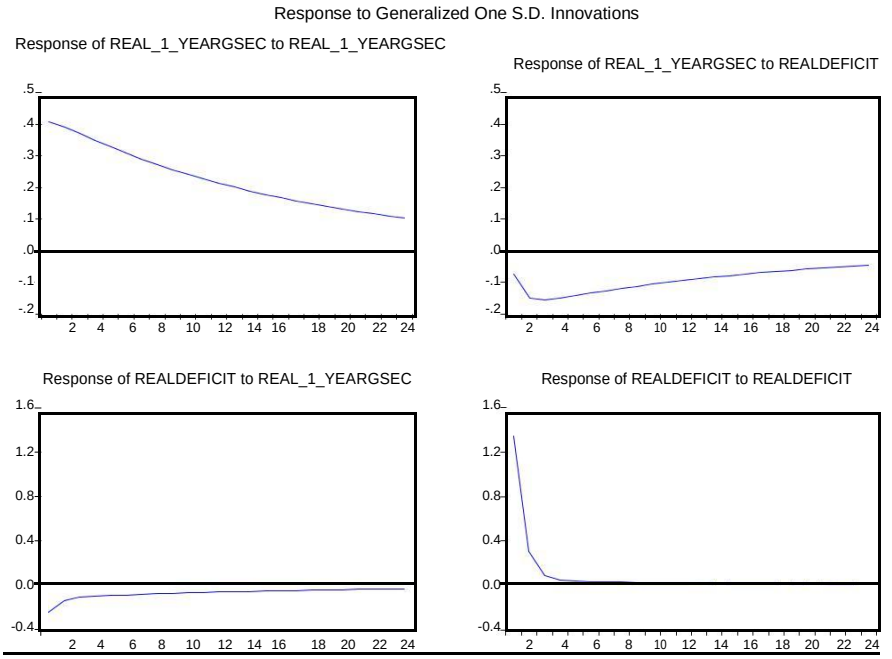
4.4 Innovation Accounting: Impulse Response Functions for the Bivariate Case

An impulse response function (IRF) traces the effect of one standard deviation shock to one of the innovations on current and future values of the endogenous variables through the dynamic structure of the VAR. The phenomenon of financial crowding out can be detected through the dynamic effect of unit (one standard deviation) increase of gross fiscal deficit of the Central Government on the future values of real interest rate and vice versa .

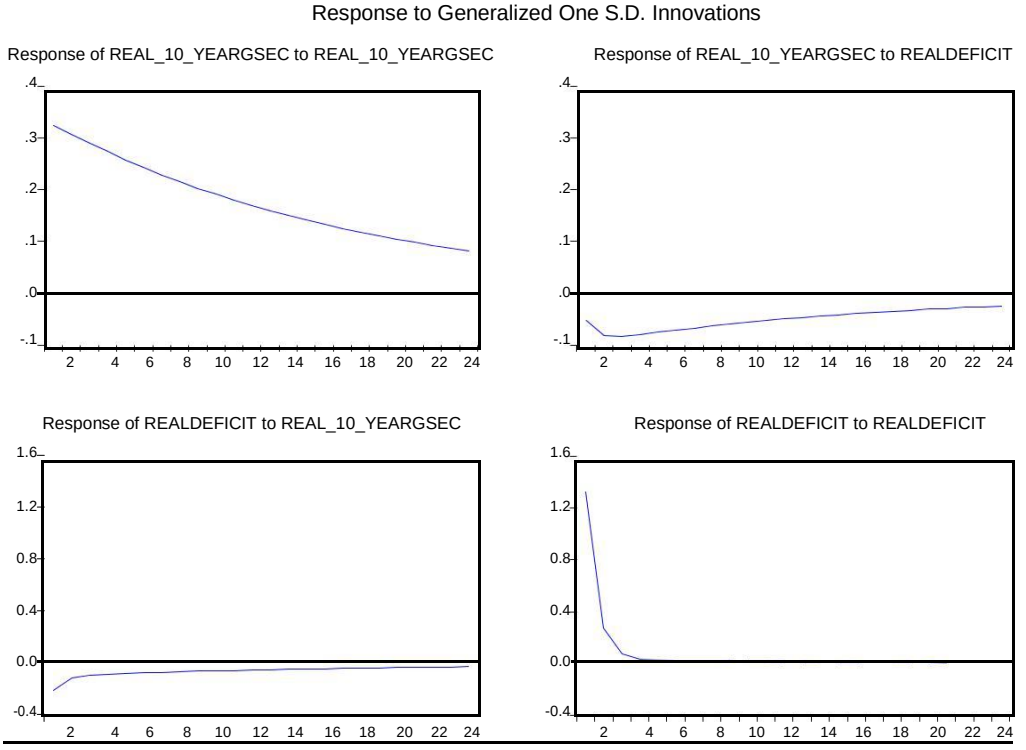
VAR model with r() and FD



VAR model with r() and FD



VAR model with r() and FD



Even though there is two-way causation between real interest rate and gross fiscal deficit of the Central government we see no crowding out phenomenon. Also, analysis of the IRF shows that neither variable has any long run effect on the other.

Multi-variate Vector Auto Regressive Model

To check for robustness of the results we include inflation rate, exchange rate changes and real adjusted reserve money growth in the VAR models. The results are summarized in Table 6, Table 7 and Table 8.

We can infer from the tables that once we account for the other macro-economic variables in the model, the two way causality breaks down and we get causality running from real interest rates to gross fiscal deficit of the central government.

Innovation Accounting: Impulse Response Functions for the Multivariate Case

The Graphs for the IRF for the multivariate VAR models are given in the appendix. The IRF for the three interest rate models show that there is a persisting impact of real interest on fiscal deficit for the in the case of the 10 year G-sec, and short run impact due 91 day T-Bills and 1 year G-sec.

Table 6

Standard errors in ( ) & t-statistics in [ ]

Variables	r()	FD	Res_Money_growth (Adj.)	Inflation	Exchange_rate_growth
r()[-1]	0.971628** (0.05624) [17.2764]	-0.030047 (0.08330) [-0.36071]	0.004225 (0.06794) [0.06218]	-0.028990 (0.05363) [-0.54050]	0.392972** (0.17170) [2.28871]
FD [-1]	-0.119312** (0.05932) [-2.01140]	0.156582* (0.08786) [1.78223]	0.000228 (0.07166) [0.00318]	0.078003 (0.05657) [1.37889]	-0.126990 (0.18110) [-0.70123]
Res_Money_growth(Adj.)	-0.020448	-0.166230	-0.232142**	-0.035145	-0.222539

[-1]	(0.07384) [-0.27694]	(0.10936) [-1.52002]	(0.08919) [-2.60269]	(0.07041) [-0.49912]	(0.22542) [-0.98722]
Inflation	0.063785 (0.04932) [1.29319]	0.051175 (0.07306) [0.70050]	0.002346 (0.05958) [0.03938]	0.915170** (0.04704) [19.4557]	0.631353** (0.15059) [4.19265]
Exchange_rate_growth	0.024051** (0.00924) [2.60153]	0.050421** (0.01369) [3.68229]	0.014024 (0.01117) [1.25575]	- 0.033768** (0.00882) [-3.83010]	0.975453** (0.02822) [34.5606]
C	-0.424060 (0.41012) [-1.03398]	2.053994** (0.60745) [3.38134]	1.196223** (0.49543) [2.41452]	0.640146 (0.39112) [1.63669]	-3.622204** (1.25211) [-2.89288]
R-squared	0.884823	0.449645	0.669580	0.915984	0.923287
F-statistic	58.09717	6.178642	15.32505	82.44967	91.01950
Schwarz criterion 16.63281					
* and ** stand for 10% and 5% level of significance					

Table 7

Standard errors in ( ) & t-statistics in [ ]

Variables	r()	FD	Res_Money_growth (Adj.)	Inflation	Exchange_rate_growth
r()[-1]	0.925739** (0.02236) [41.3994]	- 0.191270** (0.06923) [-2.76280]	0.076249 (0.05777) [1.31980]	-0.072460 (0.04552) [-1.59192]	0.206928 (0.14902) [1.38858]
FD [-1]	-0.046982 (0.02873) [-1.63532]	0.085864 (0.08895) [0.96535]	0.029234 (0.07423) [0.39385]	0.053064 (0.05848) [0.90738]	-0.088372 (0.19146) [-0.46156]
Res_Money_growth(Adj.) [-1]	-0.040822 (0.03428) [-1.19093]	-0.162103 (0.10612) [-1.52748]	-0.233673** (0.08856) [-2.63856]	-0.033322 (0.06977) [-0.47757]	-0.232320 (0.22844) [-1.01699]
Inflation	-0.000176 (0.01300) [-0.01357]	0.072807* (0.04023) [1.80964]	-0.000678 (0.03357) [-0.02019]	0.936079** (0.02645) [35.3879]	0.347655** (0.08660) [4.01436]
Exchange_rate_growth	- 0.009843**	0.049777** (0.01286)	0.013959 (0.01073)	- 0.034741**	0.991081** (0.02768)

	(0.00415) [-2.36958]	[3.87056]	[1.30071]	(0.00846) [-4.10877]	[35.8013]
C	0.077380 (0.15079) [0.51317]	2.037734** (0.46684) [4.36491]	1.167940** (0.38958) [2.99794]	0.555039* (0.30694) [1.80832]	-1.988330** (1.00490) [-1.97863]
R-squared	0.942630	0.481747	0.674259	0.917508	0.921222
F-statistic	124.2573	7.029783	15.65379	84.11353	88.43462
Schwarz criterion 16.66236					
* and ** stand for 10% and 5% level of significance					

Table 8

Standard errors in ( ) & t-statistics in [ ]

Variables	r()	FD	Res_Money_growth (Adj.)	Inflation	Exchange_rate_growth
r()[-1]	0.930526** (0.02047) [45.4529]	-0.217847** (0.08034) [-2.71141]	0.101101 (0.06685) [1.51228]	-0.074153 (0.05279) [-1.40481]	0.027405 (0.17428) [0.15724]
FD [-1]	-0.015961 (0.02260) [-0.70627]	0.091994 (0.08869) [1.03725]	0.031602 (0.07380) [0.42823]	0.056341 (0.05827) [0.96694]	-0.159743 (0.19239) [-0.83032]
Res_Money_growth(Adj.) [-1]	-0.029141 (0.02719) [-1.07184]	-0.163729 (0.10670) [-1.53449]	-0.233646** (0.08878) [-2.63167]	-0.031894 (0.07010) [-0.45498]	-0.228631 (0.23145) [-0.98781]
Inflation	-0.016223	0.051571	0.009376	0.928003**	0.350280**

	(0.01049) [-1.54720]	(0.04115) [1.25323]	(0.03424) [0.27384]	(0.02704) [34.3258]	(0.08926) [3.92409]
Exchange_rate_growth	-0.004855 (0.00337) [-1.44018]	0.049394** (0.01323) [3.73335]	0.014357 (0.01101) [1.30414]	- 0.036025** (0.00869) [-4.14454]	0.991725** (0.02870) [34.5554]
C	0.230224* (0.12471) [1.84610]	2.321581** (0.48942) [4.74349]	1.027388** (0.40724) [2.52281]	0.651759** (0.32154) [2.02698]	-1.910861* (1.06166) [-1.79988]
R-squared	0.953515	0.470363	0.670139	0.917399	0.915779
F-statistic	153.8433	6.660632	15.23686	83.29840	81.55090
Schwarz criterion 16.23776					
* and ** stand for 10% and 5% level of significance					

5. Conclusions

The study finds that when we estimate bivariate VAR models with only real interest and gross fiscal deficit of the Central Government as the variable, we find two way causality between the two variables. However, the multivariate VAR model that accounts for adjusted reserve money growth, inflation and exchange rate depreciation, we find that the direction on causality runs from real interest rates to gross fiscal deficit for all three variants of the interest rates. However, we do not find a financial crowding out effect as the VAR estimates show that real interest rates have a negative impact on fiscal deficit in both the bivariate as well as the multivariate models. This result is somewhat puzzling and does not agree with the existing empirical literature reviewed in this paper. However, a possible explanation for the negative correlation between real interest rates and fiscal deficits is given by Laubach (2005) which argues that it is difficult to isolate the effect of fiscal policy from the many other factors affecting interest rates. The most obvious being the effect of business cycles. If automatic stabilizers raise deficits during recession, while long term interest rates fall due to monetary easing, deficits and interest rates may be negatively correlated even if the partial effect of fiscal deficit on real interest rate, after partialling the effect other variables, is positive. This problem can potentially be solved

by focussing on the relationship between long-horizon forecasts of both interest rates and fiscal deficits.

This study broadly sets aside the arguments of the naysayers of increasing public expenditure by showing that, for the case India, there seems to be no significant adverse impact of fiscal deficits on the interest rates in the economy. This result is extremely important as India currently requires fairly large investment in strengthening public infrastructure, especially for education and health care. The requirement for increase in these expenditures should not be set aside on grounds of it, potentially, having negative impact on the production side of the economy, by making borrowing costlier for them, as no such negative effect is revealed in the data.

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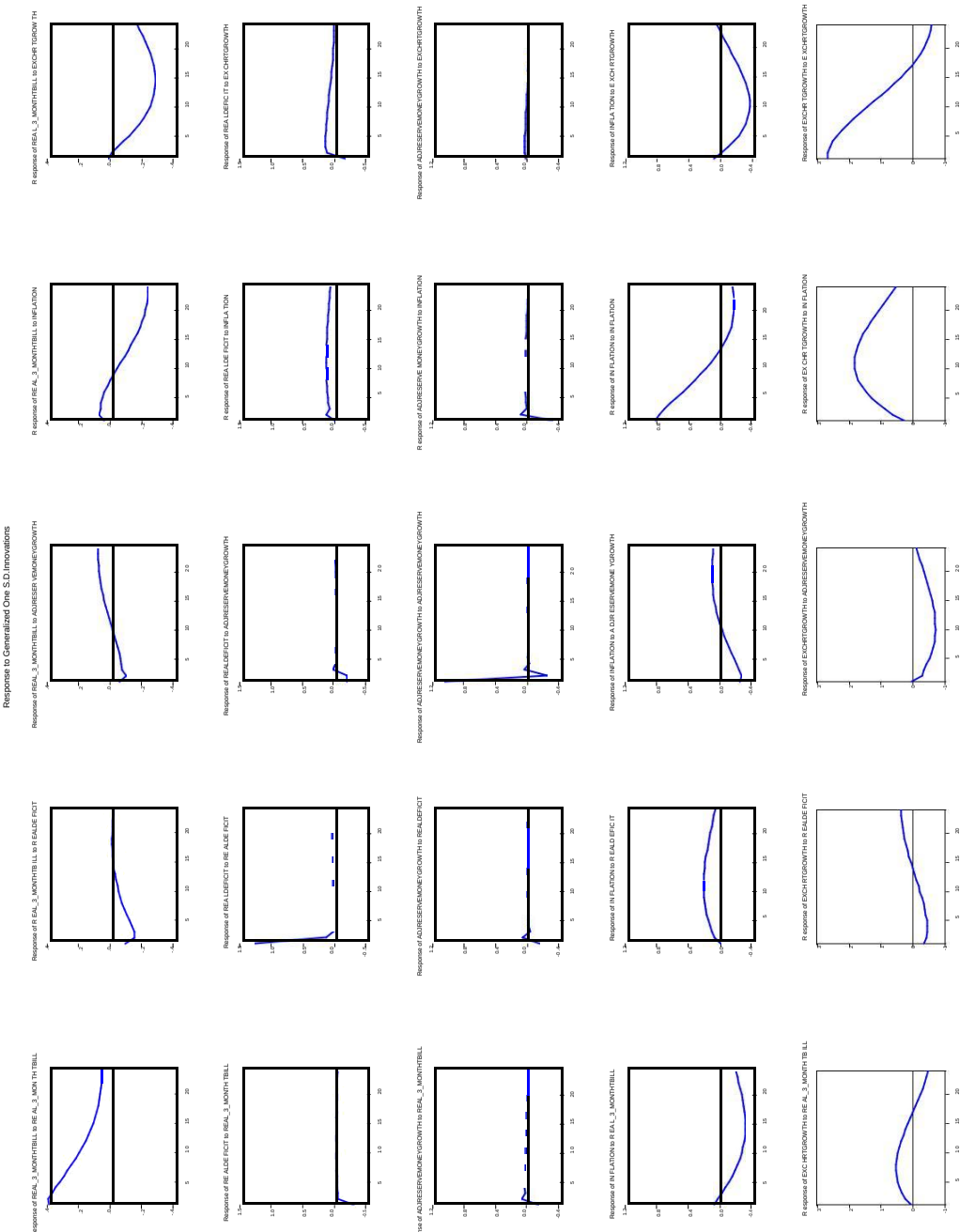
Appendix

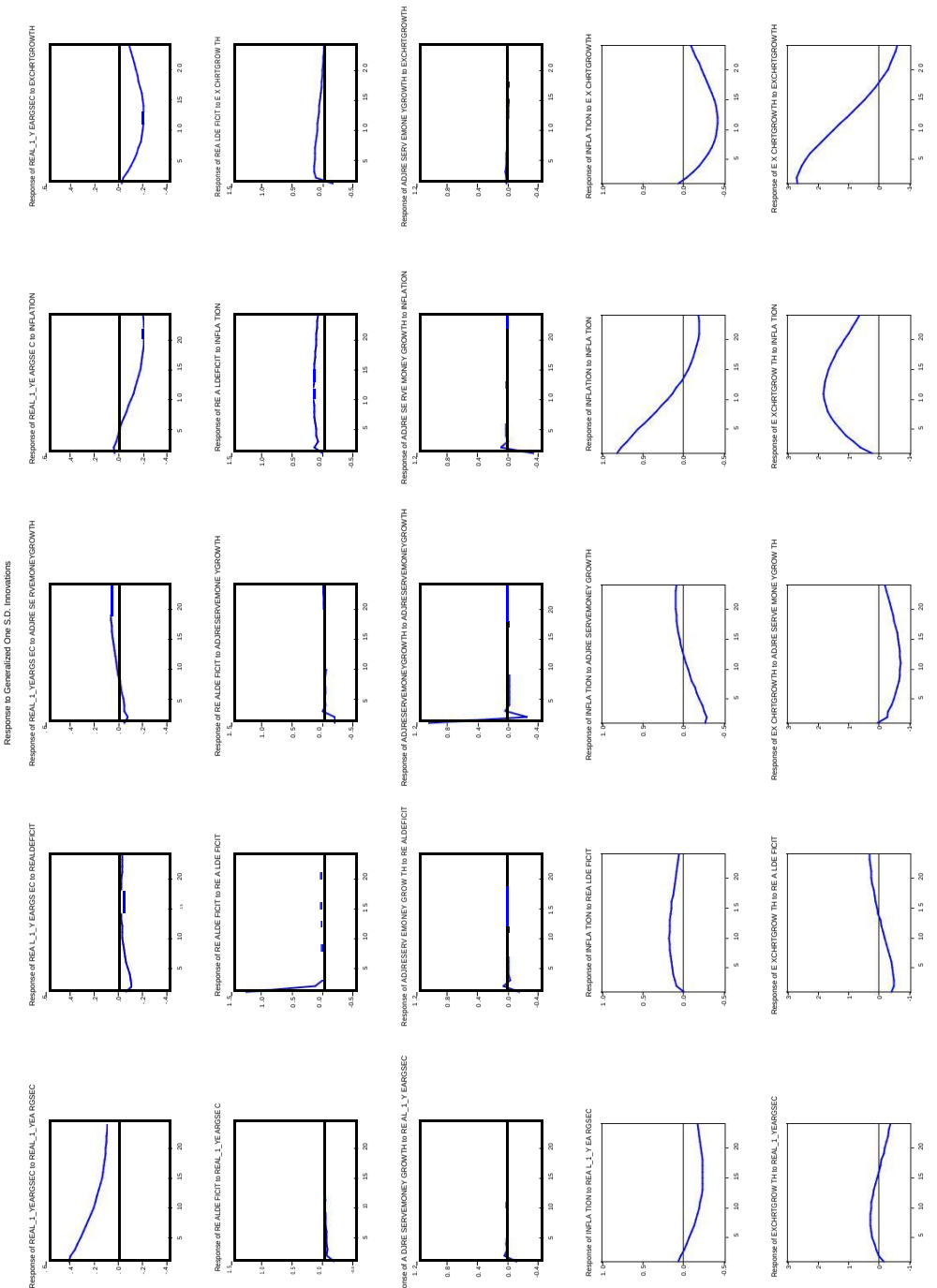
Table 1

Unit Root Analysis- ADF, DFGLS and KPSS

Test Variable	Test		Constant &Trend	Constant	No Constant and Trend	Order of integration
Real 91-day T-Bill r()	ADF		-2.226628	-2.525033	2.664051**	I(0)
	DFGLS	level	-1.385278	-0.359201	-	I(1)
		First diff.	-9.960752**	-		
	KPSS		0.086008	-	-	I(0)
Real 1 year GSEC r()	ADF		-2.700817	-2.893058**	-	I(0)
	DFGLS	level	-1.437002	-0.181518	-	I(1)
		First diff.	-5.912732**			
	KPSS		0.089838	-	-	I(0)
Real 10 year GSEC	ADF		-3.005663	0.0388**	-	I(0)

r()	DFGLS	level	-1.368254	0.283720	-	I(1)
		First diff.	-6.235670**	-		
	KPSS		0.127031			I(0)
Gross Fiscal Deficit of the Central Government FD	ADF		-10.63399**	-	-	I(0)
	DFGLS		-9.895010**	-	-	I(0)
	KPSS	level	0.188304**	0.924845**	-	I(1)
		First diff.	0.058451	0.061146		
Adjusted Real reserve money growth Res_Money_growth(Adj.)	ADF		-4.074732**	-	-	I(0)
	DFGLS	level	-2.114061	-1.477822	-	I(1)
		First diff.	-3.040639**			
	KPSS		0.112784*	0.113454	-	I(0)
Inflation(y-o-y)	ADF		-5.562016**	-	-	I(0)
	DFGLS		-4.079226**	-	-	I(0)
	KPSS		0.041611	-	-	I(0)
Exchange_rate_growth(% growth y-o-y)	ADF		-2.289831	-1.898706	-1.836560*	I(0)
	DFGLS	level	-1.660094	-1.425506	-	I(1)
		First diff.	-6.118833**	-		
	KPSS		0.076374	-	-	I(0)
* and ** stand for 10% and 5% level of significance						


Response to Generalized One S.D.Innovations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Response of REAL_1_Y EARGSEC to EXCHRTGROWTH
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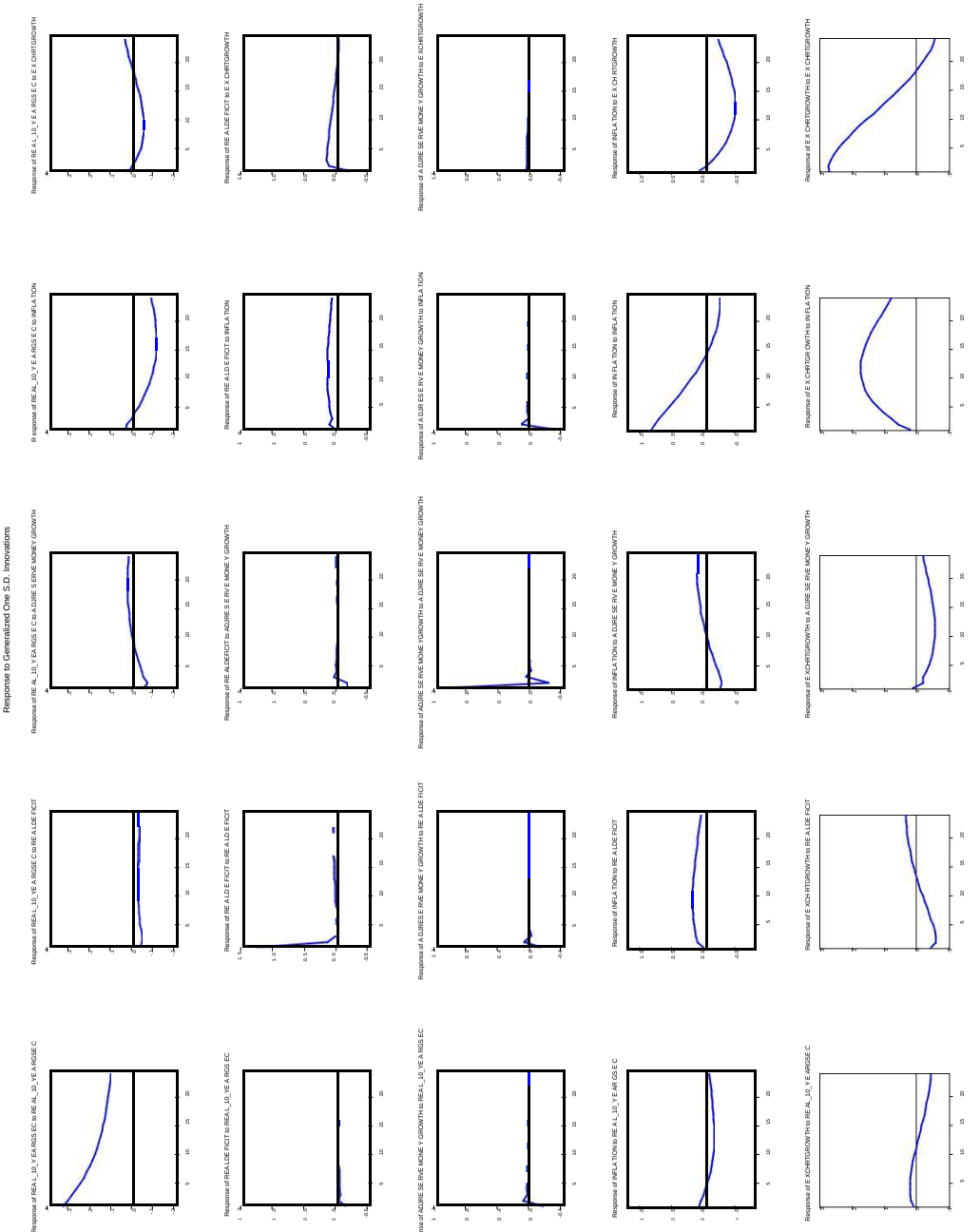
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