Sustainability and Threshold Value of Public Debt in Tamil Nadu

K R SHANMUGAM, K SHANMUGAM

The sustainability and the threshold level of public debt in Tamil Nadu is examined using the modern time series methods and threshold regression method. The results suggest that the current level of debt in the state is unsustainable, and the debt sustainability threshold is about 18.5%, which is slightly lower than the 20% norm set by the Fiscal Responsibility and Budget Management review committee for states. The state should control its debt as it is currently not growth-inducing. The simulation exercise based on the debt dynamics of the state suggests that the state economy should grow at 14% and fiscal deficit target should be 2% from 2023–24 onwards to attain the debt sustainability target in 2035–36 and with 16% growth the state could reach the target in 2030–31. The relevant policy strategy for the state is to increase its own revenue–GSDP ratio by 0.75% and contain its revenue expenditures by 0.75% from 2023–24.

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K R Shanmugam (*shanmugam@mse.ac.in*) is director, Madras School of Economics, Chennai. K Shanmugam (*shanmugamka1960@gmail.com*) is the former chief secretary of Government of Tamil Nadu.

Public debt sustainability and fiscal discipline are important for the economic stability of any national or subnational government. When its revenues fall short of its expenditure commitments, the government borrows to finance its excess expenditures. The net borrowing of the government is reflected in the fiscal deficit. Public debt is the total liabilities or borrowings of the government. Many economists believe that borrowings can enable the government to finance important development programmes and projects (Hakura 2020).

If the debt amounts can be used to finance the social/infrastructure development projects, these projects can trigger economic growth and lead to higher income in future, which may offset the cost of debt servicing. Therefore, the debt is not an issue for a government if it generates enough surplus resources in future to service its debt.[1] Public debt is considered sustainable if the government is able to meet all its current and future obligations without external financial assistance or going into default. In a lucid sense, it is basically about good housekeeping (Blanchard et al 1991).

If the debt–gross domestic product (GDP) ratio exceeds certain prudent limits, it becomes unsustainable. Excessive debt (that is, debt overhang) will lead to debt trap, which is bad for growth, development, and stability; it can negatively affect capital stock accumulation and economic growth via heightened long-term interest rates, higher distortionary tax rates, inflation, and a general constraint on countercyclical fiscal policies, which may lead to increased volatility and lower growth rates (Rugy and Salmon 2020). Sometimes, it can make the government to default which can cause borrowing government to lose market access and suffer from higher cost of borrowing.

According to the *Economic Survey* (2021–22), public debt relative to GDP in India would reach 90% at the end of 2022–23 and the centre's debt alone would be 60.2%. Studies indicate that the combined debt of central and state governments in India is unsustainable. For instance, Srivastava et al (2021) showed that the sustainable level of debt–GDP ratio for India was only 59.3% in 2018–19. The Fiscal Responsibility and Budget Management (FRBM) review committee suggested that 60% is the sustainable level for India and 40% for the centre. This essentially means that the sustainable limit for all states' combined debt–GDP is only 20%. However, the budget speech of Palanivel Thiaga Rajan, Minister for Finance and Human Resources Management, Government of Tamil Nadu for 2022–23, indicates that the total outstanding debt of Tamil Nadu will reach ₹6.53 lakh

crore (that is, debt–gross state domestic product [GSDP] ratio of 26.3%) at the end of fiscal year 2022–23. It also states that this is within the limits set by the Fifteenth Finance Commission. Further, the average real rate of growth of Tamil Nadu economy (2004–05 base) from 2005–06 to 2011–12 was 10.3% and it declined to 6.43% (2011–12 base) from 2012–13 to 2021–22.[2]

In this context, the following questions emerge: (i) Whether the public debt in Tamil Nadu is sustainable or not? (ii) Whether the debt–GSDP of Tamil Nadu is growth-inducing or not? (iii) What is the debt threshold for Tamil Nadu? (iv) Why the limit set by the finance commission for Tamil Nadu differ from the limit set by the FRBM review committee for Indian states? (v) What are the causes for the high level of public debt? And (vi) what are the fiscal policy strategies required for the state to get rid of the debt trap? This study attempts to provide answers to these questions.

Public Debt

Theoretical views: Conceptually, debt sustainability is a situation where the debt does not accumulate at a rate considerably exceeding the government's capacity to service it (IMF 2011). There are three main theoretical views on debt/deficit financing in the literature.

(i) The Ricardian view is that budget deficits today require higher taxes in the future when a government cuts taxes without changing the present or future public spending. Given that households are forward-looking, they will realise that they need to pay higher taxes in the future so that their total tax burden remains unchanged. As a result, they will reduce their consumption and increase savings to meet their future tax burden. This view (popularly known as the Ricardian equivalence theorem) is based on the inter-temporal budget constraint of the government and on the permanent income hypothesis.[3]

(ii) The Keynesian view envisages that deficit financing can boost aggregate demand and thereby stimulate the growth. That is, an increase in government spending financed by borrowing would cause the output to expand through a multiplier process and financing in this kind predominantly implies a reallocation of resources from taxpayers to the bond-holders. Hence, this is beneficial for the economy.[4]

(iii) The neo-classical view considers that the component of revenue deficit in the fiscal deficit implies a reduction in government saving or an increase in government dissaving, and thus, distorting the rate of growth.

Thus, there is no consensus among economists on whether deficit financing is good or bad or neutral (Rangarajan and Srivastava 2005). It needs to be resolved empirically, that is, it is necessary to examine whether public debt is beneficial or not and if beneficial, then up to what level period. However, on the empirical question, there is no universal agreement on how public debt sustainability can be assessed (Akhmadeev et al 2018).

Empirical models: Traditional studies employed the Domar (1944) stability condition: "As long as the real economic growth is greater than the real interest rate, the government can have a positive primary deficit such that its debt will not rise and so the debt is sustainable." This debt dynamic equation is given as:

$$d_t = p_t + d_{t-1}\left[\frac{(1+r)}{(1+g)}\right] = f_t + d_{t-1}\left[\frac{1}{(1+g)}\right] \quad \ldots (1)$$

where d_t is the debt–GDP ratio, p_t is the primary balance relative to GDP, and f_t is the fiscal deficit–GDP ratio. When the primary deficit is zero and $r=g$, the debt–GDP ratio remains constant. If $r>g$, the debt–GDP ratio will rise and is unsustainable.

This approach was extended later to consider the inter-temporal budget constraint (IBC) of the government and also with additional indicators (growth, liquidity, creditworthiness, fiscal burden, fiscal space, etc) and renamed as "indicator approach" (Blanchard et al 1991; Pattnaik et al 2003).[5] However, this approach was criticised as it applied the condition on a year-to-year basis and did not validate whether IBC of the government is satisfied or not.

The modern empirical approach on debt sustainability utilises statistical tests. The pioneer in this approach was the seminal work of Hamilton and Flavin (1986), which introduced the unit root test to check whether the public debt series (in the United States [US]) was stationary or not (that is, whether the series of public debt contains a bubble term), which later was widely adopted to examine the mean reversal process of debt series (Uctum and Wickens 2000).

Trehan and Walsh (1991) employed another test to analyse whether a quasi-difference of public debt ($D_t - vD_{t-1}$) with $o \leq v < 1+r$, (where r is the interest rate) is stationary and whether public debt and primary surpluses (S_t) are co-integrated. If the public debt is quasi-difference stationary and public debt and primary surpluses are co-integrated (or alternatively if total expenditure and revenue receipts are co-integrated), then the public debt is sustainable (Greiner and Fincke 2009). The co-integration approach gained popularity as a test for debt sustainability and was greatly accepted in literature (Quintos 1995; Gabriel and Sangduan 2011). However, these time series approaches were criticised because: (i) the unit root test is very sensitive to structural breaks and the results are misleading when strcutural breaks are present (Uctum et al 2006); (ii) rejecting a unit root in real debt/debt–GDP ratio is a difficult task; and (iii) the IBC may well be satisfied if the components of the budget are not co-integrated and even if debts are differencing and stationary (Bohn 2007).

To overcome the above drawbacks, Bohn (1995) formulated a model-based approach in 1998 to test whether the primary surplus–GDP ratio (s_t) is positive and, at least, a linearly rising function of the debt–GDP ratio (d_t):

$$s_t = \alpha + \psi\, d_t + \varepsilon_t \quad \ldots (2)$$

In equation (2), ε is the random error and α and ψ are parameters to be estimated. A positive and statistically significant value of ψ indicates that debt is sustainable.

Later, Bohn (1998) utilised the Barro's (1979) tax-smoothening hypothesis and derived the following fiscal rule or reaction function:

$$s_t = \alpha + \psi\, d_t + \phi_1\, yvar_t + \phi_2\, gvar_t + \varepsilon_t \quad \ldots (3)$$

where *yvar* accounts for fluctuations in revenues and reflects the deviation of real GDP from its trend, computed using the Hodrick–Prescott (HP) filter. Positive values for *yvar* indicate booms and negative values indicate recessions. The *gvar* reflects the deviation of real primary spending from its normal value with positive values indicating expenditures above the normal level and vice versa.

According to this model, if governments run into debt today, they would have to take corrective actions in the future by increasing the primary surplus and the positive response of primary surplus to public debt implies a mean reverting process. Later, it was extended by specifying non-linearity and time-varying coefficients in the model as:

$$s_t=\alpha+\psi_t\ d_{t-1}+\phi_1\ yvar_t+\ \phi_2\ gvar_t+\varepsilon_t \qquad \ldots (4)$$

where the reaction coefficient ψ_t is time-varying. Mathematically, any non-linear model can be approximated by a linear model with time-varying coefficients. This approximation is good under certain smoothness assumptions. Empirical estimations using these linear approximations employ the popular penalised spline method. To avoid endogeneity issues, Greiner and Fincke (2009) replaced d_t with d_{t-1}.

Ghosh et al (2013) introduced the concept of "fiscal fatigue." It happens when public debt achieves some threshold and departs from this threshold value when the primary balance does not adjust to debt. Therefore, it is essential to test for the responsiveness of primary balance to lagged levels debt relative to GDP in different regimes using the threshold regression method. The threshold model allows coefficients (of region-varying variable[s]) to differ across regions. Those regions are identified by a threshold variable being above or below a threshold value. It uses the conditional least squares to estimate the parameters of the model. The threshold value is estimated by minimising the sum of squared residuals (SSR) obtained for all alternate thresholds. Later, some argue that higher debt amounts may lead to higher growth or welfare if the debt amounts are invested on development projects (Ghosh 1998; Greiner and Fincke 2015). They suggest for testing whether the public debt is growth-inducing or not (Greiner and Fincke 2009).

Empirical studies: A handful of empirical studies have used the above approaches to verify whether the public debt is sustainable or not in various countries. For instances, Kaur et al (2014) used the indicator approach to verify the debt sustainability of Indian states; Uctum et al (2006) used the unit root test to test the debt sustainability in Group of Seven (G7) countries, selected Latin American and Asian countries and found that the debt was sustainable only in G7 countries. Hakkio and Rush (1991) and Jha and Sharma (2004) analysed the sustainability by verifying the co-integrating relationship between public revenue and expenditure.

Abiad and Ostry (2005) employed the extended version of Bohn model to test the debt sustainability of 31 emerging market countries from 1990 to 2002. Greiner and Kauermann (2008) used the penalised spline method and found that debt is sustainable in Germany and not in Italy. Griener and Fincke (2009) used the Bohn framework and p-spline technique to analyse the debt sustainability issue of US and six euro countries (Austria, France, Germany, Italy, the Netherlands, and Portugal) and six developing countries (Botswana, Costa Rica, Mauritius, Panama, Rwanda, and Tunisia). Except in France, the debt was sustainable in the US and five Euro countries. Debt was sustainable only in Botswana and Rwanda.

Tiwari (2012) used the Bohn framework and spline methodology and found that debt was unsustainable in India during 1970–2009. Shanmugam and Renjith (2021) used the panel version of Bohn framework and p-spline technique to test the debt sustainability of 20 Indian states. Lixin (2019) employed the threshold estimation and found that during 1985–2015, China's public and external debt were both sustainable. (For a review of empirical studies, see Fincke and Greiner [2011] and D'Erosmo et al [2016].)

Studies examining the debt–growth relationship at the international, national and subnational levels provide four alternative conclusions on the effect of debt on economic growth: (i) growth is independent of debt (Panizza and Presbitero 2014), (ii) growth is a positive function of debt (Fincke and Greiner 2015), (iii) growth is a negative function of debt (Hussain et al 2015), and (iv) the relationship between the public debt and the economic growth is positive when the debt level is low and if the debt exceeds the sustainability threshold, the relationship is negative (Kumar and Woo 2010; Megarsa 2015), that is, the relationship is non-linear. The advantage of the last approach is that it is useful to compute the threshold level of public debt (Rugy and Salmon 2020).

Public Debt in Tamil Nadu

The Indian Constitution assigns different borrowing powers to central and state governments. The central government debt comprises domestic debt and external debt. State governments are allowed to borrow from the domestic market and raise loans and advances from the central government. They have no power to raise loans outside India except loans for externally aided projects intermediated by the central government. The domestic debt of state government consists of market loans, loans from financial institutions like commercial banks, National Bank for Agriculture and Rural Development (NABARD), Life Insurance Corporation (LIC), National Cooperative Development Corporation (NCDC), etc, ways and advances from the Reserve Bank of India (RBI), special securities issued to National Small Savings Fund (NSSF), etc. The loans and advances comprise non-plan loans, loans for state/union territory plan schemes, loans for central plan schemes, loans for centrally sponsored schemes, loans for special schemes and other loans. Since 2005–06, due to the Twelfth Finance Commission, central loans are restricted to external loans. The public account debt of state includes small savings, provident funds, reserve funds, deposits bearing interest, deposits not bearing interest, etc.

The outstanding liabilities (or debt) of Tamil Nadu government was ₹17,124 crore in 1996–97 and increased to

Figure 1: Outstanding Liabilities to GSDP and Interest to Revenue Receipts of Tamil Nadu (1996–97 to 2020–21)

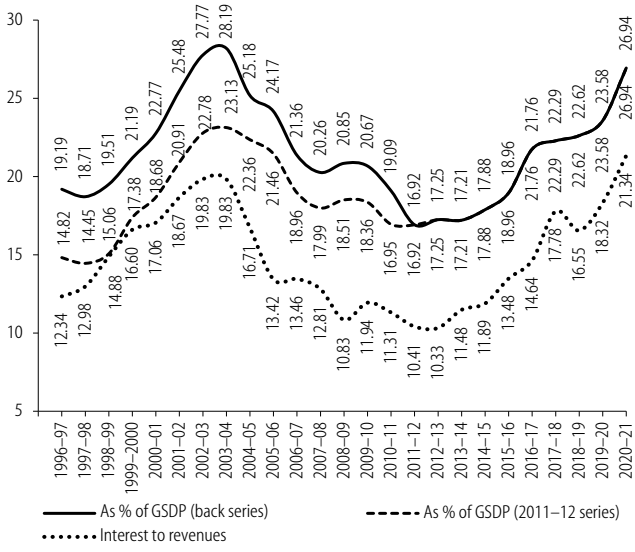
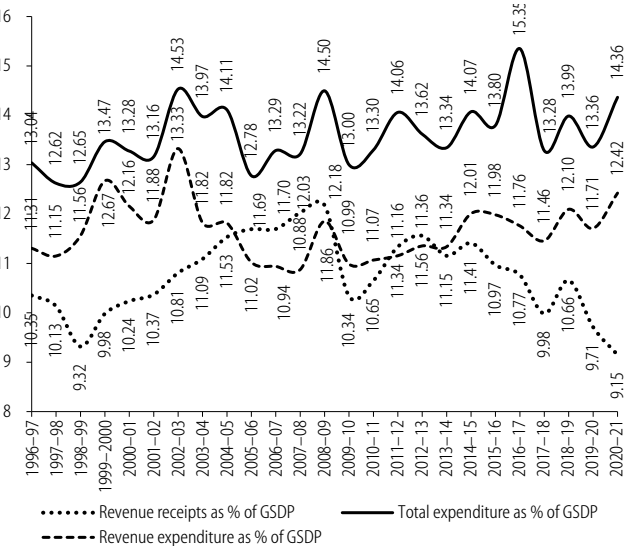


Figure 2: Revenue Receipts, Revenue Expenditures and Total Expenditures Relative to GSDP of Tamil Nadu (1996–97 to 2020–21)



₹43,915 crore. It further increased to ₹1,11,657 crore in 2011–12 and to ₹5,12,555 crore in 2020–21. Debt relative to GSDP (2011–12 series) increased from 14.82% in 1996–97 to 23.13% in 2003–04 (Table 1). Then, it continuously declined to 16.92% in 2011–12 due to various fiscal measures, including the implementation of FRBM Act in 2003.

The FRBM Act suggested for maintaining zero level of revenue deficit, 3% of fiscal deficit relative to GSDP and a sustainable level of debt. The state kept its fiscal deficit level below 3% of GSDP till 2015–16. It also kept its revenue deficit closer to zero or surplus. While the debt relative to GSDP started increasing from 2011–12 to 2015–16, it was below the 20% mark. After 2015–16, the state deviated from the FRBM norms of both revenue and fiscal deficits. The debt level exceeded 20% level suggested by the FRBM committee from 2016–17 and continuously increased to 26.94% in 2020–21 (Figure 1).[6]

Table 1: Major Fiscal Indicators for Tamil Nadu

Year	Per Capita GSDP* (Current)	Per Capita GSDP (2011–12 Series)$		Outstanding Liabilities as % of GSDP	Primary Deficit as % of GSDP	Interest Payment as % of GSDP	Primary Expenditure as % of GSDP	Fiscal Deficit as % of GSDP	Revenue Deficit as % of GSDP
		Current	Constant						
1996–97	14,967	19,380	42,300	14.82	-0.84	1.28	11.76	-2.12	-0.96
1997–98	17,191	22,260	45,305	14.45	-0.27	1.31	11.31	-1.58	-1.02
1998–99	19,436	25,166	46,990	15.06	-1.73	1.39	11.26	-3.12	-2.25
1999–2000	21,783	26,551	49,231	17.38	-1.63	1.66	11.81	-3.29	-2.69
2000–01	23,607	28,774	51,634	18.68	-1.09	1.75	11.53	-2.84	-1.92
2001–02	23,726	28,919	50,373	20.91	-0.68	1.94	11.23	-2.61	-1.51
2002–03	24,972	30,438	50,779	22.78	-1.35	2.14	12.39	-3.50	-2.52
2003–04	27,452	33,461	53,355	23.13	-0.42	2.20	11.78	-2.62	-0.73
2004–05	33,998	38,293	58,973	22.36	-0.33	1.93	12.18	-2.26	-0.28
2005–06	39,708	44,724	66,668	21.46	0.79	1.57	11.21	-0.78	0.67
2006–07	47,456	53,450	76,220	18.96	0.44	1.57	11.71	-1.13	0.76
2007–08	53,220	59,943	80,298	17.99	0.61	1.54	11.68	-0.93	1.15
2008–09	60,455	68,092	84,080	18.51	-0.57	1.32	13.18	-1.89	0.32
2009–10	71,778	80,845	92,556	18.36	0.95	1.23	11.77	-2.19	-0.65
2010–11	86,944	97,927	1,04,018	16.95	-1.32	1.21	12.09	-2.53	-0.41
2011–12	1,03,743	1,03,743	1,03,743	16.92	-1.12	1.18	12.88	-2.30	0.18
2012–13	1,17,204	1,17,204	1,08,566	17.25	-0.74	1.19	12.42	-1.93	0.21
2013–14	1,31,893	1,31,893	1,16,021	17.21	-0.84	1.28	12.06	-2.13	-0.18
2014–15	1,45,094	1,45,094	1,20,914	17.88	-1.18	1.36	12.72	-2.53	-0.60
2015–16	1,58,072	1,58,072	1,30,000	18.96	-1.30	1.48	12.32	-2.77	-1.02
2016–17	1,74,054	1,74,054	1,38,529	21.76	-2.74	1.58	13.77	-4.31	-1.00
2017–18	1,94,834	1,94,834	1,49,717	22.29	-0.94	1.78	11.51	-2.72	-1.47
2018–19	2,15,785	2,15,785	1,59,457	22.62	-1.14	1.76	12.22	-2.90	-1.44
2019–20	2,29,657	2,29,657	1,63,874	23.58	-1.57	1.78	11.58	-3.35	-2.00
2020–21	2,37,131	2,37,131	1,63,346	26.94	-2.66	1.95	12.41	-4.61	-3.28

*Actual Series: Up to 1998–99, the 1993–94 base series; 1999–2000 to 2003–04, the 1999–2000 series; 2004–05 to 2010–11, the 2004–05 series and since 2011–12, the 2011–12 series.

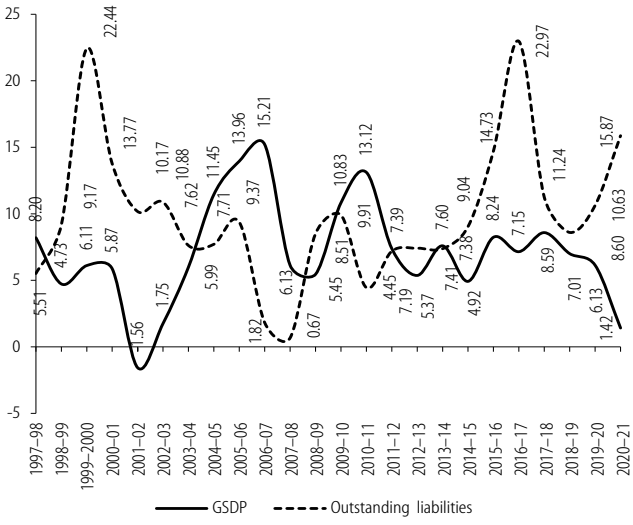
$ From 1996–97 to 2010–11, the back series converted into 2011–12 base series by EPW Research Foundation.

Source: CAG Report on Finance Accounts and State Government Budget Documents (various years).

The trends in revenue receipts, revenue expenditures and total expenditures (primary expenditure + interest payment) relative to GSDP as shown in Figure 2 explain the movement of debt–GSDP ratio. The gap between the revenue expenditure–GSDP ratio and the revenue receipts–GSDP ratio was larger until 2003–04. After that, revenue receipts–GSDP ratio exceeded the revenue expenditure–GSDP ratio till 2008–09 and again in 2011–12 and 2012–13. At the time, the debt–GSDP ratio showed a declining trend. Since 2013–14, the revenue expenditure–GSDP ratio exceeded the revenue receipts–GSDP ratio and the gap between them widened. The gap between total expenditure and revenue receipts also widened (Figure 2). This was the period when the debt–GSDP ratio started increasing continuously.

It is noted that the states' GSDP (real) growth stagnated from 2001–02 to 2003–04 resulting in increased borrowing. Thereafter, the GSDP growth picked up and recorded the highest growth of 15.21% in 2006–07 (Figure 3, p 42). Due to this high growth which was also supported by austerity measures, including the implementation of the FRBM Act in 2003, debt was kept

Figure 3: Annual Growth Rates of Real GSDP and Real Outstanding Liabilities



under control. After 2013–14, again economic growth slowed down touching the lowest level in 2020–21 due to the COVID-19 pandemic. During this period, there was a steady increase in debt level with a spike in 2016–17 for meeting the debt takeover of power utility by the state government. Except between 2010–11 and 2012–13 and in 2018–19, the revenue receipts relative to GSDP stagnated in the rest of the years accentuating the problems of revenue deficit and fiscal deficit. It is also observed that the path of interest to revenue receipts is almost the same as the path of debt–GSDP ratio.

Thus, widening of fiscal gap is due to prolonged slow economic growth with consequential fall in revenue receipts. Further restructuring the debt of power utilities, implementation of goods and services tax (GST), impact of demonetisation, and of late, the adverse impact of COVID-19 aggravated the problem. These cumulative effects forced the state to lend more to meet the gap in the revenue account. As a result, the commitment to interest payment increased. It also seems that the state has not taken effort to control the revenue expenditures after 2013–14.

Empirical Tests for Debt Sustainability

Unit root test: The simplest test on debt sustainability is to check whether the debt–GSDP series is stationary or not. Table 2 reports the Augmented Dicky-Fuller (ADF) test results. The debt–GSDP ratio in Tamil Nadu has unit root, that is, it is not stationary, indicating that the debt is unsustainable.

Co-integration test: It examines whether the government revenue and total expenditures relative to GSDP are co-integrated or not. It basically examines whether they move togher such that the resultant of their relationship produces a stationary series (Hamilton and Flavin 1986). Table 3 indicates that these two series are not co-integrated at 5% level of significance. This means that the debt in Tamil Nadu is not sustainable.

Table 2: Stationary (ADF) Test Results for Debt–GSDP Ratio (1996–97 to 2020–21)

Augmented Dickey-Fuller test statistics	t-statistics	Prob.*
	-1.2890	0.6166
Test critical values	1% level	-3.7529
	5% level	-2.9981
	10% level	-2.6388

*Mackinnon (1996) one-sided p-values.

Table 3: Results of Johansen's Co-integration (Rank) Test*

(i) Unrestricted Co-integration Rank Test (Trace)

Hypothesised No of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob**
None	0.2927	9.3697	15.4947	0.3323
Almost 1	0.0593	1.4049	3.8415	0.2359

Trace test indicates no co-integration at the 0.05 level; * Max test also provides similar results and so not reported.
** Mackinnon-Haug-Michelis (1999) p-values.

Bohn model-based non-linear test: This test is basically to test whether the primary surplus–GDP ratio (s_t) is positive and, at least, a linearly rising function of the debt–GDP ratio (d_{t-1}). Table 4 presents the penalised spline estimation results. As expected, the coefficient of business cycle variable *yvar* is positive and that of *gvar* is negative. But only the latter is statistically significant at 5% level, indicating that the primary spending above its normal value has reduced the primary surplus in the state. Although the parameter associated with lagged debt–GDP ratio is positive, it is not statistically significant even at 10% level, implying that the public debt is unsustainable in Tamil Nadu. Thus, all the three statistical tests confirm that the public debt in Tamil Nadu is not sustainable.

Table 4: p-spline Estimation Results of Debt Sustainability Equation (Dependent variable: Primary Deficit to GSDP%, st)

Variables	Notation	Coefficient (t value)
Intercept	$\alpha\hat{}$	-2.26100 (-1.011)
Lagged debt–GSDP ratio (%)	d_{t-1}	0.01436 (0.204)
Real GSDP gap	yvar	0.00001 (1.050)
Real primary expenditure gap	gvar	-0.00009 (-3.618)
edf		5.16
F (p-value)		2.659 (0.070)
R-sq (adj)		0.744
GCV		0.3546
N		24

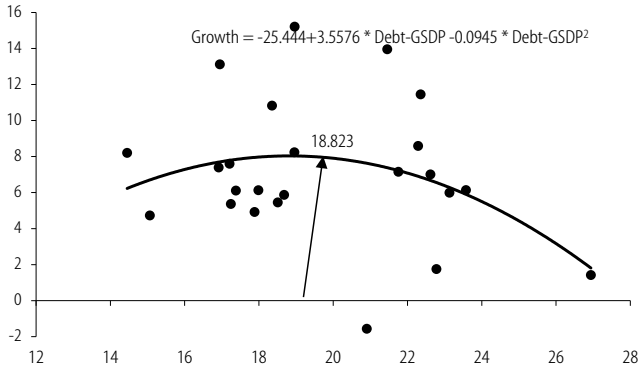
Estimating debt sustainability threshold: Table 5 presents threshold regression results, in which the lagged debt–GSDP ratio is the threshold variable. The sustainable debt–GSDP for Tamil Nadu is estimated at 18.36%, which is slightly less than the 20% norm given by the FRBM review committee for all Indian states.

Table 5: Threshold Regression Results (1997–98 to 2020–21)

Dependent Variable: Primary Deficit to GSDP % (s_t)
Threshold Variable: Lagged Debt–GSDP ratio % (d_{t-1})

Variables	Notation	Coefficient	t-statistics	Prob
$d_{t-1} < 18.3553$ (Region 1)				
Lagged debt–GSDP ratio (%)	d_{t-1}	0.227	2.500	0.012
$18.3553 \leq d_{t-1}$ (Region 2)				
Lagged debt–GSDP ratio (%)	d_{t-1}	0.182	2.514	0.012
Region invariant variables				
Real GSDP gap	yvar	-0.0001	-0.521	0.602
Real primary expenditure gap	gvar	0.0001	4.494	0.000
Constant	$\alpha\hat{}$	-2.908	-1.903	0.057
Sum squared residuals	SSR	6.408		
Akaike info criterion	AIC	-21.691		

Figure 4: Debt Threshold for Tamil Nadu



This model considers a single threshold dividing the sample into two regimes. It considers that the behaviour of primary deficit relative to GSDP may change if the debt–GSDP ratio crosses the threshold. It may trigger suitable responses by policymakers to reduce primary deficit–GSDP ratio if the debt–GSDP ratio crossed the prudent norm of 18.36% (in our case). It is observed from Table 5 that when debt–GSDP increased by one unit, the primary balance increased by 0.23 unit in region 1 where the debt level was below the threshold and by 0.18 unit in region 2 where the debt exceeded the threshold.

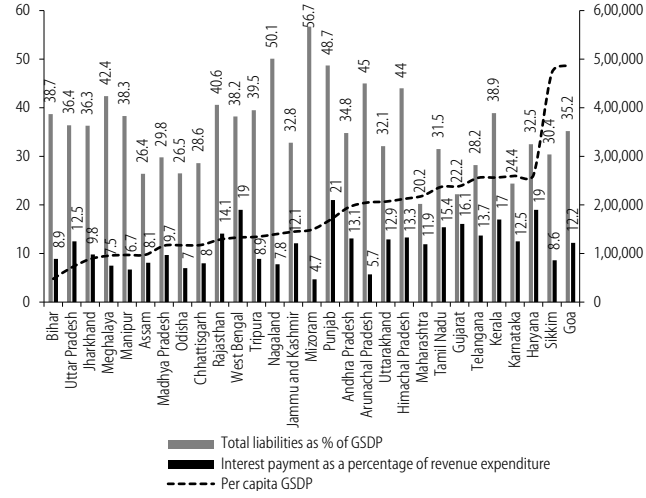
Debt–Growth Relationship

To examine the impact of debt–GSDP ratio on (nominal) growth of economy, the growth rate is regressed on debt–GSDP and its squared term. This non-linear form is useful to find out the debt threshold, a value up to this debt–GSDP ratio is growth-inducing and beyond this it is not growth-inducing (that is, growth reducing). Figure 4 depicts the non-linear relation between growth (y_t) and debt–GSDP (x_t) for Tamil Nadu from 1997–98 to 2020–21. The debt–GSDP coefficient is positive, while its squared term's coefficient is negative. The threshold level is computed using the formula: threshold = Coefficient of debt–GSDP/2 × coefficient of debt–GSDP^2 =3.5576/2*0.0945 = 18.82%, which is closer to the value of 18.36% given in threshold regression model.

Debt Profile and Per Capita Income

Figure 5 shows the debt profile, interest payment and per capita income of Indian states in 2020–21. Bihar was the poorest per capita income state with ₹47,983, while Goa was the richest one with ₹4,86,851. The per capita income of Goa was about 10 times that of the per capita income of Bihar and per capita income varied widely among Indian states. However, irrespective of their income, all states resorted to borrowing. If we go by the norm of the FRBM review committee, only Maharashtra (17.59%) meets this norm. Mizoram had the highest debt–GSDP ratio (56.7%), followed by Nagaland (50.1%) and Punjab (48.7%). Tamil Nadu ranked eighth in per capita income, but 10th in low debt–GSDP ratio. It is noted that Mizoram with the highest debt–GSDP has the lowest interest payment relative to its revenue expenditure. However, Punjab with the third highest debt–GSDP ratio has the highest interest payment–revenue expenditure ratio.

Figure 5: Debt Profile and Per Capita Income of Indian States in 2020–21



Source (Basic Data): "RBI's State Finance: A Study of State Budgets and MoSPI."

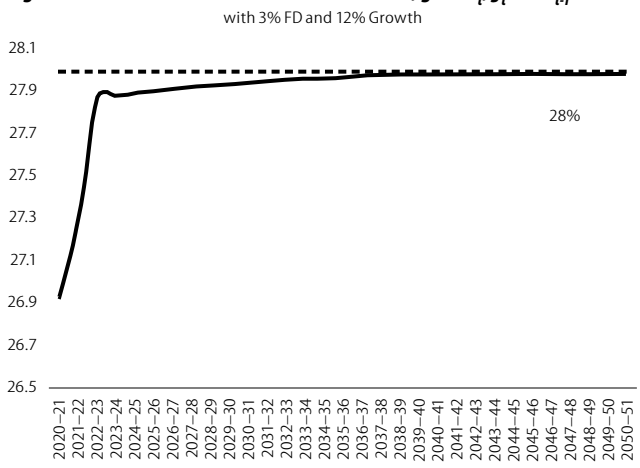
Simulation Model

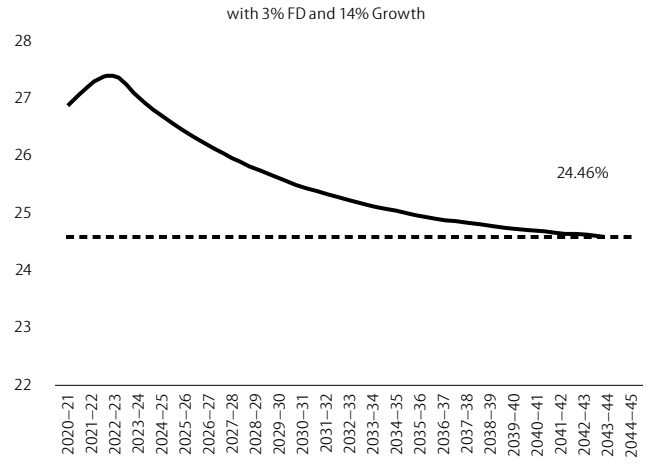
The debt–GSDP ratio (d_t) at the end of a fiscal year depends on (i) fiscal deficit–GSDP ratio (f_t), (ii) last year's debt–GSDP ratio (d_{t-1}), and (iii) nominal growth rate (g_t). The change in debt–GSDP ratio between two successive years is given by: $(d_t - d_{t-1}) = f_t - d_{t-1}\ (g_t/(1+g_t))$. Using this standard debt dynamic formula, one can project or simulate debt–GSDP level in future period, given assumptions on f_t and g_t and previous year debt (d_{t-1}). We have done a few simulation exercises using different assumptions on these three components to examine whether Tamil Nadu government will achieve the sustainable level of debt or not and when it would reach? The following initial values of debt to GSDP, fiscal deficit and nominal growth of Tamil Nadu economy from the recent budget documents are used: (i) debt to GSDP ratio for 2020–21: 26.94%; (ii) fiscal deficit for 2021–22: 3.79% and for 2022–23: 3.49%; and (iii) growth for 2021–22: 14.56%.

In exercise 1, the nominal annual growth rate is assumed to be 12% from 2022–23 onwards (based on last 10 years' actual average growth of economy of 11.3%) and the fiscal deficit is assumed at 3% from 2023–24 onwards. In exercise 2, the higher growth of 14% is used, other things remain the same. Simulations based on the above debt dynamics formula (exercise 1) indicate that the debt–GSDP ratio will rise to 27.9% in 2022–23 and continue till 2030–31 and then it will stabilise at 28% beyond 2050–51, that is, it will never reduce even after 100 years (Figure 6, p 44). In exercise 2, the debt–GSDP will initially rise to 27.4% in 2022–23. After that it will continuously decline to reach 24.6% in 2042–43 and thereafter it will stabilise for a longer period.

In exercise 3, when a still higher growth of 16% is used from 2022–23, the debt–GSDP ratio will continuously decline to reach 21.8% in 2049–50 and thereafter it will stabilise (not shown). Beyond 16% growth is a difficult task as it is highly ambitious, given the historical growth path. Therefore, the other possibility to control debt is to reduce the fiscal deficit target. If we assume 2.5% fiscal deficit target and 14% growth, the debt–GSDP will continuously decline and will stabilise at

Figure 6: Simulation Results of Debt–GSDP Ratio, given f_t, g_t and d_{t-1}





20.4% from 2056–57. This is the target level suggested in FRBM review committee. Even if we assume 16% growth, it will reach the sustainable level of 18.4% in 2045–46. Finally, when we assume 2% fiscal deficit target, the debt–GSDP ratio will reach the sustainable level in 2035–36 with 14% growth and in 2030–31 with 16% growth (Table 6).[7] It is noticed that with 14% growth the state will attain 20% target of the FRBM review committee in 2030–31 and with 16% growth it will attain 20% target in 2027–28.

Thus, ensuring 14% growth of the economy, the state should target for a revenue surplus from 2023–24 onwards such that it contains its fiscal deficit to only 2% level to obtain the sustainable debt level of about 18% before 2035–36. The relevant policy strategy for the state is to increase its own revenue–GSDP ratio by 0.75% and contain its revenue expenditures by 0.75% so that the state will reduce its fiscal deficit to 2% from 2023–24.

Strategies to Reach the Sustainable Level

From the above analyses, the following policy viewpoints emerge: (i) Although the current level of debt–GSDP (that is, above 25%) is within the limit set by the Fifteenth Finance Commission (considering the pandemic), it is not the sustainable debt level for Tamil Nadu. Our analysis clearly indicates that the debt level above 18.8% was growth reducing. Maintaining the below sustainable level of debt will be growth-inducing, which will help the state to increase its own revenues further, if they are buoyant.

(ii) Sustained debt level will reduce the interest payments. Figure 1 indicates that when the debt–GSDP ratio was 18% in 2014–15, the interest to revenue receipts was 11.5% (it is 1.35% of GSDP) and when the debt–GSDP increased to 26.94% in 2020–21, the interest to revenue receipts increased to 21.24% (that is, 1.95% of GSDP). The difference in interest is more than ₹22,500 crore. Thus, the reduction of debt–GSDP ratio will automatically reduce the interest relative to GSDP. The net reduction in the interest–GSDP ratio in the year of attaining sustainable debt level will be 0.6%. This will further improve the state's fiscal status as this savings can be spent on growth-inducing investments.

(iii) The state should aim for 14% or above nominal growth rate to create buoyancy in tax revenues/additional resources to control the debt level. This requires a critical analysis of sector-wise GSDP and come out with a clear-cut short- and long-term growth-inducing strategies/interventions on high weightage component to sustain growth at higher level.

(iv) Apart from aiming for higher growth, the debt sustainability is possible only if the fiscal deficit is brought down to 2% of GSDP from 2023–24 onwards. Therefore, the appropriate policy strategy is revenue augmentation or containing expenditures or both. We suggest that own revenue can be increased by 0.75% and expenditures can be decreased by 0.75%. The revenue augmentation within the limited scope of the state is possible only through better tax compliance, revision of tax on transport (motor vehicles), and by augmenting non-tax revenues.[8] On the expenditure side, it is inevitable to cut down unproductive

Table 6: Simulation Results to Achieve the Sustainable Debt–GSDP Ratio

Year	14% Growth and 2% Fiscal Deficit					16% Growth and 2 % Fiscal Deficit				
	f_t	d_t	g_t	$1+g$	d_t-d_{t-1}	f_t	d_t	g_t	$1+g$	d_t-d_{t-1}
2020–21	4.61	26.9	-	-	-	4.61	26.9	-	-	-
2021–22	3.79	27.3	0.1456	1.1456	0.367	3.79	27.3	0.1456	1.1456	0.367
2022–23	3.49	27.4	0.14	1.14	0.137	3.49	27.0	0.16	1.16	-0.276
2023–24	2	26.1	0.14	1.14	-1.370	2	25.3	0.16	1.16	-1.728
2024–25	2	24.9	0.14	1.14	-1.202	2	23.8	0.16	1.16	-1.490
2025–26	2	23.8	0.14	1.14	-1.054	2	22.5	0.16	1.16	-1.284
2026–27	2	22.9	0.14	1.14	-0.925	2	21.4	0.16	1.16	-1.107
2027–28	2	22.1	0.14	1.14	-0.811	2	20.5	0.16	1.16	-0.954
2028–29	2	21.4	0.14	1.14	-0.712	2	19.6	0.16	1.16	-0.823
2029–30	2	20.7	0.14	1.14	-0.624	2	18.9	0.16	1.16	-0.709
2030–31	2	20.2	0.14	1.14	-0.548	2	18.3	0.16	1.16	-0.611
2031–32	2	19.7	0.14	1.14	-0.480					
2032–33	2	19.3	0.14	1.14	-0.421					
2033–34	2	18.9	0.14	1.14	-0.370					
2034–35	2	18.6	0.14	1.14	-0.324					
2035–36	2	18.3	0.14	1.14	-0.284					

subsidies and expenses besides better targeting of welfare schemes through efficient data management.

(v) Considering the fact that the state's public sector undertakings, particularly power utility and state transport undertakings are already fiscally stressed, which could have been one of the reasons for higher level of debt in the state, it is necessary to restructure their finances so that the state can attain debt sustainability.

NOTES

1 This is true for many governments in developed countries with high debt–GDP ratios. For instance, the five-year (2017–21) average debt-GDP was 244.43% in Japan, 126.04% in Singapore, 117.87% in the US and 104.16% in France.

2 During 2005–06 to 2011–12, all India GDP (2004–05 prices) grew at 8.2%, but during 2012–13 to 2021–22, it (2011–12 prices) declined to 5.48%.

3 The first principle of public finance states that public debt must be sustainable in the sense that outstanding debt today must be equal to the present value of government's future surpluses. The second principle states that the households do not base their consumption on current income but on permanent income so that they will not raise consumption as long as their income increases temporarily.

4 Intergenerational redistribution is the main justification for popular "Golden Rule" in public finance. This rule views that governments should finance public investments that yield long-term benefits by public deficits in order to make future generations contributing to the financing. As future generations will enjoy the benefits from today's investment, their contribution to the financing is justified.

5 The IBC is $d_t^* = \sum_{j=1}^{\infty} \frac{1}{(1+r)^j} E_t[s_{t+j}]$, where $d_t^* = (1+r_t)$. d_{t-1} is the stock of debt-output ratio in the beginning of period t, denotes the expectation operator conditional on the information available at time t, and is the primary surplus-GDP ratio. The IBC requires that the present value of public debt asymptotically converges to zero, and interest rate r is resorted in order to discount the stream of public debt.

6 If we use actual GSDP series (that is, up to 1998–99, the 1993–94 base series; 1999–2000 to 2003–04, the 1999–2000 series; and 2004–05 to 2010–11, the 2004–05 series), it was 19.19% in 1996–97 and increased to 28.11% in 2003–04. That is, till 2011–12, it shows relatively a high value (Figure 1). We consider the 2011–12 series for taking ratio and measuring the growth.

7 Assuming 2% fiscal deficit and 12% growth, the debt–GSDP target of 18.8% will be met only in 2057–58.

8 During 1996–97 to 2020–21, the non-tax revenue-GSDP ratio ranged between 0.71% and 1.26%. In 2022–23, it is estimated at around 0.65%. It can be increased to 1.25% by revising user fees, charges, etc, suitably.

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