Some Aspects of Debt Sustainability and Fiscal Fatigue in West Bengal

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Abstract

One major problem plaguing the economy of West Bengal is her large Public Debt. The state in order to implement fiscal discipline has formulated her own Fiscal Responsibility and Budget Management Act in 2010 and have amended it multiple times to allow for higher deficits and debt level, heedless of the mandates of Union Government and Finance Commissions. In this context, this article tries to assess the sustainability of West Bengal's public debt using four alternate methodologies popular in literature- Domar's Approach, Unit Root and Co-Integration Approach (Hamilton's and Flavin's Approach), Penalized-Spline Approach (modified Bohn's Approach) and lastly Threshold Approach to check for the presence of Fiscal Fatigue. It conjectures that while Domar's and Hamilton's Approaches indicate unsustainable level of debt; Bohn's Approach indicates sustainable debt level at 5% but not at 1% level of significance. Using Threshold Analysis, we find evidence of Fiscal Fatigue. West Bengal's threshold debt level is below the threshold level as per the state's FRBM Act, but not as per the mandates of Union Government (FRBM Review Committee's) and 12th and 15th Finance Commissions' mandates. The study also finds that the state tends to profligate whenever the debt is below the threshold level and practices austerity when debt surpasses the threshold level.

Keywords: *Public Debt, Sustainability, Domar, Unit Root and Co-integration, Bohn' s Approach, Threshold, Fiscal Fatigue*

JEL Classification: *H62, H63, H70, H75, H76*

1. Introduction

One salient feature of West Bengal's state finance is her indebtedness. According to the Report of Twelfth Finance Commission, "The rising debt of states is a reflection of the deterioration in the fiscal performance of states and signifies a long-term mismatch between the growth of revenues and expenditures of the states. It is the consequence of persistent increase in non-plan revenue expenditure, such as interest payments, subsidies, salaries and pensions, together with sluggish growth in tax-GDP ratios, inadequate returns from public investments and insufficient growth in central transfers. Large revenue deficits have led to large fiscal deficits and spiraling debt, resulting in the emergence of a vicious cycle of deficit, debt and debt service payments". Debt Overhang is not only detrimental to economic growth and stability; it also hampers accumulation of capital stock. Unsustainable level of debt severely compromises on the repayment capacity through heightened long term interest rates and higher distortionary tax rates. As a result constraint on counter cyclical fiscal policies and inflation follow suit (Rugy and Salmon, 2020). The ratio of Public Debt to Gross Domestic Product (GSDP) of West Bengal was almost the same as that of national average in 1990. However public debt began to

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burgeon since 1999-00 and by 2013, the debt-GSDP ratio of West Bengal was the highest among the Non-Special Category (NSC) states. In 2016-17, West Bengal clocked the second highest debt-GSDP ratio at 33.8% and in 2023-24 the state has managed to garner the highest debt-GSDP ratio in the country. Since 1995, there has been a significant rise in the debt and deficit conditions of both central and state governments in India, primarily due to the rise in salaries of government employees (Rajaraman et al. 2005). In an effort to enhance the fiscal landscape, the central government implemented a rule-based fiscal framework known as the Fiscal Responsibility and Budget Management (FRBM) Act in 2003-04. This legislation mandates the complete elimination of revenue deficit and aims to reduce fiscal deficit to 3 percent of GDP, with annual reductions of 0.3% and 0.5%, respectively, to be achieved within a specified timeframe (initially set for 2008-09). Following the central government's lead, most states also established their own FRBM regulations between 2003 and 2007, barring Sikkim and West Bengal. West Bengal adopted her FRBM Act in July 2010. While West Bengal's initiatives yielded some initial positive outcomes during the next four or five years, the fiscal situation deteriorated since 2015 leading to multiple postponements and adjustments of targets between 2011 and 2024. Against this backdrop it is pertinent to study whether West Bengals' debt is sustainable or not and what is the threshold limit of this debt beyond which it becomes unsustainable. With this major objective in mind, the rest of the article is organized as follows. In Section 2 we delineate the objectives of this article. In Section 3 we conduct a literature survey and in Section 4 we posit a theoretical model. In Section 5 we delineate the methodology to be used to ascertain debt sustainability and threshold limit for the state. Section 6 deals with debt profile of the state from 1995-96 to 2023-24 and conducts empirical estimation of debt sustainability. Finally, Section 7 concludes the article.

2. Objective

The objective of this article is threefold. First, it posits a theoretical model (suitable for West Bengal's economy) to show how a rise in present debt level (a rise in the growth rate of debt) affects present and future GSDP, government expenditure and future debt level of the economy. Secondly, using three alternate empirical approaches, viz- Domar's Approach, Unit Root and Co-Integration Approach (Hamilton's and Flavin's Approach), Penalized-Spline Approach (modified Bohn's Approach), this article assess the sustainability of West Bengal's public debt. Finally, using Threshold Analysis, it checks for the existence of Fiscal Fatigue under two alternate threshold limits- one mandated by the Union Government (Review Committee on FRBM) and the other mandated by the State Government.

3. Literature Survey

The need to pursue a policy of 'Sound Finance' has been a defining feature of India's neo-liberal policy regime, particularly since foreign capital took the upper hand in determining the country's foreign exchange constraint and growth (Lahiri et. al. 2016). Thus, curtailment of fiscal deficit, primary deficit and debt-GSDP became the need of the hour (Lahiri et. al. 2016). Focus shifted on good housekeeping (Blanchard et. al. 1991). IMF (2010) postulated that debt should be sustainable in the sense that debt accumulation should be at a rate lower than government's capacity to service it. There are three main views of debt financing in literature: Ricardian View, Keynesian View and Neo-Classical View. Ricardian Equivalence states that higher levels of debt in present period would imply future rise in tax obligation, and hence household would smoothen their adjustment to revenue or expenditure shock. On the other hand, Keynesian view asserts that debt financing can stimulate growth and higher levels of debt does not pose any problem as it calls for transfer of resources from tax payers to bond holders. However, when assistance is sought from external agencies, it leads to leakage from Circular

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Flow of Income and compromises on developmental expenditures. Moreover, this multiplier effect will become depressed if bond holder's marginal propensity to consume is lower than that of the tax payers'. Finally Neo-Classical view asserts that a rise in debt distorts investment and growth through a decline in government's savings. Thus, we see that there is no consensus on the effects of debt financing and hence, the issue of debt sustainability calls for empirical estimation (Rangarajan and Srivastava, 2005). Again on the empirical front too, there is once again a lack of consensus on the method of assessing sustainability of debt (Akhmadeev et. al., 2018). However, after the seminal work of Hamilton and Flavin (1986) primarily three empirical methods have been identified to assess the sustainability of public debt. First, Unit Root test has been employed to identify if debt-GSDP/ GDP ratio is sustainable. Debt is sustainable if Unit Root test implies stationary series (Trehan and Walsh, 1991); Uctum et. al., 2006). Secondly, Co-integration test suggests that debt is sustainable if the ratios of Primary Surplus to GSDP/ GDP and debt to GSDP/ GDP are co-integrated along with debt being quasi-stationary (Hakkio and Rush, 1991); Jha and Sharma, 2004). Alternatively, debt is sustainable if total revenue and expenditure are co-integrated (Greiner and Fincke, 2009). Thirdly, according to Bohn (1998) if primary balance responds positively to debt and is statistically significant, then debt is sustainable. This approach entails the use of non-linear estimation using p-spline method. While Bohn's approach is most used in deciphering sustainability of debt due to its nice statistical properties (Rejnith, 2018), none of these models answer if there is any limit to debt below which it is sustainable and above which it is unsustainable. Ghosh (2013) therefore, uses the concept of Fiscal Fatigue to determine the threshold level of sustainable debt. Fiscal Fatigue occurs when public debt crosses some threshold and departs from this threshold value when the primary balance does not adjust to debt. RBI (2017, 2020) in its studies using budget analysis from 1985-17 and GSDP-trend Analysis from 1981-20 respectively, point out that West Bengal's debt-servicing charges have registered secular rise and the state's debt-GSDP ratio is the highest in the country. While various studies focusing on West Bengal have outlined the causes of high fiscal deficit ratio, very scanty literature exists on the issue of debt sustainability and measurement of threshold level of West Bengal's debt, particularly after the state's implementation of FRBM Act in 2010. Shamugam et. al (2022) and Rajneeth et. al. (2018) have used Bohn's and Fixed Effect Panel Approach respectively, to check sustainability of debt levels of few Indian states, along with West Bengal. Using data from 2007-19 and 2004-25 respectively, they have found that West Bengal's debt is not only unsustainable but also welfare reducing. Kaur et. al (2014) using Panel Fixed Model method for sample ranging 1980-2013 also find that West Bengal's debt level is unsustainable. Thus, we can say that unsustainable debt of the state is not a recent phenomenon, but spans decades back. Kaur (2019) using ARDL analysis on data from 1980-13 once again attests this aforesaid claim. Assessing sustainability of debt using Co-integrating Approach has been popular in literature. For the case of Bengal, Afonso (2005), using samples spanning from 1990-04 opines that not only the state's debt levels are unsustainable, but fiscal policies also tend to be weak due to high debt levels. Patnaik et. al (2003) and Jha et. al (2004) both use sample ranging from 1980-00 in their analysis. Both these studies points to the fact that fiscal indiscipline is the cause behind unsustainable debt and the state's expenditures do not move in tandem with her revenues, leading to fiscal indiscipline. Grosu (2024) has used p-spline (penalized spline) method to check debt sustainability of Romania and by their standard West Bengal's debt level is unsustainable as per international standard as well. Tiwari (2012) have used p-spline method and found that West Bengal's fiscal response to mounting debt is weak. The study by Kaur et. al. (2012), though not a recent one, is the sole one to use threshold estimation of debt level in West Bengal. This study also conjectures that debt level of West Bengal crosses the threshold level, and hence, is unsustainable. It might be insightful now to mention here how other states are faring in terms of sustainability of debt. Jha et.al. (2022) find limited evidence of strong

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long-run fiscal linkage (cointegration) between state expenditures and output of 16 states. According to them, while debt levels of Gujarat, Maharashtra and Haryana are adequately sustainable, those of Assam, Bihar, Himachal Pradesh, Karnataka, Madhya Pradesh, Odisha, Rajasthan, Tamil Nadu and Uttar Pradesh are moderately sustainable. However, debt levels of Andhra Pradesh, Kerala, Punjab, turn out to be unsustainable. A study by ICRA (2023) finds quite similar results. According to this report, debt levels of Maharashtra, Gujarat and Karnataka are sustainable (since their debt-GSDP ratio is below 20%), while other states like Haryana, Madhya Pradesh, Tamil Nadu, Uttar Pradesh and Telangana (whose debt-GSDP ratios are within 20%-30%) have moderately sustainable debt. However, Andhra Pradesh, Kerala and Rajasthan have unsustainable debt level, with debt-GSDP ratio hovering above 30%. NIPFP (2022) in its study conjecture that Gujarat, Karnataka, Maharashtra, Tamil Nadu, Telangana, Haryana boasts of sustainable debt level, exhibiting strong fiscal indicators, including lower debt-to-GSDP ratios, robust own revenue generation, and prudent expenditure management; unlike Punjab, Kerala, Rajasthan and Bihar. On the other hand, NITI Aayog (2022) adds Odisha, Chhattisgarh, Goa and Jharkhand to its list of states having sustainable debt levels and cautions red flag to the states of Punjab, Andhra Pradesh and Kerala. It can thus be discerned from the above studies that while some states have been unanimously labeled as best (Gujarat and Maharashtra) and worst performers (Kerala, Andhra Pradesh and Punjab) by all the studies, there is considerable ambiguity regarding debt sustainability of debt in others states. Therefore, it becomes imperative to assess the sustainability of debt using various alternate methodologies for a single state and come up with a figure regarding its threshold level of debt, which in turn depends on various macroeconomic factors (like GSDP, tax revenue, non-tax revenue, special grant etc) that are state-specific. Now, while there is a consensus that West Bengal's debt level is unsustainable, there is a lack of studies that delineate whether this level is still maintained or it has even deteriorated, after the implementation of FRBM Act in 2010. Further, threshold level of debt has various aspects for the case of West Bengal which literature has remained largely silent upon. While the Union Government mandates a threshold limit of 20% for all Indian states, the Government of West Bengal mandates a level of 34.3%. In this present context this study shall use three approaches to assess debt sustainability of West Bengal considering recent fiscal statistics, an aspect not covered in literature. It shall also assess the internal threshold level, along with the Union Government's to check for fiscal fatigue in West Bengal. We shall now proceed with the theoretical model.

4. Model

An economy's debt level can rise mainly on account of two fronts. First, its expenditures are high relative to its income and secondly, it may have moderate means to earn revenues from various sources (due to low income or investment). For the economy of West Bengal, both the channels operate heavily. The state's ratio of Government Expenditure to GSDP has been as high as 17.3% in 2023-24. West Bengal's ratio of own tax revenue to GSDP is a meager 5.4% in 2024-25, which is the second lowest (barring the North-Eastern states) in the country. The state also has the lowest own non-tax revenue to GSDP ratio (0.3%) in the country, including the North-Eastern States in 2024-25. Thus, West Bengal has to heavily depend on borrowing. Revenue Expenditure of the state is almost 90% (in 2024-25) and thus, a paltry sum of 10% is earmarked for capital expenditure. Hence, the state's ability to garner higher growth in future through capital investment is also limited which further inhibits future growth and higher tax revenue. This compromises heavily on the state's ability to become reliant on its own resources, leading to a perpetual game of borrowing. We now present below a theoretical model to gauge the effect of a rise is debt on relevant macroeconomic variables. Debt of an economy (D_t), in a particular period is the difference between the sum of government spending (G_t) and previous

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period debt repayment along with interest$[(1+i_t)D_{t-1}]$ net of revenue earnings (R_t). For simplicity, we assume that revenue of the economy is a rising function of its income (Y_t). Further, there are other sources of revenue (e.g., own non-tax revenues, borrowings, etc) for any state which depend on exogenous factors $(\bar{R})$. Thus, we can write:

$$D_t = G_t - R_t + (1+i_t)D_{t-1}, \text{ where } R_t = \hat{t}Y_t + \bar{R} \quad (1)$$

$$\text{Or, } G_t = D_{t-1}(d_t - i_t) + \hat{t}Y_t + \bar{R}, \text{ where } d_t = \frac{D_t - D_{t-1}}{D_{t-1}} \quad (2)$$

$$\text{Or, } G_t = \rho_{t-1}\frac{(d_t - i_t)}{(1+g_t)}Y_t + \hat{t}Y_t + \bar{R}, \text{ where, } g_t = \frac{Y_t - Y_{t-1}}{Y_{t-1}} \text{ and } \rho_{t-1} = \frac{D_{t-1}}{Y_{t-1}} \quad (3)$$

Let us now focus on the equilibrium condition of the product market. Now, for any economy, net exports comprise an important source of injection or leakage from income, depending on whether it is positive or negative. Net exports depend on real exchange rate (which in turn depends on capital flows, tax rates on foreign firms and foreign income (see Lahiri et.al. (2016)), for a macroeconomic model of India). However, for an individual state, the factors that influence net exports are to be deemed exogenous, as national policy influences them. To elucidate, capital flows depend on interest rate differential between India and abroad, and interest rate is a policy variable of RBI (given by $\bar{r}$). Tax rates on foreign firms are decided by Union Government of India and hence, West Bengal has no direct influence on them. It should be taken into cognizance that West Bengal hosts a staggering 0.5% of total FDI inflow in India and only 0.05% of its GSDP (in 2024) is exported. West Bengal does not exert considerable strength on capital flows and exchange rate, and hence these variables can be treated as exogenous in macroeconomic modeling of West Bengal (however, for states like Maharashtra, Karnataka and Gujarat, who form the major sites of FDI inflow, this is not true). In fact, for an economy like that of West Bengal, we can suppress the net-export function from the national income identity for brevity of purpose. However, for the sake of completeness, we avoid this temptation. Rest of the arguments in the NI accounting identity is standard in literature. We write the equilibrium condition as:

$$Y_t = C_t[(1-\hat{t})Y_t] + I_t(\bar{r}, Y_{t-1}) + G_t + NX_t(e_t, Y_t^*, Y), \quad (4)$$

Where, symbols have their usual meanings and signs.

Substituting (2) in (4)

$$Y_t = C_t[(1-\hat{t})Y_t] + I_t(\bar{r}, Y_{t-1}) + (d_t - i_t)(1+d_{t-1})D_{t-2} + \hat{t}Y_t + \bar{R} + NX_t(e_t, Y_t^*, Y) \quad (5)$$

Let us now assess the effect of a rise in debt on present and future income of the economy. We consider two cases where the debt-GSDP ratio (denoted by, ρ) is below and above the threshold limit (denoted by, $\bar{\rho}$). The threshold limit is decided by the government in its FRBM Act and is revised from time to time, both by the Central and State Governments. A relaxation on debt-GSDP ratio (defined as threshold) implies a relaxation of fiscal deficit ratio as well. This follows from the fact that fiscal deficit is the sum of primary deficit and interest payment on debt, and hence, there is a one-to-one correspondence between threshold (defined as debt-GSDP ratio) and fiscal deficit ratio (fiscal deficit-GSDP ratio). As a result, we focus on the comparative static exercises of a change in debt only.

Case 1: $\rho_{t-1} < \bar{\rho}$

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In this case there is sufficient fiscal space available for expansion. We can gauge the effect of a rise in growth rate of debt on present and future income by differentiating (5) w.r.t. d_t and d_{t-1}. These are given in (6) and (7) respectively.

$$\frac{\partial Y_t}{\partial d_t} = \frac{(1+d_{t-1})D_{t-2}}{1-C'_t(1-\hat{t})-\hat{t}-NX_t} > 0 \quad (6)$$

$$\frac{\partial Y_t}{\partial d_{t-1}} = \frac{I'_t\frac{\partial Y_{t-1}}{\partial d_{t-1}}+(d_t-i_t)D_{t-2}}{1-C'_t(1-\hat{t})-\hat{t}-NX_t} \quad (7)$$

Now, from stability condition (i.e., excess demand (ED_t) falls with a rise in output, ($\frac{\partial ED_t}{\partial Y_t} < 0$)), we get the denominator of (6) and (7) to be positive. Therefore, we see that a rise in present period debt leads to an expansion of present period output level. But whether a rise in present period debt it raises future output or not, i.e., whether $\frac{\partial Y_t}{\partial d_{t-1}}$ is positive or negative, depends on the sign of the numerator of (7). If the growth of present debt is larger than the interest rate applicable on debt (i_t), then a rise in growth rate of debt will raise future GDP as well. In other words, government can play a Ponzi game without the fear of default when debt is below the threshold level. This happens because; there is sufficient fiscal space available to the government for expansion due to fiscal discipline it follows by adhering to FRBM targets.

We now consider the second case where the debt-GSDP ratio is above the threshold limit.

Case 2: $\rho_{t-1} > \bar{\rho}$

In this case, by policy mandate, when the debt-GSDP ratio breaches the threshold limit, government has to cut down its next-period debt level and hence, growth rate of debt will fall. This further implies that ceteris paribus, there will be a reduction in the next-period government expenditure as well [see equation (3)]. Thus, we can write for this case, $\frac{\partial d_t}{\partial \rho_{t-1}} < 0$, which implies, ceteris paribus, $\frac{\partial G_t}{\partial \rho_{t-1}} < 0$ and $\frac{\partial G_t}{\partial d_{t-1}} < 0$. Now differentiating (4) w.r.t. d_{t-1}, we get:

$$\frac{\partial Y_t}{\partial d_{t-1}} = \frac{I_t'\left(\frac{\partial Y_{t-1}}{\partial d_{t-1}}\right)+\frac{\partial G_t}{\partial d_{t-1}}}{1-C'_t(1-\hat{t})-NX_t} \gtreqless 0, \text{ since, } I_t'\left(\frac{\partial Y_{t-1}}{\partial d_{t-1}}\right) > 0, \frac{\partial G_t}{\partial d_{t-1}} < 0. \quad (8)$$

Thus, when the government breaches the ceiling, not only government spending falls, but output in next period is likely to decrease as well, ceteris paribus. We now argue that the numerator of (8) is likely to be negative. This is because for an economy like that of West Bengal, sensitivity of investment to last period output is negligible. Let us explain. West Bengal spends about 5.7% (in 2023-24) of its GSDP on Social Sector. Social Sector spending comprises of three heads- revenue expenditure (which do not add to investment), capital outlay and loans. Capital outlay forms only 10% of the state's expenditure. Further, under the head capital outlay, expenditures on education and health comprise of certain items that do not propel investment. For example, water supply and sanitation, family welfare and nutrition are clubbed under health expenditure, which do not augment capital stock much. Similarly much investment on sports and art-and-culture under the category of education do not have acceleration effect on investment. As a result, we can say that even though a rise in capital expenditure will raise output, it will not add to the capital stock. Hence, the term $I_t'\left(\frac{\partial Y_{t-1}}{\partial d_{t-1}}\right)$ is small. On the other hand, more the debt-GSDP ratio breaches the threshold, higher would be the value of $\frac{\partial G_t}{\partial d_{t-1}}$. Therefore, we can say that for the economy of West Bengal,

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$$\frac{\partial Y_t}{\partial d_{t-1}} = \frac{I_t'\left(\frac{\partial Y_{t-1}}{\partial d_{t-1}}\right)+\frac{\partial G_t}{\partial d_{t-1}}}{1-C'_t(1-\hat{t})-NX_t} < 0 \quad (9)$$

Hence, we discern that a rise in debt beyond what is stipulated in policy, will contract government expenditure, debt and income in the next period. In other words, while sustainable level of debt will contribute to economy's growth, unsustainable level of debt will crowd out growth.

Now, question remains how this level of threshold or sustainable debt is determined. This is explained below.

An economy's debt is sustainable if the real GSDP rises more than debt at a time period. Only then debt can be serviced from present output, without resorting to any additional borrowing. Mathematically, we can write, debt will be sustainable if:

$$\frac{Y_t-Y_{t-1}}{Y_{t-1}} > \frac{D_t-D_{t-1}}{D_{t-1}} \quad (10)$$

Rearranging (10), we can write debt will be sustainable if:

$$\rho_t < \rho_{t-1} \quad (11)$$

Empirically, we can estimate (11) and conjecture that debt will be sustainable if debt-GSDP ratio exhibits mean-reverting behavior or is stationary. That is if $\alpha<1$, in equation (12) below, debt will be sustainable.

$\rho_t = \alpha\rho_{t-1} + \varepsilon_t$, where ε_t is random noise. (12)

Different researchers have used different methods to estimate (12). This is illustrated in the next section.

5. Methodology: Empirical Models to Assess the Sustainability of West Bengal's Debt

We know that the major problem related to the state's fiscal discipline is its outstanding debt, since much of state's earnings are diverted to debt repayment and interest payment, berefting the state from utilizing funds for developmental purpose. Hence, despite reduction in fiscal and revenue deficit ratios in recent times, sustainability of debt becomes an issue of contention (see Figures 1 and 2). Now, if the growth rate of real GDP surpasses the growth rate of the sum of debt taken and interest paid on outstanding loan, then raising public debt is less likely to become a Ponzi Game. Government will be capable to meet its present and future obligations without defaulting or even by any external borrowing (Blanchard et. al. (1991)). Debt, in this case is slated to reach sustainable level over the years, however high its present value may be. But, measuring sustainability of debt using this method focuses on debt build-up relative to GSDP. Any negative shock on income can disturb this secular trajectory. If we assume that Wagner's Law works for the economy, then with economic growth, public debt will rise. In this case too, what the policy makers need to remain cautious about is the threshold level of sustainable debt. However, against the Keynesian prescription of economic growth being funded by public debt in an under-employed economy, debt build up has an upper limit, beyond which it is likely to be unsustainable in the long run (see equation (9)) and economic growth will soon become a Ponzi Game. Whatever might be the direction of this causality, the sustainability of debt becomes a burning issue, particularly for an economy which has not been able to reduce revenue deficit to zero. Therefore, we shall now focus on three alternate models to check sustainability of West Bengal's debt. We shall also delineate the fourth model through which we can measure Fiscal Fatigue.

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Model 1

According to Domar (1944), if the real growth of an economy is greater than the real interest rate, then debt is sustainable and government can have a positive primary surplus. However, this approach is myopic in nature and neglects the inter-temporal budget constraint of the government (Shanmugam, 2022).

Model 2

Griener and Fincke (2009) suggest checking whether Total Expenditure and Revenue Receipts are co-integrated or not. Modifying the approaches of Trehan and Walsh (1991) and Hamilton and Flavin (1986), they opine that debt would be sustainable if total expenditure and revenue receipts are co-integrated. In other words, if quasi-difference of public debt is stationary and public debt and primary surplus are co-integrated, debt would be sustainable in long run (Hamilton and Flavin, 1986).

Model 3

This approach is based on Ricardian Equivalence. According to Bohn (1998) if primary surplus relative to GSDP is positive and also a positive linear function of debt relative to GSDP, then debt is sustainable. He controls for variations in total expenditure and GSDP in his model. He considers a positive linear relation of primary surplus to real debt as higher values of present day debt would call for corrective action in future, which will raise primary surplus. In other words, debt would exhibit mean-reverting process. Hence their method (correcting for endogeneity bias) involves regression of ratio of primary surplus to GSDP on previous year's debt-GSDP ratio, controlling for deviations of GSDP and real primary spending from trend value (using HP Filter). Estimation of this model requires the use of p-spline regression method.

Model 4

Another standard method of assessing sustainability of debt is to consider Fiscal Fatigue (Ghosh et. al. 2013). It is a situation when rising levels of debt causes primary balance to run into deficit and primary balance cannot adjust to rising debt levels, leading to unsustainable debt-GSDP ratio. This happens when debt-GSDP ratio departs from a certain critical threshold level. That is, beyond this threshold level, debt becomes non-stationary in nature.

6. Results

In this section we shall now empirically assess the sustainability of public debt in West Bengal. In India, borrowing power of state governments is limited. While the central government can raise loans from both the domestic and external markets, the state governments have access to only the domestic markets. However, it may borrow from the central government. The only access to external assistance that a state may have are the projects implemented by donor agencies in states (like WB, IMF, ADB etc) moderated and approved by the Central Government. The Union Government's Fiscal Responsibility and Budget Management Act, 2003 set norms for both the central and state governments with regards to fiscal deficit and revenue deficit. Further, as discussed before, following the recommendations of 12th Finance Commission, West Bengal promulgated her own FRBM Act in 2010. However, this act has been changed five times between 2011 and 2024. While the initial version of the Act envisaged a target of 0%, 3% and 34.3% of Revenue Deficit to GSDP Ratio, Fiscal Deficit to GSDP Ratio and Debt to GSDP Ratio respectively within 2014-15; in 2024, the limit for Fiscal Deficit ratio

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was raised to 3.5%, a tad 1.5% less from the amendment made in 2022. While revenue deficit and fiscal deficit have always been above the comfortable range, it must be acknowledged that during the initial years of the implementation of the Act, the state did witness some concerted improvement in these deficits. As Figure 1 exhibits, revenue and fiscal deficit levels were historically high till 2009-10 (for the purpose of calculation, we have converted the entire series for all variables to base year 2011-12 for the purpose of analysis). Thereafter the state finances began to improve, but only till 2018-19. Conducting Bai-Perron tests to check for their structural breaks (see Table 1), we discern that 2011-12 marks a structural break for fiscal deficit. Prior and post this break point, the ratio of fiscal deficit to GSDP has improved from 5.5% to 3.0%, thanks to the implementation of the FRBM Act in 2010. However, Revenue Deficit to GSDP ratio exhibits 3 break points- 1998-99, 2003-04 and 2010-11.During the period 1995-96 to 1998-99 it posted an average value of 2.6%, which rose to 5.6% for the next five years, before falling to 3.7% on average during 2004-05 to 2010-11.Though the deficit could not be eliminated till date, it has been reduced substantially to 2.1% from 4.1% after the Act was implemented. Therefore, a priori we can say that despite the targets of FRBMA, 2010 being not met till date; West Bengal has shown some prudence in fiscal management.

Table 1: Bai-Perron Test on FD and RD Ratios

FD-GSDP Ratio				RD-GSDP Ratio			
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05				Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05			
Sequential F-statistic determined breaks:			1	Sequential F-statistic determined breaks:			3
Break Test	F-statistic	Scaled F-statistic	Critical Value**	Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	32.48	32.48	8.58	0 vs. 1 *	26.09	26.09	8.58
1 vs. 2	5.98	5.988	10.13	1 vs. 2 *	13.04	13.04	10.13
				2 vs. 3 *	16.56	16.56	11.14
				3 vs. 4	4.00	4.00	11.83
Break dates:	Sequential	Repartition		Break dates:	Sequential	Repartition	
1	17	17		1	17	5	
				2	5	10	
				3	10	17	

Source: Author's Calculation based on data from RBI Handbook of Indian Economy, 2016 and 2024 and CAG Report, Various Years.

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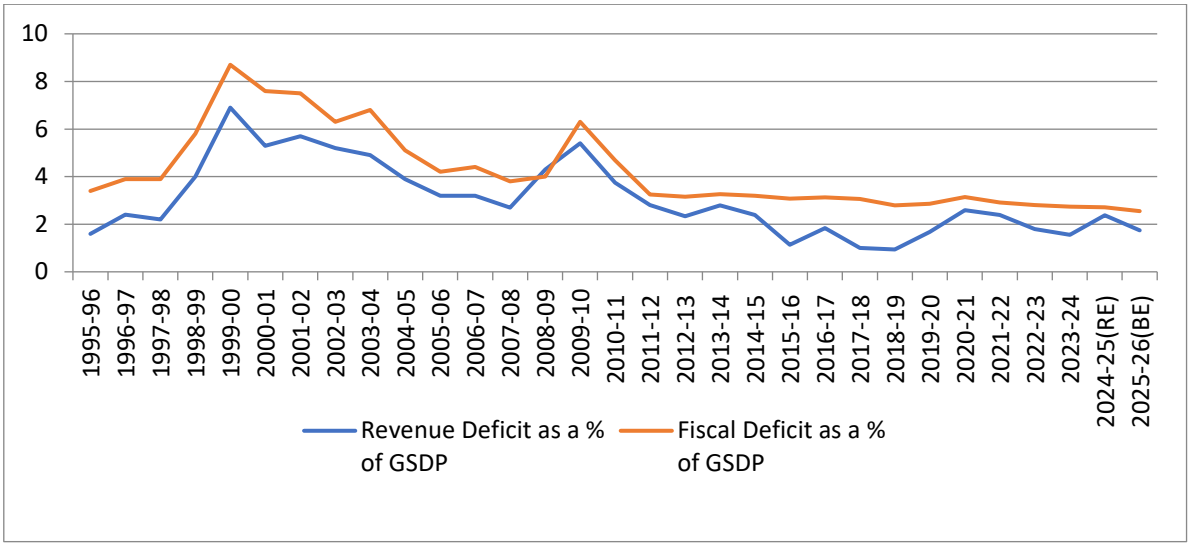
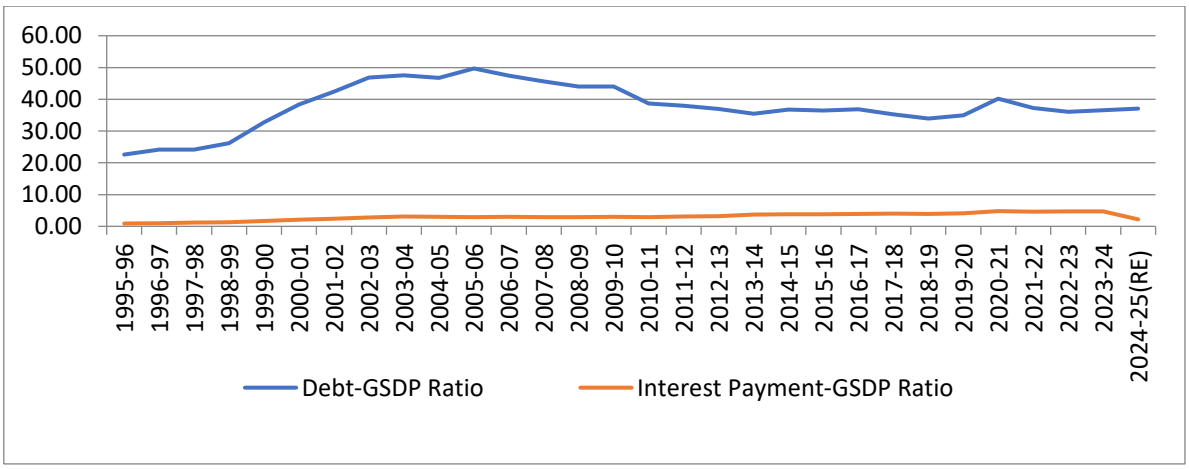
Figure 1: Fiscal Deficit and Revenue Deficit Ratios to GSDP



Source: Author's Calculation based on data from RBI Handbook of Indian Economy, 2016 and 2024 and CAG Report, Various Years.

Coming to the debt front, the amount of liability of the Government of West Bengal (debt) was to the tune of Rs 1080 Crore in 1995-96, which by 2024-25 rose to Rs 26802.37 Crore, a jump of 2381.7%. But, as a share of GSDP (using base year 2011-12) of the state, it implies a rise from 22.6% to 37.03% during the same period. However, this rise has not been uniform. As can be evidenced from Figure 2, the share of debt to GSDP of West Bengal scaled uniformly and peaked to 50% (the highest) in 2005-06. Thereafter it has shown a downward trend till 2019-20 bottoming at 34% in 2018-19, before rising once again till 2024-25. Notwithstanding the fact that the Covid pandemic is one major reason for the reversal of trend in recent times, the debt-GSDP ratio has actually started its uphill movement one year prior to the pandemic (which started in 2020-21) and still continues to rise (despite the end of the pandemic in 2022-23). What is worrisome is the fact that debt-servicing charge exhibits a continuous positive trend from 1995-96 to 2024-25. While it clocked a meager 0.89% of state's GSDP in 1995-96, it has risen to 4.73% in 2023-24.

Figure 2: Debt-GSDP and Interest Payment-GSDP Ratio of West Bengal



Source: Author's Calculation based on data from RBI Handbook of Indian Economy, 2016 and 2024 and CAG Report, Various Years.

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The state's FRBM Act in its first amendment in 2011 set an upper ceiling on debt limits and envisaged to reduce its debt-GSDP ratio from 40.6 % to 34.3% by 2014-15. However, this target was unachieved throughout the decade, except for 2018-19. Again in 2020, the State vouched to maintain its maximum debt-GSDP ratio at 34.3% by 2024-25, which was unachieved. It is pertinent to note that while the state set its threshold at 34.3%, the FRBM Review Committee has set the threshold level at 20% for all states and the 15th Finance Commission at 25%. This raises several doubts about the sustainability of West Bengal's debt-GSDP ratio. Using the classic Domar's Approach and the three models delineated in Section 3, we shall now empirically estimate them.

Model 1

Using Domar's (1944) argument, we know that if growth rate of real GSDP surpasses the growth rate of debt, then debt is sustainable. In other words, it means that Debt-GSDP ratio does not rise over time. Mathematically, this can be written as:

$\frac{\Delta D}{D} \leq \frac{\Delta Y}{Y}$, where D and Y are absolute values of debt and GSDP (13)

Now, Primary Deficit (P) is the difference between Fiscal Deficit (F) and Interest Payment on Debt (iD) given by:

$$P = F - iD \quad (14)$$

Now, using the fact that $F = \Delta D$, we can rearrange (14) and write (13) as:

$$p \leq dg - id, \quad (15)$$

where $p = P/Y$, $d = D/Y$ and they denote Primary Deficit-GSDP Ratio and Debt-GSDP ratio respectively, and $g = \frac{\Delta Y}{Y}$denotes the growth rate of GSDP

Plotting the R.H.S. and L.H.S. in Figure 3, we see that Primary Deficit Ratio lies above the $dg - id$ line, barring the time period from 2004-05 to 2010-2011 (except for 2007-08). Thus, post 2011-12, the Debt-GSDP ratio of the state has not been sustainable. What is worrisome is the fact that the gap between these two lines have been widening since, 2011-12; indicating that West Bengal's debt is becoming all the more unsustainable over time. This further indicates that the state's public debt is not growth-inducing.

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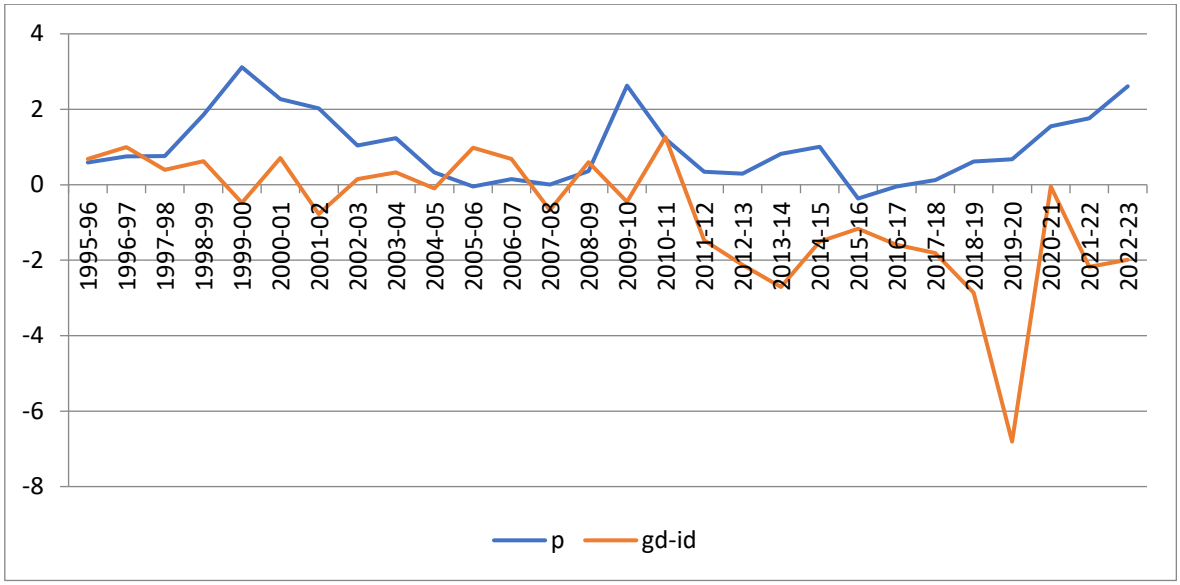
Figure 3: Debt Sustainability of West Bengal using Domar's Approach



Source: Author's Calculation based on data from RBI Handbook of Indian Economy, 2016 and 2024 and CAG Report, Various Years.

Model 2

Using the methodology outlined by Hamilton and Flavin, (1986) we first check for the existence of unit root in Debt-GSDP ratio. The presence of unit root, using ADF test indicates that Debt-GSDP ratio does not exhibit any mean reverting behavior, hence is non-stationary and thereby, unsustainable. Thereafter, we check for the presence of unit root at first difference as well as co-integration between Primary deficit-GSDP ratio and total public debt-GSDP ratio. If we find that debt-GSDP ratio at first difference is stationary and it is co-integrated with Primary Deficit to GSDP ratio, then we conclude that debt is sustainable. That is, we basically examine whether they move together such that the resultant error term that emanates from their relationship produces a stationary series (Hamilton and Flavin, 1986). The necessary condition to conduct this analysis is to ensure that the two series at levels are non-stationary. Table 2 posits the results.

Table 2: Debt Sustainability of West Bengal using Hamilton and Flavin's Approach

ADF Test on Primary Deficit-GSDP Ratio (Level and First Difference)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic at Level			-2.54	0.12
Test critical values:	1% level		-3.81	
	5% level		-3.02	
	10% level		-2.65	
Augmented Dickey-Fuller test statistic at First Difference			-3.64	0.04
	1% level		-4.32	
	5% level		-3.58	
	10% level		-3.33	

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ADF Test on Debt GSDP Ratio				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.05	0.55
Test critical values:	1% level		-4.31	
	5% level		-3.57	
	10% level		-3.22	
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.36	10.97	15.49	0.21
At most 1	0.12	2.39	3.84	0.12
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.36	8.58	14.26	0.32
At most 1	0.12	2.39	3.84	0.12

Source: Author's Calculation based on data from RBI Handbook of Indian Economy, 2016 and 2024 and CAG Report, Various Years.

From the above Table 2, we can see that Debt-GSDP ratio has a unit root in level but not in first difference. Thus, it is stationary at first difference but non-stationary at level. Secondly, both the trace and rank tests indicate that the ratios of primary deficit to GSDP and debt to GSDP are not co-integrated, despite both being non-stationary at levels. Hence there is no evidence of co-integration between them. Therefore, once again we may conclude that West Bengal's debt is clearly unsustainable.

Model 3

Mathematically, any non-linear model can be approximated by a linear model with time varying coefficients under certain smoothness assumptions (Shanmugam, 2022). Empirical estimations using these linear approximations employ the popular p-spline method given below:

$$pd_t = \alpha + \beta_t d_{t-1} + \gamma_t yvar_t + \delta_t gvar_t + \epsilon_t \quad (16)$$

where, $pd, d, yvar$ and $gvar$ stand for Primary Deficit to GSDP ratio, Debt-GSDP ratio, variation in real income and variation real primary expenditure from their mean levels, respectively. $\epsilon_t$is the random error term. A statistically significant positive value of β indicates that debt is sustainable. The deviations in GSDP and Primary Expenditure are computed using the Hodrick-Prescott (HP) filter. To avoid endogeneity bias, d_{t-1} has been used instead of d_t in equation (13). The results of the regression are given below in Table 3.

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Table 3: Debt Sustainability of West Bengal using Bohn's Approach (p-spline method)

Dependent Variable: pd				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
d_{t-1}	0.033827	0.012410	2.725720	0.011328
$yvar_t$	0.000010	0.000003	2.956338	0.006542
$gvar_t$	-0.000011	0.000004	-2.691853	0.012262
R-squared	0.16	Mean dependent var		1.04
Adjusted R-squared	0.10	S.D. dependent var		0.95
S.E. of regression	0.90	Akaike info criterion		2.73
Sum squared resid	21.19	Schwarz criterion		2.87
Log likelihood	-36.60	Hannan-Quinn criter.		2.78
Durbin-Watson stat	0.84			

Source: Author's Calculation based on data from RBI Handbook of Indian Economy, 2016 and 2024 and CAG Report, Various Years.

From the above Table 3, we see that lagged value of debt raises primary deficit. For one unit rise in Debt-GSDP ratio, primary deficit ratio rises by 0.03 units. The coefficient of lagged Debt-GSDP ratio is statistically significant at 5% level of significance but not at 1%. Thus, we conclude that West Bengals's debt is sustainable at 5% level of significance but not at 1% level of significance. Further, as expected, coefficients of $yvar_t$and $gvar_t$are respectively positive and negative and statistically significant at 5% level of significance. In fact, coefficient of$yvar_t$ is significant even at 1% level. Thus, these results validate the claim that while the GSDP above its normal value reduces primary deficit, primary spending above its normal value raises it in the state of West Bengal.

Model 4

Analysing threshold level of debt for West Bengal remains a contentious issue, for the sheer reason that the Government of West Bengal, heedless of the recommendations of the Review Committee on FRBM, has managed to scale up the level of targeted Debt-GSDP ratio from 20% to 34.3% on their policy document. We shall therefore consider only two alternate scenarios: threshold levels at 20%and 35.5% (35.47% as calculated using threshold regression equation) to assess whether the state faces any fiscal fatigue or not. We omit the case of 34.3% as in our sample, only five samples correspond to Debt-GSDP ratio below 34.3%. Further, the amount of Debt-GSDP ratio stipulated by Government of West Bengal does not differ much from 35.5%. Hence we focus only on two cases. These are reported in Tables 4 and 5. We first consider the case where threshold level of Debt-GSDP ratio is 35.5% (see Table 4). The threshold equation divides the space into two halves, the first half where debt level is below 35.5%, and in our sample, it consists of only 9 observations. Hence, to preserve degrees of freedom and power of test, we do not consider any region invariant variables (deviations in GSDP and Primary Expenditure using HP Filter)[i].

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Table 4: Debt Sustainability of West Bengal at 35.5% Threshold

below 35.5%					above 35.5%				
Dependent Variable: pd					Dependent Variable: pd				
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Variable	Coefficient	Std. Error	t-Statistic	Prob.
d_{t-1}	0.032	0.011	2.84	0.021	d_{t-1}	0.0253	0.014	1.85	0.080
					$yvar_t$	0.00001	0.000	2.61	0.017
					$gvar_t$	-0.00001	0.000	-2.19	0.041
Adjusted R-squared	0.23	S.D. dependent var		0.90	Adjusted R-squared	0.25	S.D. dependent var		0.99
Durbin-Watson stat	1.29				Durbin-Watson stat	1.14			

Source: Author's Calculation based on data from RBI Handbook of Indian Economy, 2016 and 2024 and CAG Report, Various Years.

From Table 4above we see that for Debt-GSDP ratio below 35.5% there is evidence of Fiscal Fatigue at 10% and 5% levels of significances but not at 1%. However, for the region above threshold of 35.5%, there is no evidence of Fiscal Fatigue at 1% and 5% levels of significances. Thus, Debt-GSDP ratio is sustainable as per the state's standard. Further, whenever Debt-GSDP ratio breaches the threshold level, policy makers respond by reducing Primary Deficit-GSDP ratio in the next period. Analogously, we see that when Debt-GSDP ratio remains below the threshold of 35.5%, Government profligates in the next period. These are evident from the facts that coefficients of d_{t-1} at below threshold of 35.5% is 0.032, which is higher than 0.025, the coefficient of d_{t-1} above the threshold limit of 35.5%[ii]. Hence, we may conclude that there is evidence of Fiscal Fatigue below the threshold limit, but not above that. The coefficients of variables of the invariant zones are significant at 5%, and have usual impact on primary deficit. Debt is therefore sustainable below 35.5% of Debt-GSDP ratio. Let us now see what happens to sustainability of debt if we consider the threshold level of 20%. Once again, we take into cognizance region invariant variables like deviations in GSDP and Primary Expenditure (estimated using HP Filter). For this level of threshold, we get the entire sample as beyond the threshold level. Results are reported below in Table 5.

Table 5: Debt Sustainability at 20% Threshold Level

Dependent Variable: pd	Coefficient	Std. Error	t-Statistic	Prob.
Variable				
d_{t-1}	0.033827	0.012410	2.72	0.01
$yvar_t$	0.000010	0.000003	2.95	0.00
$gvar_t$	-0.000011	0.000004	-2.69	0.01
Adjusted R-squared	0.1	S.D. dependent var		0.95
Durbin-Watson stat	1.2			

Source: Author's Calculation based on data from RBI Handbook of Indian Economy, 2016 and 2024 and CAG Report, Various Years.

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Once again we see that there is fiscal fatigue (at 5% level of significance)) for threshold level 20%. West Bengal's Debt-GSDP ratio as per Central Government's standard is clearly unsustainable. The signs and meaning of the region invariant variable are same as before. Therefore, we may conclude from the above analysis that most of the measures indicate that West Bengal's public debt is unsustainable. Domar's methodology indicates unsustainable debt level since 2011-12 along with the fact that the magnitude of unsustainability has been on the rise. While Hamilton's Approach indicates that Bengal's debt level is unsustainable; using Bohn's Approach, we see that West Bengal's Debt-GSDP ratio is unsustainable at 1% level of significance but not at 5%. Similarly, it is only when we consider threshold level of 35.5% that we find West Bengal's debt level to be sustainable, but certainly not at 20%. Thus, there is a large consensus among these methodologies that West Bengal's debt is unsustainable. Further, whatever may be the level of significance or threshold limit (20% or 35.5%), the state's Debt-GSDP ratio is undoubtedly high by Indian standard. Thus, Bengal needs to restructure her debt profile and adhere to stringent fiscal norms to avoid debt default in the future. Especially at a time when devolution of fund from central government is being tied to fiscal discipline of the state, the issue of reduction of Debt-GSDP ratio to sustainable level becomes imperative for conducive atmosphere for growth and investment in the state.

7. Conclusion

This article has served three purposes. First, it has shown whenever debt level goes beyond the comfortable range, policy makers of West Bengal are forced to cut down on their expenditure, and thereby debt to adhere to the state's FRBM rules leading to a contraction in output. Secondly, it has shown through three alternate empirical models that the debt level of the state is clearly unsustainable at its present level. Lastly, this article also posits that there is fiscal fatigue, both below and above the threshold limit set by the Union Government. However, if we consider the threshold limit set by the State Government, there exists fiscal fatigue above the threshold limit, but not below. Based on the above analyses, we may conclude that the current level of debt-GSDP is not within the limit set by the 15th Finance Commission (25%), and it is certainly not the sustainable debt level for West Bengal. Our analysis clearly indicates that the state's debt is negatively related to its growth (see Figure 3 and equation (9)). Maintaining debt below its sustainable level debt is crucial to boost economic growth, which will also help the state to increase its own revenues further, if they are buoyant. The limitation of the study is though it postulates that West Bengal's debt is unsustainable, it does not seek a reason for it. It can be due to lower tax/ non-tax receipts (including transfer from Union Government) or can be due to excessive subsidies as well (According to National Institute of Public Finance and Policy Report, two-thirds of the non-merit subsidies are States sponsored). It is also important to understand how rising interest payment of the state is affective capital expenditure of the state. We shall address these issues in our forthcoming endeavours.

Notes:

i. Even if we consider region invariant variables in this case (below threshold 35.5%), results do The coefficient of lagged value Debt-GSDP ratio turns out to 0.08 and is statistically significant at 5%. Further the coefficients of variation in real GSDP and total expenditure turn out to be statistically insignificant, even at 10% level of significance. Hence, fiscal fatigue would be higher in this case.
ii. If we had considered inclusion of region invariant variables below the threshold level of 35.5%, then this claim would have been stronger. Policy makers tend to show higher profligacy whenever Debt-GSDP ratio falls below 35.5% and higher austerity for reaching this limit.

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