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CENTRAL BANK INDEPENDENCE AND ITS IMPACT ON FISCAL DEFICIT: EVIDENCE FROM INDIA

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Abstract: The paper explores the relationship between Central bank independence (CBI) and fiscal deficit in India. Moreover, the study tries to assess the impact of CBI on the levels of fiscal deficit. The study incorporates other variables like Gross Domestic Product, financial development, and trade openness to analyze their impact on the fiscal deficit. The study employed Auto-regressive distributed lag model (ARDL) Bounds test developed by Pesaran, Shin, and Smith (2001) to examine the long-run relationship between CBI and fiscal deficit. The study also employs a legal index for measuring CBI developed by Jasmine et al (2019) as well as an actual measure of independence developed by Cukierman (1992) to measure CBI in India. The study confirms the long-run relationship between the CBI and fiscal deficit as well as among other variables. An increase in the levels of CBI leads to falling in the levels of fiscal deficit. The other explanatory variables used in the study also confirm the long-run relationship and impact fiscal deficit negatively except for trade openness, which positively impacts the fiscal deficit.

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1. Introduction

Fiscal dominance has long been a problem in many developing countries and many African countries, tapping the balance of power between the fiscal and monetary authorities in jeopardy. For instance, the Global financial crisis (GFC) of 2008 and Covid-19 over the last two years led to a substantial increase in central banks' balance sheets across the world. Higher debt to GDP ratios stimulated and renewed fiscal dominance (Strong and Yayi, 2021). This has generated pressure on the CBs. As governments increase the level of debt to mitigate and combat the recessionary effects of such events, a burden on central banks to accommodate and absorb government debt strengthens fiscal supremacy (Strong and Yayi, 2021).

Fiscal dominance can take several forms like that of central banks directly financing government debt and putting pressure on the central banks to keep interest rates low or to intervene in foreign markets by limiting currency depreciation and by reducing debt servicing costs. A lot of fiscal spending restraints the economic cycle, and it is due to the political pressures that led countries to accrue high debts (Eslava, 2011). An increase in the fiscal deficit hampers the economy's growth performance, due to which policymakers have resorted to finding solutions to curb the negative effects of rising deficits.

One such solution is to grant central banks more independence to instate fiscal discipline, limit government borrowings and improve macro-economic performance (Grilli et al. 1991, Alesina and Summers, 1993). The negative relation between fiscal deficit and Central Bank Independence (CBI) has been a nascent outcome of CBI (Bodea & Higashijima, 2017). Central bank independence refers to the direct and indirect independence of a bank from political or government intervention in the conduct of monetary policy or independence relating to the decisions and timings of monetary policy actions (Patat, 2003; Lucotte, 2009; Walsh, 2010). Central banks enjoying independence choose to usher in fiscal discipline by restraining the lax fiscal policy by raising interest rates and limiting debt monetization, due to the long-run association between fiscal deficits and Inflation (Bodea & Higashijima, 2017).

The notion of central bank independence has gained prominence because it's only the independent central bank that can enhance credibility, price stability, and fiscal discipline both in the short and long run. If this assumption is correct, then we can expect a negative correlation between the CBI and our dependent variable of interest i.e., Fiscal deficit.

In general, many economists agree that greater central bank independence results in lowering of Inflation and fiscal deficit (Cukierman, Web, and Neyapti, 1992; Cukierman et al., 2002; Crowe and Meade, 2008) and/or that CBI can help to reduce political business cycle shocks (Nordhaus, 1975); however, there is a lack of agreement in the literature regarding the relationship between fiscal deficits and CBI. For example, studies in developed countries have reported a negative relationship between CBI and fiscal deficits in the case of OECD countries (Burdekin and Laney (1988), Grilli et al. (1991) or De Haan and Sturm (1992), whereas similar studies in developing countries have produced ambiguous and statistically insignificant results. We used both legal as well as actual CBI modeled on the lines of Jasmine et al., (2019) and Cukierman (1992) for assessing the impact of CBI on the fiscal deficit in India. Higher levels of legal CBI result in lower fiscal deficits while a higher TOR is assumed to be associated with a decreased amount of independence once you cross a particular threshold and a higher fiscal deficit (Cukierman et al., 1992). Removing central bank governors prematurely and frequently could be a sign that the fiscal authority is looking to select a subservient governor whose policy reactions reflect the government's strategy. It's clear that the executive branch is trying to appoint an ally. The time-inconsistency problem can be exacerbated if the fiscal and monetary authorities form an alliance, i.e., a central bank abandons its commitment to price stability and instead surprises economic agents with a stimulus expansion. Assumably, a higher level of independence can shield the central bank from political influence and promote budgetary discipline by allowing a central banker to concentrate on the core objective of price stability and fiscal discipline.

To the best of our knowledge, no study has been carried out in India that measures the relationship between fiscal deficit and CBI. Against this backdrop, the study attempts to examine the impact of CBI, both legal and actual, on the fiscal deficit. The rest of the paper is structured as follows: the next section presents a brief review of relevant literature in section 2. Section 3 discusses data and methodology. Results and discussion are reported in Section 4. Section 5 concludes.

2. Literature review pertaining to fiscal deficit and CBI

The fiscal deficit has been considered a phenomenon where government expenditure exceeds the receipts of revenue it generates from various sources (The World Bank, 2005). The impact of fiscal deficit on the macro economy has been a subject of extensive interest due to its implication (Anyanwu, 1997). World Bank (2001) reports that many countries have witnessed a significant increase in the growth of their respective GDP due to the reduction in fiscal deficits. The fiscal deficits originate due to the loose fiscal policy followed by the governments to match their levels of expenditure due to the lesser receipts. The concept of fiscal deficit originated from the Keynesian school of economic thought, which stated that it

boosts employment, demand, and production (Dwyer, 2011). However, the research conducted by Awe and Shina (2012) concluded that rising fiscal deficits hamper the overall macroeconomic scenario of developed and developing countries.

According to Combes (2006), developing countries have a highly volatile tax base which results in budget deficits or surpluses. Yet, the motivation and capacity of the governments to run budget surpluses during good times are hindered by the enormous political pressures who want to favor their constituencies to increase their vote base (Alesina and Perotti, 1994). The main properties that drive governments to run deficits are the powerful elite groups as well as the lack of proper institutions and institutional quality (Combes, 2006). Tornell and Lane (1999), stated that the countries experiencing such properties and qualities succumb to the terms of trade effects which results in a decline in growth and hence rising fiscal deficits. Moreover, trade shocks enhance the inequalities, affecting the tax as a source of revenue generation and ultimately higher fiscal deficits (Bevan, 1999).

In their study, Ahmad and Malik (2009) used data on 35 countries to examine the impact of budget deficits on financial development. The study concludes that rising levels of fiscal deficit lower the effective functioning of financial markets. Jamshed Y. Uppal (2011) investigated the relationship between the bond market and fiscal deficit in Pakistan and concluded that higher fiscal spending and the bond market affect each other negatively.

The economic theory states that as the central bank enjoys more freedom in respect to its goals and targets vis a vis instrument, they instate fiscal discipline in the economy [1]. Monetary authorities guide the legislature and enforce them to ensure fiscal discipline by restricting lending and borrowing. Independent central banks usher more discipline in the economy by compelling the governments of the day to raise revenue by other means and sources like raising taxes rates or adjusting the policy of expenditures in line with the revenues. As the level of the central bank increases, the levels of fiscal balances increase, or the level of fiscal balances increases (Strong and Yayi, 2021). Few studies have conducted empirical research on the CBI and fiscal deficit or fiscal balances. However, many studies like Burdekin and Laney (1988) Grilli et al. (1991) De Haan and Sturm (1992) Cukierman et al. (1992) about the relationship between fiscal deficit and CBI has yielded mixed results. Grilli et al. (1991) constructed an index of legal CBI to apprehend the autonomy of central banks. Their study, which contains the 18 OECD countries, concluded that the independence of central banks does not impact the fiscal balances. Likewise, in his study, Cukierman (1992) stated that the legal CBI does not have any impact on the fiscal balances and constructed the actual level of independence proxied by the turnover rate (TOR) to assess the impact of CBI and fiscal deficit. The study concludes that the actual level of CBI affects the fiscal deficits and an inverse relationship exists between the two variables.

Similarly, another study done by Lucotte (2009) concluded the negative association between the CBI and fiscal deficit. However, other studies pertaining to the relationship between the two variables stated that negative relation does not hold between levels of CBI measured by Turnover rate and fiscal deficit (Sikken and de Haan, 1998). Besides, a limited number of studies have examined the association between CBI and fiscal deficit in developing countries. Mpofu (2012) researched the southern and northern countries of Africa using actual CBI proxied by TOR and concluded that the actual levels of CBI do not have a statistically significant relationship with the fiscal deficit.

Pollard (1993) researched 16 OECD countries using the Alsenia and Summers index to assess the relationship between fiscal deficit and CBI. Their study concludes that CBI affects fiscal deficits negatively but the coefficients are statistically insignificant. Similarly, Benassy-Quere and Pisani-Ferry (1994) researched 20 OECD countries using the CWN index and GMT index to examine the nexus between fiscal deficit. Their study concludes that higher levels of CBI improve fiscal discipline and affect its inversely. Another study was conducted by Sikken and De Haan (1998) on 30 developed countries using the CWN index to examine the impact of CBI on Budget deficits. However, they didn't find any relation between these two variables.

Lucotte (2009) has conducted research on the 78 developing countries using CWN and TOR index to investigate the relationship between fiscal deficit and CBI. The studies concluded that legal CBI affects fiscal deficit inversely while TOR affects fiscal deficit positively i.e., as the actual independence increases fiscal deficit also increases.

To conclude, the above studies examined the relationship between fiscal deficit and macroeconomic variables, particularly Gross Domestic Product, private investment, and CBI. The studies have used annual and quarterly data and revealed that fiscal deficit impacts these variables positively and negatively. However, the impact of CBI on the fiscal deficit is negative as the level of CBI increases the levels of fiscal deficits decrease. All the studies discussed above employed Cukierman's (1992) index to assess the relationship between CBI and fiscal deficit. This study is the first kind in India that examines the impact of CBI on the fiscal deficit in India using annual time series data on the variables taken in the study. Moreover, the study employs the Legal CBI index developed by Jasmine et al. (2019) which is superior to the legal index of Cukierman (1992) both theoretically as well as methodologically. Further, the study investigates the impact of GDP, Trade openness which has been proxied as the sum of exports and imports as a percentage of GDP, and Financial development proxied as a ratio of private credit to GDP. The study also employs the actual measure of independence developed by Cukierman (1992)

proxied by turnover ratio to examine the impact of the frequent turnover of governors on the levels of fiscal deficit.

3. Econometric Methodology and empirical data

This study examines the impact of the CBI on the fiscal deficit in India and covers the period from 1990-2018. The data set used to carry out empirical analysis comprises four crucial macroeconomic variables and values of two CBI indexes, one developed by Jasmine et al. (2019) and the other developed by Cukierman (1992). The former Index measures legal CBI, which refers to autonomy granted to central banks by the legislature of the country, while as latter measures actual autonomy of central banks in practice proxied by turnover rate. The details of the variables regarding their explanation, measurement, and symbols are taken and their sources are provided in table no 1.

3.1 Non-stationarity

To check the existence of the long-run relationship (Cointegration) among variables under study, the first step is to test the stationarity property of variables. This is because non-stationary variables yield spurious regression. To carry out the process, the study employs the Augmented Dicky fuller test (ADF) and Phillips-Perron test (PP) in order to know the integration of variables taken in the study. Though, both the tests ADF and PP are different with respect to the design of the null hypothesis. The ADF test the presence of unit root or non-stationary in the null hypothesis and PP tests whether stationarity exists in the null hypothesis [2].

3.2 Methodology pertaining to Cointegration

After recognizing the order of integration among the variables in the study, the next step is to investigate whether the long-run relationship (called Cointegration) among the variables holds. Various tests have been developed for testing the Cointegration. Engle & Granger (1987) and Philips &Hansen (1990) have constructed the residual-based system of the single equation method in order to carry out bivariate analysis while as, Johansen (1988), Johansen-Juselius (1990) and Johansen (1996) have constructed another system of cointegration process which has been used for carrying out multivariate analysis. Likewise, Pesaran & Shin (1998) and Pesaran, Shin & Smith (2001) have improved the previous system of multivariate equation systems and constructed a new method for examining the long-run strong correlation among the variables, which got commonly referred to in the literature as Auto distributed lag model (ARDL) or Bounds test. Hence, this study applies the ARDL approach to Cointegration because of its superiority over the above-mentioned cointegration tests.

Table 1 Abbreviation and description of variables

Variables	Symbol	Description	Source
Fiscal Deficit	FD	Gross fiscal deficit as a percentage of GDP	RBI Database
Gross Domestic Product	GDP	Annual growth rate of real GDP At the base year 2010	RBI Database
Trade openness	TO	Sum of exports and imports as a percentage of GDP	RBI Database
Financial Development	DC	Ratio of private credit to GDP	DBIE Reserve bank of India
Central bank independence	CBI	Legal CBI calculated	Jasmine *et. al* 2019 index
Turnover rate	TOR	Actual independence Calculated	Cukierman 1992 Index

Source: Author's own representation

The orthodox cointegration methods constructed till the end of the twentieth century were based on the premise that the order of integration of the variables should be the same. In case, the order of integration turned out to be different and heterogenous for a few of the variables we get then the mix of I (0), I (1) as well as miniature order of integration and this technique of Cointegration provided inefficient estimates and therefore reduce the power of forecasting for the model estimation (Kim et al., 2011). The ARDL does not possess such flaws and can be applied smoothly even if there is a combination of both stationary as well as non-stationary present, but the model variables do not possess the integration order of two [3]. A system of single equations is appropriate and can be easily interpreted as it syndicates dynamic error correction specification with the long-run regression of Cointegration. The ARDL model warrants agility regarding the selection of lag length regarding diverse variables by ensuring the proper selection of lag criteria like SBC or AIC [4].

In the same way, the model takes specific instruments regarding endogenous variables and therefore prevents potential bias that may arise because of the problem of endogeneity. Lastly, the ARDL technique is suitable aptly and performs well in case the sample size is small (Narayan, 2004). In contrast to the orthodox error correction models, the modified error correction model is not constrained in the coefficients pertaining to the lagged variables [5].

The technique for the estimation of the ARDL model follows two-step procedures. As far as the first step is concerned the presence or absence of Cointegration is tested. If there occurs a presence of Cointegration then in the second step short run and long run coefficients are estimated along with the error correction term. The general form of equation representing the ARDL (p, q) model is as:

$$Z_t = \lambda_0 + \sum_{i=1}^{p} \sigma_i Z_{t-i} + \sum_{j=0}^{q} \nu_j w_{t-j} + \mu_t \quad (1)$$

Where Z_t represents the predicted variable, Z_{t-i} signifies the AR terms with σ_i as coefficients associated with AR. Z_{t-i} constitutes set of set of regressed variables and ν_j are the coefficients representing partial slope. The lags of the predicted variables range from 1 to p and the regressed variable range in between 0 to q. The proper values of the p and q lag lengths are selected based on lag selection criteria involving SBC and AIC. Lastly in the above equation μ_t represents the random disturbance term, which is presumed to be distributed identically as well as independently. As far as the variables pertaining to this study are concerned, the consistent form of the ARDL model is represented by the following equations:

$$\begin{aligned}\Delta FB_t = {} & \theta_0 + \theta_1 FB_{t-1} + \theta_2 GDP_{t-1} + \theta_3 TO_{t-1} + \theta_4 DC_{t-1} \\ & + \theta_5 CBI_{t-1} \\ & + \sum_{j=1}^{p} \omega_i \Delta FB_{t-j} + \sum_{j=0}^{q} \rho_j \Delta GDP_{t-j} \\ & + \sum_{j=0}^{q} \sigma_j \Delta TO_{t-j} + \sum_{j=0}^{q} \vartheta_j \Delta DC_{t-j} + \sum_{j=0}^{q} \varphi_j \Delta CBI_{t-j} \\ & + \mu_t\end{aligned} \quad (2)$$

The Equation-2 is the general form of the ARDL model used for the study where θ_0 represents the intercept term, θ_1 denotes the coefficient of AR, θ_2 to θ_5 represents the coefficients pertaining to the long run and ω_i, ρ_j, σ_j, ϑ_j and φ_j represents the coefficients pertaining to the estimators of the short run. The rest of the terms in the model represents Fiscal deficit, Gross domestic product, Trade openness, financial development and the Legal values of CBI. Lastly in the model is the μ_t which is $\mu_t \sim$ iid (0, σ^2). Then we proceed to test the null hypothesis which is the joint insignificance of lagged levels coefficients or no-integration against the alternative hypothesis of joint significance or the absence or presence of Cointegration in order to verify and ensure the Bounds test which is as in the following form:

$H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = 0$ (No cointegration)

$H_A: \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq 0$ (Cointegration exists)

For the testing of the hypothesis, Pesaran et al. (2001) have given the values of critical level as well as values for lower and upper bounds that ensure cognizance of integration properties of different models with different explanatory variables. Presuming that from the estimation of the model if the calculated values of the F-statistic are less than the lower bound value then the procedure is to accept the null hypotheses and there does not exist integration among the variables. Likewise, if the calculated F-statistic values are above the upper bounds, it indicates that there exists a long-run relationship among the variables under consideration. If the calculated values of the F-statistic range between the two extremes of lower and upper, then it signifies the absence of non-stationarity among the variables, thereby implying that Cointegration does not hold.

However, if the presence of Cointegration is found in the first very step of the estimation procedure, then we proceed to estimate the ARDL (p, q^1, q^2, q^3, … q^n in the long run with the following equation:

$$FB_t = C_0 + \sum_{i=1}^{p} \theta_i FB_{t-i} + \sum_{j=0}^{q1} \theta_j GDP_{t-j} + \sum_{j=0}^{q2} \theta_j TO_{t-j} + \sum_{j=0}^{q3} \theta_j DC_{t-j} + \sum_{j=0}^{q4} \theta_j CBI_{t-j} \quad (3)$$

Then we choose the proper lag lengths for the various variables under study based on either SBC or AIC to explain the dynamic nature of the long-run association between the variables and assume errors are uncorrelated. Lastly, the error correction term and the coefficients of the short-run gauge the pace which tune the adjustments in order to restore the relation of long-run equilibrium following any of the disturbances in the short run are to be estimated by the error correction technique which is as follows [6]:

$$\Delta FB_t = \pi + \sum_{j=1}^{p} \omega_i \Delta FB_{t-j} + \sum_{j=0}^{q1} \rho_j \Delta GDP_{t-j} + \sum_{j=0}^{q2} \sigma_j \Delta TO_{t-j} + \sum_{j=0}^{q3} \vartheta_j \Delta DC_{t-j} + \sum_{j=0}^{q4} \varphi_j \Delta CBI_{t-j} + \xi ecm_{t-1} + \mu_t \quad (4)$$

In the above equation $\omega_{i,}$ ρ_j, σ_j, ϑ_j and φ_j represent the coefficients pertaining to the short-run, while ξ represents the pace with which the adjustment occurs towards long-run equilibrium. Moreover, we also run many diagnostic tests that were

calculated to confirm that the estimated model possesses the properties of efficiency, unbiasedness, and stability.

4. Results and Discussions

4.1 Results of Unit root tests

To confirm that the evidence pertaining to the presence or absence of stationary or non-stationarity in the individual data series are binding, this chapter uses both Augmented Dickey Fuller (ADF) and Phillips- Perron (PP) tests to examine that none of the variables is having an I (2) order of integration. Pesaran et al (2001) clearly have stated that the ARDL model works in case we have I (0), I (1) or a combination of these two. Ouattara (2004) stated that ARDL estimation does not work in case the order of integration turns out to be I (2). Testing the process of stationarity and the product of the process validates the application of the ARDL bounds tests. The results of ADF are reported in the table no 4.2 and 4.3.

Table 2 ADF test results

Null hypothesis: Series is stationary					
	Level			**First difference**	
Variable	**Constant**	**Constant & Trend**	**Variable**	**Constant**	**Constant & Trend**
FB	-2.88 (0.06)	-3.55 (0.05)	D(FB)	-6.30 (0.00)	-6.13 (0.00)
GDP	-4.41 (0.00)	-4.95 (0.00)			
TO	-1.51 (0.50)	-1.77 (0.68)	D(TO)	-5.85 (0.00)	-5.85 (0.00)
DC	-0.34 (0.90)	-2.36 (0.38)	D(DC)	-1.85 (0.01)	-1.82 (0.02)
CBI	-1.81 (0.36)	-3.07 (0.13)	D(CBI)	-6.18 (0.00)	-6.30 (0.00)
TOR	-1.82 (0.35)	-1.76 (0.69)	D(TOR)	-5.06 (0.00)	-5.02 (0.00)

Source: Author's Own Calculation () contains p-values, D indicates the first difference

4.1 Cointegration Test Results

The unit root analysis ensures that none of the individual variable series is integrated into the order I(2). All the series are in the integration of either I(0) or I(1); therefore, we can use the ARDL bounds testing process to establish the long-run co-movements between our dependent and explanatory variables. The estimated ARDL equation is conveyed in Table 3. With FB as our regressed variable and GDP, TO, DC, CBI and

TOR as our explanatory variables, we proceed to estimate the ARDL model with lag length (3, 1, 1, 3, 2) by applying SBC and AIC measures. Table 3 reveals that the calculated value of F- statistic is 5.10 for variables GDP, TO, DC, CBI and 4.12 for the explanatory variables using TOR instead of CBI. The rule of thumb is that if the calculated values of the F-statistic are larger than the two extreme bounds values, thereby implying that a long-run relationship exists and vice versa. From Table 3, the calculated F-statistic value is greater than the upper bound critical value of 4.01 at a 5 percent significance level. Therefore, the results establish that the long-run relationship exists among the variables of interest in this chapter.

Table 3 Unit Root Analysis (Phillips-Perron test results)

	Level		First Difference		
Variable	**Constant**	**Constant & Trend**	**Variable**	**Constant**	**Constant & Trend**
FB	-2.69	-3.50	D(FB)	-9.81	-9.33
	(0.08)	(0.05)		(0.00)	(0.00)
GDP	-4.34	5.90			
	(0.00)	(0.00)			
TO	-1.46	-1.80	D(TO)	-5.85	-5.86
	(0.53)	(0.67)		(0.00)	(0.00)
DC	-0.54	-1.80	D(DC)	-4.44	-4.36
	(0.86)	(0.67)		(0.00)	(0.00)
CBI	-1.67	-3.08	D(CBI)	-6.96	-6.82
	(0.43)	(0.12)		(0.00)	(0.00)
TOR	-2.02	-1.85	D(TOR)	-5.06	-5.02
	(0.27)	(0.65)		(0.00)	(0.00)

Source: Author's own calculation () contains p-values. D indicates the first difference

After establishing that the Cointegration exists through the Bounds procedure, we proceed to conduct certain diagnostic tests reported in Table 4 to check the robustness and constancy of the model. We conducted the LM test.

To check that no serial correlation among the variables exists, we run the BPG test to check the heteroscedasticity and confirm that it does not exist in our model and accept the null hypothesis of Homoscedasticity and also for checking of misspecification in the model we run Ramsey Reset Test which reports that misspecifications do not exist in case of our model. Lastly, we test the goodness of fit by using the adjusted R2 technique which also turns out to be good.

Table 4 Cointegration Results

Null Hypothesis: No long-run relationships exist (CBI)		
F-STAT	**Cointegration**	**Selection Criteria**
5.10	**YES**	**Automatic**
Null Hypothesis: No long-run relationships exist (TOR)		
F-STAT	**Cointegration**	**Selection Criteria**
4.12	**YES**	**Automatic**
	Critical Bounds	
Significance	IO Bound	I1Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	**3.25**	**4.49**
1%	3.74	5.06

Source: Author's own calculation

Table 5 Diagnostic Tests

Test	**F-statistics**	**P-value**
LM Test	2.31	0.15
BPG	1.73	0.18
Ramsey Reset Test	1.21	0.29

Source: Author's own calculation

Table 6 Long-run results

Dependent Variable FB		
Long run coefficient		
Variable	**Coefficient**	**P-Value**
GDP	-0.676	0.000
TO	0.117	0.021
DC	-0.892	0.107
CBI	-0.101	0.005
C	15.222	0.000

Source: Author's own calculation

Table 7 Short run dynamics (ECM)

Dependent Variable FB		
Short run Dynamics		
Variable	**Coefficient**	**P-Value**
D (FB (-1))	0.405	0.000
D (FB (-2))	0.190	0.048
D (GDP)	-0.034	0.344

D (TO)	-0.054	0.047
D (CBI)	1.027	0.011
D (CBI (-1))	0.237	0.455
D (CBI (-2))	1.122	0.001
D(DC)	0.795	0.145
D (DC (-1))	-0.084	0.113
ECM	-0.716	0.000

Source: Author's own calculation

Then we proceed to check the stability of our estimated coefficients for the entire period by CUSUM (Cumulative sum) and CUSUMSQ (cumulative sum of squares) at a 5% level of significance as reported in the figures (4.1 and 4.2) below.
Both CUSUM (Cumulative sum) and CUSUMSQ (cumulative sum of squares) at a 5% level of significance are significant and our estimated model is significant.

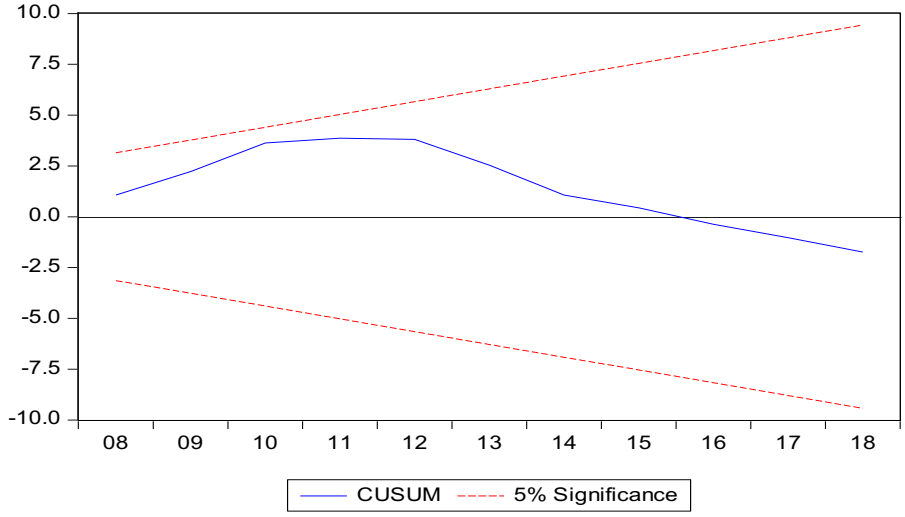

Figure 1 Stability test 1
Source: Author's own calculation

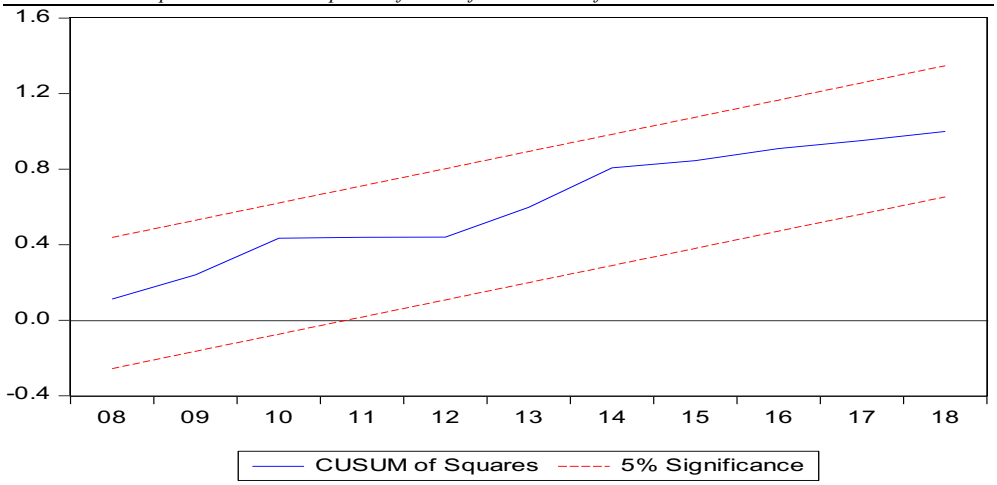

Figure 2 Stability test II
Source: Author's own calculation

4.2 Long run and short run Relationship

The short and long-run results are reported in Tables 5, 6 and 7. The results reveal a negative and statistically significant relationship between fiscal deficit and Gross domestic product, more specifically 1 percent increase in the real GDP growth rate led to a decline in fiscal deficit by 0.67 percent. The results go in line with the economic theory. The mismatch between government revenue and expenditures, whereby the expenditure exceeds the receipts, is termed fiscal deficit. In order to minimize the deficit gap between the two government resorts to monetization of debt, borrowings either domestic or foreign which hampers the macroeconomic stability of the country (Amrutha et al. 2019).

As GDP increases which is taken as a proxy for the level of overall economic performance and is having a positive relationship with the tax base, therefore, an increase in the tax base enhances the overall economic development of the country as well as the formalization of the economy takes place which results in structural change in the economy from primary to secondary and service sector (Castro and Camarillo,2014). It is important to mention here that according to tax buoyancy, as GDP increases or the tax base goes up it will generate more revenue to the government. Thus, the government needs to borrow less or it will cause less dependence on the government on borrowings and consequently, the fiscal deficit will be lower and vice versa. Moreover, With the increase in the country's economic growth, the government's spending on social programs declines as only a certain section of the population needs these programs with rising levels of income.

Consequently, an increase in the gross domestic product results in a decline in the fiscal deficits due to efficiency in public spending (Ram, 1886). Furthermore, an increase in the GDP regulates and controls the economy on a sustainable fiscal path, thereby creating long-term stability and vice versa (Ahmadi, 2021). While as, if the economic growth in the country tends to be low, demand for public goods increases and to meet the growing needs of expenses government resorts to fiscal deficits due to the lower capacity of tax revenues which leads to a worsening of budget balances and vice versa (Lucotte, 2009).

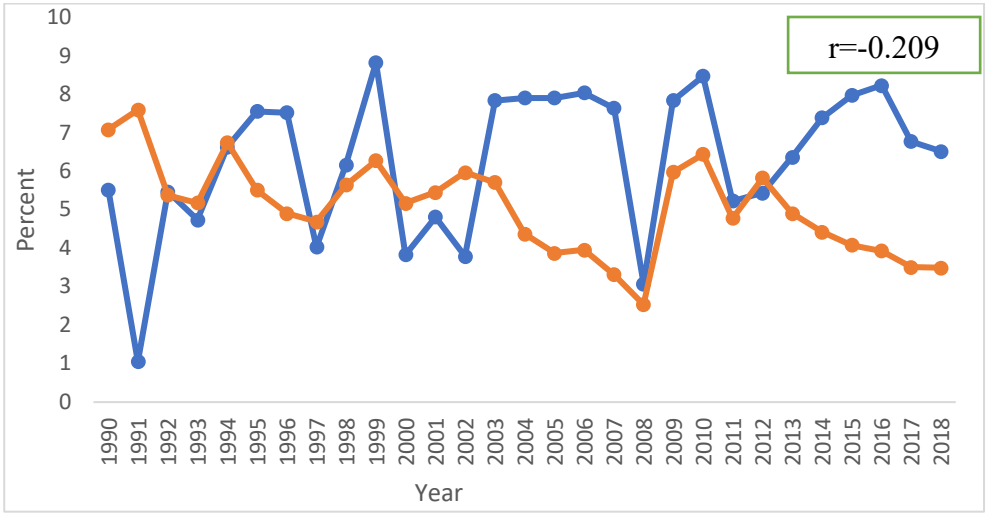

Figure 3 Trend of fiscal deficit and Gross domestic product in India
Note: Red line is fiscal deficit and the Blue line is GDP
Source: Author's own calculation using data from RBI

The views regarding the impact of economic growth on the fiscal deficit are mixed. As some studies state that with the increase in government revenue, the expenditure also rises which can be used for developmental activities (Wagner, 1883). However, as argued by Mallick (2008) if the increase in government spending comes through the borrowings from bond markets, this will result in crowding out effect [7]. Further increase in government spending leads to an upsurge in domestic production and national income, which enhances the demand for foreign goods and expands the income of exporting countries. However, the net impact depends on whether the revenues exceed expenditures and vice versa. In the case of India as in figure 3 above there is a negative relationship between fiscal deficit and GDP as the correlation

between the GDP and fiscal deficit is negative and the calculated r value is -0.209. As GDP increases, there has been a fall in the fiscal deficit levels due to the FRBM act 2003 and the banning of RBI from active involvement in buying primary securities for the government. However, for the years 2007-09 with an increase in GDP fiscal deficit increased which was due to the global financial crises that India resorted to fiscal deficit to boost the demand to mitigate the effect of shock.

Similarly, the long-run coefficient of trade openness comes out to be positive and statistically significant. The positive coefficient suggests that keeping other things constant, a one percent increase in trade openness in the Indian economy will lead to a 0.11 percent rise in fiscal deficit in the long run. This seems logical because to enhance trade, the economy needs to become more and more open, resulting in a decrease in tariffs and quotas, thereby reducing tax collection [8]. To cope with the revenue generation government resorts to deficit financing (Castro and Camarillo, 2014). Moreover, as argued by Savvides (1998) and Alseina and Perotti (1996), trade openness increases enhance income inequalities, concurrently creating upward pressure on the demand for public goods which reduces the capability of the government to increase taxes and thereby resorting to deficit financing. Besides, Combes and Sedik (2006) argued that as economies become open, they are subject to external shocks which lead to a decrease or increase in the tax base. However, developed economies have a sound tax base and smooth consumption, which does not lead to borrowings. While as developing countries like India are having volatile spending as well as a volatile tax base and thereby through the ratchet effect incur deficit budgets [9].

Another channel through which trade openness impacts fiscal deficit positively is Inflation. India is one of the emerging economies of the world and has diversified its trade with various countries. The import share as a percentage of GDP in the Indian economy is higher than the export, which influences domestic prices through an increase in the current account deficit (Sahu and Sharma, 2018). They further argued that an increase in domestic prices leads to an increase in government expenditure and fiscal deficit.

It is important to mention here that Romer's hypothesis (1993) which suggests that trade openness reduces Inflation does not hold true in the Indian context. This implies trade openness in the Indian context is inflationary. Thus, it can be argued that when openness is inflationary, it is possible that trade openness can increase the fiscal deficit in the Indian context.

However, in the short run, its impact on fiscal deficit is reported to be negative. In the short run as the increase in trade takes place it leads to an increase in the source of revenue for the government by way of an increase in the tax collection and hence a decrease in the fiscal deficit.

Coming to the impact of financial development on fiscal deficit, the levels of financial development affect fiscal deficit negatively and is statistically significant. More specifically 1% increase in the levels of financial development led to a reduction in fiscal deficit by 0.89 %. The impact of financial development on fiscal development can be traced through monetary policy effectiveness. As the levels of financial development increase in the country, it results in access to sound financial markets which can meet the needs of government expenditure through the floatation of fresh bonds in the bond market and thereby implying lower pressure on the central banks to meet the financing needs of the government. However, if the fiscal authority dominates the monetary policy and the country lacks financial development which implies constraints in the private sector to accommodate the government debt, thereby putting pressure on central banks to finance the government debt and leading to an increase in fiscal deficit (Strong and Yayi, 2021). Also, there is an indirect transmission mechanism in economic theory which states that high levels of financial development enhance economic growth by increasing capital accumulation, savings, and savings into productive channels. Moreover, the financial depth of the country boosts the inflow of foreign capital which leads to an increase in the country's revenue and hence can lower the budget deficits.

Likewise, the impact of CBI on fiscal deficit is negative and statistically significant. As reported in table 6 that 1% increase in CBI leads to a 0.10 % fall in the fiscal deficit. This result is in line with the literature on CBI as the central banks enjoy higher levels of independence. They restrain the government from borrowing and monetizing debt (Cukierman, 1992). Higher levels of CBI usher more fiscal discipline in the economy by limiting the government's credit lendings and raising the interest rate on the government borrowings [10]. However, suppose the CBs are devoid of autonomy. In that case, monetary authorities cover up the fiscal deficits of the government by printing more money and by absorbing more government bonds at lower interest rates which leads to the subjugation of monetary policy at the hands of the government and results in high Inflation (Sargent and Wallace, 1981).

Lastly, the general summary of short-run results reveals the impact of independent variables on fiscal deficit. These results are in line with the long-run dynamics except for the trade openness, which explains the above results. Furthermore, the statistically significant negative error term correction term validates the results of the Bounds F-test which confirms and ensures the presence of Cointegration among the variables under study. Moreover, the speed at which error correction occurs is -0.716, affirming that it will take 1.522 years to assemble the long-run equilibrium.

4.3 Results model II

We run the same ARDL model with the same set of equations, the results of which are reported in the above table no 8, 9 and 10 but replaced the legal CBI with that of

the actual CBI proxied by the turnover rate of governors (TOR), in order to assess the impact of actual CBI on fiscal deficit. The rest of the explanatory variables are the same, i.e., GDP, TO, DC and TOR, which is a new variable. We perform certain diagnostic tests and CUSUM and CUSUMSQ at a 5% level of significance which is reported as below:

Table 8 Diagnostic Tests

Test	F-statistics	P-value
LM	1.51	0.254
BPG	2.23	0.072
Ramsey Reset Test	3.92	0.071

Source: Author's own calculation

Table 9 Long-run results

Dependent Variable FB		
Long run coefficient		
Variable	**Coefficient**	**P-Value**
GDP	-0.171	0.107
TO	0.112	0.089
DC	-0.115	0.104
TOR	1.132	0.033
C	7.143	0.000

Source: Author's own calculation

Table 10 Short run results (ECM)

Dependent Variable FB		
Short run Dynamics		
Variable	**Coefficient**	**P-Value**
D (FB (-1))	0.347	0.038
D (GDP)	0.016	0.780
D (TO)	-0.025	0.605
D (TOR)	0.953	0.736
D (DC)	-0.064	0.468
ECM	-0.842	0.000

Source: Author's own calculation

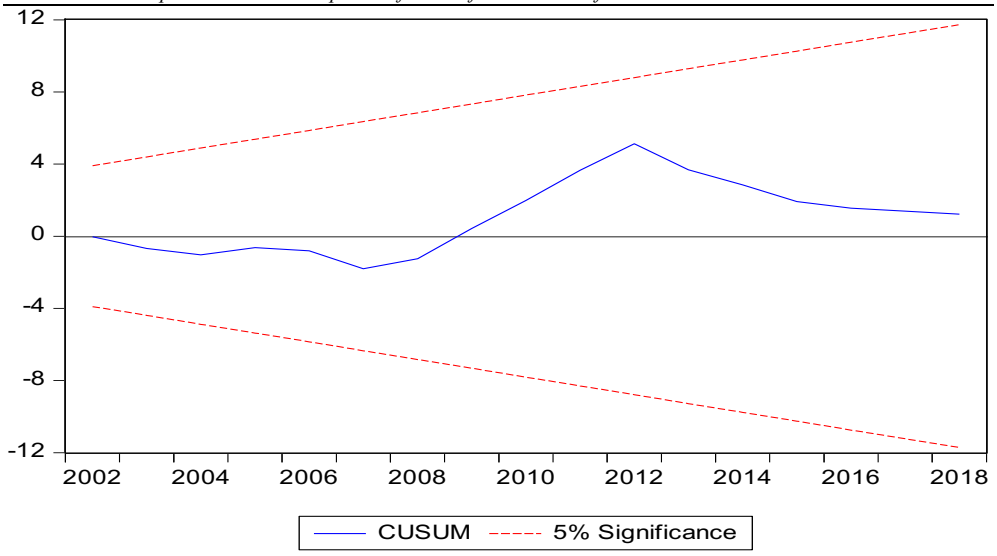

Figure 4 Stability Test III
Source: Author's own calculations

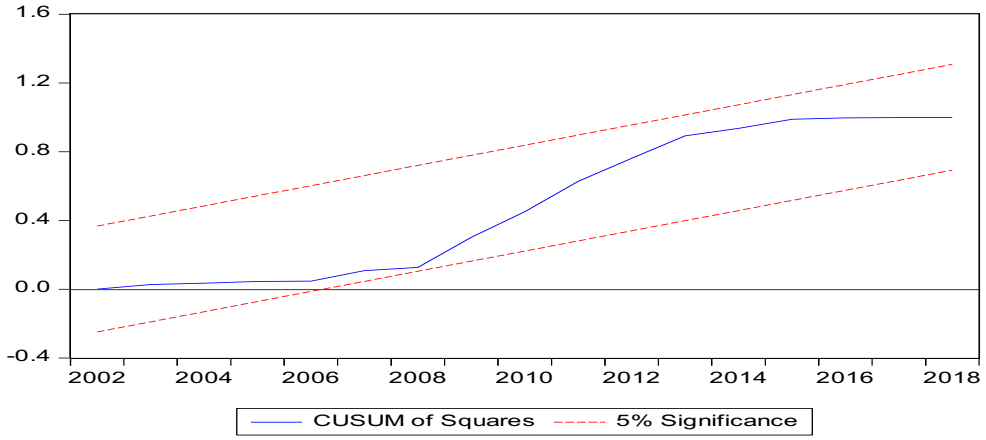

Figure 5 Stability Test IV
Source: Author's own calculation

As revealed in the above tables the results of the variables are the same as in the above tables, with only changes in the replaced variable TOR. As reported in the table, the impact of governors' turnover rate is positive and statistically significant

on fiscal deficit. The positive relationship between the variables is that the more frequently the governors are removed from office before their tenure, the fiscal deficit will likely be. The results are in line with Cukierman (1992), Cukierman & Webb (1995) and Strong and Yayi (2021) who in their studies, stated that the governors who oppose the government policies are replaced with an ally in order to accommodate their needs and policies. For the rest of the explanatory variables, the signs are the same as in the above tables.

5. Conclusions

The study has tried to examine the impact of CBI on the fiscal deficit by investigating the determinants of fiscal deficit for the period 1990-2018. We used the ARDL approach to check the variables' long-run co-movements. After having recognized the order of integration exists among the variables and all the variables are integrated of order either I (0) or I (1) and none of the variables has an I (2) order of integration. This procedure confirms and favors the cointegration procedure based on the Bounds test.

In the long run, the impact of explanatory variables is well according to the theoretical contours and research conducted by many scholars. The coefficient of each variable is statistically significant. Precisely, the impact of GDP on fiscal deficit is negative and is well according in line with the economic theory. Likewise, the impact of trade openness on fiscal deficit is positive as well as negative due to the channels of trade liberalization. If liberalization takes place which leads to more openness and if the openness comes at the cost of a reduction in tariffs and taxes then it leads to fiscal deficits (Gupta, 2007). On the other hand, if trade openness by way of trade liberalization increases the revenue collection by way of tariffication of quotas, reduction in exemptions and enhancement in the customs process then it leads to a fall in fiscal deficits (Keen and Simone, 2004).

Similarly, the impact of financial development on fiscal deficit is negative due to the direct and indirect channels of the transmission mechanism of monetary policy effectiveness. Moreover, the impact of central bank independence on fiscal deficit is negative and in line with the literature on CBI, which states as central banks enjoy more autonomy the levels of fiscal deficit decrease due to credit limitations on government. Finally, the impact of TOR on fiscal deficit is found to be positive, which reveals that frequent removal of governors results in a large deficit as government appoints ally who accommodates their fiscal policies.

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Notes:

[1] For more details see Strong and Yayi (2021).

[2] For more details refer to Dickey and Fuller (1979) and Phillips-Perron (1988).

[3] In case the time series under consideration is having an integration order of two I (2), then the test statistic of the estimation is unacceptable, Ouattara (2006).
[4] In the model selection of proper lengths of lag avoids any loss pertaining to information regarding the long run.
[5] Due to this Modified ECM is known as unconstrained ECM while as Pesaran et al. (2001) have named it as restrictive ECM.
[6] For more details see (Apergis et al. 2010 Bhat, 2018).
[7] Government borrowings to finance productive as well as unproductive activities by way of floating bonds can hamper economic growth by way of creating huge fiscal deficits.
[8] For more details see Mallick, H. (2008). Government spending, trade openness and economic growth in India: A time series analysis.
[9] The ratchet effect states that as income decreases the level of spending does not fall with the fall in income.
[10] For more details see Yannick Lucotte (2009), Central Bank Independence and Budget Deficits in Developing Countries: New Evidence from Panel Data Analysis.