

Public Debt Sustainability under Fiscal Federalism: An Analysis of Indian States

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This study is an attempt to check public debt sustainability of sub-national governments in India for the period of 1991-2014 with focus on the contribution of federal transfers towards fiscal sustainability. Using the approach of fiscal reaction function, results indicate that states have pursued sustainable fiscal policy by generating (reducing) primary surplus (deficit) against their past accumulated liabilities. Their positive response is much higher when we exclude federal transfers from primary surplus suggesting that the federal transfers substitute the public debt. In other words, federal transfers do not provide incentive to states to keep their budget in balance. Hence federal transfers should be accompanied by incentives and conditions which could motivate state governments to pursue fiscal sustainability. The implementation of FRBMA, a rule based fiscal policy, has led to improvement in fiscal situation. Looking at the path of fiscal consolidation post-FRBMA it comes out that the capital expenditure has not experienced a decline during the process of fiscal consolidation. Although revenue expenditure does not show any significant change, its two components namely interest payments; and wages and salaries had experienced decline contributing in fiscal consolidation.

Keywords: Fiscal Sustainability, fiscal consolidation, federal transfers, Indian sub-national governments.

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1. Introduction

The issue of fiscal sustainability has attained attention from both academicians and policy makers. Public debt forms part of total revenue which is used to fill shortfall of revenue from expenditure responsibility, but is subject to repayment in future. In a decentralized economy like India, where federal transfers connect the central and state government finances, public debt sustainability becomes an important concern at lower tiers of governance as well. Two major objectives are pursued while determining the share of each state in divisible pool of union taxes¹ and grants, those are equity and efficiency. Principle of equity is followed to even out the resource deficiencies across states so that each state is able to ensure a comparable level of public services to its residents. However objective of equity does not, by itself, guarantee the uniformity in delivery of public services. It can generate adverse incentive for states to show resource deficiency in its funds. Therefore central government addresses this question of adverse incentive by its second objective of efficiency by motivating states to exploit their resource base and providing comparable level of public services in a cost effective manner and also by imposing some conditions in devolution of grants (FC, 2000, 2004, 2009). Despite of these federal transfers, the resource mobilisation through various taxation and non-taxation sources at sub-national level has not been able to fulfil the total budget requirement, which led to borrowing and accumulation of debt due to lack of repayment ability of their past debt. While observing the gross primary deficit (GPD) of both tiers of governments it seems that combined GPD of all states has been as high as that of central government (Figure A1). The outstanding liabilities of state governments seem to vary from 15% of GSDP to 57% GSDP (Table 2). Additionally, expenditure on interest payments and wage bills has led to increasing fiscal stress across sub-national level and led to the crowding out of productive expenditure (Lahiri 2000). Sub-national governments, in a situation of financial stress could demand more resources from the centre, therefore, could shift a part of their fiscal stress to the central government. This could further impact the resource availability at the centre. Due to these alarming indicators, the issue of fiscal sustainability has gained much importance not only for central government but also for sub-national level of governance.

The present study attempts to check fiscal sustainability of the sub-national governments in India. Several studies have been conducted in this context Chelliah (1991), Buiter & Patel (1992), Olekalns and Cashin (2000), Moorthy et al. (2000), Rangarajan & Srivastava (2003),

¹For details, please refer to Finance Commission (2003); and Chakraborty and Isaac (2008).

Jha and Sharma (2004), Kannan & Singh (2007), Goyal (2011), and Raju (2011). Majority of these studies have focussed on central government finance but bypass the state government analysis. Only few studies have taken up the issue of sub-national debt sustainability. Goyal et al. (2004) studied sustainability of central, state and their combined finances. While central and state finances considered separately were unsustainable, combined finances were found to be sustainable. The netting out of inter-governmental flows led to narrowing down the gap between expenditure and revenue, therefore showing sustainability at the combined level. Authors concluded that any credible assessment of sustainability of finances should exclude inter-governmental flows. Rajaraman and et al. (2005) grouped states on the basis of their sustainability status. The authors argue that even if fiscal deficit is stabilized at some percent of GDP, it will not lead to immediate stabilization of debt to GSDP ratio at the corresponding level. West Bengal was found to be on the most unsustainable path. Other states which follow in decreasing order are Punjab, Gujarat, Madhya Pradesh, Orissa, Uttar Pradesh, Bihar and Rajasthan.

The objective of the present study is threefold. First objective is to estimate fiscal reaction function at Indian sub-national level following Bohn (1988) approach, an econometric exercise to observe whether governments respond to past outstanding debt by generating (reducing) primary surplus (deficit) in current time period. A positive response indicates the sustainability criterion. Second objective is to analyse the contribution of federal transfers towards fiscal sustainability. Because the purpose behind federal transfers is to strengthen the spending capacity across states, this study tries to analyse whether these transfers have augmented or retarded the ability of sub-national governments to generate fiscal surplus. Third objective is to observe the channels of fiscal consolidation across states given states follow the path of fiscal sustainability by generating (reducing) primary surplus (deficit).

The paper is organised as follows. Section 2 discusses several aspects of public debt which provide additional motivation to conduct fiscal sustainability at sub-national level in India. It describes the impact of public debt on an economy. Section 3 provides brief description of several efforts undertaken at sub-national level to reduce its debt. Section 4 describes several definitions associated with public debt sustainability followed by several methodologies adopted in literature to gauge fiscal sustainability. Section 5 describes all the variables. Section 6 presents results and discussion. Section 7 describes the channels of fiscal consolidation. Section 8 concludes.

2. Public Debt and its Impact in an Economy: Views from Theoretical Literature

The debate on public debt sustainability is closely related with its potential positive and negative impact on the economic growth and development. The neoclassical thought on public debt depends on the assumption of farsighted individuals who can plan their consumption over their life time. Budget deficits shift taxes on the future generations, therefore raise the life time consumption of the individuals and reducing the saving in the economy. Assuming the full employment of resources in the economy, interest rates rise to equate the decreased saving to its demand and therefore to balance the capital market. The increased interest rates could further reduce, discourage or displace in capital accumulation by the private sector, therefore crowding out the private capital investment.

Keynesian view has emphasised the role of public debt to revive the economy from recession when there is lack of investment, and employment resulting in low economic growth. In such a scenario Keynes emphasised the role of deficit financing or public debt to augment the scale of public investment, hence an appropriate fiscal instrument for the short run. Therefore the followers of Keynesian view predicted the positive impact of public debt on economic growth.

On the other hand, New classical thought on public debt and its effect on economy can be traced through the Ricardian Equivalence theorem proposed by David Ricardo in 1817 and further emphasised by Robert Barro in 1974. This view postulates deficit in current time period as future tax liabilities. Assuming that economic agents are perfectly foresighted and altruistic, they have the ability to consider current deficit as future taxes. Therefore they change their behaviour towards current budget deficit. Hence a budget deficit met by raising debt rather than raising taxes leaves consumption, saving, investment, and economic growth unaffected in current and future periods, which does not alter the generational welfare.

On empirical front, a number of studies have attempted to analyse the adverse effect of public debt via crowding-out of private capital investment. Although the linkage between budget deficit and private investment has not been explored much, the crowding out hypothesis has been studied partially by focussing on impact of budget deficit on short and long term interest rates. A fiscal policy is said to be crowding out private investment if a positive relationship between budget deficit and interest rates is observed. A study by Paesani et al. (2006) studied the impact of debt accumulation on long term interest rates for Germany, Italy and USA. Authors concluded their study with the findings that debt accumulation leads to higher long

term interest rates and this effect spread across economies as well. Similarly Laubach (2010) found 3-4 basis points increase in long term interest rate with increase in debt/GDP ratio.

Another strand of empirical literature focussed on estimating a threshold level of public debt, a debt limit which could be favourable for the economic growth. It is based on a non-linear relationship of economic growth with public debt. Beyond that threshold level, public debt could turn to be detrimental to the economy (Caner et al. 2010; Afonso et al. 2011; Atonakakis 2014; Proano et al. 2014; and Perri 2014 etc.).

Effect of public debt on economic growth has been studied in literature substantially. Modigliani (1961) and Saint-Paul (1992) explain how the current and future generations could be effect by the tax-financing and debt-financing the expenditure requirement. Current tax payers bear the burden if expenditure is financed through a rise in tax rate. The burden of debt servicing falls on future generation of tax payers. Whether it will be favourable or unfavourable for future generations, should be judged from the net benefit from the debt such as subtraction of gross burden and any extra tax benefit.

In brief we can say that, an attempt should be made to check whether the past trends of budget deficit and borrowing can be continued without facing a scope of adverse behaviour by the lenders. The need for studying the sustainability also arises as overspending of the government along with the rising debt imposes the repayment pressure on the future generations and increases the pressure on the fiscal policy.

3. Efforts Undertaken to Tackle Fiscal Deficit of State Governments

The fiscal stances of state governments show that aggregate expenditure of 14 states governments is approximately 17.9% of GSDP with variation across states (Table 1). Bihar, with share at 29.9% spends the highest, followed by 24.0% of Uttar Pradesh. On the other side, the states such as Maharashtra, and Gujarat spend the least with share of 13.0%, 14.1% of their GSDP respectively. While observing the quality of expenditure, the composition of total expenditure seems to be dominated by revenue expenditure at sub-national level, which stands at 13.4% of GSDP for all states. The capital expenditure, considered to be productive component of the total expenditure stands at only 2.4% of GSDP for all states. Therefore, large part of the aggregate expenditure is diverted towards unproductive expenditure which constitutes subsidy payments, pensions, wages and salaries, interest payments etc. On revenue side, states governments raise 16.4% of its GSDP as aggregate revenue, which falls

short of the total expenditure liabilities leading to fiscal deficit and debt accumulation over a period of time.

Analysing the fiscal balance, the gross fiscal deficit as ratio of GSDP (GFD/GSDP) is found to be 2.8% for all 14 states. Bihar has recorded the highest GFD/GSDP ratio of 6.3%, followed by Rajasthan at 3.5%. On the other hand, Maharashtra with GFD/GSDP ratio of 1.8% has the lowest GFD. In order to study the quality of deficits, the magnitude of revenue deficit as ratio of GSDP is critical to gauge the quality of fiscal deficit. It shows whether revenue receipts which constitute states' own tax revenue along with federal transfers are sufficient to balance revenue account. If not, then a part of capital account surplus or debt raised thereon would be diverted towards revenue account deficit. In other words, fiscal surplus on capital account could be channelized to finance unproductive expenditure on revenue account, reducing fiscal space for capital creation in the economy. Similarly, revenue deficit to gross fiscal deficit (RD/GFD) ratio will indicate what part of debt raised in terms of gross fiscal deficit is diverted towards revenue account. The RD/GFD ratio was as high as 55.8% in 2000-01 (Rao, 2002). Looking at the latest estimates, table (1) reveals that revenue deficit constitutes 4.2% of gross fiscal deficit at the aggregate level, indicating a sharp decline from the level of 2000-01. Therefore quality of fiscal deficit has improved over the years.

Table 1. Fiscal Scenario at Sub-national Level: 2013-14

State	Rev. Def. /Gross Fiscal Def.	As ratio of GSDP (at current prices)						
		Gross Fiscal Deficit	Rev. Def	Total Exp	Rev. Exp	Capital Exp	Interest Payments	Total Revenue
Andhra Pradesh	-4.3	2.9	-0.1	18.7	12.9	2.5	1.8	16.3
Bihar	3.1	6.3	0.2	29.9	18.2	5.5	1.7	24.0
Gujarat	-58.9	2.1	-1.2	14.1	9.8	3.3	1.7	13.3
Haryana	46.8	3.0	1.4	14.4	10.8	1.4	1.6	13.3
Karnataka	-0.3	2.9	0.0	18.9	14.5	2.9	1.3	18.7
Kerala	47.8	3.3	1.6	18.0	15.3	1.5	2.1	16.9
Madhya Pradesh	-57.3	2.7	-1.6	22.1	16.1	2.8	1.5	20.1
Maharashtra	11.2	1.8	0.2	13.0	10.3	1.5	1.4	12.1
Orissa	-32.9	2.2	-0.7	23.0	16.7	2.9	1.8	19.3
Punjab	64.2	2.6	1.7	16.7	13.1	1.3	2.4	15.1
Rajasthan	13.9	3.5	0.5	19.3	14.6	2.9	1.8	17.6
Tamil Nadu	-1.1	2.5	0.0	17.0	12.9	2.3	1.4	15.4
Uttar Pradesh	-22.5	2.9	-0.7	24.0	18.3	3.5	2.0	22.0
West Bengal	54.5	3.1	1.7	15.8	13.0	1.3	2.7	15.4
All (14 states)	4.2	2.8	0.1	17.9	13.4	2.4	1.7	16.4

Note: (i) Based on author's calculations. (ii) Data Source: RBI (2004, 2010, 2012, and 2015); and EPW Research Foundation.

Mix evidence can be observed across sub-national governments. Few states which have deteriorated their fiscal balance not only with positive revenue deficit but also by large RD/GFD ratio are Punjab, West Bengal, Kerala and Haryana. Their RD/GFD ratio stands at 64.2%, 54.5%, 47.8% and 46.8% respectively. On the other hand, states with surplus are Gujarat, Madhya Pradesh, Orissa, and Uttar Pradesh with RD/GFD ratio at -58.9%, -57.3%, -32.9% and -22.5%. Therefore, a large variation can be observed at the sub-national level.

Some evidence is found on literature which focused on the evolution of debt and deficit over time. Rao and Sen (2011) described that the fiscal situation deteriorated in late 90's due to rising burden of interest rates, indebtedness and subsidies. In order to establish fiscal discipline among states, a way of providing appropriate incentive was adopted during Eleventh Finance Commission (EFC). The FC was given the task to review the public finances of centre and states and to suggest ways to restructure the public finance to restore budgetary balance and macro-economic stability. A fund was created to provide incentive grants to states. The states were required bring improvement of minimum 5 percentage point in ratio of revenue deficit/surplus and revenue receipts every year to avail that incentive funds.

States had to elaborate this scheme with Medium Term Fiscal Restructuring Policy (MTFRP), which aimed at bringing GFD as 2.5% of GSDP along with revenue deficit to zero, and limiting interest payments to 18-20% of revenue receipts. Fiscal situation showed signs of improvement in 2001-02 due to improved tax collection driven by high economic growth. There restructuring plan of the government lacked on studying the structural causes of fiscal imbalance. Fiscal deficit of states instead of declining by at least 5 percentage points, increased from 4.64% of GDP in 1999-2000 to 4.97% in 2003-04 and revenue deficit marginally declined from 2.82% to 2.67%.

Many institutional changes have been made to reduce the fiscal burden of the states. An example of such initiative is Fiscal Responsibility and Budget Management Act (FRBMA), where state governments are directed to eliminate the revenue deficit and reduce the fiscal deficit and debt levels gradually. The Twelfth Finance Commission (TWFC) formulated a restructuring plan setting the target for consolidated fiscal deficit to be at 6% of GDP (3% for Centre and 3% for each of the states) and revenue deficit to be zero by 2009-10. It recommended each state to implement the fiscal restructuring legislation with a goal to reduce fiscal deficit to 3% of GSDP and revenue deficit to zero by 2008-09. There was

incentive attached to this legislation in the form of debt relief and a write off scheme. Debt Swap Scheme was another help to state government. Under this scheme the state governments were suggested to prepay central loans which had interest rate above 13%. The state governments were directed to prepay debt by raising lower cost debt from the market or by initiating small saving schemes. This scheme was active from 2002-03 to 2004-05 (Raut, 2011). Rao and Sen (2011) showed that the fiscal situation improved at both centre and state levels from 2003-04 to 2008-09. The consolidated fiscal deficit declined to 4.1% of GDP in 2007-08 from 8.9% in 2001-04. The revenue deficit declined from 5.9% of GDP in 2003-04 to 0.2% in 2007-08, which was a close figure to zero.

4. Methodologies to check Public Debt Sustainability

This section describes various definitions adopted in literature to study fiscal sustainability in an economy and also summarises methodologies developed to investigate it.

4.1. Definitions used for Sustainability of Public Debt

Public debt sustainability has been tested using various definitions and concepts: Sustainability, Stability and Government Solvency. The solvency deals with the capacity of the government to repay its debt. The capacity of repaying debt is analysed by comparing the outstanding debt with the expected present discounted value of future surpluses. If former is less than the later, then government is considered as solvent (Shirakawa, 2012). In other word it specifies that the government can repay its current outstanding debt by generating the surpluses in the future. On the other hand if the government solvency is undermined i.e. outstanding debt is much higher than the expected present discounted value of future surpluses then government should undertake economic and financial structural reform measures to avoid the financial instability. The author explains that, in reality, the solvency condition is difficult to be checked, because the expected future surplus depends upon the potential to generate more revenues and the potential cut in expenditure. In scenario where government reaches its 'fiscal limit'², government solvency is undermined.

Debt stabilization is defined as debt being a constant percentage of gross domestic products, a debt carrying capacity of the economy (Rajaraman et al., 2005). The authors describe the stability of debt in absolute terms as well as relative to GDP.

² Fiscal limit is defined a situation when potential to raise tax revenue and cut expenditures is low.

There is no consensus reached to define sustainability of the public finances. Rangarajan and Srivastava (2005) argue that the concept of sustainability should not be considered synonymous to solvency. A balance should be made between the cost of borrowing and the returns from that borrowing, which further can be used to service the debt. Debt and fiscal deficit should be considered together while studying the sustainability. The main objective of the government is to stabilize the debt to GDP ratio at a sustainable level that is compatible with the solvency of the government.

Perotti et al. (1998) argue that the conventional definition of sustainability comparing current outstanding debt with the future expected surpluses in discounted terms ignores the current fiscal policy. An ambiguous result can be achieved as anything can be assumed about the future fiscal policy in order to calculate the expected future surpluses. Since the expectations about the future are based on the past expenditure and revenue, they are likely to miss the recent changes in the fiscal policy. The authors propose a new definition of sustainability in terms of controllability of the public finance, which is a crucial issue from central bank's and market's point of view. Consider a scenario where a bad shock affects the revenue and expenditure commitments of the government. The concept of controllability defines risk that such a scenario leaves government, economically and technically, unable to prevent its spending and deficit from growing beyond their economically justifiable levels.

4.2. Various Methodologies

A vast literature has emerged in the last three decades to examine the sustainability of the public finances. The related studies are based on government solvency, sustainability and the stability of government debt (both internal and external). The public debt in an economy evolves as follows:

$$B_t = (r_t) B_{t-1} + B_{t-1} + (G_t - T_t) \dots\dots\dots (1)$$

Here, B_t is the outstanding public debt of a state at time period t ; r_t denotes interest rate; $r_t(B_{t-1})$ denotes the total interest amount to be paid on accumulated debt, and $(G_t - T_t)$ is the the current primary deficit excluding interest payments.

$$B_t - B_{t-1} = (r_t) B_{t-1} + (G_t - T_t) \dots\dots\dots (2)$$

Therefore debt to be raised in time period t consists of past accumulated debt and interest to be paid; and current period deficit. Expressing the second equation as proportion of real national income would yield the following equation:

$$\frac{B_t}{Y_t} = (1 + r_t) \frac{B_{t-1}}{Y_t} + \left(\frac{G_t - T_t}{Y_t} \right) \dots\dots\dots (3)$$

$$b_t = (1 + r_t) b_{t-1} \frac{Y_{t-1}}{Y_t} + (g_t - t_t) \dots\dots\dots (4)$$

$$b_t = (1 + r_t) b_{t-1} \frac{Y_{t-1}}{(1+n_t)Y_{t-1}} + (g_t - t_t) \dots\dots\dots (5)$$

Using the approximation $(1+r) / (1+n) \approx (1+ r - n)$, equation (5) can be written as:

$$b_t = (1 + r_t - n_t) b_{t-1} + (g_t - t_t) \dots\dots\dots (6)$$

This equation specifies the budget constraint of the government in real terms, where the evolution of domestic debt to income ratio depends upon the past accumulated debt (b_{t-1}) times the difference between real interest rate and growth rate of real income ($r_t - n_t$). The stability of public debt can be explained as follows. The debt to income ratio will be constant if $b_t = b_{t-1}$. Therefore, $(r_t - n_t)b_{t-1} = -(g_t - t_t)$. From (6) the steady state value of public debt can be derived as follows:

$$b^* = (g_t - t_t)/(n_t - r_t) = \text{primary deficit} / (n_t - r_t) \dots\dots\dots (7)$$

This equation specifies that if the difference between r_t and n_t is positive i.e. $r_t > n_t$ then government needs to run primary surplus in order to maintain a constant debt to income ratio. Also this case would lead the debt ratio to increase given the primary deficit to GDP ratio and make it unbounded. On the other hand, it is possible to maintain certain level of primary deficit if the difference between r_t and n_t is negative i.e. $r_t < n_t$.

Inter-temporal Budget Constraint

$$b_t = \frac{(1+r_t)}{(1+n_t)} b_{t-1} - (s_t) \dots\dots\dots (8)$$

$$b_{t-1} = \frac{(1+n_t)}{(1+r_t)} b_t + \frac{(1+n_t)}{(1+r_t)} (s_t) \dots\dots\dots (9)$$

Writing equation (8) for time period t and t+1 gives us:

$$b_t = \frac{(1+n_t)}{(1+r_t)} b_{t+1} + \frac{(1+n_t)}{(1+r_t)} (s_{t+1}) \dots\dots\dots (10)$$

$$b_{t+1} = \frac{(1+n_t)}{(1+r_t)} b_{t+2} + \frac{(1+n_t)}{(1+r_t)} (s_{t+2}) \dots\dots\dots (11)$$

Substituting equation (10) in (9) gives us the form of:

$$b_t = \left(\frac{1+n_t}{1+r_t}\right)^2 b_{t+2} + \left(\frac{1+n_t}{1+r_t}\right)^2 s_{t+2} + \left(\frac{1+n_t}{1+r_t}\right) (s_{t+1}) \dots\dots\dots (12)$$

$$b_t = b_{t+N} \left(\frac{1+n_t}{1+r_t}\right)^N + \sum_{j=1}^N \left(\frac{1+n}{1+r}\right)^j s_{t+j} \dots\dots\dots (13)$$

Equation 13 specifies the inter-temporal budget constraint. Taking expectation as of time t and applying as N goes to infinity gives the following budget constraint:

$$b_t = \lim_{N \rightarrow \infty} E_t b_{t+N} \left(\frac{1+n_t}{1+r_t}\right)^N + E_t \sum_{j=1}^N \left(\frac{1+n}{1+r}\right)^j s_{t+j} \dots\dots\dots (14)$$

Eq (13) demonstrates that government debt will be sustainable if debt at time t equals the expected present value of future primary surplus if and only if discounted future debt converges to zero as N approaches infinity. Therefore

$$\lim_{N \rightarrow \infty} E_t b_{t+N} \left(\frac{1+r_t}{1+n_t}\right)^{-N} = 0 \dots\dots\dots (15); \text{ and it derives}$$

$$b_t = E_t \sum_{j=1}^N \left(\frac{1+n}{1+r}\right)^j s_{t+j} \dots\dots\dots (16)$$

The equation (15) is a transversality condition which describes that government honours its debt in the long term. This condition rules out the possibility of Ponzi Game where government rolls out new debt to repay its past debts. In other words, transversality condition prohibits the infinite borrowing by the government. Equation (16) indicates the present value borrowing constraint. It states that any positive amount of debt at time t should be equivalent to sum of discounted value of future primary surplus.

4.3. Empirical Strategies to check Debt Sustainability

Hamilton and Flavin (1986) designed a framework to test the implications of the present-value budget constraint where stationarity of the discounted debt would indicate a sustainable deficit policy. Applying this framework on U.S. data for the period of 1960-84, their study reported stationarity of the debt processes and concluded that there is no violation of the

government's borrowing constraint. In other words they found the presence of ability to pay in U.S. government. This analysis was extended by Wilcox (1989) where result on deficit sustainability was found to be affected by the existence of structural breaks. Author made a distinction between dynamically efficient and inefficient economies. The economies which are dynamically efficient, face a present-value borrowing constraint. In other words the current market value of the debt equals the discounted sum of expected future surpluses in dynamically efficient economies. On the contrary dynamically inefficient economies face no present-value borrowing constraint. A strong evidence of a shift in the structure of U.S. fiscal policy was observed. For the period prior to 1974, he found no evidence of a violation of the borrowing constraint, but the stationarity of the discounted deficit failed to hold for the post-1974 period.

Trehan and Walsh (1988) derived a stationarity condition of deficit inclusive of interest rate as a stronger condition to ensure balanced budget of the government. The authors derive this stationarity test under the assumption of a constant real interest rate and show that it is equivalent to the co-integration between primary surplus and public debt. The authors conducted stationarity tests on U.S. data for 1890-1986 and conclude that the assumption of inter-temporal budget balance is not rejected by the data.

Fischer & Easterly (1990) highlight the view given by Buiter (1985) that the debt dynamics and the sustainability of deficit are affected by the difference between the real interest rate and the growth rate of GNP. The debt to GNP ratio will continue to rise if government is running a primary deficit larger than the amount of seignorage it can obtain and if the real interest rate exceeds the economy's growth rate.

Quintos (1995) extended the empirical literature on deficit sustainability by introducing 'strong' and 'weak' conditions for sustainability of deficit. The "strong" requirement corresponds to necessary and sufficient condition defined by Hamilton and Flavin (1986) that the debt process should be stationary for the bubble term to go to 0. The "weaker" condition introduced allows the bubble term to go to 0 at a rate slower than required in the 'stronger' condition. Alternatively, this "strong" requirement also pertains to the necessary and sufficient condition mentioned in Trehan and Walsh (1988) that revenue and expenditures be co-integrated, whereas this co-integration is only a sufficient condition for weaker' condition of sustainability; with the necessary and sufficient condition being that the debt process grow slower than the growth rate of mean interest rates. It allows the deficit to be mildly explosive

but it will be sustainable as long as the growth rate of debt does not exceed the growth rate of GDP.

Bohn (1995) studied the government policies in a stochastic general equilibrium model. It highlights that existing empirical sustainability tests may not give appropriate results. In an economy which is dynamically efficient³ and safe interest rate⁴ is below the average growth rate, correct discounting is especially important. If safe interest rate is used to test transversality condition for such an economy, then the fiscal policy with stable debt-GDP ratio would be identified as non-sustainable. It highlights that future government debt, spending and taxes must generally be discounted at the rates which are not related to the interest rates on the government debt.

Bohn (1998) proposed a methodology to view the direct evidence for corrective action taken by the government against accumulation of debt. This evidence can be found by examining the response of primary budget surplus (excluding interest payment) to the changes in debt-income ratio⁵. Author argues that if government keeps on accumulating debt relative to aggregate income, then sustainable policy must respond by generating primary surplus as a corrective action. This signifies a sufficient condition for sustainability if the response of primary surplus to debt-income ratio is strictly positive and at least linear. Apart from taking debt-income ratio as an independent variable, this study also considers other variables that can affect the primary surplus. These variables are temporary government spending and business cycle indicator. He analysed the U.S. fiscal policy through this methodology and concluded that for the sample period 1916-1995 and for various sub-periods, the U.S. fiscal policy has been sustainable.

The methodology evolves as follows:

The fiscal reaction function has been constructed using the variables which are directly related to the debt dynamics.

$$p_{i,t} = \alpha_i + \rho b_{i,t-1} + \sum_{m=1}^M \beta_m X_{m,i,t} + \varepsilon_{i,t} \dots \dots \dots (16)$$

³ This study borrows result from Abel et al. (1989) which shows strong evidence about U.S. economy to be dynamically efficient.

⁴ This study explains that the level of the safe interest rate depends on risk aversion and on the variance of income growth. The safe interest rate will be negative or below the average growth rate of the economy if individuals are sufficiently risk averse and if the variance of income growth is sufficiently large.

⁵ This study mentions that discounted debt is influenced by various shocks in the economy (e.g. shocks in government spending, interest rates and income growth) so it should not be taken as uni-variate time series.

Or

$$p_{i,t} = \rho b_{i,t-1} + \mu_{i,t} \dots\dots\dots (17)$$

Where $p_{i,t}$ is the primary balance in country i at time t ; $b_{i,t-1}$ is the level of debt at the end of previous period; α_i is the country specific intercept which captures the fixed effect; X_m is a vector of macro-economic variables which could affect the primary balance; and $\varepsilon_{i,t}$ is an error term. The parameter ρ captures the response of primary balance to the past changes in the public debt. From debt evolving equation for period $t+1$ we have:

$$b_{t+1}(1+n) = (1+r)b_t + (g_t - t_t) \dots\dots\dots (18)$$

Substituting Eq (17) into Eq (18), we get

$$b_{t+1} = \left(\frac{1+r-\rho}{1+n}\right) b_t - \left(\frac{1}{1+n}\right) \mu_t \dots\dots\dots (19)$$

$$b_{t+j} = \left(\frac{1+r-\rho}{1+n}\right)^j b_t - \left(\frac{1}{1+n}\right) \sum_{i=1}^j \left(\frac{1+r-\rho}{1+n}\right)^{i-1} \mu_{t+j-i} \dots\dots\dots (20)$$

$$B_{t+j} = b_{t+j} \cdot Y_{t+j} = (b_{t+j}) \cdot Y_t \cdot (1+n)^j \dots\dots\dots (21)$$

Ignoring second term in (20)

$$B_{t+j} = \left(\frac{1+r-\rho}{1+n}\right)^j b_t \cdot Y_t \cdot (1+n)^j \dots\dots\dots (21)$$

$$\frac{B_{t+j}}{(1+r)^j} = \left(\frac{1+r-\rho}{1+r}\right)^j b_t \cdot Y_t$$

The present value borrowing constraint is satisfied if

$$\frac{1+r-\rho}{1+r} < 1$$

Therefore $\rho > 0$

Several other versions of fiscal reaction functions have been estimated in literature. De Mello (2005) extended the fiscal reaction function by controlling for the effect of monetary policy. Author included monetary base to GDP ratio into the model. In a different version of fiscal reaction function by Budina and Wijnbergen (2008), the role of monetary policy has been controlled in a way that generates revenue for the central government. The contribution of

seigniorage, a government receives from difference between cost of issuing money and value of issued money, is considered as a potential revenue source for the government.

The fiscal reaction function by Bohn (1998) refers to the closed economy in which reliance of government on foreign debt is not incorporated. Few other studies have extended the scope of fiscal reaction function by incorporating external economy. Penalver and Thwaites (2006) included share of foreign debt and exchange rate. Similarly Adedeji and William (2007) extended fiscal reaction function by including terms of trade and trade openness of the economy.

5. Variables

This section specifies the methodology used in this study. In the studies cited above the focus has been more on the stationarity of public debt and testing for long run relationship between the revenue and expenditure, which is being conducted using the co-integration technique.

$$p_{i,t} = \alpha_i + \rho b_{i,t-1} + \sum_{m=1}^M \beta_m X_{m,i,t} + \varepsilon_{i,t}$$

Where $p_{i,t}$ is the primary balance in country i at time t ; $b_{i,t-1}$ is the level of debt at the end of previous period; α_i is the country specific intercept which captures the fixed effect; X_m is a vector of macro-economic variables which affect the primary balance; and $\varepsilon_{i,t}$ is an error term. The parameter ρ captures the response of primary balance to the past changes in the public debt. The variable, past debt i.e. the outstanding liabilities is considered as ratio of GSDP which varies from 0.15 to 0.57.

Following the approach of Potrafke and Reischmann (2015), the dependent variable $p_{i,t}$ is defined in two ways. First way is to consider primary balance which is gross fiscal deficit net of interest payments. The ratio of primary surplus to GSDP varies from -0.056 (indicating deficit) to 0.040. Secondly, in order to see the contribution of federal transfers towards fiscal sustainability of individual states, primary balance is defined as net of federal transfers. The ratio of primary surplus net of transfers to GSDP varies from -0.190 (indicating surplus) to 0.008.

The following variables were incorporated as X variables above equation: First two variables refer to temporary fluctuations in output and expenditure level. Two alternative approaches

have been used to define these variables. First approach is as followed in Bohn (1988). The author used HP filter to compute output gap. Because war time fluctuation in military spending dominantly derived the fluctuations in total expenditure in USA so Bohn (1988) used gap between actual and estimated military spending as proxy for expenditure fluctuations. In this paper we use HP filter to compute both *Real Output Gap* and *Real Expenditure Gap* capturing the output and expenditure cycle in the economy respectively. These variables are defined as actual value minus the trend component.

$y_c = (y_t - y_t^T)$; and similarly $g_c = (g_t - g_t^T)$. Here y_t and g_t are actual levels of real output and real expenditure in logarithmic terms. y_c and g_c refer to the cycle components; y_t^T and g_t^T trend components of log real output and log real expenditure obtained using HP filter. The second approach follows Barro (1986) to construct the measures of business cycle indicator (YVAR) and the level of temporary government spending (GVAR). The corresponding formulas to define these variables are as follows:

$$YVAR = (y_t^T - y_t) / y_t^T * (g_t^T / y_t) \text{ and } GVAR = (g_t - g_t^T) / g_t^T * (g_t^T / y_t)$$

Here y_t and g_t are actual levels of real output and real expenditure. y_t^T and g_t^T trend components of real output and real expenditure obtained using HP filter. The first term in YVAR ($y_t^T - y_t$) is negative of cycle component as defined in real output gap. Therefore coefficients of YVAR and real output gap are expected to be of opposite signs.

Other control variables used in equation are as follows. First we control for policy changes reflected through the implementation of FRBMA. As mentioned earlier that FRBMA was adopted at state levels in different years, therefore a dummy variable is generated which takes value 1 for the years after FRBMA was implemented, and zero for the years before FRBMA implementation. Another major policy change in the field of public finance that took place was implementation of VAT. This was also adopted by all states in different years. A dummy variable is generated for VAT implementation as well, which takes value of 1 for years after implementation of VAT and zero otherwise. The impact of these two policy changes is expected to be positive on primary balance.

In order to study the fiscal behaviour of high debt states, a dummy variable has been generated which takes value 1 if a state has outstanding debt more than average of all states. In other words, if outstanding debt to GDP ratio exceeds 0.2966, then high debt dummy takes value 1 and zero otherwise.

In order capture the persistence in dependent variable, we include first lag of primary surplus to GSDP ratio.

Table 2: Summary Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Ratio of Primary Surplus to GSDP	336	-0.009	0.013	-0.056	0.040
Ratio of Primary Surplus (net of Transfers) to GSDP	336	-0.059	0.033	-0.190	0.008
Debt to GSDP Ratio	336	0.297	0.097	0.151	0.573
Real output gap	336	-1.90E-11	0.034	-0.247	0.198
Real Expenditure gap	336	4.93E-13	0.057	-0.177	0.277
YVAR	336	3.83E-06	6.94E-05	0.000	0.001
GVAR	336	-6.05E-07	0.000	0.000	0.001
FRBM Dummy	336	0.426	0.495	0	1
VAT Dummy	336	0.408	0.492	0	1
High Debt Dummy	336	0.452	0.498	0	1

Note: (i) Based on author's calculations. (ii) Data Source: RBI (2004, 2010, 2012, and 2015); and EPW Research Foundation.

6. Results

This section discusses some stylized facts about the state finances. The information on various policy changes is highlighted to understand the various efforts which were undertaken at the sub-national level to reduce deficit through fiscal rules. Further the results have been discussed.

6.1. Is Sub-National Public Debt in India is Sustainable?

Results from OLS panel fixed effect estimation are reported in table 3 and 4 with primary balance and primary balance net of transfers as dependent variables in respective tables. Table 5 and 6 represent the results from dynamic panel estimation and similarly dependent variable is primary surplus and primary surplus net of transfers in both the tables respectively. Several models are estimated in order to check the robustness of results. In model 1, only lagged debt variable is included. With positive and significant association with dependent variable, it seems that state governments respond favourably to past accumulated debt. The primary surplus to GSDP ratio increases by 0.42 points if there is one unit increase in lagged debt to GSDP ratio. In model 2, we include real output and expenditure gap. While

output gap does not seem to have any significant association with primary balance, real expenditure gap is found to have expected negative and significant sign. Upon replacing these two variables with their alternation specification i.e. YVAR and GVAR in model 3, results seem to hold. GVAR is seen to have negative and significant association with primary surplus. Therefore, primary surplus decreases when real expenditure increases above its trend level. Additionally, the coefficient of lagged debt varies marginally in both of these specifications.

Further, we controlled for lagged dependent variable in models 4 to 7. The positive and significant value of coefficient of lagged dependent variable indicates that primary surplus to GSDP ratio has persistence over time. Further, model 6 and 7 are estimated with inclusion of FRBMA and VAT dummies; and High debt dummy into equation. The coefficient of lagged debt does not change drastically upon inclusion of lagged dependent variable and these three dummy variables. While VAT dummy has negative association with primary surplus, FRBMA dummy is found to have positive association with primary surplus. Therefore states have improved their fiscal position after the implementation of FRBMA. Further high debt dummy highlights that states with debt to GSDP ratio above average seems to have negative association with primary surplus.

Table 4 reports results from same specification as that of table 3 but different dependent variable defined as primary surplus net of federal transfers. Results indicate that the coefficient of lagged debt is positive but becomes significant upon inclusion of lagged dependent variable. Additionally, ρ is lesser in all the models as compared to ρ in table 3.

Table 3: Fiscal Reaction of Primary Surplus for the period of 1991-92 to 2014-15: A Fixed Effect Panel OLS Model

Dependent Variable: Ratio of Primary Surplus to GSDP (at Current prices)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lagged Debt to GSDP Ratio (ρ)	0.042*** (0.000)	0.045*** (0.000)	0.046*** (0.000)	0.042*** (0.000)	0.043*** (0.000)	0.05*** (0.000)	0.05*** (0.000)
Real output gap		0.032 (0.108)		0.016 (0.294)		0.012 (0.441)	
Real Expenditure gap		-0.071*** (0.000)		-0.062*** (0.000)		-0.061*** (0.000)	
YVAR			-13.25 (0.179)		-7.38 (0.337)		-5.32 (0.485)
GVAR			-32.61*** (0.000)		-28.38*** (0.000)		-28.31*** (0.000)
FRBM Dummy						0.01*** (0.004)	0.01*** (0.004)
VAT Dummy						-0.003* (0.073)	-0.004* (0.063)
High Debt Dummy						-0.004* (0.058)	-0.004* (0.052)
Lagged Dependent Variable				0.575*** (0.000)	0.579*** (0.000)	0.539*** (0.000)	0.544*** (0.000)
Constant	-0.022*** (0.000)	-0.023*** (0.000)	-0.023*** (0.000)	-0.017*** (0.000)	-0.017*** (0.000)	-0.018*** (0.000)	-0.019*** (0.000)
N	322	322	322	322	322	322	322
R-Sq	0.034	0.118	0.099	0.472	0.456	0.515	0.501
State Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: (i) Based on Authors' Calculations; Number in parentheses indicates p-value; (ii) Significance levels: *** - $p < 0.01$; ** - $p < 0.05$; and * - $p < 0.1$. (iii) Dependent variable is ratio of gross primary surplus to current GSDP. (iv) Real output gap is calculated of log of real GSDP using HP filter. (v) Real expenditure gap is calculated of log of real total expenditure using HP filter. (vi) These results are obtained from OLS Panel Fixed Effect Model.

Data Source: RBI (2004, 2010, 2012, and 2015); and EPW Research Foundation.

Table 4: Fiscal Reaction of Primary Surplus (net of Transfers) for the period of 1991-92 to 2014-15: A Fixed Effect Panel OLS Model

Dependent Variable: Ratio of Primary Surplus (net of transfers) to GSDP (at Current prices)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lagged Debt to GSDP Ratio (ρ)	-0.002 (0.910)	0.004 (0.756)	0.006 (0.643)	0.032*** (0.000)	0.034*** (0.000)	0.040*** (0.000)	0.042*** (0.000)
Real output gap		0.108*** (0.000)		0.088*** (0.000)		0.096*** (0.000)	
Real Expenditure gap		-0.078*** (0.000)		-0.069*** (0.000)		-0.073*** (0.000)	
YVAR			-49.52*** (0.001)		-45.75*** (0.000)		-49.24*** (0.000)
GVAR			-38.67*** (0.000)		-33.62*** (0.000)		-36.18*** (0.000)
FRBM Dummy						0.004 (0.106)	0.004* (0.083)
VAT Dummy						-0.01*** (0.000)	-0.01*** (0.000)
High Debt Dummy						-0.001 (0.798)	-0.001 (0.786)
Lagged Dependent Variable				0.815*** (0.000)	0.819*** (0.000)	0.808*** (0.000)	0.813*** (0.000)
Constant	-0.0584*** (0.000)	-0.0601*** (0.000)	-0.0606*** (0.000)	-0.0212*** (0.000)	-0.0215*** (0.000)	-0.0213*** (0.000)	-0.0216*** (0.000)
N	322	322	322	322	322	322	322
R-Sq	0.145	0.019	0.017	0.887	0.885	0.893	0.892
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: (i) Based on Authors' Calculations; Number in parentheses indicates p-value; (ii) Significance levels: *** - $p < 0.01$; ** - $p < 0.05$; and * - $p < 0.1$. (iii) Dependent variable is ratio of gross primary surplus (net of federal transfers) to current GSDP. (iv) Real output gap is calculated of log of real GSDP using HP filter. (v) Real expenditure gap is calculated of log of real total expenditure using HP filter. (vi) These results are obtained from OLS Panel Fixed Effect Model.

Data Source: RBI (2004, 2010, 2012, and 2015); and EPW Research Foundation.

Table 5: Fiscal Reaction of Primary Surplus for the period of 1991-92 to 2014-15: A Dynamic Panel Model

Dependent Variable: Ratio of Primary Surplus to GSDP				
	(1)	(2)	(3)	(4)
Lagged Debt to GSDP Ratio (ρ)	0.0386*** (0.004)	0.0392*** (0.006)	0.088** (0.036)	0.069** (0.018)
Real output gap	0.015 (0.429)			-0.004 (0.656)
Real Expenditure gap	-0.058*** (0.000)			-0.053*** (0.000)
YVAR		-5.24 (0.593)	-29.78 (0.324)	
GVAR		-27.09*** (0.000)	-15.92 (0.422)	
FRBM Dummy			0.006* (0.075)	0.005** (0.022)
VAT Dummy			-0.004 (0.223)	-0.004 (0.134)
High Debt Dummy			-0.011* (0.059)	-0.009** (0.032)
Lagged Dependent Variable	0.607*** (0.000)	0.618*** (0.000)	0.519*** (0.001)	0.603** (0.001)
Constant	-0.0147*** (0.001)	-0.0149*** (0.002)	-0.0261*** (0.007)	-0.0206*** (0.006)
N	322	322	322	322
AR 1 - p value	0.007	0.006	0.007	0.017
AR 2 - p value	0.241	0.253	0.913	0.324
Hansen Test - p value	0.321	0.332	0.507	0.759
Instruments	13	13	16	16

Note: (i) Based on Authors' Calculations; Number in parentheses indicates p-value; (ii) Significance levels: *** - $p < 0.01$; ** - $p < 0.05$; and * - $p < 0.1$. (iii) Dependent variable is ratio of gross primary surplus (net of federal transfers) to current GSDP.

(iv) Real output gap is calculated of log of real GSDP using HP filter.

(v) Real expenditure gap is calculated of log of real total expenditure using HP filter.

(vi) These results are obtained from two step GMM estimation, where instrument were collapsed and considered up to 5th lag.

Data Source: RBI (2004, 2010, 2012, and 2015); and EPW Research Foundation.

Table 6: Fiscal Reaction of Primary Surplus (net of Transfers) for the period of 1991-92 to 2014-15: A Dynamic Panel Model

Dependent Variable: Ratio of Primary Surplus (net of Transfers) to GSDP				
	(1)	(2)	(3)	(4)
Lagged Debt to GSDP Ratio (ρ)	0.093*** (0.005)	0.090*** (0.006)	0.148** (0.023)	0.164** (0.032)
Real output gap	0.100*** (0.000)			0.067** (0.010)
Real Expenditure gap	-0.073*** (0.002)			-0.072*** (0.004)
YVAR		-52.79*** (0.002)	-31.36 (0.117)	
GVAR		-37.62*** (0.008)	-32.34 (0.167)	
FRBM Dummy			0.006 (0.238)	0.004 (0.353)
VAT Dummy			-0.0129** (0.024)	-0.012** (0.029)
High Debt Dummy			-0.0209** (0.038)	-0.024* (0.050)
Lagged Dependent Variable	0.89*** (0.000)	0.92*** (0.000)	0.93*** (0.000)	0.90*** (0.000)
Constant	-0.034** (0.038)	-0.031* (0.050)	-0.036** (0.030)	-0.041* (0.054)
N	322	322	322	322
AR 1 - p value	0.007	0.006	0.006	0.006
AR 2 - p value	0.402	0.382	0.221	0.412
Hansen Test - p value	0.861	0.847	0.220	0.295
Instruments	23	23	16	16

Note: (i) Based on Authors' Calculations; Number in parentheses indicates p-value; (ii) Significance levels: *** - $p < 0.01$; ** - $p < 0.05$; and * - $p < 0.1$. (iii) Dependent variable is ratio of gross primary surplus (net of federal transfers) to current GSDP.

(iv) Real output gap is calculated of log of real GSDP using HP filter.

(v) Real expenditure gap is calculated of log of real total expenditure using HP filter.

(vi) These results are obtained from two step GMM estimation, where instrument were collapsed and considered up to 5th lag.

Data Source: RBI (2004, 2010, 2012, and 2015); and EPW Research Foundation.

It indicates that the response of states towards lagged debt is higher when standard definition of primary surplus is considered as compared to the latter case. Following results come out while observing the coefficient of control variables. As expected, primary surplus (net of fiscal transfers) increases with higher real output gap and decreases with real expenditure gap. While FRBMA and VAT shows similar sign as in table 3, high debt dummy does not show any significant result. Additionally, the lagged dependent variable shows higher persistence with large and significant coefficient.

Table 5 and 6 show the results from GMM dynamic panel estimation with standard definition of primary surplus and net of transfers respectively. Both lagged dependent variable and lagged debt to GSDP ratio are treated as endogenous variables. The positive and significant association of FRBMA implementation with standard primary surplus holds (table 5). While VAT dummy does not report any significant results, high debt dummy shows similar results as in table 3 and 4. In other words, states with high debt are found to be less responsive than states with lesser debt. Significant persistence is observed in primary surplus as its lagged variable has positive and significant coefficient. Real expenditure gap and GVAR are found to have negative and significant association. Therefore dynamic panel estimation also shows that when government spending is above its trend level then primary surplus declines. After including all control variables in model 3 and 4, the response of primary surplus towards lagged debt to GSDP ratio is 0.087 and 0.069 respectively which is found to be higher than OLS panel estimation of 0.049 and 0.051 respectively (Table 3, model 6 and 7).

Further table 6 reports the response of primary surplus (net of transfers) with dynamic GMM panel estimation. Comparing it with its counterpart results with OLS panel estimation in table 4, the response of primary surplus after deducting federal transfers is observed to be much higher in dynamic estimation. Additionally, this coefficient is also significantly higher when we compare it with table 5 where standard primary surplus including federal transfers is used as dependent variable. Going ahead, real output gap and real expenditure gap have significant impact upon primary surplus (net of transfers) with expected sign. The dependent variable seems to have high persistence. Among other control dummy variables, FRBMA has positive but not significant impact with primary surplus, and VAT has negative and significant association.

In brief we can summarise the results as follows. The positive and significant coefficient of past accumulated debt to GSDP ratio (ρ) in all the models indicate that states are following

the path fiscal sustainability by generating primary surplus or reducing deficit. The model estimated using GMM methodology gives robust results. State's positive response (positive ρ) is much higher when we exclude federal transfers from primary surplus. It suggests, therefore that, the federal transfers substitute the public debt. In other words, however, states are following the path of fiscal sustainability, the federal transfers do not provide incentive to state governments to keep their budget in balance.

7. Fiscal Consolidation

The debt sustainability analysis in last section highlighted that reductions in primary fiscal deficit have occurred at the state level post FRBMA period. Therefore next question arises of which direction of fiscal consolidation has been followed by the state governments to reduce their deficit. Guided by empirical evidence on fiscal consolidation, the purpose of this exercise is merely to observe the composition of fiscal adjustments undertaken by state governments in India rather than to find determinants of such fiscal consolidation.

Fiscal consolidation term refers to those policy stances which are targeted to control fiscal deficit by fiscal policy tools along with an objective to decrease accumulated debt stock. These fiscal policy tools are the channels through which fiscal adjustment is undertaken. For example, bringing reduction in expenditure or increasing revenue or both.

Several aspects can be highlighted related to the fiscal consolidation strategy in an economy. First, the empirical literature concentrates on the factors which could influence the scenarios of implementation of fiscal consolidation. The structural, political and economic factors of an economy have been established as important determinants which could influence the likelihood of undertaking fiscal consolidation. Mierau et al. (2007) using data for 20 OECD countries for the period of 1970-2003, highlighted that likelihood of undertaking the process of fiscal consolidation increases with the level of debt. Similar result was also found by Barrios et al. (2010) using a set of EU and non-EU countries for the period of 1970-2008. Authors concluded that higher debt levels enhance the chances of achieving successful fiscal consolidation. Mierau et al. (2007) also studied the effect of political and economic factors on the rapid and gradual fiscal adjustments undertaken in these OECD countries. While political factors were found to have no significant impact on fiscal adjustments, rapid fiscal adjustments were found to be mainly driven by upcoming election year. The contribution of political factors in success of fiscal consolidation has gained attention since 80's. One such study by Roubini and Sachs (1989) analyzed the fiscal policy and budget institutions over

OECD countries. Authors found that ruling governments of coalition or minority nature have harder times in implementing fiscal consolidations strategies and maintaining fiscal discipline. Based on study of OECD countries, Alesina and Perotti (1995) also analyzed the fiscal consolidation scenarios with respect to political and several economic factors. Authors concluded that political factors such as coalition government and government ideology matter while observing the success of fiscal consolidation efforts. Coalition governments were found to be least successful in undertaking successful fiscal consolidation efforts as compared to singly party government and minority government. Similarly centrist governments were found to be least capable of initiating steps of successful fiscal consolidation as compared to right-wing or left-wing parties. Similarly, Tavares (2004) using information of OECD countries, studied the impact of government ideology on the fiscal consolidation process. Author concluded that government ideology affects the persistence of major fiscal adjustments. The spending cuts by left wing government and tax increase by right wing governments were found to be associated with persistent adjustments.

Secondly, literature highlights the factors which could influence likelihood of success or failure of fiscal consolidation strategies. Ardagna (2004) based on an empirical study of OECD countries from 1970 to 2002, points out that size of fiscal consolidation matters for its success to reduce debt to GDP ratio. Generally, larger initial fiscal adjustment results in higher likelihood of success of fiscal consolidation. Further, the impact of fiscal rules or budgetary institutions on fiscal consolidation has been analyzed, but has not attained broader consensus. European Commission (2007) found no impact of fiscal rules on fiscal consolidation. Wurzel et al. (2007) using data for 24 OECD countries found that fiscal rules with embedded expenditure goals were associated with longer and larger fiscal adjustments. Therefore, well designed and transparent fiscal rules could lead to successful fiscal consolidation efforts.

Thirdly, the empirical evidence in literature suggests that composition of undertaking fiscal adjustments matters for its success and duration. Its duration is important because the process of fiscal consolidation is considered to be a multi-year process rather than single year process. Studies have compared the strength of tax and expenditure related fiscal adjustments. Alesina and Perotti (1995), Zaghini (2001) and Ardagna (2001) show that expenditure based fiscal consolidation strategies are long-lasting and more effective at reducing public liabilities than tax-based fiscal adjustments. Further in an empirical paper, Alesina and Perotti (1995,

1997) studied the expenditure composition and highlighted reduction in social transfers and government wages as successful adjustment rather than cutting public investment.

Fourthly, discussion on fiscal consolidation concentrates on the expansionary and contractionary effects on public consumption and growth of output. Perotti (1999) using data for 19 OECD countries for the time period of 1965 to 1994, found that reductions brought in public deficit during the periods of high public debt are likely to be expansionary leading to higher private consumption. Further based on empirical evidence, Alesina and Ardagna (2010) and IMF (2010) described that fiscal adjustments through tax increase and reduction in public investment are more likely to be contractionary than fiscal adjustments through reductions in current spending. The latter adjustments are more likely to be successful in bringing reductions in deficit.

7.1. Channels of Fiscal Consolidation process at the sub-national level

In order to observe the path of fiscal consolidation, the change in aggregate expenditure and aggregate revenue along with their various components has been observed against FRBMA dummy (Table A1). This analysis points out various minute details about the fiscal stance of sub-national governments in post FRBMA period. Both gross fiscal deficit and revenue deficit seem to have declined, where revenue deficit has declined at faster pace than the aggregate gross fiscal deficit. Therefore it indicates that fiscal consolidation has occurred at the sub-national level. One main concern of policy makers has been that the revenue expenditure, considered as committed expenditure, with its large share in total expenditure, could displace productive expenditure on capital account while undertaking the process of fiscal consolidation. But analysis in Table A1 confirms an expansion in the capital expenditure as ratio of GSDP at the aggregate level. Therefore the capital expenditure has not experienced a decline during the process of fiscal consolidation. Two categories of revenue expenditure namely interest payments; and wages and salaries, on the other hand, had experienced decline contributing in fiscal consolidation.

There seem to be vast disparities in fiscal consolidation scenario of individual state governments. All 14 states can be grouped into two categories. First category includes those states which have experienced decline in both GFD and RD. These are Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Orissa, Rajasthan, Tamil Nadu, and Uttar Pradesh. But wide disparities can be observed in sources of decline in GFD and RD. All these states except Gujarat and Maharashtra, have recorded an expansion in revenue receipts and especially in

own tax revenue. Karnataka and Uttar Pradesh have experienced increase in both aggregate revenue and expenditure, where increase in former is larger than the increase in the latter. Therefore, these two states have pursued revenue led fiscal consolidation. Gujarat, Maharashtra and Orissa seem to have experienced expenditure led fiscal consolidation. Gujarat has recorded a squeeze in all revenue categories analysed such as aggregate, revenue receipts, own tax revenue, and capital receipts, which is lesser than decline in aggregate expenditure. Maharashtra has recorded decline in aggregate expenditure but no significant change in aggregate revenue. Similarly Orissa has faced larger decline in aggregate expenditure than in aggregate revenue. In rest of the three states namely, Andhra Pradesh, Rajasthan, and Tamil Nadu, no conclusive result regarding channel of fiscal consolidation can be charted out.

Second category of states does not provide any conclusive results in trend of GFD and RD. It includes Bihar, Haryana, Kerala, Madhya Pradesh, Punjab, and West Bengal. Only few signs of fiscal consolidation can be observed for these states. A significant decline in RD and no change in GFD can be observed for Bihar and Madhya Pradesh. Similarly Punjab has recorded significant decline only in gross fiscal deficit, indicating fiscal consolidation. But it does not provide any clear result regarding channels of fiscal consolidation.

Expenditure on wages and salaries suggests that this category of expenditure has contributed favourably towards fiscal consolidation by showing a significant decline at the aggregate level. All individual states except Gujarat, Uttar Pradesh and West Bengal show a significant decline. While Gujarat shows positive and significant increase in wages and salaries, Uttar Pradesh and West Bengal does not show any significant results. Similar results can be observed in Interest payments at aggregate level. Expenditure on interest payments has declined after FRBMA implementation at aggregate level. But individual states do not show any significant results except Bihar, Haryana and Orissa, which show a significant decline in interest payments.

Looking at other important categories of expenditure such as *Education* and *Health*, few notable results can be charted out. Health expenditure has experienced a decline post-FRBM period at aggregate level as well as for all individual state governments except Bihar, Madhya Pradesh, West Bengal and Uttar Pradesh. While results do not indicate significant estimate for first three states, Uttar Pradesh has increased its health expenditure post FRBMA. In case of education expenditure, no significant estimates can be found at the aggregate level.

7. Conclusion

This study is an attempt to check public debt sustainability of sub-national governments in India for the period of 1991-2014. With focus on the contribution of federal transfers towards fiscal sustainability of sub-national governments, this study makes an addition to the existing analysis.

The fiscal reaction function is estimated which brings out the response of primary surplus to the past accumulated debt. A positive and significant response will indicate that sub-national governments follow fiscal discipline by generating (reducing) primary surplus (deficit) if there is outstanding debt to be repaid. This study tackles the problem of endogeneity by way of applying dynamic panel approach in addition to the OLS panel estimation. Results indicate that states have pursued sustainable fiscal policy by generating (reducing) primary surplus (deficit) against their past accumulated liabilities. Their positive response is much higher when we exclude federal transfers from primary surplus. It suggests, therefore that, the federal transfers substitute the public debt. In other words, federal transfers do not provide incentive to states to keep their budget in balance. The policy implication coming out of this analysis suggests that federal transfers should be accompanied by incentives and conditions which could motivate state governments to keep their budget in balance.

Another aspect of this analysis describes that the implementation of FRBMA has led to improvement in fiscal situation at sub-national level. The capital expenditure has not experienced a decline during the process of fiscal consolidation. Two categories of revenue expenditure namely interest payments; and wages and salaries, on the other hand, had experienced decline contributing in fiscal consolidation. Health expenditure has experienced a decline post-FRBM period at aggregate level. The path of fiscal consolidation post FRBMA has not been identical for all states. Few notable results come out. Karnataka and Uttar Pradesh have experienced revenue led fiscal consolidation. Gujarat, Maharashtra and Orissa seem to have pursued expenditure led fiscal consolidation.

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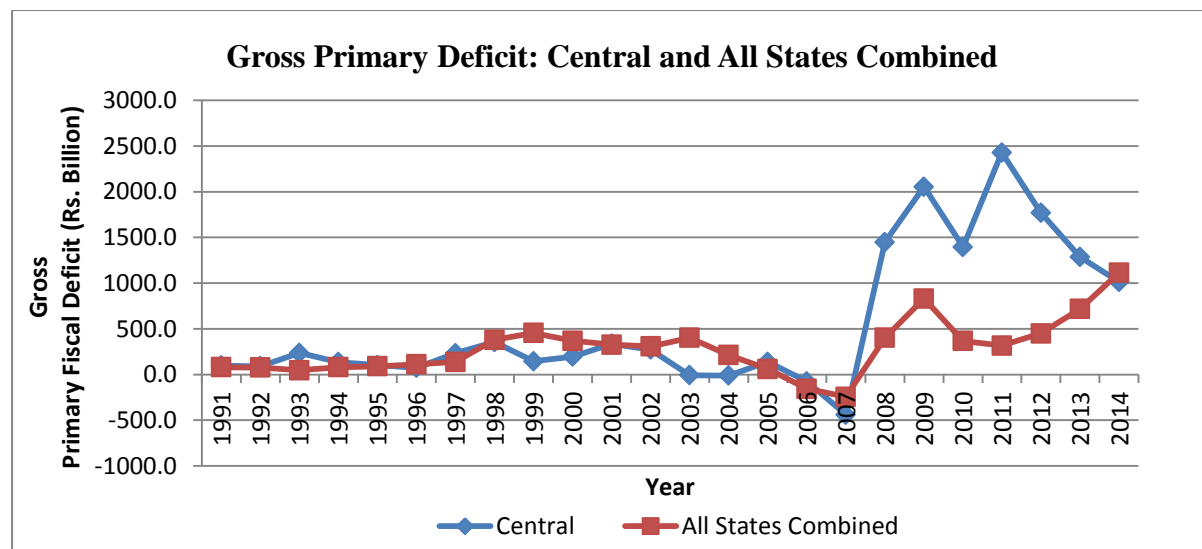
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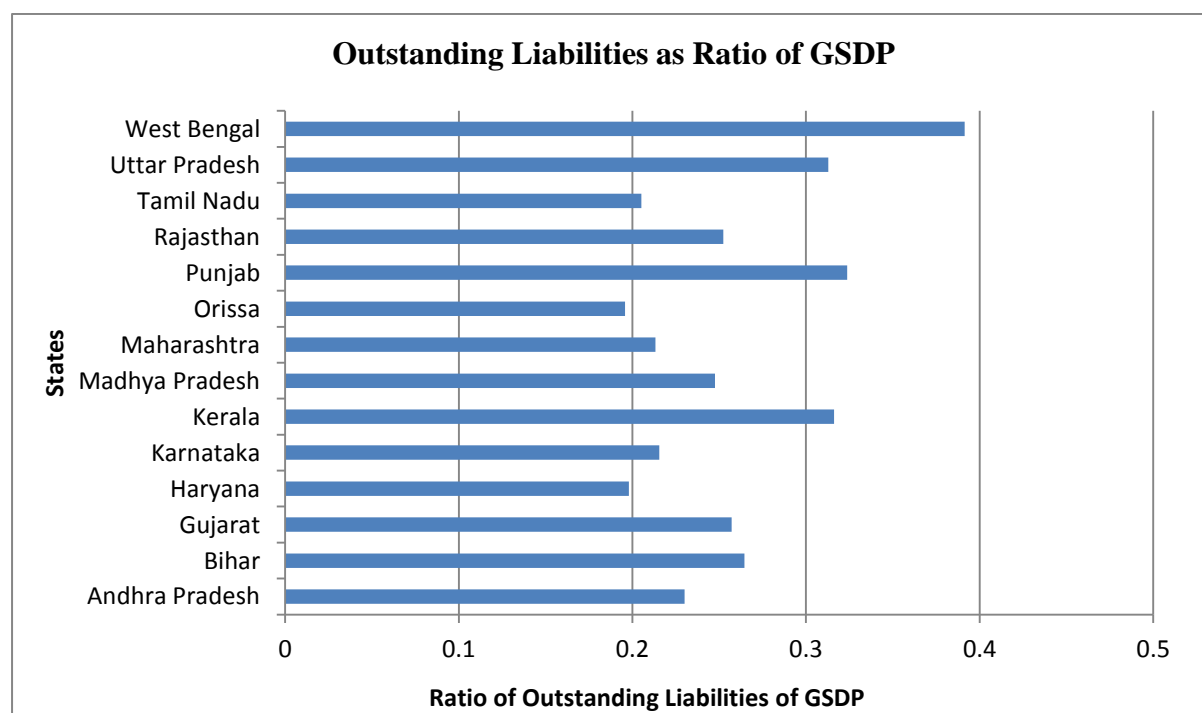
Appendices

**Figure A1: Level of Gross Primary Deficit: Central and All State Governments
(Combined) – 1991-92 to 2014-15**



Note: (i) Based on author's calculations. (ii) Data Source: RBI (2004, 2010, 2012, and 2015); and EPW Research Foundation.

Figure A2: State-Wise Outstanding Liabilities as ratio of GSDP: 2012-13



Note: (i) Based on author's calculations. (ii) Data Source: RBI (2004, 2010, 2012, and 2015); and EPW Research Foundation.

Table A1: Fiscal Scenario after FRBMA Implementation Sub-national Level: 1991-91 to 2013-14[illegible]

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State	Variable	GFD	RD	Total Exp	Revenue Exp	Capital Exp	Education Exp	Health Exp	Wage and Salaries	Interest Payment	Total Revenue	Revenue Receipts	Own Tax Rev	Capital Receipts
Kerala	FRBM	-0.29 (0.49)	-0.08 (0.86)	0.46 (0.33)	0.16 (0.71)	-0.08 (0.52)	-0.51*** (0.00)	-0.09*** (0.00)	-0.72*** (0.00)	0.11 (0.54)	0.54 (0.23)	0.32 (0.20)	0.69*** (0.00)	0.22 (0.63)
	Cons.	3.85*** (0.00)	2.35*** (0.00)	16.15*** (0.00)	13.97*** (0.00)	1.01*** (0.00)	3.28*** (0.00)	0.81*** (0.00)	5.31*** (0.00)	2.35*** (0.00)	16.18*** (0.00)	11.53*** (0.00)	7.23*** (0.00)	4.65*** (0.00)
	N	23	23	23	20	23	23	23	23	23	23	23	23	23
Madhya Pradesh	FRBM	-0.87 (0.12)	-3.41*** (0.00)	5.09*** (0.00)	2.27*** (0.00)	1.84*** (0.00)	0.46*** (0.00)	0.04 (0.16)	-0.88*** (0.00)	0.05 (0.82)	5.44*** (0.00)	5.73*** (0.00)	2.39*** (0.00)	-0.29 (0.73)
	Cons.	3.26*** (0.00)	1.24*** (0.00)	17.45*** (0.00)	14.08*** (0.00)	1.76*** (0.00)	2.39*** (0.00)	0.68*** (0.00)	5.50*** (0.00)	2.04*** (0.00)	17.30*** (0.00)	12.77*** (0.00)	5.31*** (0.00)	4.52*** (0.00)
	N	23	23	23	20	23	23	23	23	23	23	23	23	23
Maharashtra	FRBM	-1.37*** (0.00)	-1.55*** (0.00)	-1.34** (0.02)	-1.14*** (0.00)	0.22 (0.23)	-0.13 (0.40)	-0.11*** (0.00)	-1.13*** (0.00)	-0.002 (0.99)	-0.97 (0.11)	0.43 (0.15)	0.45* (0.03)	-1.40* (0.04)
	Cons.	3.20*** (0.00)	1.421*** (0.00)	14.24*** (0.00)	11.53*** (0.00)	1.55*** (0.00)	2.52*** (0.00)	0.52*** (0.00)	5.35*** (0.00)	1.65*** (0.00)	14.28*** (0.00)	10.09*** (0.00)	6.70*** (0.00)	4.19*** (0.00)
	N	23	23	23	20	23	23	23	23	23	23	23	23	23
Orissa	FRBM	-4.98*** (0.00)	-4.58*** (0.00)	-1.80* (0.06)	-1.01 (0.12)	-0.04 (0.89)	-0.29* (0.09)	-0.22*** (0.00)	-1.58*** (0.00)	-1.53** (0.00)	-1.61* (0.08)	3.51*** (0.00)	1.58*** (0.00)	-5.13*** (0.00)
	Cons.	5.24*** (0.00)	2.74*** (0.00)	20.80*** (0.00)	16.34*** (0.00)	2.14*** (0.00)	3.27*** (0.00)	0.77*** (0.00)	6.53*** (0.00)	3.68*** (0.00)	20.82*** (0.00)	13.63*** (0.00)	4.19*** (0.00)	7.19*** (0.00)
	N	23	23	23	20	23	23	23	23	23	23	23	23	23
Punjab	FRBM	-1.30*** (0.00)	-0.57 (0.20)	-0.10 (0.92)	0.07 (0.93)	-0.05 (0.84)	-0.27** (0.02)	-0.15*** (0.00)	0 ()	-0.23 (0.50)	-1.2 (0.31)	0.66 (0.36)	0.98*** (0.00)	-1.86 (0.08)
	Cons.	4.74*** (0.00)	2.99*** (0.00)	17.98*** (0.00)	14.88*** (0.00)	1.21*** (0.00)	2.37*** (0.00)	0.70*** (0.00)	5.61*** (0.00)	3.22*** (0.00)	18.72*** (0.00)	11.83*** (0.00)	6.17*** (0.00)	6.89*** (0.00)
	N	23	23	23	20	23	23	23	3	23	23	23	23	23

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State	Variable	GFD	RD	Total Exp	Revenue Exp	Capital Exp	Education Exp	Health Exp	Wage and Salaries	Interest Payment	Total Revenue	Revenue Receipts	Own Tax Rev	Capital Receipts
Rajasthan	FRBM	-2.21*** (0.00)	-2.01*** (0.00)	-1.09 (0.16)	-0.57 (0.31)	0.04 (0.89)	-0.12 (0.26)	-0.15*** (0.00)	-0.77*** (0.00)	-0.43 (0.22)	-0.79 (0.36)	1.62*** (0.00)	1.14*** (0.00)	-2.41*** (0.00)
	Cons.	4.66*** (0.00)	2.01*** (0.00)	19.13*** (0.00)	14.84*** (0.00)	2.43*** (0.00)	3.20*** (0.00)	0.85*** (0.00)	5.18*** (0.00)	2.97*** (0.00)	19.11*** (0.00)	12.75*** (0.00)	5.35*** (0.00)	6.36*** (0.00)
	N	23	23	23	20	23	23	23	18	23	23	23	23	23
Tamil Nadu	FRBM	-0.60* (0.08)	-2.06*** (0.00)	0.66 (0.33)	-1.22** (0.04)	1.21*** (0.00)	-0.45*** (0.00)	-0.19*** (0.00)	-1.19*** (0.00)	0.02 (0.89)	1.01 (0.13)	0.91** (0.02)	1.01*** (0.00)	0.10 (0.82)
	Cons.	2.73*** (0.00)	1.94*** (0.00)	15.83*** (0.00)	13.94*** (0.00)	0.83*** (0.00)	2.69*** (0.00)	0.73*** (0.00)	5.02*** (0.00)	1.63*** (0.00)	15.84*** (0.00)	11.95*** (0.00)	7.64*** (0.00)	3.88*** (0.00)
	N	23	23	23	20	23	23	23	23	23	23	23	23	23
Uttar Pradesh	FRBM	-1.31*** (0.00)	-3.21*** (0.00)	4.14*** (0.00)	2.68*** (0.00)	2.22*** (0.00)	0.62*** (0.00)	0.18*** (0.00)	0.47 (0.18)	-0.32 (0.30)	4.30*** (0.00)	5.82*** (0.00)	2.12*** (0.00)	-1.52 (0.18)
	Cons.	4.67*** (0.00)	2.82*** (0.00)	18.46*** (0.00)	14.70*** (0.00)	1.44*** (0.00)	2.78*** (0.00)	0.71*** (0.00)	3.47*** (0.00)	3.02*** (0.00)	18.50*** (0.00)	11.94*** (0.00)	4.75*** (0.00)	6.56*** (0.00)
	N	23	23	23	20	23	23	23	22	23	23	23	23	23
West Bengal	FRBM	-1.38 (0.17)	-0.85 (0.37)	0.03 (0.98)	1.21 (0.44)	-0.07 (0.71)	0.22 (0.25)	-0.07 (0.29)	-0.37 (0.50)	-0.25 (0.64)	0.03 (0.98)	1.16** (0.03)	0.37 (0.21)	-1.13 (0.34)
	Cons.	4.84*** (0.00)	3.47*** (0.00)	15.81*** (0.00)	12.89*** (0.00)	0.84*** (0.00)	2.70*** (0.00)	0.73*** (0.00)	5.24*** (0.00)	3.19*** (0.00)	15.88*** (0.00)	9.58*** (0.00)	4.58*** (0.00)	6.30*** (0.00)
	N	23	23	23	20	23	23	23	17	23	23	23	23	23
All	FRBM	-1.36*** (0.00)	-2.04*** (0.00)	0.58** (0.05)	-0.07 (0.72)	0.87*** (0.00)	-0.04 (0.31)	-0.08*** (0.00)	-0.77*** (0.00)	-0.34*** (0.00)	0.60* (0.06)	1.98*** (0.00)	1.12*** (0.00)	-1.39*** (0.00)
	Cons.	3.90*** (0.00)	2.01*** (0.00)	17.47*** (0.00)	14.22*** (0.00)	1.52*** (0.00)	2.76*** (0.00)	0.70*** (0.00)	4.96*** (0.00)	2.54*** (0.00)	17.58*** (0.00)	12.2*** (0.00)	5.98*** (0.00)	5.37*** (0.00)
	N	322	322	322	322	322	322	322	284	322	322	322	322	322

Note: (i) Based on author's calculations. (ii) Data Source: RBI (2004, 2010, 2012, and 2015); and EPW Research Foundation.