Relationship between the GDP Growth and Twin Deficit of India

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Abstract:- **India has attained commendable growth of GDP over the period. This study has attempted to comprehend this GDP performance of India by analyzing the behavior of fiscal deficit of the central government, current account balance, net FDI inflow, Gross Capital Formation, Real Interest Rate and Short Term Debt ranging from 1985 to 2016 in VAR framework. We observe that Keynesian view has worked in India. Though Granger causation rejected the presence of Twin Deficit phenomenon in India, our study found Fiscal Deficit and deficit in the Current Account Balance are distantly related siblings and together indeed deteriorates economic activities in India.**

JEL Classification:- E01, E37, E43, E62, F32, H62, H8

Keywords:- GDP, Fiscal Deficit, Current Account Balance, Keynes, Twin Deficit, VAR, Granger Causation.

I. INTRODUCTION

India has witnessed very sluggish economic growth during 2019-20 given the GDP growth achieved subsequent of global recession of 2008-09. This has once again given an incentive to discuss about the government expenditure to revive the economy. However, while stimulating the economy in this almost zero economic growth condition, measures taken up by the government shall not be violating the 'growth with stability' objective of fiscal policy. Aftermath of COVID-19 when the economy will be in a dire need of big push from the government in all the sectors an attention is required to maintain an internal balance along with steadiness on external front.

In order to strengthen the economy on internal as well as external fore with desirable level of employment and supportable price rise, fiscal as well as monetary policies plays an important role.

According to well established economic theories, given by Pilbeam [1], such as Mundell-Fleming model, policy mix i.e. fiscal and monetary policy working together in the flexible exchange rate system succeed in achieving both of the stabilities. Yet, economies of the world find it very difficult to have simultaneous equilibrium on both the levels, not only in the present COVID-19 but also in normal years without any crisis. Mostly, it is found that instability on one fore is leading to uncertainty in another and vice versa. The disequilibrium at internal and external level might be of surplus or deficit in nature. Our present study has revealed how India is performing on both fronts while striving to have accelerated GDP growth.

When the government income is less than its expenditure on various activities and this excess spending is not contributing substantially to generate employment opportunities in the domestic economy, it leads to critical internal imbalance. This kind of economic situation at fiscal front is termed as fiscal deficit. Surplus in government finances is not painstakingly problematic but deficit indeed treated as hitch to the government in power. So in simple words, when tax revenue collection of the government is unable to cover its expenses, we term such condition as fiscal deficit (FD). In this paper we are using FD as a proxy variable to reflect internal imbalance. It has two important implications with respect to how does it affect the domestic economy. First, if government prefers external financing to fill up the deficit it has its own pros and cons. Second, when the government decides to finance its deficit from domestic borrowing it affects investment decisions of private sector. Carbaugh [2] has argued that when economy is witnessing the precisely high unemployment level it indicates the possible changes in the general price level that might affect the growth of the economy negatively.

According to World Bank [3] external balance implies balanced current and capital account of a country's balance of payment. But, the export and import of goods and services along with net primary and secondary income do not always balance resulting into instability in the Balance of Payment, (BoP) i.e. either deficit or surplus. When the disequilibrium in the BoP is of ephemeral, the nation manages such situation by adjusting its forex. Surplus in the BoP is not the matter of worry till other countries are not taking drastic corrective measures like the recent one taken up by the USA against China. But deficit in BoP, which might be of temporary or fundamental in nature, undeniably upsets the economy of any nation and most of the developing economies often experiences it therefore, they customarily resort to external borrowing.

The presence of surplus at fiscal and current account positions of a nation may not affect its economy so callously as the deficits otherwise. The simultaneous occurrence of FD and Current Account Deficit (CAD) is termed as Twin Deficit. To understand the nexus between fiscal and current account position we have examined the various empirical findings. These studies have discussed the twin deficit aspect from various angles and how these

two deficits affect the growth of respective economies. For instance, Unidirectional Granger Causality running from FD to CAD as proved by Lau and Tang [4], Unidirectional Reverse Granger Causality resulting from CAD to FD as emphasized by Constantine [5], Bi-directional Causality i.e. FD affecting CAD and again CAD affecting FD as defined by Alam et al. [6], Bayat et al. [7] and Suresh and Gautam [8] and FD and CAD are dependent on each other to a certain extent as testified by Helliwell [9].

This paper is structured as section I Introduction. Section II brief the Literature Review. Next, section III is about the objectives and hypotheses framed in this paper. The following section IV deal with Data, Sources, Definitions used in this paper and the basic statistical information of the data studied. Section V deal out the econometric analysis which is comprised of results of Johansen cointegration test, ADF Unit Root test, Granger Causation test, IRF and Variance Decomposition tests results. Section VI is conclusion.

II. LITERATURE REVIEW

The economy of Ghana was scrutinized by Sakyi and Opoku [10] for the period 1960- 2012 in order to find the long run association between fiscal deficit and current account deficit. They found FD in Ghana helped to improve CAD during the study period through the interest rate induced foreign capital inflows. Their study found FD incurred by the Government of Ghana while financing the productive expenditures in the economy actually contributed in widening the employment prospects. In the same way, they underlined the fact if government slashes down the taxes of private sector, specifically concerned with export segment, then as well employment opportunities can be generated devoid of the need of the government expenditure to bourgeon.

Makun [11] examined the data of budget and current account deficit of India running from 1980-2012 and concluded the presence of twin deficit in Indian economy. This study found the unidirectional causation from budget deficit to current account deficit.

By applying bootstrap rolling windows causality tests developed by Hatemi in 2012 for the data of Brazil, India, Indonesia, South Africa and Turkey ranging from 2001 to 2015, Selim et al. [12] found absence of twin deficit in South Africa and Brazil. Their study indicated, in Turkey when government expenditure reduced it helped in reducing current account deficit but reverse was not the fact. In case of India they found uni- directional causality was running from current account deficit to fiscal deficit. However, in case of Indonesia their study ascertained the presence of twin divergence. They also concluded that such relation between these two deficits would not last for long time provided these countries stay shoulder to shoulder with the fiscal control.

After empirically scrutinizing the Indian economy for the period 2000-01 to 2012-13 Agarwal [13] established unidirectional causality running from current account deficit to fiscal deficit. The study of Singh [14] of Indian economy came up with three important results. One among them was that India is heading towards the sovereign default with its current and ever increasing high debt to GDP ratio. Second finding highlighted the severity of misallocation of government deficit spending. The third is depreciating rupee which was the result of rising current account deficit even though India was net receiver of capital. This reflects unsustainable debt dynamics and economic growth for long run. These three important findings are still cause of concern for Indian economy.

Four South Asian economies including Bangladesh, India, Pakistan and Sri Lanka had been investigated by Mumtaz and Munir [15] to find out which economic phenomena – Twin Deficit, Ricardian equivalence hypothesis (REH) or Feldstein Horioka Puzzle (FH) was existing in the countries observed. For the time period 1981-2014 their study found absence of twin deficit in these four economies. During short run current account balance was found to be getting influenced by private saving and investment in India but in case of Sri Lanka reverse scenario found to be the reality. REH failed in Bangladesh and Sri Lanka, hinting at tax cuts encourages consumers to expand demand instead of savings. In India and Pakistan presence of REH was established indicating incompetence of fiscal policy to relieve the economy. Existence of FH puzzle in India and Pakistan was also rejected suggesting poor connection between private savings and investment. They additionally demonstrated that both these countries were integrated with international market but not fully.

III. OBJECTIVES AND HYPOTHESES OF THE STUDY

The variables considered for this analysis includes log form of Gross Domestic Product (LGDP), Gross Fiscal Deficit as percent of GDP (GFD_GDP), Current Account Balance as percent of GDP (CAB), Foreign Direct Investment net inflows as percent of GDP (FDI_NI), Real Interest Rate in percent (RIR), Short-term debt as percent of total external debt (Short_Term_Debt) and Gross Capital Formation as percent of GDP (GCFG). All the variables except GFD_GDP were assimilated from World Bank [3]. We had calculated GFD_GDP from various economic surveys [16] spanning between 1984-85 to 2016-17. To harmonise the time period of the time series we have had converted the fiscal year data of GFD into annual year format by following the World Bank method.

➢ *Objectives of Study*
- To examine the dynamic interconnection among the variables under analysis.
- To establish the type of causality running between Twin Deficit of India.
- To inspect the transmission channel between twin deficits and how they are affecting growth of India.
- To scrutinize the contribution of selected variables in disturbing GDP of India.

➢ *Hypotheses Inspected*
- Granger causation from FD_GDP to deficit in CAB.
- Reverse Granger causation from deficit in CAB to FD_GDP.
- FD_GDP and deficit of CAB are independent of each other.
- GDP getting influenced by Twin Deficit, FDI_NI, RIR and Short_Term_Debt.
- Changes into CAB of India is subject to changes into GCFG and Short_Term_Debt.

IV. DATA, SOURCES, OPERATIONAL DEFINITIONS AND BASIC STATISTICS

In this paper we have had relied on the secondary data obtained from World Bank [3] and various Economic Surveys of India [16]. The data studied ran from 1985 to 2016 of our selected variables. We had used the converted quarterly high frequency data instead of low frequency data by applying the standard data interpolation technique of the Eviews 10.

➢ *Operational Definitions*
Definitions given below are stated by World Bank [3] and different economic surveys of India [16] specifically to define GFD.

- Gross Domestic Product: GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. The GDP data is in constant local currency. We have expressed the GDP value in log form.

- Gross Fiscal Deficit (percent of GDP): It is the excess of total expenditure over the revenue receipts, recovery of loans and other receipts to the government mainly disinvestment proceeds from the PSUs.

- Current account balance (percent of GDP): Current account balance is the sum of net exports of goods and services, net primary income, and net secondary income.

- Foreign direct investment, net inflows (percent of GDP): Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors and is divided by GDP.

- Real interest rate (percent): Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. The terms and conditions attached to lending rates differ from country to country, however, limiting their comparability.

- Short-Term-Debt (percent of total external debt): Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt. Total external debt is debt owed to non-residents repayable in currency, goods, or services. Total external debt is the sum of public, publicly guaranteed, and private non-guaranteed long-term debt, use of IMF credit, and short-term debt.

- Gross capital formation (percent of GDP): Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress."

The basic descriptive statistics captured of these above defined variables have shown in the Table 1 and Table 1A.

	GDP_LCU	GFD_GDP	CAB	FDI_NI	GCFG	RIR	Short_Term_Debt
Mean	5.11	5.63	-1.42	1.00	30.96	6.10	11.11
Median	4.07	5.43	-1.55	0.77	28.75	6.40	10.20
Maximum	1.22	8.82	1.46	3.65	42.47	9.19	23.77
Minimum	1.73	2.70	-5.00	0.02	22.37	-0.59	2.75

Table 1:- Descriptive Statistics of the Raw Data
Source: Derived by Eviews 10. Jagtap [17]

	LGDP	GFD_GDP	CAB	FDI_NI	GCFG	RIR	Short_Term_Debt
Mean	31.39	5.63	-1.42	1.00	30.96	6.10	11.11
Median	31.33	5.43	-1.55	0.77	28.75	6.40	10.20
Maximum	32.43	8.82	1.46	3.65	42.47	9.19	23.77
Minimum	30.48	2.70	-5.00	0.02	22.37	-0.59	2.75

Table 1A:- Descriptive Statistics of the Converted Data
Source: Derived by Eviews 10. Jagtap [17]

The descriptive statistics shows the concern with respect to GFD_GDP which is on and average 5.63 percent of GDP and minimum it can go only to 2.70 percent of GDP. In other word we can say that FRBM Act 2003's target of keeping fiscal deficit below 3.00 percent of GDP can be realised and Union Government of India has indeed achieved during the time period of 2007. The mean growth rate of India's GDP expressed in local currency unit is coming just 5. 11. Current account balance is mostly in deficit as mean value is coming as – 1.42 percent.

V. ECONOMETRIC ANALYSIS

In this section we have analysed different econometric tests which have been conducted to scrutinize our hypotheses. The applications started with finding the appropriate lag length and Johansen cointegration test.

To check whether selected variables LGDP, GFD, CAB, FDI_NI, GCFG, RIR and Short_Term_Debt have long run associations in this study, Johansen Cointegration test have been applied on original data without making it stationary with five lag order. This optimum lag order was given by Akaike information criterion (AIC), Final prediction error (FPE) and Hannan-Quinn information criterion (HQ). Johansen Cointegration test help us with respect to select the methodology to be applied in order to conclude the analysis i.e. to go with VAR or VECM. According to the assumption of this test cointegrating vectors remains stable during the course of study, which cannot be the reality in the long run as events like trade cycle, strained relations with other economies, domestic scams and international shocks do affect the various parameters of the economy including those which are considered in this study.

➤ *Result of Johansen Cointegration Test*

Table 2 shows Johansen Cointegration test results. In case of Trace Statistics, we accept the Null Hypothesis (H$_0$) of Zero cointegrating equations and reject the Alternative Hypothesis (H$_1$) of cointegrating equations are more than zero, since Trace Statistics value 123.9616 coming was less than the 0.05 critical value of 125.6154 with probability of 6.28 percent. Hence by Trace Statistics Test we determined that there are zero cointegrating equations in our data. Hence, we applied VAR methodology.

Similarly, when we studied the Max Eigenvalue statistics and decided to accept the (H$_0$) of zero cointegrating equations and reject the (H$_1$) stating cointegrating equations are more than zero, since Max Eigenvalue Statistics 35.18313 was less than the 0.05 critical value of 46.23142 with probability of 44.83 percent. Hence, Maximum Eigenvalue Test too rejected the presence of long run cointegration among our selected variables for analysis and again reemphasised the necessity of VAR instead of VECM modelling.

Thus, according to Trace test as well as Maximum-Eigenvalue test in this model there was no cointegrating equations at 0.05 significance level as shown in the Table 2.

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.250528	123.9616	125.6154	0.0628
At most 1	0.215505	88.77848	95.75366	0.1371
At most 2	0.184216	59.16731	69.81889	0.2618
At most 3	0.114591	34.32744	47.85613	0.4840
At most 4	0.093505	19.47943	29.79707	0.4589
At most 5	0.043371	7.502691	15.49471	0.5200
At most 6	0.017012	2.093263	3.841466	0.1479
Trace test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.250528	35.18313	46.23142	0.4483
At most 1	0.215505	29.61117	40.07757	0.4497
At most 2	0.184216	24.83987	33.87687	0.3959
At most 3	0.114591	14.84802	27.58434	0.7601
At most 4	0.093505	11.97674	21.13162	0.5500
At most 5	0.043371	5.409428	14.26460	0.6895
At most 6	0.017012	2.093263	3.841466	0.1479
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 2:- Result of Johansen Cointegration Test
Source: Derived by Eviews 10. Jagtap [17]

We began our analysis methodology with VAR ordering of p shown in the equation (1) by following Lütkepohl [18].

$$Y_t = C + \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + \dots + \Pi_p Y_{t-p} + \varepsilon_t, \quad t = 1, 2, \dots, T \quad (1)$$

Here,

Y_t is the $(n \times 1)$ vector of integrated variables of order one and ε_t is the $(n \times 1)$ vector of innovations.

Let, Y_t= (LGDP, GFD_GDP, CAB, FDI_NI, GCFG, RIR and Short_Term_Debt) indicating the vector of (7×1) time series of endogenous variables. The standard form of this model is given below in equation (2).

$$Y_t = C + \sum_{i=1}^{p} \Pi_i Y_{t-1} + \varepsilon_t \quad (2)$$

Here,
C = (7×1) vector of intercepts
Π_i = Matrix of autoregressive coefficients of order i
$$\varepsilon_t \equiv \left[\varepsilon_t^{LGDP}, \ \varepsilon_t^{GFD\_GDP}, \ \varepsilon_t^{CAB}, \ \varepsilon_t^{FDI\_NI}, \ \varepsilon_t^{GCFG}, \varepsilon_t^{RIR}, \varepsilon_t^{Short\_Term\_Debt} \right]' \quad (3)$$

⇒ the reduced form ordinary least squares residuals.

This VAR (p) model has several parameters which could be having complex interaction among themselves. So, to inspect dynamic properties of the VAR (p), we used the summary measures including Granger causality test, Impulse Response Function (IRF) and Variance Decomposition method (VD).

➤ *Unit Root Tests Results*
The result of Augmented Dickey – Fuller Test (ADF) regarding the stationarity of selected variables in this paper is shown in the Table 3. According to this test the time series data of all the variables under study were first order stationary.

Variable	At Level			At 1st Difference		
	t-stat	Prob*	Hypothesis	t-stat	Prob*	Hypothesis
LGDP	-1.403566	85.52	H_0: Accept	-3.487244	4.54	H_0: Reject
			H_1: Reject			H_1: Accept
GFD _GDP	-2.380133	38.81	H_0: Accept	-5.180742	0.02	H_0: Reject
			H_1: Reject			H_1: Accept
CAB	-2.011758	58.90	H_0: Accept	-11.09813	0.00	H_0: Reject
			H_1: Reject			H_1: Accept
FDI_ NI	-2.721094	23.01	H_0: Accept	-11.13348	0.00	H_0: Reject
			H_1: Reject			H_1: Accept
GCFG	-1.084052	92.69	H_0: Accept	-11.2268	0.00	H_0: Reject
			H_1: Reject			H_1: Accept
RIR	-2.494624	33.04	H_0: Accept	-8.081718	0.00	H_0: Reject
			H_1: Reject			H_1: Accept
Short_ Term_ Debt	-1.98805	60.17	H_0: Accept	-3.769148	2.15	H_0: Reject
			H_1: Reject			H_1: Accept
* 5.00 Percent Significant Level.						

Table 3:- ADF Unit Root Test Result
Source: Derived by Eviews 10 and complied by Jagtap [17].

The VAR is estimated with lag order of 5 by following the AIC and HQ criterion. All the variables found to be integrated of order one, I (1), on the basis of the unit root test results given by Augmented Dickey – Fuller Test. After running the standard VAR in Eviews 10 the seven system model equations generated. We selected the LGDP model and continued our testing with the equation (4). The VAR was found to be stable with all the inverse AR Roots continued to remain inside the unit circle. In other word the model studied in this paper was dynamically stable as shown in Fig. 1.

Inverse Roots of AR Characteristic Polynomial
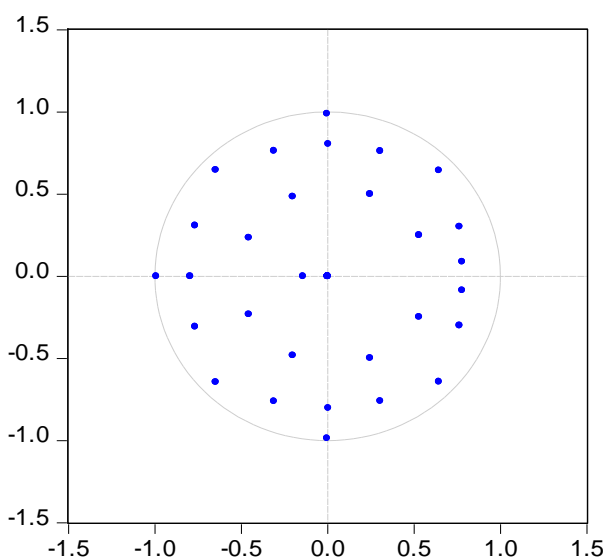
Fig 1:- Inverse AR Roots
Source: Derived by Eviews 10. Jagtap [17].

$$
\begin{aligned}
D(LGDP) = {} & C(1) \times D\big(LGDP(-1)\big) + C(2) \\
& \times D\big(LGDP(-2)\big) + C(3) \\
& \times D(LGDP(-3)) + C(4) \\
& \times D(LGDP(-4)) + C(5) \\
& \times D(LGDP(-5)) + C(6) \\
& \times D(GFD\_\_GDP\_(-1)) + C(7) \\
& \times D(GFD\_\_GDP\_(-2)) + C(8) \\
& \times D(GFD\_\_GDP\_(-3)) + C(9) \\
& \times D(GFD\_\_GDP\_(-4)) + C(10) \\
& \times D(GFD\_\_GDP\_(-5)) + C(11) \\
& \times D(CAB(-1)) + C(12) \\
& \times D(CAB(-2)) + C(13) \\
& \times D(CAB(-3)) + C(14) \\
& \times D(CAB(-4)) + C(15) \\
& \times D(CAB(-5)) + C(16) \\
& \times D(FDI\_NI(-1)) + C(17) \\
& \times D(FDI\_NI(-2)) + C(18) \\
& \times D(FDI\_NI(-3)) + C(19) \\
& \times D(FDI\_NI(-4)) + C(20) \\
& \times D(FDI\_NI(-5)) + C(21) \\
& \times D(GCFG(-1)) + C(22) \\
& \times D(GCFG(-2)) + C(23) \\
& \times D(GCFG(-3)) + C(24) \\
& \times D(GCFG(-4)) + C(25) \\
& \times D(GCFG(-5)) + C(26) \\
& \times D(RIR(-1)) + C(27) \\
& \times D(RIR(-2)) + C(28) \\
& \times D(RIR(-3)) + C(29) \\
& \times D(RIR(-4)) + C(30) \\
& \times D(RIR(-5)) + C(31) \\
& \times D(Short\_Term\text{-}Debt(-1)) + C(32) \\
& \times D(Short\_Term\text{-}Debt(-2)) + C(33) \\
& \times D(Short\_Term\text{-}Debt(-3)) + C(34) \\
& \times D(Short\_Term\text{-}Debt(-4)) + C(35) \\
& \times D(Short\_Term\text{-}Debt(-5)) + C(36)
\end{aligned}
$$

(4)

The important result output of this model is given in the Table 4.

R- Squared	Adj. R - Squared	Sum sq. Residuals	F – Stat	Prob (F-statistic)	S.E. equation	AIC
0.869122	0.815858	0.013610	16.31717	0.000000	0.012580	-5.6729

Table 4:- LGDP model Results
Source: Derived by Eviews 10. Jagtap [17].

The coefficient diagnostic test revealed that lagged values of LGDP, FDI_NI, RIR and Short_Term_Debt had substantial impact on the dependent variable of our model i.e. LGDP. Wald Test result along with probability of F-statistics which was 0.00 implied explanatory variables together influenced the GDP of India.

Residuals were homoscedastic up to lag order of five as supported by ARCH test. No serial correlation found among the residuals of the model, proved by Breusch-Godfrey Serial Correlation LM Test. Q – Statistics also reinforced the acceptance of absence of serial correlation in the residuals up to lag 36.

➢ *Granger Causality Test Results*
According to Granger [19] this particular causality test is used to study the connection between two or more variables when one is causing the another. The hypothesis used in this test were:
1. H_0: Variable A Does Not Granger Cause Variable B.
2. H_1: Variable A Does Granger Cause Variable B.

The various results obtained shows following relationship among the variables.
• RIR Granger caused LGDP but reverse was not true.

Pattanaik et al. [20] study also support that RIR plays an implicit role in influencing the investment decisions in India and hence at macro level it is GDP which gets affected. India has witnessed at multiple times, whenever RIR was above average response of GDP was positive. For example, before the global financial crisis of 2008, RIR used to be high along with high GDP growth. But after crisis of 2008 to till 2011 RIR found to be falling on the backdrop of rising inflation rate in India and economic activities also started slowing down. To keep the economy on growth path under the inflationary scenario, RIR was used as an important policy instrument by maintaining it above average level. The reasoning is that when the marginal efficiency of capital expected from the investment beats the cost of fund then investors find it profitable and they show inclination to make an investment in the economy.

• Granger causality between LGDP and almost all parameters was found to be absent. However, the further investigation conducted with the help of IRF and VD techniques in VAR framework revealed very substantive relationship between LGDP and other observed variables.

• Deficit in CAB Granger caused the RIR in India. However, reverse Granger causation observed to be absent. This finding was supported by IRF too.

• This study found no Granger as well as reverse Granger causal relationship between GFD_GDP and CAB deficit implying absence of the twin deficit phenomenon. However, they found to be related in the long run, as proved by IRF analysis.

• The bi – directional presence of the Granger causality was confirmed between GCFG and RIR. Granger causality was present between GCFG and Short_Term_Debt but reverse was not true.

➢ *Impulse Response Function (IRF) Results*
Granger causality test may not be an efficient indicator to establish relationship among various variables which affects the economy. Therefore, we conducted IRF analysis for cumulative eight quarters and got an interesting result. In this paper we have given some examples to highlight the graphical presentation of IRF.
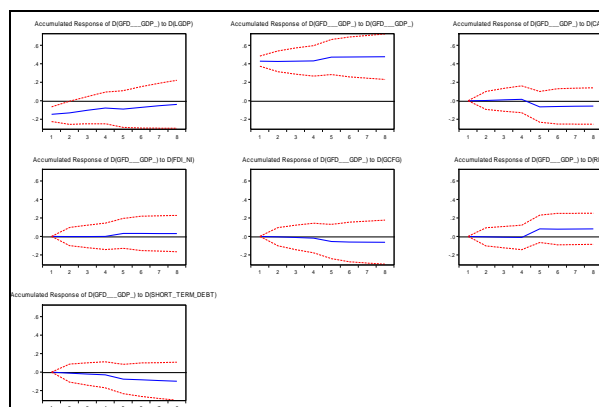

Fig 2:- Response of d(GFD_GDP) IRF based on Cholesky Ordering
Source: Derived by Eviews 10. Jagtap [17]

Fig. 2 reflects Fiscal deficit responds to changes into GDP but never became positive. The argument given by Jagtap [17] implies to keep the tempo of growth in the GDP government always show inclination towards further increase in the expenditure and it has always been thought after policy recommendation tool at disposable to the government in the Indian economy. For instance, as stated by Singh [21], Government of India need to maintain high fiscal deficit in the financial year 2020 in the form of fiscal stimulus to the economy to have sustainable growth.

However, when the response of GDP to changes into GFD_GDP studied, it was found that for first Four Quarters output growth was not at all responding to GFD_GDP and after Quarter Fifth though the response of economic activities established to be positive but that was very woeful. The major reason could be the components of fiscal deficit. In India, primary deficit i.e. fiscal deficit adjusted for interest payment is always less. This implies fund available with the government which could be diverted towards productive purposes is continually not as much of requirement of the economy. Hence whenever government tries to pursue the fiscal prudence in general, we can say it reduces its spending on the socio -economic capital expenditure represented by fallen GCFG in the study.

Still, whatsoever meagre sum is getting injected into the economy with lagged is having small but positive effect on the GDP. Therefore, we can say that when fiscal deficit is the reality in India it will positively affect the economic activities provided it is incurred on productive purposes. It supports the Keynesian views on relationship between the government deficit and the economic activities. The response of fiscal deficit to its own lagged value was found to be very worrisome, as with every high value of it in the past led to next quarter increased fiscal deficit.

IRF analysis showed though in the short run CAB was not affecting GFD_GDP but from Quarter Fourth it started negatively affecting to the GFD_GDP indeed. Similarly, when an impulse was given to GFD_GDP, the response from CAB was destructive. Further findings suggested that when CAB was deteriorating it also led to drop in the output growth in India. Thus, even though the existence of twin deficit phenomenon was rejected by the Granger Causation test, it was getting proved that CAB and GFD_GDP affects each other adversely and hence GDP also contracts badly. Hence we can say that though both the deficits are not immediate twins but indeed related with each other as distanced siblings in case of India.

During the study period, GFD_GDP and LGDP responded very insignificantly to changes introduced in FDI_NI from Fifth Quarter onward. However, when the response of FDI_NI to the fiscal position of the union government was observed it was probed that as the fiscal deficit increased in the initial time FDI remained disinterested but in the long term it indeed responded negatively. The important cause could be that the foreign stable investment gets attracted towards the overall macroeconomic stability of the economy and gross fiscal deficit is one among those components as mentioned by World Bank in its report of 1997 [22].

The interesting information which was derived from the analysis with respect to a shock in GCFG is that it affects fiscal deficit adversely only in the long run but not instantaneously. The rationale possibly be the implementation gap of the government programs in infrastructure development which exaggerate fiscal deficit in the future. Whereas, reaction of the GCFG towards positive disturbance in the gross fiscal deficit was always positive though fragile. This could be interpreted as if fiscal deficit is incurred on the capital formatting activities then it contributes in the development of the economy and therefore gross domestic activities too expands.

The relationship between GFD_GDP and RIR in the short run found to be insignificant but same became very vital in the long run. The reasoning put forward by Jagtap [17] was, increased fiscal deficit leads to augmented monetary base in the economy, let it get financed either via RBI or private sector purchasing the government securities. This put the financial institutes under due pressure of not reducing the lending rates apart from their own reluctance to lend money to private players. At the same time to keep investment in India attractive real interest rate, as well thought-out tool, is kept purposefully high. But it indicates greater than before funding cost causative to greater fiscal deficit in the forthcoming period because as soon as government borrows fund it comes at still higher interest rate. In the Granger causality analysis also we had found that GFD_GDP Granger caused RIR. The response of the RIR to output growth in India was found to be positive in the first Four Quarters.

Positive stimulus in the Short_Term_Debt was found to be exaggerating gross fiscal deficit position of Union Government of India. The reason behind this could be proffered as to restrict the economy from falling into the deep recession if government has resorted on expanding its deficit, the liabilities of interest payment in the next time period increases and thus deteriorating the fiscal circumstance in the future. The response of the GDP to a shock in Short_Term_Debt was very dramatic, as till Quarter Third economy responded positively might be due to injection of the borrowed fund in the economy but through the Fourth Quarter economy succumbed to negative effects and once again revived from the Sixth Quarter. So six months' impact on the economy was very disturbing. The justification possibly will be given is that to pay - off the interests on the previously accumulated loans by the end of the fiscal period government has to start looking for the fresh creditors. So, to keep in terms of Pocha [23] even if India's entire debt to GDP ratio is supposed to be 65.00 percent, which is said to be within the sustainable level, India is 'neck – deep' in debt trap to be precise.

➢ *Result of Variance Decomposition (VD) Analysis:*
As we know IRF support us to understand the extent of positive or negative reactions of the dependent variables to a shock in specific variable but, relatively how much a particular shock is contributing the fluctuations in the given variable is better understood with the help of variance decompositions. The variance decomposition method here we have used to apprehend the effects of innovations on selected variables in the short as well long run.

Table 5 shows in the short run, i.e. say till Quarter Three, a shock in the LGDP account for 99.08 percent for own shock whereas all other variables contributed very poorly in the fluctuations of it. However, in the long run approximately by the Quarter Tenth, the influence of its own shock fell to 88.30 percent and contribution of the changes in the real interest rate and short term debt in the variations of LGDP increased by 2.39 and 6.53 percent respectively. The shocks in the other variables leading to

instabilities of LGDP found to be growing but less than one percent. It implies LGDP gets influenced by its own surprise more than the blows of other variables.

Quarter	D(LGDP)	D(GFD___GDP_)	D(CAB)	D(FDI_NI)	D(GCFG)	D(RIR)	D(Short_Term_Debt)
1	100.00	0.00	0.00	0.00	0.00	0.00	0.00
2	99.55	0.01	0.01	0.01	0.03	0.05	0.31
3	99.08	0.02	0.11	0.01	0.15	0.08	0.51
4	98.78	0.03	0.18	0.01	0.24	0.09	0.63
5	91.37	0.90	0.29	0.52	0.28	3.36	3.24
6	90.95	0.89	0.35	0.51	0.36	3.37	3.53
7	90.66	0.88	0.41	0.50	0.42	3.28	3.81
8	90.50	0.88	0.45	0.49	0.46	3.22	3.97
9	88.64	0.97	0.86	0.44	0.41	2.40	6.25
10	88.30	0.95	0.89	0.44	0.46	2.39	6.53

Table 5:- Variance Decomposition of D(LGDP)
Source: Derived by Eviews 10. Jagtap [17]

Table 6 states the response of gross fiscal deficit to the variations introduced in other parameters in this study. It shows the forecast error contribution of the variation in the gross fiscal deficit of the central government remains major influencing factor in the short as well as in the long run. As it is clear from the table that between 80.00 – 89.00 percent variations in the GFD was caused by the shock in the GFD itself. An impulse in the LGDP generated almost same variation in the GFD throughout the observed quarters. It was current account balance shock which in the long run

contribute more than what it was in the short run in the GFD variations i.e. from 0.02 percent in the Quarter Third to about 2.94 percent in the Quarter Seventh. Which implies very weak but positive relationship between CAB and GFD_GDP in India. On the same line disturbances in the gross fiscal deficit was explained by impulses in the GFCG, RIR and the short term debt burden in the long run though during short period of time their contribution was negligible in influencing GFD_GDP.

Quarter	D(LGDP)	D(GFD___GDP_)	D(CAB)	D(FDI_NI)	D(GCFG)	D(RIR)	D(Short_Term_Debt)
1	10.49	89.50	0.00	0.00	0.00	0.00	0.00
2	10.58	89.31	0.00	0.00	0.00	0.01	0.07
3	10.93	88.85	0.02	0.00	0.03	0.01	0.11
4	11.17	88.55	0.04	0.00	0.05	0.02	0.14
5	10.16	80.88	2.94	0.44	0.67	3.81	1.07
6	10.28	80.73	2.94	0.43	0.68	3.81	1.08
7	10.41	80.58	2.94	0.43	0.68	3.80	1.12
8	10.49	80.49	2.93	0.43	0.68	3.80	1.14
9	10.07	80.41	2.87	0.62	1.11	3.78	1.10
10	10.10	80.38	2.87	0.62	1.11	3.78	1.11

Table 6:- Variance Decomposition of D(GFD___GDP_)]
Source: Derived by Eviews 10. Jagtap [17]

Table 7 indicates the variance itemization of the current account balance to own shock remained around 91.00 percent till the Quarter Four but from Quarter Fifth to Tenth its contribution in explaining forecast error eroded between 57.00 – 59.00 percent. The fluctuations in the

LGDP accounted for 0.98 percent in the short run represented by Quarter Third but in the long run its involvement increased to 5.25 percent in clarifying the variations in CAB. The major contributor of the CAB variations during the long run was found to be gross capital

formation changes taking place in the economy. It implies if GCFG is increased in our economy then there are possibilities that in the long run current account balance will improve in favour of Indian economy by supporting India's export sector as well as encouraging the domestic production to reduce the reliance on import. The innovations in gross fiscal deficit accounted for 7.69 percent variations in the CAB within one year but by the Fifth Quarter its contribution became constant around 5.00

percent. This indicates that gross fiscal deficit is second most strong variable affecting the current account position of India. This reiterate our findings of IRF, implying India's fiscal and current account imbalance are indeed related. Till the Fourth Quarter RIR and Short term debt deviations accounted for the discrepancies in the CAB by 0.00 percent respectively. But in the long run their role to describe the shock in CAB shown substantial increase.

Quarter	D(LGDP)	D(GFD___GDP_)	D(CAB)	D(FDI_NI)	D(GCFG)	D(RIR)	D(Short_Term_Debt)
1	0.94	7.69	91.35	0.00	0.00	0.00	0.00
2	0.95	7.69	91.34	0.00	0.00	0.00	0.00
3	0.98	7.69	91.31	0.00	0.00	0.00	0.00
4	1.00	7.69	91.28	0.00	0.00	0.00	0.01
5	4.75	5.01	59.86	0.08	27.81	1.01	1.45
6	4.76	5.01	59.86	0.08	27.81	1.01	1.45
7	4.76	5.01	59.85	0.08	27.81	1.01	1.45
8	4.76	5.01	59.85	0.08	27.81	1.01	1.45
9	5.24	5.50	57.80	0.47	26.89	2.34	1.72
10	5.25	5.50	57.79	0.47	26.88	2.34	1.73

Table 7:- Variance Decomposition of D(CAB)
Source: Derived by Eviews 10. Jagtap [17].

As reflected in Table 8, an impulse in FDI_NI led to imbalance in itself by 73.25 percent in the Quarter Three i.e. in the short run which receded to around 50.59 – 53.49 percent in the long run. During short period of time LGDP describing disturbances in the FDI_NI was 15.43 percent in the first three months which further in the long run for instance in the Quarter Eighth increased to 20.09 percent. Which make it the stronger variable in explaining the variability in FDI_NI right from the beginning. The

forecast error disturbance in the FDI_NI clarifying capacity of the gross fiscal deficit increased from 7.99 percent during Second Quarter to 21.10 percent in the Fifth Quarter but remained constant thereafter. In the short run shock in the real interest rate and short term debt were unable to explain the fluctuations in the FDI net inflows significantly but in the long run both of them indeed contributed by 3.37 percent and 1.01 percent respectively.

Quarter	D(LGDP)	D(GFD___GDP_)	D(CAB)	D(FDI_NI)	D(GCFG)	D(RIR)	D(Short_Term_Debt)
1	15.43	8.00	2.61	73.94	0.00	0.00	0.00
2	15.53	7.99	2.61	73.74	0.00	0.01	0.09
3	15.94	7.94	2.63	73.25	0.04	0.02	0.15
4	16.23	7.91	2.63	72.93	0.07	0.02	0.18
5	20.06	21.10	2.27	53.49	0.93	1.11	1.00
6	20.06	21.10	2.27	53.48	0.93	1.11	1.01
7	20.08	21.09	2.27	53.45	0.94	1.13	1.01
8	20.09	21.08	2.28	53.42	0.95	1.13	1.01
9	19.03	21.36	3.57	50.61	1.02	3.37	1.01
10	19.05	21.35	3.57	50.59	1.03	3.37	1.01

Table 8:- Variance Decomposition of D(FDI_NI)
Source: Derived by Eviews 10. Jagtap [17].

The VD of the gross capital formation is specified in Table 9. This table implies that between 70.28 to 80.96 percent of the forecasting error of GCFG was accounted for by its own shock during all the time. Similarly, the

contribution of the shock in the LGDP resulting into the fluctuations in the GCFG remained constant in all the time period around 17.00 percent. The variations in the GFD and CAB explained 0.48 and 0.69 percent changes in the GCFG

in the short run. Whereas, in the long run, stimulus in the GFD and CAB contributed by1.01 and 1.27 percent respectively in elucidating the forecast error in the GCFG. A shock in the FDI NI caused 0.01 percent fluctuations in the shock of GFCG during the first year but it became capable of explaining the variations in the GCFG shock by 2.11 percent after Quarter Fifth. The capability of

Short_Term_Debt persisted to be insignificant in short as well as long run to explain the variations of GCFG. However, it was RIR whose role in justifying the deviations in the shock of GCFG improved from 0.00 percent in the Second Quarter to 6.59 percent by Tenth Quarter.

Quarter	D(LGDP)	D(GFD ___GDP_)	D(CAB)	D(FDI _NI)	D(GCFG)	D(RIR)	D(Short _Term_ Debt)
1	17.85	0.48	0.68	0.01	80.96	0.00	0.00
2	17.86	0.48	0.68	0.01	80.94	0.00	0.00
3	17.89	0.48	0.69	0.01	80.89	0.00	0.01
4	17.92	0.48	0.69	0.01	80.86	0.00	0.01
5	17.14	0.43	1.30	2.11	72.63	5.96	0.39
6	17.14	0.43	1.30	2.11	72.63	5.96	0.39
7	17.14	0.43	1.30	2.11	72.63	5.97	0.39
8	17.14	0.43	1.30	2.11	72.63	5.97	0.39
9	17.77	1.01	1.27	2.67	70.28	6.59	0.37
10	17.77	1.01	1.27	2.67	70.28	6.59	0.38

Table 9:- Variance Decomposition of D(GCFG)
Source: Derived by Eviews 10. Jagtap [17].

The VD of the RIR in Table 10 indicates that 89.74 percent of the forecast error of RIR was accounted by its own shock within a year of the estimation which fell in the long run to 50.83 percent only. For all the estimation period short term debt and CAB were very inconsequentially influencing the RIR. But variations in the GFD and FDI_NI accounted for significant involvement in the forecast error

variance of the RIR after Quarter Fifth. The impact of the tremor in the LGDP within a year estimation was found to be causative constantly around 3.00 percent but in the long run i.e. by Ninth Quarter its influence escalated to 9.56 percent in explaining the changes in the RIR.

Quarter	D(LGDP)	D(GFD ___GDP_)	D(CAB)	D(FDI _NI)	D(GCFG)	D(RIR)	D(Short _Term_ Debt)
1	3.41	0.39	0.49	0.09	5.84	89.74	0.00
2	3.41	0.39	0.49	0.09	5.84	89.74	0.00
3	3.42	0.39	0.49	0.09	5.84	89.74	0.00
4	3.42	0.39	0.50	0.09	5.84	89.74	0.00
5	6.13	16.15	0.55	5.15	13.62	58.22	0.15
6	6.13	16.15	0.55	5.15	13.62	58.22	0.15
7	6.13	16.15	0.55	5.15	13.62	58.22	0.15
8	6.13	16.15	0.55	5.15	13.62	58.22	0.15
9	9.56	13.96	0.98	7.48	16.97	50.83	0.18
10	9.57	13.96	0.98	7.48	16.97	50.83	0.19

Table 10:- Variance Decomposition of D(RIR)
Source: Derived by Eviews 10. Jagtap [17].

Table 11 represents the VD of the short term debt. The forecast error of the short term debt accounted for its self-shock in the first Four Quarters of the estimations specifying between 57.58 to 58.32 percent which decreased to 43.48 percent in the Quarter Tenth. The fluctuations in the FDI_NI explained between 33.89 to 34.45 percent forecasting error in the short term debt shock during the short run which reduced to 23.78 percent after Ninth Quarter. An innovation in the GFD_GDP and GCFG

contributed less than one percent for the short duration to cause fluctuation in the of short term debt shock. This surged to 3.56 and 10.07 percent in the Quarter Tenth respectively. The variations in the LGDP, RIR and CAB accounted for 1.92, 1.92 and 3.42 percent respectively in describing the shudder in the short term debt in Quarter Third but augments to 8.24, 4.88 and 5.96 percent respectively in the Tenth Quarter of the estimations.

Quarter	D(LGDP)	D(GFD ___GDP_)	D(CAB)	D(FDI _NI)	D(GCFG)	D(RIR)	D(Short _Term_ Debt)
1	1.14	0.52	3.41	34.45	0.21	1.91	58.32
2	1.31	0.52	3.41	34.34	0.22	1.92	58.24
3	1.92	0.52	3.42	34.07	0.27	1.92	57.85
4	2.34	0.52	3.42	33.89	0.30	1.92	57.58
5	7.36	1.14	6.52	26.11	7.07	4.55	47.21
6	7.48	1.14	6.51	26.07	7.07	4.55	47.14
7	7.58	1.14	6.51	26.03	7.06	4.54	47.10
8	7.64	1.14	6.50	26.01	7.06	4.54	47.08
9	8.22	3.56	5.96	23.78	10.07	4.88	43.49
10	8.24	3.56	5.96	23.78	10.07	4.88	43.48

Table 11:- Variance Decomposition of D(Short_Term_Debt)
Source: Derived by Eviews 10. Jagtap [17].

VI. CONCLUSION

In this article we have assessed the relationship between output growth represented by LGDP and other important parameters under VAR environment by applying Granger Causality Test, Impulse Response Function and Variance Decomposition techniques. The bi – directional existence of the Granger connection has been established between GCFG and RIR. But twin deficit phenomenon has been rejected by the Granger causation.

The IRF showed fiscal deficit of India unquestionably improves with the GDP growth. But it is not possible to have surplus on fiscal front given the level of development in India. Deterioration in the current account balance negatively disturb the fiscal deficit condition of India in short as well as long run. Fiscal deficit is persistent and never displays recovery implying certain sort of relation between current account balance and fiscal deficit of India. This study supports Keynesian view on the government spending in India. According to which Indian economy indeed responds positively to government spending directed towards the productive purposes though after lag. This implies that to encourage economic activities Union Government does and should play an important role in India. The forecast error variance decomposition of GDP has given the surprising result which states that GDP of India gets influenced more by its own shock followed by RIR and Short term debt variables.

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