

MACRO DETERMINANTS INFLUENCING INDIA'S FISCAL DEFICIT: AN ECONOMETRIC TEST

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ABSTRACT

The growth performance of any country is determined by its strong fiscal policy, which plays a key role in stabilizing the economy. With the increasing rate of fiscal deficit in India, it has become the great concern for the policy makers as it stood at 5.54 lakh crores at the end of August 2018 (approximately reaching 70.1 percent of the budgetary estimate), reaching 3.4 % of the total gross domestic product of the country. This deficit is also coined by imbalances in various macro indicators both from theoretical and empirical grounds. The motivation of this paper is to empirically examine the interrelation between India's fiscal deficit with some macro indicators by recognizing four factors namely- total government expenditure, gross domestic product (GDP), real effective exchange rate (REER), Board money (M3) as a component of money supply, Inflation in terms of consumer price index (CPI) and real interest rate (RIR) by covering time period 1980 to 2018. This study has been used various econometric tools like Augmented Dicky-Fuller (ADF) unit root test for checking the stationary, Autoregressive distributive lag model (ARDL) bound test and Error correction Mechanism (ECM) is later on used for testing both long run as well as short run dynamics of the model. The result shows that all the selected variables have significant influence on Fiscal deficit in India.

KEYWORDS: *Fiscal Deficit; Government Expenditure; Inflation; ARDL*

INTRODUCTION

By definition, fiscal deficit refers to the budgetary deficit along with other borrowings and liabilities of the government. Till 1990, people in India hardly heard about the term 'fiscal deficit'. It became exasperatingly familiar after 1991. In the year 2012-13, due to rise in government planned expenditure fiscal deficit to the percentage of total gross domestic product has rose to 5.1 percent and hurriedly a fiscal consolidated roadmap was set up as an awakening threat that, if this deficit is not reduced, would reach a very high level. Meanwhile this deficit rate was quite fell down to 4.8 percent of GDP in 2013-14. The growth performance of any country is measured in terms of its strong fiscal policy as it the key indicator for bringing stability in the economy (Easterly and Rebelo, 1993). The recent slowdown in Indian Economy with falling GDP fuelled this deficit rate causing misbalancing macro performance which is quite visible from the table 1 with highest growth rate of fiscal deficit to the percentage of GDP. From both the theoretical and empirical grounds, various economic schools of thought have mentioned about the interaction between fiscal deficit and various macro indicators. Under Keynesian view, A momentary tax drop has an instant and quantitatively noteworthy shock on aggregate demand as some myopic or liquidity constrained people have high propensities to consume out of existing

disposable income (Bernheim, B. Douglas, 1989). So deficits inspire both consumption and income of the nation, accumulate saving and capital. Thus deficits have beneficial consequences in the economy. While Ricardo opined that deficit has a matter of indifference as it shifts tax payment to future generations, they depart dynamic resources unaltered. Thus very few studies have focused on the interaction between India's fiscal deficit with major macro factors. The motivation of this paper is to empirically examine the interrelation between India's fiscal deficit with some macro indicators by recognizing four factors namely- total government expenditure, gross domestic product (GDP), real effective exchange rate (REER), Board money (M3) as a component of money supply, Inflation in terms of consumer price index (CPI) and real interest rate (RIR) by covering time period 1980 to 2018.

Table1: Consolidated Fiscal Deficit as a Percentage to Total Gross Domestic Product (GDP) in India (20152016 to 20182019)
(In Percent)

Particulars	20152016	20162017	20172018	20182019
Revenue Deficit - Union	2.56	2.25	1.79	1.36
Revenue Deficit -States	1.07	1.32	1.60	1.84
Consolidated Revenue Deficit	1.49	0.92	0.19	0.48
Fiscal Deficit- Union	3.60	3.00	3.00	3.00
Fiscal Deficit -States	2.76	2.77	2.77	2.73
Consolidated Fiscal Deficit	6.36	5.77	5.77	5.73

Source: Ministry of Finance, Govt. of India. (ON953).

REVIEW OF LITERATURE

Theoretical and Empirical

As far as the deficit in finance is concerned, Saleh (2003) in his study has discussed the verification of Keynesian proposition in both developing and developed nations and found well-built and constructive association among budget deficits and rate of interest. Later on Lwanga and Mawejje (2014) found a budget deficit is responsible for widening interest rate and current account deficits but found no causal connection among GDP and budget deficits in Uganda covering time period 1999 to 2011. While Sharma and Mittal (2019) empirically investigate the impact of fiscal deficit on Indian economy by considering four macro indicators- inflation(WPI), current account deficit(CAD), Total expenditure as a percentage to GDP, interest rate and nominal effective exchange rate(NEER) and found that it supports the neo-classical context of budget deficit on Indian economy i.e., the reduction of government saving is not compensate by mounting private saving then budget deficits have a detrimental consequence on growth. Chakraborty (2006) analysed has used asymmetric vector autoregressive model for addressing both the real and financial crowding out between public and private investments in developing countries like India and found that fiscal deficit not persuade to boost interest rate.

Tiwari and Tiwari(2011) has empirically investigated the interconnection between inflation rate and fiscal deficit in India, considering other factors like money supply and total expenditure covering time period 1970 to 2009 by using log linear multiple regression method and found that inflation rate not at all causing rising fiscal deficit. While money supply and total expenditure has significant impact on rise in fiscal deficit. Meanwhile, Shabbir and Ahmed (1994) established a constructive and significant impact of budget deficit on inflation but no impact on money supply. Additionally, Kivilcim (1998) by covering time period 1950-1987, has investigated the long run association between budget deficit and inflation in Turkish economy and found same directional relationship between the two.

From the above discussion it is quite visible that most of the studies that have done so far has consider only some limited number of macro indicators and its impact on fiscal deficit in India. With the rising trend of fiscal deficit and its severe impact on Indian economy, the present study fills the gap by considering six macro indicators – Total expenditure, board money(M3) as a component of money supply, real interest rate, real effective exchange rate, inflation rate in terms of consumer price index(CPI) and its inter linkage between India's fiscal deficit.

Table 2 shows the explanation and the data sources of the selected macro variables. Further, data are converted to the natural log value so that changes in the variables represent the relative changes or percentage changes after multiplied by 100 (Gujarati, 1998, Kakoti,D.,2019).

Data and Econometrics Methodology

Table 2: The Macro Indicators Impacting India's Fiscal Deficit

Variable	Proxy for Each Determinant	Data Source
Total expenditure	Total government expenditure	https://www.indiastat.com/
Fiscal deficit	Gross fiscal deficit	https://www.indiastat.com/
Exchange rate	REER (Real effective exchange rate)	Reserve bank of India (RBI) Bulletins, data are based on different base periods, so splicing technique is used to make it one single series and take 2005 as a base year.
Inflation	CPI (Consumer price index)	FRED database https://fred.stlouisfed.org/series/DDOE01INA086NWDB
Money supply	M3(Broad money)	United nation conference on trade and Development(UNCTAD) http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx
Interest rate	RIR (Real interest rate)	World Bank https://data.worldbank.org/indicator/FR.INR.RINR?view=chart

Source: Author's compilation

$$\text{Gross Fiscal Deficit (GFD)} = F(\text{TOEXP, GDP, M3, RIR, REER, CPI})$$

Augmented Dicky fuller (ADF) Unit root test is used to check the stationarity of the time series under observation.

The equation is:

$$\Delta y_t = \alpha + \beta t + \delta y_{t-1} + \theta \sum \Delta y_{t-1} + \epsilon_t$$

Where y is the concerned variable, i.e., GFD, ϵ_t represents white noise error term and Δ represents one time difference term. α and T are constant and trend term respectively. When $\delta = 0$, the time series is stationary.

To plug up the gap in the econometric literature, Instead of using traditional co-integration tests which are unacceptable as they are not proficient in case of identifying the variables of the model that have integrated at different levels, so ARDL bound testing approach presented by Pesaran and Pesaran (1997), Pesaran and Shin (1999), and Pesaran, Shin and Smith (2001) used (regardless the order of integration, so unit root does not create any problem) (Maddala and Kim, 1998), The equation for testing ARDL is:

$$\begin{aligned} \Delta GFD = & C_t + a_i \sum x_{t-i} + f_j \sum Tot\ expt - j + \beta k \sum GDPT - k + \gamma l \sum CPI\ t - l + \delta m \sum RIR\ t - m \\ & + \theta n \sum REER\ t - n + \varphi o \sum M3\ t - o + \epsilon_t \end{aligned}$$

Where ε_t is the random disturbance term, C_t is constant and $X_t - i$ represents the autoregressive term, this shows the long run co-integrating regression equation. Here, the null hypothesis and alternate hypothesis can be represented as follows:

- **H0:** $\lambda_j = \beta_k = \gamma_l = \delta_m = \theta_n = \psi_o = 0$ (There is no co-integration among the variables)
- **H1:** $\lambda_j \neq \beta_k \neq \gamma_l \neq \delta_m \neq \theta_n \neq \psi_o \neq 0$ (There is co-integration among the variables)

EMPIRICAL RESULTS

In order to test the stationary of the time series data on the selected variables, ADF (Augmented Dickey-Fuller) test has been used to examined at both level(intercept)and first difference(intercept), in order to evade the ‘ spurious’ regression analysis. Unit root test results are shown in the table 2 for seven selected variables.

From the Table 3 it is reflected that except GFD and RIR all other variables are non-stationary at level. When we take the 1st difference of the series, ADF results show that the p -values are less than 0.05 and the estimated values are also greater than the critical values. But time series has no unit root; it is stationary at 1st difference and intercepts level by rejecting the null hypothesis. The model diagnostic results show that our model satisfies all three least square assumptions, i.e., they are normally distributed, no serial correlation, Homoskedasticity among the residuals.

Table3: Unit Root Test Results (H0: Time Series Has a Unit Root)

Indicators	Augmented Dicky Fuller(ADF) Test		
	Levels(Intercept) t-Statistics	1 st Difference(Intercept) t -Statistics	
Gross fiscal deficit(GFD)	-5.81***		
Total government expenditure	-1.43	-3.86**	
Inflation(CPI)	-1.20	-6.27***	
Gross Domestic product(GDP)	2.23	-4.74***	
money supply(M3)	-.26	-6.03***	
Real interest rate(RIR)	3.98**		
Real effective exchange rate	--0.550	-4.70***	
Model Diagnostic			
Test	Null Hypothesis	P-Values	Results
Normality	Normally distributed	.70	Cannot reject null hypothesis(H0)
Serial correlation	No serial correlation	.65	Cannot reject null hypothesis(H0)
Heteroskesticity	Homoskedasticity	.30	Cannot reject null hypothesis(H0)

Note: ** and *** represents the rejection of H_0 at 0.05 and 0.01 percent level of significance.

Source: Author’s compilation.

Autoregressive Distributed Lag (ARDL) Model: Long Run and Short Run Analysis

ARDL model is most finest approach for estimating long run and short-run dynamics among the seven selected variables by taking maximum lag 3 (automatic selection). The AIC suggests ARDL (3, 3, 2, 3, 2, 2, and 1) model as a best optimal model out of 12288 models shown with the help of criteria graph (Figure 1).

The criteria graph (figure2) shows top 20 model of ARDL out of which ARDL (3, 3, 2, 3, 2, 2, 1) model is strong over other models. Later on recursive estimate CUSUM test under stability diagnostic is used to check the stability of the model (Figure 3). As the cumulative sum is within the area between the two.05 percent critical lines, the model is proof as stable.

Table 4 shows It is clear from the ARDL test results that the selected variables *lnREER*, *lnRIR (-3)* *LnCPI(-3)*, *lnGDP*, *LnTEXP* are significant to influence India's fiscal deficit. The R- squared value is .99 indicates the goodness of fit of the selected model and F statistics is also highly significant that is .000 which represents overall significant levels of the model. Later on ARDL long run form and co-integrating bound test presented by Pesaran and Pesaran (1997), Pesaran and Shin (1999), and Pesaran, Shin and Smith (2001) is used to verify the long run co-integration among the variables (table5). The Bound test results shows that there is a co-integration i.e., a long run association between the selected variables as the calculated F –statistic value is Greater than the upper bound and lower bound critical values at different significance levels by rejecting the null hypothesis.

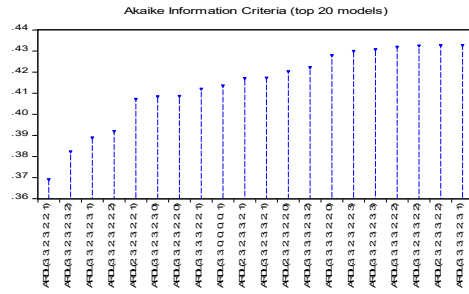


Figure 1: Criteria Graph.

Source: Derived from ARDL system

Source: Authors compilation.

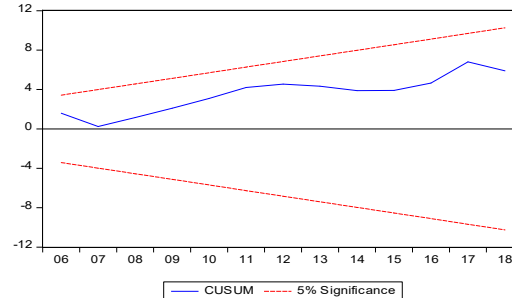


Figure 2: Stability Test for the Model.

Table 4: ARDL Test Results, Selected from the Model (3, 3, 2, 3, 2, 2)

Sl. No	Coefficient	Coefficient Values	Probability
1	lnGFD(-1)	0.04	.8384
2	lnGFD(-2)	.75	.0113**
3	lnGFD(-3)	-3.39	.2790
4	lnREER	1.23	.6361**
5	lnREER(-1)	4.83	.0900*
	lnREER(-2)	-3.88	.0657*
6	RIR	0.027	.4519
7	RIR(-1)	-0.05	.2728
8	RIR(-2)	-0.059	.1381
9	RIR(-3)	-0.08	.0458**
10	lnTEXP	1.78	.0390**
11	lnTEXP(-1)	1.70	.1359
12	lnTEXP(-2)	1.94	.0900*
13	lnM3	-.23	.5677
14	lnM3(-1)	-.87	.0809*
15	lnM3(-2)	-.23	.1186
16	lnCPI	-2.27	.4219
17	lnCPI(-1)	-.26	.9200
18	lnCPI(-2)	3.84	.2953
19	lnCPI(-3)	-4.089	.0299**
20	lnGDP	-12.11	.0172**
21	lnGDP(-1)	4.31	.2754
22	Constant	89.67	.0010***
23	R-squared	.99	
24	F-statistics	130.02	.0000***

Note:*, *** and** denote significant levels at 1%, and 5% level of significant respectively.

Source: Authors compilation.

Table 5: Bound Test Results

(H ⁰ : No Levels Long Run Relationship) F-Statistics- 7.80		
Critical Values	Lower Bound L(0)	Upper Bound L(1)
95 % (0.05)	2.45	3.61
90 % (0.10)	2.12	3.23
99 % (0.01)	3.15	4.43

Source: Authors compilation.

Error Correction Test

Now error correction model (ECM) under ARDL approach is used to check the short run dynamics between India's fiscal deficit and the selected macro determinants (Table 6).

Table 6 shows In order to established the co-integrating association between the major macro determinants to Fiscal deficit in India, the error correction coefficient must be negative and significant In our result also, we have found the error correction coefficient that is represented by co-integrating Eq (-1)) and its value is -1.11, indicating causality from the determinants to OFDI that means the error correction term corrects the previous year disequilibrium by 111 percent annually reflects the strong causality. The other coefficients $d(\ln reer(-1))$, $D(\ln texp)$, $D(\ln M3(-1))$, $D(\ln CPI(-2))$ and $D(\ln RIR(-1))$ have significant association with India's fiscal deficit in the short run.

Table 6: Error Correction Mechanism [D (LnGFD) is the Dependent Variable]

S No	Coefficient	Coefficient Values	Probabilities
1	D(lnGFD(-1))	1.15	.0021***
2	D(lnGFD(-2))	.39	.0734*
3	D(lnREER)	1.23	.3715
4	D(lnREER(-1))	3.88	.0053***
5	D(lnRIR)	0.02	.2512
6	D(lnRIR(-1))	0.145	.0010***
7	D(lnRIR(-2))	.08	.0115**
8	D(lnTEXP)	1.78	.0032***
9	D(lnTEXP(-1))	-1.94	.0352**
10	D(lnM3)	-0.23	.3687
11	D(lnM3(-1))	.49	.0002***
12	D(lnCPI)	-2.27	.1485
13	D(lnCPI(-1))	.88	.5228
14	D(lnCPI(-2))	4.08	.0031***
15	D(lnGDP)	-12.11	.0041***
16	constant	89.67	.0001***
17	Coint Eq(-1)* or ECT	-1.11	.0001***

Note: ***, ** and * denotes significant levels at 1 %, 5 % and 10 % level of significance respectively.

Source: Authors compilation.

CONCLUSIONS

This present study has made an attempt to empirically explore the impact of the major indicators- Gross domestic product, inflation rate, total government expenditure, money supply and interest rate on India's growing fiscal deficit by covering time period 1980 to 2018. From the results, it is found that all macro indicators have strong role to influence on this rising fiscal deficit both from theoretical and empirical grounds. However this study is restricted to consider only six indicators excluding current account deficit. Further research can be developed by considering those macro elements keeping in view of its strategic and theoretical background.

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