RESEARCH PAPER

Policy Implications of Fiscal Deficit and Its Trends in India: An Econometric Analysis

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ABSTRACT

The paper attempted to explore the trend of fiscal deficit in India from 1993-94 to 2022-23 and also to determine whether the growth patterns of fiscal deficit have changed before and after the Housing Bubble Crisis of 2008. The study too made an effort to analyse the causality among fiscal deficit, government revenue and expenditure in India. Therefore, the paper follows a diagnostic research design, and is based on secondary data, collected from the Budget and finance documents of the Government of India. Econometrics tools including eight different regression models and CAGR (Compound Annual Growth Rate) were used. And the study revealed that the fiscal deficit follows a log-linear trend, and as per the VDA (Variance Decomposition Analysis) model in the long run the variability of fiscal deficit is explained by 66.09% of govt. expenditure, for the sample period. Thus, the study recommends to efficiently utilise the govt. expenditure to have a proper management of the fiscal deficit in India.

HIGHLIGHTS

◉ The study throws a light on the trends of fiscal deficit in India, and concludes that fiscal deficit in India follows a log-linear trend, as well as there is a decrease in the growth rate of fiscal deficit in India after the Housing Bubble Crisis.

Keywords: Expenditure, Fiscal Deficit, Policy Implications, Revenue, VDA, VECM

When it comes to managing a country's money, one of the most important things to keep an eye on is something called the "fiscal deficit." This is like a financial health check for a nation. It tells us how well a country is managing its money, specifically how much it spends versus how much it earns through taxes and other sources. In India, a country known for its diverse economy, the fiscal deficit has a big impact on how the government manages its finances. Over the years, India has had to make some important decisions about its fiscal deficit as it strives to develop and grow.

The fiscal deficit is basically the gap between what the government earns and what it spends in a year, not including any money it borrows. It shows us how much the government relies on borrowing to cover its expenses. Some level of fiscal deficit is okay because it allows the government to invest in things like infrastructure, education, and healthcare. But if the deficit becomes too large or unsustainable, it can lead to problems like rising prices (inflation), less money for important projects, and a growing debt burden.

India's history with fiscal deficits goes back to its early years after gaining independence. During this time, the focus was on building the nation and investing in key areas like farming, roads, and education. This required spending more money than the government earned, but the deficits

were manageable and mostly funded within the country. In the 1980s and 1990s, India underwent major economic changes. It opened up to foreign investments and embraced more market-oriented policies. This led to larger fiscal deficits, but it was seen as a way to achieve faster economic growth and modernization.

By the late 1990s, concerns about India's growing deficits grew. The deficits had become alarmingly large, and the country faced the risk of a debt crisis. To address this, the government introduced the Fiscal Responsibility and Budget Management (FRBM) Act in 2003. This law aimed to keep the fiscal deficit in check and showed a commitment to responsible financial management. However, in 2008, the global financial crisis hit, and India had to loosen its purse strings to stimulate the economy. This led to a temporary increase in the fiscal deficit. In recent years, India faced new challenges like the Covid-19 pandemic. The government had to spend a lot on healthcare and economic relief, raising questions about how to sustainably manage the fiscal deficit.

REVIEW OF LITERATURE

If we look at the existing studies, they vary on the analytical ground or on the empirical ground. In current years, the fiscal deficit is an important topic for policymakers as well as researchers as a larger volume of fiscal deficit increases, widens the gap between the fiscal deficit and economic growth, and slows down economic growth (Fischer and Easterly, 1990) Martin R & Fardmanesh, 1990; Rao M Govinda, 2002; Rangarajan and Srivastav, 2005; Adam & Bevan, 2005; Mundle *et al.* 2011; De. S. (2012); Mohanty, 2018; Singh & Fouzdars, 2019; Ali, 2019). The available studies have mainly focussed on fiscal deficit and that varies from country to country. The fiscal deficit increases government expenditure which reduces economic growth (Kumar & Soumya, 2010; Mohanty, 2018). A high ratio of fiscal deficit to GDP leads to increases in government expenditure and reduces economic growth in the long run generating uncertainty about the future (Fischer and Easterly, 1990). On the other hand, a high ratio of fiscal deficit affects macroeconomic variables and financial stability in the economy of a country.

Rao m Govinda (2002) analysed the trends in fiscal imbalance and the origin of such disparity in States.

The focus should be on improving transmit efficiency and revenue productivity besides prioritisation and reducing of unproductive expenditures. Rangarajan & Srivastava, (2005) analysed. The fiscal deficit is the difference between the Government's total expenditure and total receipts net of borrowings (Yap, Reyes, & Cuenca, 2009). Fiscal deficit is one of the four major types of deficits that move in an economy, the other deficits are budget deficit, revenue deficit and primary deficit. Amarendra Das (2011) found that the government went for a radical cut in development expenditure to control deficits due to the increase in total revenue caused by tax reform measures, the growth of the economy from the early 2000s, and the rise in revenue transfer from the central government to the state. Anurag Balajee, Shekhar Tomar & Gautham Udupa (April 2020), explained how the INR 1.7 trillion fiscal packages announced by the Government of India will not modify the crisis of the economy as of now. They suggest that India can spend 2.2-4.8% of its GDP based on the yardstick and calculate the current fiscal deficit of India at 8.4% (in the most pessimistic case) and 3.7% (in the most optimistic case) after taking into consideration all the tax and output deficiencies in the wake of Covid-19.

OBJECTIVES & HYPOTHESES

The study endeavoured to explore the trend of fiscal deficit in India as well as to determine whether the growth patterns of fiscal deficit have changed before and after the Housing Bubble Crisis of 2008. Furthermore, the study made an effort to analyse the causality and long-run variability among fiscal deficit, Govt. revenue and expenditure, in the Indian Context. Thus, to accomplish the objectives, the following hypotheses have been developed.

- **H_0:** The fiscal deficit in India follows a linear trend.
- **H_0:** There is no change in the growth rate of fiscal deficit before and after the Housing Bubble Crisis.
- **H_0:** There is no causal relationship among fiscal deficit, Govt. revenue and expenditure.

DATA SOURCE & METHODOLOGY

The study employs three variables, namely; gross fiscal deficit, govt. revenue and govt. expenditure,

which are collected from the Budget documents of the Government of India and Finance Accounts. The time span of the study ranges from the year 1993 to 2022.

Since the first objective of the study is to analyse the accurate trend of the fiscal deficit, eight different regression models are taken into consideration, by taking Fiscal deficit as dependent and Time as independent variables, the equations for which are presented in Table – 2. After that to measure the average annual growth rate of fiscal deficit before and after the crisis period, CAGR (Compound Annual Growth Rate) is utilised, and its equation is illustrated below.

$$CAGR = (V_{final} / V_{begin})^{1/t} - 1 \qquad …(1)$$

Where, V_{final} = Final Value, V_{begin} = Beginning Value, and t = Time in Years.

For the final objective of the study, after transforming all the variables into a log form, ADF (Augmented Dickey-Fuller) and PP (Phillips & Perron) tests are applied to check the level of stationarity of the variables. Afterwards, Johanson and Juselius Cointegration Test is used to determine the long-run relationship among the variables. After confirming the long-run relationship, VECM (Vector Error Correction Model) is employed to draw the causal relationship among the variables. Just after the causality analysis, the VDA (Variance Decomposition Analysis) is used to examine the amount of information each variable contributes to the other variable in the auto-regression, for the long run.

DATA ANALYSIS AND RESULT

Trend Analysis

Figure 1 depicts the trends in central government fiscal shortfalls over the last three decades. India's economy was in a complete state of collapse from 1990 to 1991 due to heavy debt loads, rising interest rates, and deficits. The methods advised to handle the issue are frequently referred to as the New Economic Policy of 1991. The three approaches mentioned—liberalization, privatization, and globalization—can be broadly classed together. The Fiscal Responsibility and Budget Management (FRBM) Act, 2003, was put into effect in 2004 after

the Standing Committee suggested several crucial modifications be made to the FRBM Bill, which was introduced in April 2003.
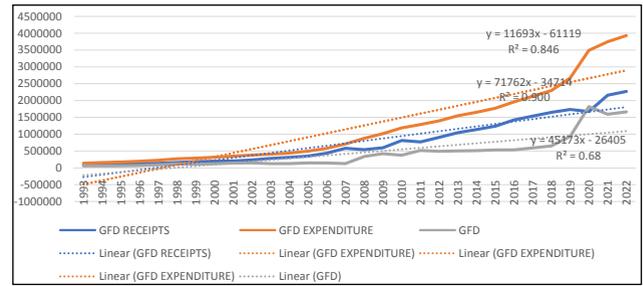
Fig. 1: Trend of Fiscal Deficit

Fig. 1 shows the fiscal deficit in India from 1993-94 to 2022-23. It shows the total expenditure, total receipts, fiscal deficit and growth rate of the fiscal deficit for each year. The growth rate is the percentage change in the fiscal deficit from the previous year. The table expresses the trends of fiscal deficit data in India. Some of the main points of the table are explained below:

- The fiscal deficit was highest in the year 2020-21, at 3490108 crore rupees, due to the impact of the COVID-19 pandemic on the economy and the government's incentives.

- It was lowest in 1994, at 57703 crore rupees when the government had a fiscal surplus for the first time since independence.

- The growth rate of the fiscal deficit was most negative in 1998-99, at 27.45% to -7.62% indicating an intense reduction in it from the previous year.

- It was higher in 2008, at 165.53 %, indicating a steep growth in the fiscal deficit from the preceding year.

- Total expenditure and total receipts of the government increased steadily over the years, indicating the expansion of the economy and the public sector. The total expenditure was higher than the total receipts in almost throughout the years.

- The total spending and total receiving of the government also fluctuated with the business cycles and external shocks. Such as, they increased sharply in 2008-09 and 2009-10 due to the worldwide financial crisis and the government's financial stimulus. They enlarged significantly in 2020-21 and 2021-22 due to the

COVID-19 pandemic and the government's relief measures.

In order to determine the appropriate trend line of fiscal deficit in India, for the sample period, eight different regression analyses were conducted, which are illustrated in Table 1.
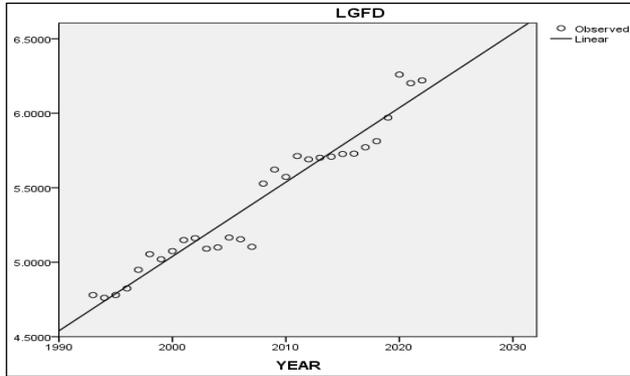
Fig. 2: Log-Lin Trend of Fiscal Deficit

Table 1 explains different regression models such as linear, logarithmic, Lin-Log, Log-Lin, inverse, quadratic, cubic and exponential. The R^2 value indicates the proportion of the variance in the dependent variable that's explained by the independent variable(s). The Log-Lin regression model has the highest R^2 which is (0.970), suggesting that the model explains the most variance in the data compared to the other models. It is the best fit for the analysis. The F-statistic is used to test the overall significance of the model. The higher the F-statistic, the more evidence there is against the null hypothesis. Thus, it is confirmed that the fiscal deficit follows a Log-Lin trend. The trend line is shown in the Fig. 2. Additionally, Table 1 revealed

that every year, the fiscal deficit in India increased at the rate of 5% as a whole.

Crisis Analysis

Table 2: CAGR of Fiscal Deficit

CAGR	Percentage
Overall CAGR	11.70
Pre-Crisis CAGR	13.0858
Post-Crisis CAGR	10.34875

Source: Authors' calculation.

Table 3 explains that the overall compound growth rate is 11.70 per cent. It is also evident from the table that during the pre-crisis period (1995-2008) the average annual growth rate of fiscal deficit was 13.08%, which was greater than the post-crisis period (2009-2022). This clearly indicated that there was a change in the annual growth rate in the fiscal deficit.

Stationary Analysis

Table 3 revealed that all the variables were found to be stationary at first difference or integrated of order one or I(1). Thus, the VAR (Vector Auto-regression) model cannot be applied to the variables. For that specific reason, after conducting the Johanson and Juselius (JJ) cointegration test, VECM is implemented in the study.

Cointegration Analysis

As all the variables were found to be I(1), the JJ test was employed with no deterministic trend and restricted constant. Since the trace statistics in Table

Table 1: Regression analysis

Regression Models	Equation	Intercept	Beta	F-statistics	R^2
Linear	$Y_t = \alpha + \beta T_t + \mu_t$	-90247694.36***	45172.512***	59.511***	0.680
Logarithmic	$\ln Y_t = \alpha_1 + \alpha_2 \ln T_t + \mu_t$	-688481639.2***	9059181126***	59.140***	0.679
Lin-Log	$Y_t = \alpha + \beta \ln T_t + \mu_t$	-688481639.2***	208595354.2***	59.140***	0.874
Log-Lin	$\ln Y_t = \alpha_1 + \alpha_3 T_t + \mu_t$	**-94.784*****	**0.050*****	**454.248*****	**0.970**
Inverse	$Y_t = \alpha + K/t + \mu_t$	90936041***	-1.817E+11***	58.722***	0.677
Quadratic	$Y_t = \alpha_0 + \alpha_1 T^2 + bT + \mu^t$	-44951844.79***	11.262***	59.884***	0.681
Cubic	$Y_t = \alpha_0 + \alpha_1 T^3 + \alpha_2 T^2 + \alpha_3 T + \mu_t$	-29853265.4***	.004***	60.260***	0.683
Exponential	$Y_t = \alpha_1 + \alpha_2 e^x + \mu_t$	1.643E-095***	.115***	445.248***	0.941

Note: *The asterisk (***) represents significance at a 1% level.*

Source: Authors' calculation.

Table 3: Unit Root Test

		UNIT ROOT TEST (PP)				UNIT ROOT TEST (ADF)		
		At Level				**At Level**		
With Constant	t-Statistic	**LE**	**LGFD**	**LR**	t-Statistic	**LE**	**LGFD**	**LR**
		-0.5095	-0.0671	-1.6008		-0.5333	-0.0978	-1.8755
	Prob.	*0.8755*	*0.9441*	*0.4694*	*Prob.*	*0.8700*	*0.9407*	*0.3381*
		At First Difference				**At First Difference**		
		d(LE)	**d(LGFD)**	**d(LR)**		**d(LE)**	**d(LGFD)**	**d(LR)**
With Constant	t-Statistic	-3.2582	-5.4217	-7.8748	t-Statistic	-3.3344	-5.4192	-6.1127
	Prob.	0.0270	0.0001	0.0000	Prob.	0.0227	0.0001	0.0000

Note: *LR, LE, and LGFD are the log forms of govt. revenue, expenditure and fiscal deficit respectively.*

Source: *Authors' Compilation.*

Table 4: Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.53666	48.71992	35.19275	0.001
At most 1 *	0.454216	27.17971	20.26184	0.0047
At most 2 *	0.305923	10.22481	9.164546	0.0314

Table 5: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.53666	21.54021	22.29962	0.0636
At most 1 *	0.454216	16.9549	15.8921	0.034
At most 2 *	0.305923	10.22481	9.164546	0.0314

Note: *The asterisk (*) represents significance at a 5% level.*

4, and maximum eigen value statistics in Table 5 were greater than the 0.05 critical value for the case "At most 2", there was cointegration among at least two cointegrating equations.

As per the VECM model displayed in Table 6, only in the case of expenditure and revenue, the lagged value of the error correction mechanism is statistically significant at a 1% significance level (as the t-statistics values are greater than 2.58), which confirmed the long-run relationship in the corresponding equations. The ECM (-1) shows the rate at which the short-run discrepancy is rectified in the long-run per year. For instance, the short-run discrepancy in the LR (log of revenue) is corrected at the speed of 31.32%. The table too showed that a per cent change in is associated with a 0.300192% increase in the D(LE), on an average, ceteris paribus, in the short-run. The R-squared values suggest the

models explain a moderate amount of the variation in the changes in the variables. The F-statistics suggest that the overall model is statistically significant.

Table 6: Vector Error Correction Estimates

Error Correction	D(LGFD)	D(LE)	D(LR)
CointEq1	-0.184062	-0.313283	-0.361643
	-0.47008	-0.09288	-0.16365
	[-0.39155]	[-3.37313]	[-2.20985]
CointEq2	-0.601315	0.453109	0.932306
	-0.96175	-0.19002	-0.33481
	[-0.62523]	[2.38458]	[2.78455]
D(LGFD(-1))	-0.048815	0.300192	0.010386
	-0.87802	-0.17347	-0.30566
	[-0.05560]	[1.73048]	[0.03398]

D(LGFD(-2))	-0.568005	0.209624	0.408301
	-0.8576	-0.16944	-0.29855
	[-0.66232]	[1.23717]	[1.36759]
D(LE(-1))	1.704214	-0.289	-0.116757
	-2.26505	-0.44751	-0.78853
	[0.75239]	[-0.64579]	[-0.14807]
D(LE(-2))	1.732159	-0.530859	-0.7589
	-2.84816	-0.56272	-0.99153
	[0.60817]	[-0.94338]	[-0.76539]
D(LR(-1))	0.058957	0.309233	-0.551976
	-1.99586	-0.39433	-0.69482
	[0.02954]	[0.78420]	[-0.79442]
D(LR(-2))	-0.753488	0.188093	0.29124
	-1.95131	-0.38553	-0.67931
	[-0.38614]	[0.48789]	[0.42873]
R-squared	0.386404	0.498564	0.456384
F-statistic	1.709285	2.698739	2.278733

Note: *Values in parentheses show the t-statistics value, and the upper line values of t-statistics present the corresponding standard errors. Values presented above the standard error, are the slope coefficients.*

Decomposition Analysis

VDA analyses how much of the variability of the dependent variable is lagged by its own variance, and which of the independent variable is stronger in explaining the variability in the dependent variable. According to the results of Table 7, in the long run (10th period/year) the dependent variable i.e., LE is explained by its own shock at 37.76%, but is explained by 64.77% by LGFD. Likewise, in the long-run the variability of LGFD is explained by 66.09% by LE. And, the LGFD explains 93.74% of the long run variability of LR.

Table 7: Variance Decomposition Analysis

Variance Decomposition of LE:			
Period	S.E.	LE	LGFD	LR
1	0.020575	100	0	0
2	0.032829	97.05572	2.910689	0.033586
3	0.040448	85.91722	13.20846	0.874324
4	0.050356	65.53133	31.91618	2.552491
5	0.060655	50.61792	46.0622	3.319879
6	0.068283	42.64708	53.64787	3.70505
7	0.074671	37.76127	58.18339	4.055338
8	0.080874	34.49449	61.25258	4.252929
9	0.08631	32.36326	63.30122	4.335522
10	0.0911	30.80033	64.7715	4.42817

Variance Decomposition of LGFD:			
Period	S.E.	LE	LGFD	LR
1	0.102294	39.07951	60.92049	0
2	0.131494	56.32852	43.6051	0.06638
3	0.149334	64.01184	34.51758	1.470571
4	0.157624	66.56295	31.31688	2.120167
5	0.165769	65.5521	30.66271	3.785191
6	0.175364	64.93342	30.23196	4.834628
7	0.182381	64.92415	29.60186	5.473989
8	0.188197	65.25595	28.63597	6.108077
9	0.195044	65.64159	27.7028	6.655618
10	0.201842	66.09102	26.87524	7.033733

Variance Decomposition of LR:			
Period	S.E.	LE	LGFD	LR
1	0.035921	9.143977	87.85319	3.002831
2	0.043826	7.61955	90.35604	2.024414
3	0.046109	8.075731	88.03132	3.892947
4	0.056047	5.889609	91.40184	2.708556
5	0.063612	4.703013	93.10908	2.187904
6	0.070672	5.347146	92.8599	1.792954
7	0.077328	5.426166	93.0758	1.498033
8	0.084151	5.071544	93.66271	1.265743
9	0.089792	5.097527	93.77959	1.12288
10	0.094776	5.240535	93.74621	1.013259

Source: Authors' calculation.

CONCLUSION

The study attempted to track the appropriate trend or growth pattern of fiscal deficit in India for the period 1993 – 2022. The study by employing eight different regression methods, confirmed that the fiscal deficit in India follows a log-linear trend, and in each year the fiscal deficit in India increases at the rate of 5 per cent, for the sample period. The study also found that after the Housing Bubble Crisis, the annual growth rate of fiscal deficit in India was lesser as compared to the pre-crisis era. And, that's a relief. Additionally, the piece validates from the VECM that in the short-run fiscal deficit has no causal relationship with govt. expenditure and revenue. However, in the short-run, govt. revenue is positively as well as significantly impacted by fiscal deficit and expenditure, and the expenditure is positively affected by revenue and fiscal deficit. In the long-run, the majority of the variability of fiscal deficit is explained by govt. expenditure. Thus, to reduce the fiscal deficit in India, efforts should be

made to efficiently utilise the govt. expenditure. The paper does not want to emphasise on the trade of between the two schools of economic thoughts led by Adam Smith and Richard Musgrave that, deficit led to a high current economic burden and low growth or not, rather it recommends to efficiently using the govt. expenditure for the proper management of fiscal deficit. This finding is corroborated by Albassam (2020), and Afonso & Alves (2023).

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