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THE EFFECT OF FISCAL MANAGEMENT ON GOVERNMENT EXPENDITURE IN THE STATES OF INDIA: A PANEL DATA ANALYSIS

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Abstract: The Fiscal Responsibility and Budget Management (FRBM) Act, 2003 imposes fiscal discipline on governments by limiting the fiscal deficit to a manageable level of 3% of the GDP. With fiscal consolidation, a reduced fiscal deficit decreases interest payment and debt servicing and permits governments to prioritise spending on capital expenditure or social sector expenditure. By reducing the revenue deficit, falling interest payments further increases the scope of capital outlay. This paper examines the causal relationship between fiscal deficit, interest payment, social sector expenditure and capital outlay, using panel data on state finances of seventeen major states of India years over a time period 2000-2023. The panel data analysis, based on the Johansen cointegration test, Granger causality test and error correction mechanism shows that there is a long-run relationship between gross fiscal deficit, capital outlay and interest payment. And there is long-run causality running from interest payment to capital outlay. Though there is short-run causality, there is no long-run causality running from aggregate social sector expenditure to gross fiscal deficit. The estimated results suggest that many state governments have increased their capital expenditure with a reduction in gross fiscal deficit and interest payment.

Keywords: Fiscal deficit, interest payment, government expenditure, causality, cointegration, error correction

INTRODUCTION

The Fiscal Responsibility and Budget Management (FRBM) Act was enacted in 2003 by the Parliament of India to institutionalise discipline in India's finances, reduce fiscal deficit, improve macroeconomic management, fiscal sustainability, and management of public funds, ultimately moving towards a balanced budget. The immediate and principal aim was to eliminate the revenue deficit of the country and bring down the fiscal deficit to a manageable level of 3% of the GDP by March 2008. However, due to the 2007 international financial crisis, the deadline for the implementation of the targets in the Act was initially postponed and subsequently suspended in 2009. The FRBM Act provides a legal institutional framework for fiscal consolidation. It is now mandatory for the central government to take measures to reduce fiscal deficit, to eliminate revenue deficit and to generate revenue surplus. The FRBM Act binds the government to hold to the path of fiscal consolidation. The government can move away from the path of fiscal consolidation only in case of natural calamity, national security and other exceptional grounds which the central government may specify.

Subsequently, the state governments have also adopted a rule-based framework for fiscal correction and consolidation through progressive enactment of Fiscal Responsibility Legislation (FRL). Karnataka was the first to enact the FRL in September 2002 followed by Kerala and Tamil Nadu in 2003, and Punjab in 2004. Subsequently, twenty-two more states enacted the FRLs. The fiscal position of the state governments broadly followed the pattern witnessed by the central government. There has been severe fiscal stress in the finances of state governments since the mid-eighties. The fiscal stress emanated from the inadequacy of receipts in meeting the expenditure requirements, low and declining buoyancy in tax and non-tax receipts, and constraints on internal resource mobilisation due to losses incurred by state-owned public sector undertakings. The deceleration in resource transfer from the centre to the states also contributed to the worsening of state finances. The enactment of FRLs has provided an impetus to the process of attaining fiscal sustainability as a reduction in key deficit indicators viz. revenue deficit (RD) and gross fiscal deficit (GFD). Apart from fiscal sustainability, meeting the targets set in FRLs is crucial not only for maintaining credibility in budgetary operations but also for ensuring prudent debt management and greater transparency.

With FRBM, a reduction in fiscal deficit favours a further reduction in future interest payments. Consequently, with a given level of revenue, a reduction in interest payment releases funds for other public expenditures. Hence, the falling interest payment may create two immediate effects: (i) increases the scope for social sector expenditure in the revenue account, and (ii) by reducing revenue deficit, increases the scope of capital outlay, for a given amount of borrowing. Thus, after the implementation of the FRBM Act, fiscal consolidation at the state level improves not only the quantity but also the quality of expenditure by the states. For sustainable long-term growth, the revenue account needs to be balanced while borrowed funds should only be used for capital expenditure in order to maintain intergenerational equity. Moreover, lower deficits lead to reduced borrowings which, in turn, would ease the interest burden.

Following the FRBM and FRL acts, in the process of fiscal corrections, there has been a rise in total expenditure involving both revenue and capital components accompanied by some rise in revenue receipts. Significantly, 13 out of 17 non-special category states have been successful in reducing the proportion of their total expenditure to GSDP after the implementation of FRBM. Before the implementation of FRBM, the average total expenditure per GSDP was 17.8% and post-FRBM the average total expenditure to GSDP was 17.1. Goa, Maharashtra, Haryana, Rajasthan and Jharkhand have experienced an expenditure reduction of two percentage points and above, which is noteworthy since the overall average expenditure GSDP ratio of the 17 states underwent a reduction of about one percentage point between the two points (RBI, 2016). In terms of expenditure composition, 12 states have been able to curtail their revenue expenditure-GSDP ratio in the post-FRBM period. While the overall average has reduced by 1% age point in the post-FRBM period, four states (Goa, Maharashtra, Haryana, and Gujarat) have been successful in reducing their revenue expenditure-GSDP ratio by 2% age points or more.

The states, in general, have raised the average capital outlay-GSDP ratio by 0.6% age point post-FRBM. Six states (Chhattisgarh, Madhya Pradesh, Uttar Pradesh, Bihar, Karnataka and Tamil Nadu) out-performed the average by improving this ratio by more than 1% age point. Overall, 13 states have improved their capital outlay-GSDP ratios. At the overall level, there has been only marginal improvement in the average development expenditure-GSDP ratio. Although no high-income state recorded an improvement in the post-FRBM period, seven states from the low-income group have improved the average development expenditure-GSDP ratio. In contrast, there has been an appreciable decline in the average non-developmental expenditure-GSDP ratio post-FRBM, with the majority of states achieving a reduction in the range of 0.4-3.9 points (RBI, 2016). After the implementation of FRBM, there has been an increase in the number of occasions on which various states have recorded revenue balance or surplus.

Among the 17 non-special category states, in the 11 non-special category states viz. Andhra Pradesh, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Uttar Pradesh, Rajasthan, Bihar, Haryana, Kerala, Punjab, Tamil Nadu and West Bengal, after the FRBM Act, while the average gross fiscal deficit (GFD) has continuously declined since 2005, around 2010 there has been a hike in GFD because of the economic depression and it goes on increasing since then. While the average interest payment in these states has been declining, the capital outlay has been increasing. Thus, after the introduction of the FRBM Act, there is a significant relationship between the changes in interest payment and capital outlay. In the other 6 states viz. Bihar, Haryana, Kerala, Punjab, Tamil Nadu and West Bengal, interest payment and higher capital outlay are higher.

Thus, there exists a causal relationship between fiscal deficit, interest payment and debt servicing, social sector expenditure and capital outlay. However, the direction of causality is not clear as some states show inverse and some states exhibit a positive relation between interest payment and capital outlay. Hence, the main objective of this paper is to empirically examine the causality between fiscal deficit, interest payment, social sector expenditure and capital outlay. Empirically, state finances data and panel data methodology are used. The causality analysis of this paper shows there is a long-run relationship between gross fiscal deficit and capital outlay and interest payment and from interest payment to capital outlay. There exists some disequilibrium in these variables and the error correction results show reduced GFD-induced capital sector outlay and not the social sector spending.

DATA AND METHODOLOGY

The database used in this study is unbalanced panel data for 17 states of India for the years 2000-2023, collected from 'State Finances: A Study of Budgets' published annually by the RBI with regard to the fiscal position of state governments. The 17 states are Andhra Pradesh, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. The data contains not only the statements of GFD, revenue expenditure and capital expenditure of the states but also includes data on the policy initiatives of state governments, the government of India and the RBI. The consolidated fiscal position of state governments, an assessment of state-wise fiscal performance, outstanding liabilities, market borrowings and contingent liabilities of state governments, fiscal transfers to the state governments and issues and perspectives in the path of fiscal adjustment, expenditure management, fiscal transparency and budget integrity, debt sustainability and infrastructural financing. The variables considered for the causality analysis are gross fiscal deficit, interest payment, capital outlay and aggregate social sector expenditure.

Gross fiscal deficit is calculated by taking the difference between the total revenue and total expenditure of the government. While calculating the total revenue, borrowing is not included. On one hand, interest payment by states, as a borrower, represents the rate charged on lending funds. On the other hand, as an investor, **interest payments** represent income earned on cash accounts or fixed and variable rate securities. Capital outlay is calculated by adding development expenditure and rural development expenditure. Aggregate social sector expenditure is calculated by adding all the expenditure incurred by the government for the development of the social sectors. They include education, sports, art, culture, medical and public health, family welfare, water supply and sanitation, housing, urban development, the welfare of scheduled caste, scheduled tribes and other backward classes, labour and labour welfare, social security and welfare, nutrition, relief on account of natural calamities, others. The panel unit is the state and the time variable is the year, and the natural log of all the variables is used to avoid the surplus value of GFD in some states. As the study focuses on the time series of GFD and its causality between interest payment and debt servicing, capital outlay and aggregate social sector expenditure, panel unit root test, Johansen cointegration test, vector error correction model and Granger causality test are used in the empirical analysis.

Stationarity Test: Stationarity of a time series is an important phenomenon because it can influence its behaviour. Applying OLS to a non-stationary random process (integrated) of variables will only generate a spurious regression. Stationarity is the statistical characteristics of a series such as its mean and variance being constant over time. If both are constant over time, then the series is said to be a stationary process, otherwise, non-stationary process. If a series is stationary without any differencing it is designated as integrated of order 0, I (1). On the other hand, a series that has stationary at first difference is designated I (1). For the stationarity test, the conventional test is the Dicky-Fuller unit root tests of the following,

$$y_{it} = \alpha_i + \rho_i y_{it-1} + e_{it} \quad (1)$$

The null hypothesis is that each series in the data contains a unit root, i.e. $H_0: \rho_i=0$ for all i and the alternative hypothesis is that it does not have a unit root, i.e. $H_1 \neq 0$.

Panel Unit Root test: The panel unit root tests are more powerful (less likely to commit a Type II error) than time series unit root tests applied to individual series because the information in the time series is enhanced by that contained in the cross-section data. In addition, in contrast to individual unit root tests which have complicated limiting distributions, panel unit root tests lead to statistics with a normal distribution in the limit. With the exception of the IPS test (Im, Pesaran and Shin (2003), Levin, Lin and Chu (2002), Breitung (2000) and Hadri (2000) tests assume that there is a common (identical) unit root process across the relevant cross-sections. The LLC and Breitung tests employ a null hypothesis of a unit root using the following Augmented Dickey-Fuller (ADF) specification,

$$\Delta y_{it} = \alpha y_{it-1} + \Sigma \beta_{ij} \Delta y_{it-j} + \delta x_{it} + u_{it} \quad (2)$$

where y_{it} refers to the pooled variable, X_{it} represents exogenous variables in the model such as country fixed effects and individual time trends, and u_{it} refers to the error terms which are assumed to be mutually independent disturbances. It is also assumed that $\alpha = \rho$-1 is identical across the three cross-sections, but the lag order for the difference terms across the 17 states is allowed to vary. By contrast, the less restrictive IPS test (and other widely used tests such as the ADF Fisher Chi-square) estimates a separate ADF regression for each of the 17 cross sections to allow for individual unit root processes; i.e. ρ_i may vary across cross sections.

Cointegration Test: In the case of non-stationary data, it is quite possible that there is a linear combination of integrated variables that is stationary; such variables are said to be cointegrated. The cointegration test procedure uses two tests to determine the number of cointegrating vectors: the Trace test and the Maximum Eigenvalue test. The Trace statistic investigates the null hypothesis of r cointegrating relations against the alternative of n cointegrating relations, here n is the number of variables in the system for $r = 0, 1, 2, \ldots, n-1$. Its equation is computed according to the following formula,

$$\text{Trace statistic: Trace} = -T \Sigma \text{ Log } (1-\lambda^1_t) \quad t = r+1, \ldots, p \tag{3}$$

where λ is the maximum eigenvalue, $\lambda^1_{r+1}, \ldots, \lambda^1_p$ are $(p-r)$ number of estimated eigenvalues and T is the sample size. The Maximum Eigenvalue statistic tests the null hypothesis of r cointegrating relations against the alternative of $r+1$ cointegrating relations for $r = 0, 1, 2 \ldots n-1$. This test statistic is computed as,

$$\text{Maximum eigenvalue statistic: } \lambda_{max} (r, r+1) = -T \log (1 - \lambda^1_{r+1}) \tag{4}$$

In some cases, Trace and Maximum Eigenvalue statistics may yield different results and then in this case the result of the trace test should be preferred. To determine whether a cointegrating relationship exists among the variables, the Pedroni (1999) methodology employs four-panel statistics and three group panel statistics to test the null hypothesis of no cointegration against the alternative hypothesis of cointegration. In the case of panel statistics, the first-order autoregressive term is assumed to be the same across all the cross-sections, while in the case of group panel statistics the parameter is allowed to vary over the cross-sections. If the null is rejected in the panel case, then the variable GFD is cointegrated with all the variables. On the other hand, if the null is rejected in the group panel case, then there is at least one cointegration among the variables.

Error Correction Model: The Error Correction Model (ECM) is a theoretically driven approach useful for estimating both short-term and long-term effects of a time series on another time series. The term error correction relates to the fact that the last period's deviation from a long-run equilibrium, the error, influences its short-run dynamics. The ECMs directly estimate the speed at which a dependent variable returns to equilibrium after a change in another variable. If cointegration has been detected between series, then as there exists a long-term equilibrium relationship between them, the ECM is applied in order to evaluate the short-run properties of the grated series. The regression equations for ECM are,

$$\Delta y_t = \alpha_1 + \rho_1 e_1 + \textstyle\sum_{i-0}^{n} \beta_i \, \Delta y_{t-1} + \sum_{i-0}^{n} \delta_i \, \Delta x_{t-I} + \sum_{i-0}^{n} \gamma_i z_{t-i} \tag{5}$$

$$\Delta x_t = \alpha_2 + \rho_2 e_{i-1} + \textstyle\sum_{i-0}^{n} \beta_i \, \Delta y_{t-1} + \sum_{i-0}^{n} \delta_i \, \Delta x_{t-I} + z_{t-i} \tag{6}$$

In the Vector Error Correction Model (VECM), the cointegration rank shows the number of cointegrating vectors. For instance, a rank of two indicates that two linearly independent combinations of the non-stationary variables will be stationary. A negative and significant coefficient of the ECM indicates that any short-term fluctuations between the independent variables and the dependent variable will give rise to a stable long-run relationship between the variables.

Granger Causality Test: A general specification of the Granger-causality test can be expressed as,

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \ldots\ldots + \alpha_i y_{t-I} + \beta_1 x_{t-1} + \ldots\ldots + \beta_i x_{t-I} + v \quad (7)$$

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \ldots\ldots + \alpha_i x_{t-I} + \beta_1 y_{t-1} + \ldots\ldots + \beta_i y_{t-I} + v \quad (8)$$

In the model, the subscript denotes time periods and v is a white noise error. The constant parameter α_0 represents the constant growth rate of the variables and thus the trend in the variables can be interpreted as general movements of cointegration between the variables and y that follows the unit root process. We can obtain two tests from the analysis: the first examines the null hypothesis that the *x* does not Granger-cause *y* and the second test examines the null hypothesis that *y* does not Granger-cause *x*. If we fail to reject the former null hypothesis and reject the latter, then we conclude that *x* changes are Granger-cause by a change in *y*. Unidirectional causality will occur between the two variables if either null hypothesis is rejected. Bidirectional causality exists if both null hypotheses are rejected and no causality exists, i.e. neither null hypothesis is rejected.

EMPIRICAL ANALYSIS

Table 1 presents the descriptive statistics of the variables used in the study. The dependent variable is gross fiscal deficit (LGFD), and the explanatory variables are total aggregate expenditure (LAGGEXP), total capital outlay (LCO), and interest payment and debt servicing (LIP), all in natural log forms. It can be noted that the interest payment is almost equal to capital outlay and the gross fiscal deficit. Table 2 presents the correlation matrix of the variables used in the study. The interest payment and gross fiscal deficit are highly correlated. And capital outlay and interest payments are also highly correlated. The least correlation is between interest payment and social sector expenditure.

Unit Root Test: In order to investigate the stationarity of the variables LAGGEXP, LCO, LIP and LGFD, panel unit root tests (Levin Lin Chu, Breitung, Fisher Phillips Perron, Im, Peseran Shin, Fisher ADF) are applied. The null hypothesis is the 'presence of unit root' (i.e. presence of non-stationarity) against the alternative hypothesis 'series is stationary'. It is clear from Table 3 that the null hypothesis of no unit root for all the

Table 1: Descriptive Statistics of Variables

Variable	*Description (Rs.crore per annum)*	*Mean*	*Std. dev.*
GFD	Gross fiscal deficit (total revenue-total expenditure)	8648.68	7994.86
AGGEXP	Aggregate social sector expenditure(addition of expenditures on education, sports, art, culture, medical and public health, family welfare, water supply and sanitation, housing, urban development, welfare of scheduled caste scheduled tribes and other backward classes, labour and labour welfare, social security and welfare, nutrition, relief on account of natural calamities, others and economic services)	3979075	6076415
CO	Total capital outlay(combined development expenditure and rural development expenditure)	7610.57	7701.50
IP	Interest payment and debt servicing (appropriation for reduction or avoidance of debt and interest payment and debt servicing)	7600.05	6102.66
LGFD	Log of gross fiscal deficit	8.490	1.411
LAGGEXP	Log of aggregate social sector expenditure	15.882	2.560
LCO	Log of capital outlay	8.456	1.112
LIP	Log of interest payment and debt servicing	8.605	0.931

Table 2: Correlation Matrix of Causal Variables

Variable	*LAGGEXP*	*LCO*	*LGFD*	*LIP*
LAGGEXP	1.00	-	-	-
LCO	0.058(0.51)	1.00	-	-
LGFD	0.295*(0.00)	0.328*(0.00)	1.00	-
LIP	0.235*(0.002)	0.555*(0.00)	0.645*(0.000)	1.00
Note: p-values in parentheses. * Significant at 5 per cent level.				

time series is rejected at their first difference at a 1% level of significance. All the variables have unit roots in their level form, but at the first difference, the variables became stationary and integrated of the same order, i.e. I (1).

Cointegration Test: The cointegration relationship across the variables is performed by Johansen's (1991) cointegration test. The precondition for the panel cointegration test is that the variables must be non-stationary at levels, but when all the variables are converted into the first difference the variables become stationary. As shown in Table 4, all the variables are non-stationary at levels and when taken first difference they become stationary. Both the trace statistic and maximum Eigen statistics reject the null hypothesis of no cointegration at 0.05 level in all cases. The Johansen methodology shows that there exist at most two cointegrating relationships among LGFD, LCO, LIP, and LAGGEXP. Hence, estimation of the VECM model is required

Table 3: Unit Root Test for Stationarity (p-values)

Variable	*Levin, Lin, Chu test*		*ADF-Chi-square*		*PP-Fisher Chi-square*	
	level	*1st difference*	*level*	*1st difference*	*level*	*1st difference*
LAGGEXP	0.04	0.00	0.93	0.00	0.95	0.00
LCO	0.94	0.00	1.00	0.00	1.00	0.00
LIP	1.00	0.00	1.00	0.00	1.00	0.00
LGFD	0.97	0.00	1.00	0.00	1.00	0.00

Table 4: Johansen-Fisher Panel Cointegration Test

LGFD= f(LAGGEXP,LCO, LIP)				
No of CEs	*Trace statistics*	*0.05 critical value*	*Max–Eigen statistics*	*0.05 critical value*
None**	432.1	47.856	349.2	27.584
At most 1	176.9	29.798	137.3	21.131
At most 2	109.2	15.495	109.2	14.265

Note: ** Trace and max Eigen statistics indicate 1 cointegrating equation at 5% level.

in this context. The presence of cointegration between variables suggests a long-run relationship among the variables under consideration.

The long-run relationship between LAGGEXP, LCO, and LIP for one cointegrating vector for 17 states over the period is shown in Table 5. There exists a long-run relationship between LGFD, LCO and LIP. The estimated long-run coefficients are interpreted in such a way that if the coefficient value is negative and the p-value is significant, then there exists a long-run relationship among the variables. The coefficient value of LAGGEXP is negative but the p-value is 0.33 i.e. the p-value is insignificant, and hence the null hypothesis that there exists a long-run relationship between LGFD and LAGCEXP is rejected. Even though there is a budget deficit, the state governments would like to expand on social sectors. The results also show that there exists a long-run relationship between capital outlay with interest payment, and there is long-run causality running from interest payment to capital outlay.

Table 5: VECM Estimates of Long Run Coefficients

Variable	*Dependent variable*		
	LGFD	*LIP*	*LCO*
LAGGEXP	-0.046 (0.33)	-	-
LCO	- 0.431** (0.00)	0.02** (0.04)	-
LIP	- 0.79** (0.00)	-	0.40** (0.00)
R-square	0.81	0.40	0.56

Note: p-values in parentheses. ** significant at 5% level.

Granger Causality Test - Wald Statistic: The Granger causality is used to test the short-run causality among variables. The test statistics for the Granger test should follow a Chi-square distribution instead of an F-distribution. With respect to the short-run causality between LGFD, LCO and LAGGEXP, the p-values are significant, as shown in Table 6. Therefore, the null hypothesis that there is no short-run causality running from the independent variable to the dependent variables is rejected, as the chi-square p-value for both lags is lower than 0.05. Hence, LCO jointly causes GFD. Likewise, the chi-square p-values for the independent variables aggregate social sector expenditure and interest payment are also lower than 0.05, and hence both the lags of these variables jointly cause GFD.

Table 6: Granger Causality Test: Wald Statistic

Variable	*LGFD*	*LCO*	*LAGGEXP*	*LIP*
LGFD	-	0.253 C(12)=C(13)=0	0.000 C(22)=C(23)=0	0.051 C(32)=C(33)=0
LCO	0.004** C(4)=C(5)=0	-	0.000 C(24)=C(25)=0	0.065 C(34)=C(35)=0
LAGGEXP	0.000* C(6)=C(7)=0	0.0004* C(16)=C(17)=0	-	0.407 C(36)=C(37)=0
LIP	0.201 C(8)=C(9)=0	0.349 C(18)=C(19)=0	0.609 C(28)=C(29)=0	-

Note: *,** significant at 1, 5% levels.

Vector Error Correction Model: The error correction mechanism tries to correct the disequilibrium between gross fiscal deficit and interest payment. As shown in Table 7, the current log of gross fiscal deficit only depends on the second log of interest payment. And it is not influenced by the one-period lag of interest payment. Hence, the error correction of the second lag is more important than the first lag**.** After error correction, 46% of the change in the GFD variable is explained by the second lag

Table 7: VECM Estimates of Error Correction Estimates

Dependent Variable: Log(GFD)				
D(LOG_GFD_) = C(1)*(LOG_GFD_(-1) - 1.05701719659*LOG_INTR_PAYMENT(-1) + 0.555847431289) + C(2)*D(LOG_GFD_(-1)) + C(3)*D(LOG_GFD_(-2)) + C(4)*D(LOG_INTR_PAYMENT(-1)) + C(5)*D(LOG_INTR_PAYMENT(-2)) + C(6)				
	Coefficient	*Std. error*	*t-statistic*	*Probability*
(C1)	-0.781	0.148	-5.263	0.000
(C2)	-0.140	0.123	-1.137	0.256
(C3)	0.011	0.084	0.138	0.889
(C4)	1.166	0.909	1.282	0.201
(C5)	-1.177	0.931	-1.265	0.207
(C6)	0.137	0.156	0.881	0.379
(C7)	0.042	0.013	3.185	0.001
(C8)	-0.021	0.011	-1.902	0.058
(C9)	-0.001	0.007	-0.168	0.866
(C10)	0.033	0.083	0.398	0.690
(C11)	-0.166	0.086	-1.931	0.054
(C12)	0.117	0.014	8.045	0.000
R-square	0.463			
Adjusted R-squire	0.441			
SE of regression	1.0337			
Sum squared residual	132.510			
Mean dependent variable	0.129			
SD dependent variable	1.383			
Durbin-Watson statistics	2.106			

value of the interest payment. In the second error correction, the log of capital outlay depends on the log of interest payment. Current capital outlay depends on its own first and second lags as well as the first and second lags of the interest payment. After error correction, 55% of changes in the capital outlay are explained by a change in interest payment. When C1, the error correction term, has a negative coefficient and is significant then there exists long-run causality from the independent variable to the dependent variable. In both the cointegrating equations, the C1 coefficient is negative and statistically significant at the 1% level. This means that there would be a speed of adjustment towards long-run equilibrium.

Pairwise Granger Causality Test: The Pairwise Granger causality test explains which variable Granger causes the other. Table 8 shows that capital outlay Granger cause gross fiscal deficit and gross fiscal deficit does not Granger cause capital outlay. Hence, there exists unidirectional causality between gross fiscal deficit and capital outlay and in the case of interest payment and gross fiscal deficit also there exists unidirectional causality. But, in the case of capital outlay and aggregate social sector expenditure, a bidirectional causality exists. The last causality is bidirectional causality among interest payment and capital outlay.

Table 8: Pairwise Granger Causality Test

Null hypothesis	*F-statistics*	*p-value*
LOG_AGG_ does not Granger Cause LOG_GFD_	72.41	0.00
LOG_ GFD_ does not Granger Cause LOG_AGG	28.01	0.00
LOG_CO_ does not Granger Cause LOG_GFD_	6.72**	0.0016
LOG_GFD_ does not Granger Cause LOG_CO_	0.08	0.92
LOG_IP_ does not Granger Cause LOG_GFD_	15.08	0.00
LOG_GFD_ does not Granger Cause LOG_IP_	6.33**	0.002
LOG_CO_ does not Granger Cause LOG_AGG_	7.69**	0.0006
LOG_ AGG_ does not Granger Cause LOG_CO_	0.84	0.43
LOG_IP_ does not Granger Cause LOG_AGG_	19.79	0.00
LOG_ AGG_ does not Granger Cause LOG_IP_	4.09	0.018
LOG_IP_does not Granger Cause LOG_CO_	3.33**	0.049
LOG_ CO_ does not Granger Cause LOG_IP_	3.11**	0.047

Note: ** significant at 5% level.

CONCLUSION

The Fiscal Responsibility and Budget Management (FRBM) Act, 2003 limits the fiscal deficit of both central and state governments with the objective of imposing fiscal discipline. It necessitates that the fiscal management should be conducted in a disciplined manner i.e. government deficits or borrowings should be kept within reasonable limits.

Therefore, governments should plan their expenditures in accordance with their revenues so that the borrowing should be within limits. Then it is the discretion of the governments to prioritise spending, whether on capital expenditure or on social sector expenditure. Reduction in fiscal deficit leads to a further reduction in future interest payment and debt servicing, an expenditure in the revenue account. Consequently, with a given level of revenue, a reduction in interest payment releases funds for other public expenditures. The falling interest payment may create two immediate effects (i) increases the scope for social sector expenditure in the revenue account, and (ii) by reducing revenue deficit, increases the scope of capital outlay, for a given amount of borrowing.

The empirical analysis of this paper shows that the test variables – LGFD, LIP, LCO and LAGGEXP – are non-stationary at levels and they are stationary at their first difference. Hence, the unit root tests are performed, and the cointegration analysis for those variables shows that there are at most two cointegrating equations, implying causality among the variables. With cointegration with each other, there should be some disequilibrium happening between those variables and some causality among the variables. As regards causality, there is no long-run causality running from aggregate social sector expenditure to gross fiscal deficit, but there is short-run causality running from social sector expenditure and gross fiscal deficit. There exists a long-run relationship between gross fiscal deficit and capital outlay and interest payment. And the capital outlay and interest payment have a long-run relationship with the gross fiscal deficit. And there is long-run causality running from interest payment to capital outlay.

As there is some disequilibrium happening between those variables, the error correction model is applied to correct that disequilibrium. For, a reduction in fiscal deficit means a low rate of interest payment, and hence, the revenue deficit will reduce or the revenue surplus will increase. It will allow the government to spend more on long-term expenditure (capital expenditure). Hence, a reduction in interest payment will increase the capital outlay and there will be more spending for meeting long-term capital sector expenditure.

Thus, after the implementation of the FRBM Act, each state government took measures for effective fiscal consolidation which has a positive effect on the reduction in gross fiscal deficit. This means governments have been able to reduce their GFD to a certain extent and they could spend more on capital sector development. With the consequent reduced interest payment and debt servicing, the discretion of the state governments to spend either on the social sector or on the capital sector. As the data suggests many state governments have increased their capital expenditure as the GFD and interest payment and serving of debt reduced. However, in reality, the governments should also have to expend for the social sector irrespective of surplus revenue or not, and hence the governments face deficit budgets all the time.

REFERENCES

Bose, N., M. E. Haque and D.R. Osborn (2007) "Public Expenditure and Economic Growth: A Disaggregated Analysis for Developing Countries", *The Manchester School*, 75, 5, 533-556.

Breitung, J. (2000) "The Local Power of Some Unit Root Tests for Panel Data", in B.H. Baltagi (ed.): *Advances in Econometrics, Volume 15: Nonstationary Panels, Panel Cointegration, and Dynamic Panels*, Amsterdam: JAI Press, 161-178.

Hadri, K. (2000) "Testing for Stationarity in Heterogeneous Panel Data", *Econometrics Journal*, 3, 2, 148-161.

Im, K.S., M.H. Pesaran and Y. Shin (2003) "Testing for Unit Roots in Heterogeneous Panels", *Journal of Econometrics*, 115, 1, 53-74.

Johansen, S. (1991) "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models", *Econometrica*, 59, 6, 1551-1580.

Levin, A., C.-F. Lin and C.-S.J. Chu (2002) "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties", *Journal of Econometrics*, 108, 1, 1-24.

Mohanty, R.K. (2012) "Fiscal Deficit – Economic Growth Nexus in India: A Cointegration Analysis", Working Paper, CESP, JNU, New Delhi.

Pedroni, P. (1999) "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors", *Oxford Bulletin of Economics and Statistics*, *Special Issue*, 61, 653-670.

Philips, P.C.B. and P. Perron (1988) "Testing for Unit Root in the Time Series Regression", *Biometrika*, 75, 2, 335-346.

Rangarajan, C. and D.K. Srivastava (2005) "Fiscal Deficit and Government Debt in India Implications for Growth and Stabilization", Working Paper, NIPFP, New Delhi.

Rangarajan, C. and D. Subba Rao (2007) "Importance of Being Earnest about Fiscal Responsibility", Monograph 3/2007, Madras School of Economics, Chennai.

Reserve Bank of India (2016) *State Finances: A Study of Budgets, 2015-16*, Mumbai: RBI.

Srivastava, D.K. (2006) "FRBM Act and Eleventh Plan Approach Paper", *Economic and Political Weekly*, 41, 43/44, 4553-4559.

Srivastava, D.K. (2008) "Fiscal Responsibility Rules in India Impact And Reassessment", Paper presented at the V.K.R.V. Rao Centenary Conference on National Income and Other Macroeconomic Aggregates in a Growing Economy, April 28-30l, 2008, Delhi School of Economics and Institute of Economic Growth, Delhi.

Tan, E.C. (2006) "Fiscal Deficits Inflation and Economic Growth in a Successful Open Developing Economy", *Review of Applied Economics*, 2, 1, 29-139.

Tiwari, A.K. and A.P. Tiwari (2011) "Fiscal Deficit and Inflation: An Empirical Analysis for India, *Romanian Economic Journal*, 14, 42, 131-158.

Tiwari, A.K., K.G. Suresh and M. Mihai (2015) "A Structural VAR analysis of Fiscal Shocks on Current Accounts in Greece", *Theoretical and Applied Economics*, 22, 3, 5-20.

Appendix 1: VECM Estimates of Error Correction Mechanism

Cointegrating equations				
LOG_GFD_(-1)	1.000			
LOG_AGG_(-1)	-1.749 (0.052) [-33.128]			
LOG_CO_(-1)	0.437 (0.083) [5.269]			
LOG_INTR_PAYMENT(_1)	0.3622 (0.092) [3.916]			
Constant	11.224			
Error correction	*D(LOG_GFD_)*	*D(LOG_AGG_)*	*D(LOG_CO)*	*D(LOG_IP)*
CointEq1	0.014 (0.029) [0.476]	1.4606 (0.044) [32.557]	-0.097 (0.041) [-2.366]	-0.003 (0.004) [-0.677]
D(LOG_GFD_(-1))	0.168 (0.072) [2.324]	-0.898 (0.109) [-8.194]	-0.137 (0.100) [-1.364]	0.023 (0.012) [1.931]
D(LOG_GFD_(-2))	-0.104 (0.045) [-2.297]	-0.309 (0.068) [-4.495]	0.0003 (0.063) [0.004]	0.012 (0.007) [1.584]
D(LOG_AGG_(-1))	-0.013 (0.037) [-0.348]	0.594 (0.057) [10.409]	-0.172 (0.052) [-3.300]	0.003 (0.006) [0.433]
D(LOG_AGG_(-2))	0.308 (0.028) [10.748]	0.139 (0.043) [3.220]	-0.139 (0.039) [-3.512]	0.007 (0.004) [1.580]
D(LOG_CO_(-1))	0.171 (0.062) [2.765]	-0.892 (0.093) [-9.529]	-0.983 (0.085) [-11.464]	-0.002 (0.010) [-0.219]
D(LOG_CO_(-2))	0.147 (0.088) [1.668]	-0.428 (0.133) [-3.204]	-0.427 (0.122) [-3.483]	-0.005 (0.014) [-0.337]
D(LOG_IP_(-1))	-1.055 (0.533) [-1.979]	-1.099 (0.804) [-1.366]	-0.470 (0.737) [-0.638]	0.060 (0.088) [0.686]
D(LOG_IP_(-2))	-0.317 (0.569) [-0.557]	-0.272 (0.859) [-0.317]	-0.0631 (0.787) [-0.080]	-0.095 (0.094) [-1.008]
Constant	0.303 (0.093) [3.261]	0.294 (0.140) [2.097]	0.124 (0.128) [0.967]	0.102 (0.015) [6.594]
R-square	0.825	0.960	0.566	0.086
Adjusted R-square	0.812	0.957	0.533	0.018
F-statistics	63.100	326.863	17.401	1.267
Log likelihood	-112.650	-166.186	-154.803	120.503
Akaike AIC	1.886	2.710	2.535	-1.700
Schwarz SC	2.107	2.931	2.756	-1.479

Note: Standard errors in parentheses and absolute t-values in brackets.

Appendix 2: VECM System Equations

Model 1	D(LOG_GFD_) = C(1)*(LOG_GFD_(-1) + 0.435*LOG_CO_(-1) - 1.750*LOG_AGG_(-1) + 0.362*LOG_INTR_PAYMENT(-1) + 11.224) + C(2)*D(LOG_GFD_(-1)) + C(3)*D(LOG_GFD_(-2)) + C(4)*D(LOG_CO_(-1)) + C(5)*D(LOG_CO_(-2)) + C(6)*D(LOG_AGG_(-1)) + C(7)*D(LOG_AGG_(-2)) + C(8)*D(LOG_INTR_PAYMENT(-1)) + C(9)*D(LOG_INTR_PAYMENT(-2)) + C(10)
Model 2	D(LOG_CO_) = C(11)*(LOG_GFD_(-1) + 0.437*LOG_CO_(-1) - 1.749*LOG_AGG_(-1) + 0.362*LOG_INTR_PAYMENT(-1) + 11.224) + C(12)*D(LOG_GFD_(-1)) + C(13)*D(LOG_GFD_(-2)) + C(14)*D(LOG_CO_(-1)) + C(15)*D(LOG_CO_(-2)) + C(16)*D(LOG_AGG_(-1)) + C(17)*D(LOG_AGG_(-2)) + C(18)*D(LOG_INTR_PAYMENT(-1)) + C(19)*D(LOG_INTR_PAYMENT(-2)) + C(20)
Model 3	D(LOG_AGG_) = C(21)*(LOG_GFD_(-1) + 0.437*LOG_CO_(-1) - 1.7498*LOG_AGG_(-1) + 0.362*LOG_INTR_PAYMENT(-1) + 11.224) + C(22)*D(LOG_GFD_(-1)) + C(23)*D(LOG_GFD_(-2)) + C(24)*D(LOG_CO_(-1)) + C(25)*D(LOG_CO_(-2)) + C(26)*D(LOG_AGG_(-1)) + C(27)*D(LOG_AGG_(-2)) + C(28)*D(LOG_INTR_PAYMENT(-1)) + C(29)*D(LOG_INTR_PAYMENT(-2)) + C(30)
Model 4	D(LOG_INTR_PAYMENT) = C(31)*(LOG_GFD_(-1) + 0.437*LOG_CO_(-1) - 1.749*LOG_AGG_(-1) + 0.3626*LOG_INTR_PAYMENT(-1) + 11.224) + C(32)*D(LOG_GFD_(-1)) + C(33)*D(LOG_GFD_(-2)) + C(34)*D(LOG_CO_(-1)) + C(35)*D(LOG_CO_(-2)) + C(36)*D(LOG_AGG_(-1)) + C(37)*D(LOG_AGG_(-2)) + C(38)*D(LOG_INTR_PAYMENT(-1)) + C(39)*D(LOG_INTR_PAYMENT(-2)) + C(40)