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Fiscal and Debt Sustainability in a Federal Structure: The Case of Assam in North East India♦

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ABSTRACT

While containing deficits and public debt at sustainable level is a matter of concern for all the states in India, their heterogeneity in terms of size, level of income, fiscal position and the ability to raise resources calls for individual analysis of the issue of fiscal sustainability of a particular state. Assam in northeast India has been experiencing the problem of fiscal instability since 1990s due mainly to the rise in public debt and fiscal deficit. A relatively better fiscal position in the earlier part of the present century is followed by rising public debt and deficits in recent years. Based on secondary data, the present study is an attempt to analyse the fiscal and debt sustainability of the state during 1991-2010. The study finds that a higher proportion of revenue deficit in fiscal deficit has resulted in fiscal instability in some years during the study period. But positive Domar gap and primary surplus in some years has helped in reducing the debt-GSDP ratio. The presence of cointegration between revenue receipt and revenue expenditure; and revenue receipt and total expenditure implies that the state has been able to maintain fiscal sustainability during the period under consideration.

Key words: fiscal deficit, debt sustainability, Assam, cointegration, error correction mechanism

JEL Classification: H3, H6

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1. Introduction

A well designed fiscal strategy helps an economy to move towards a higher growth path without high inflation or intergenerational transfers of the burden of public debt. Appropriate and timely framed fiscal policy measures can foster growth and human development through both macroeconomic (for example, through the influence of the budget deficit on growth) and microeconomic (through its influence on the efficiency of resource use) channels, by setting efficient and effective use of scarce resources and by creating the right incentive signals (Clements et al. 2004, Heller and Rao 2004). The importance of fiscal policy in developing countries arises from the fact that government intervention through appropriate fiscal policy is still considered as an instrument of economic development in these countries (Bagchi 2002). Developing countries, however, are often caught in the dilemma of limited revenue raising capacities, while the expenditure responsibilities have been tremendous. This has led to huge imbalances in the fiscal scenario of many developing countries in recent years.

India is a federal country with constitutional demarcation of responsibilities for different tiers of government. Both the central and state governments in the country have revenue raising power. The seventh schedule (article 246) of the Indian Constitution determines the revenue sources of each jurisdiction by specifying the subject matter of different tiers of government as Union List (List I), State List (List II) and Concurrent List (List III). With regard to the Concurrent List, both the Parliament and a State Legislature can make laws, but the laws made by the parliament will prevail. The residuary functions, that is, those not listed in I and II, are vested with the Union. Thus, the Central Government in India has supremacy over a wide range of legislature field including the power of taxation also (Heller and Rao 2004; Vithal and Sastry 2000). The Union List includes, among others, taxes on income other than agricultural income, excise duties, custom and corporation tax. The State List includes land revenue, tax on agricultural Income, estate duty, taxes on sale or purchase of goods, taxes on vehicles, on professions, on luxuries, on entertainment, and stamp duties etc. Taxes that are assigned to the central government are found to be more elastic and productive compared to the state taxes. As a result, imbalances occur in the finances of the state governments requiring transfer of revenue from the central government (Rangarajan and Srivastava 2008). The transfer mechanism through different channels has been designed by the Constitution to correct the imbalances arising out of asymmetries in tax assignment between the central and state governments in India. In other words, the revenue receipts of the state governments consist of both own revenue generated from different sources and central transfers. But revenue generation capacities of the state governments in India are found to be widely diversified due to various factors such as geographical location, infrastructure facilities, availability of natural resources and pace of industrialization etc. While there is wide variation in the revenue raising capacities of the state, the expenditure responsibilities have remained more or less similar. This resulted in huge fiscal imbalances of the states, particularly in the last decade of the 20th century.

In recent years, however, there is a growing awareness among the states in India to contain fiscal imbalances which has led to accumulation of debt and deterioration in the fiscal indicators (Rao 2002; Srivastava 2009). Earlier, most Indian economists were of the view that the growth of public debt in planned magnitude was normal and desirable in a developing country like India. Borrowing was considered to represent the absorption by the government of a part of domestic savings and the inflow of capital from abroad to finance and promote capital formation in the public sector and priority areas in the private sector (Chelliah 1996). This view was based on the assumption that borrowed funds would be used only for capital purposes and the resultant investment would yield adequate direct and or indirect returns. But these assumptions are not often fulfilled in case of both central and state

governments in India. The fiscal crisis and the resultant exponential growth of public debt in India in the later part of 1990s was not merely because of rising revenue expenditure ahead of current revenues, but also because capital expenditure financed by borrowings did not yield adequate returns (Chelliah 1996). The deterioration in the fiscal indicators and rising public debt of the state governments in India during that period disrupted the normal functioning of the economy which ultimately contributed towards macroeconomic instability of the whole nation (Rao 2005). In view of this, the recent Finance Commissions of Government of India, in their terms of reference, have given importance on fiscal and debt sustainability (TFC 2009). A sustainable fiscal policy helps a state to maintain a stable fiscal position without undertaking drastic and painful reforms measures. The significance of fiscal sustainability is more for poor and backward states as deterioration in their fiscal position may hamper the overall economic development of those states. Assam, in the North Eastern region, has been experiencing the problem of fiscal instability since 1990s mainly due to rise in public debt and fiscal deficit. Although there was some improvement in the fiscal position of the state in earlier part of the last decade, rising public debt and deficits in recent years is expected to create the problem of fiscal instability. Considering the significance of fiscal and debt sustainability on state finances, the present study is taken up to study fiscal and debt sustainability of the state during 1990-91 and 2009-10.

The paper comprises of seven sections including this introduction. While section two explains the theoretical framework for examining fiscal and debt sustainability section three describes the data source and methodology adopted for carrying out the study. The issue of fiscal sustainability in Assam has been examined in section four by looking into various deficit indicators. Fifth section of the paper examines the issue of debt sustainability in the state in terms of basic indicators such as outstanding liabilities, debt to GSDP¹ ratio and primary deficit etc. A time series analysis of fiscal and debt sustainability of the state has been carried out in the sixth section. In the concluding section, findings are summarized and conclusions are drawn.

2. Theoretical Framework for Examining Fiscal and Debt Sustainability:

The issues of fiscal sustainability and solvency² are usually addressed by analyzing the variables such as growth rate of GSDP, average interest rate on public debt and growth rate of public debt etc.³ The earlier statement of debt dynamics by Domar (1944) remains the simplest guide for the policy maker for fiscal and debt sustainability. Subsequent restatements in terms of infinite horizon constraint on the present discounted value (PDV) of debt have not changed the fundamental Domar condition for stabilization of debt as a ratio to GDP (Rajaraman et al. 2005; Rakshit 2005; Rath 2005).

According to the Domar's model for solvency of public debt,

$$D_0 = - \sum \frac{PD_t}{(1+r)^t} \quad (1)$$

Here, D_0 = Present stock of outstanding debt

PD_t = Primary deficit for the time period t

r = interest rate on public debt

The above equation implies that for solvency, present outstanding stock of public debt must be equal to the summation of discounted primary surplus of future years expressed in terms of present value.

Primary deficit incurred in a particular year can be expressed as,

$$PD_t = D_t - (1 + r)D_{t-1} \quad (2)$$

To examine sustainability, the equation (2) can be expressed as

$$D_t = (1 + r)D_{t-1} + PD_t \quad (3)$$

Dividing both sides by Y_t

$$\frac{D_t}{Y_t} = \frac{(1+r)D_{t-1}}{Y_t} + \frac{PD_t}{Y_t} \quad (4)$$

$$\Rightarrow \left(\frac{D}{Y}\right)_t = \left(\frac{1+r}{1+g}\right) \left(\frac{D}{Y}\right)_{t-1} + \left(\frac{PD}{Y}\right)_t \quad (5)$$

Writing $d_t = \left(\frac{D}{Y}\right)_t$ as the debt-GSDP ratio and $pd_t = \left(\frac{PD}{Y}\right)_t$

$$\Rightarrow d_t = \left(\frac{1+r}{1+g}\right) d_{t-1} + pd_t \quad (6)$$

Here, pd_t can be assumed as pd as the ratio of primary deficit to GSDP is targeted to a constant value (Rath, 2005). Now, equation (6) can be rewritten as:

$$\Rightarrow d_t = \left(\frac{1+r}{1+g}\right) d_{t-1} + pd \quad (7)$$

Equation (7) is a first order difference equation. On solving the equation, it is found,

$$d_t = \left[d_0 - \left(\frac{1+g}{g-r}\right) pd \right] \left(\frac{1+r}{1+g}\right)^t + \left(\frac{1+g}{g-r}\right) pd \quad (8)$$

d_t tends to $\left(\frac{1+g}{g-r}\right) pd$ if and only if $\left(\frac{1+r}{1+g}\right)^t$ tends to zero as t tends to infinity.

This is possible if

$$0 < \left(\frac{1+r}{1+g} \right) < 1$$

$$\Rightarrow (1+r) < (1+g)$$

$$\Rightarrow r < g$$

i.e., interest rate on public debt must be less than the annual growth rate of GSDP. Domar model concludes that for sustainability of public debt, the following condition must be satisfied, i.e., growth rate of public debt (k) \leq interest rate on public debt (r) $<$ growth rate of GSDP (g) when an economy is running by the accumulation of primary deficit. It is also necessary to determine the conditions for sustainability of public debt when the rate of interest on public debt is greater than the growth rate of GSDP. For doing this, equation (6) can also be expressed as:

$$d_t = (r - g)d_{t-1} + pd_t \quad (9)$$

From the above equation, it is evident that when $r > g$, for the sustainability of public debt, i.e., to keep $d_t = d_{t-1}$ or for achieving a stable constant debt-GSDP ratio for the future, there must be targeted primary surplus to GSDP ratio. This can be derived in the following manner:

$$d_t = \left(\frac{1+r}{1+g} \right) d_{t-1} + pd_t$$

$$d_t = \left(\frac{1+r}{1+g} \right) d_{t-1} - pd_t \text{ if there is primary surplus}$$

$$ps = \left(\frac{1+r}{1+g} \right) d - d \text{ in static sense}$$

$$ps = \left(\frac{r-g}{1+g} \right) d \quad (10)$$

Therefore, when $r > g$, for an economy to achieve debt sustainability, the following conditions must be satisfied

$$ps = \left(\frac{r-g}{1+g} \right) \frac{debt}{GSDP} \quad (11)$$

From equation (11), it is possible to determine amount of primary surplus required when $r > g$. It is also necessary to determine the amount of fiscal deficit for debt sustainability. The sustainability condition can also be derived from the concept of fiscal deficit (Rajaraman et al. 2005). Fiscal deficit is nothing but total net borrowings of the government as given in equation (12) as produced below:

$$(Fiscal\ Deficit)_t = D_t - D_{t-1} \quad (12)$$

$$\Rightarrow D_t = D_{t-1} + (FD)_t \quad (13)$$

Diving both side by Y_t

$$\Rightarrow \frac{D_t}{Y_t} = \frac{D_{t-1}}{Y_t} + \frac{(FD)_t}{Y_t} \quad (14)$$

$$\Rightarrow \frac{D_t}{Y_t} = \frac{D_{t-1}}{(1+g)Y_{t-1}} + \frac{(FD)_t}{Y_t} \quad (15)$$

$$\Rightarrow \frac{D}{Y} - \frac{D}{(1+g)Y} = \frac{FD}{Y}, \text{ in static sense} \quad (16)$$

$$\Rightarrow \frac{D}{Y} \left(1 - \frac{1}{1+g}\right) = \frac{D}{Y} \left(\frac{g}{1+g}\right) = d, \text{ where } fd = \frac{FD}{GSDP} \quad (17)$$

It implies that for debt sustainability,

$$\frac{Debt}{GSDP} = \left(\frac{1+g}{g}\right) \left(\frac{Fiscal\ Deficit}{GSDP}\right) \quad (18)$$

The above equation gives the relationship between the fiscal deficit and debt-GSDP ratio. It tells about the amount of fiscal deficit an economy can incur with a given growth rate.

3. Data Source and Methodology:

The study is based on secondary data. Data pertaining to the work are collected from various reports and publications of different government and other organisations such as the Directorate of Economics and Statistics, Government of Assam; Central Statistical Organisation, Government of India; Comptroller and Auditor General, Government of India; Reserve Bank of India; etc. To be specific, data on deficit indicators and interest payment are collected from the publications of Comptroller and Auditor General of India and GSDP (Gross State Domestic Product) data are collected from Central Statistical Organisation, Government of India. While the data on sub-national revenue receipt, revenue expenditure and total expenditure are collected from the Office of the Directorate of Economics and Statistics, Government of Assam, the data on outstanding liabilities (debt to GSDP and interest payments to revenue receipts) are obtained from Reserve Bank of India publication entitled 'State Finances: A Study of Budgets, RBI'.

For studying fiscal and debt sustainability, trend and composition of different deficit indicators have been analysed for the study period. The year wise debt-GSDP ratio is computed to analyse the burden of public debt of the state. The Domar gap and debt stabilisation index are computed to study the stability of the debt-GSDP ratio of the state. A cointegration analysis is carried out to examine the long run relationship between the variables which may have impact on fiscal and debt sustainability of the state.

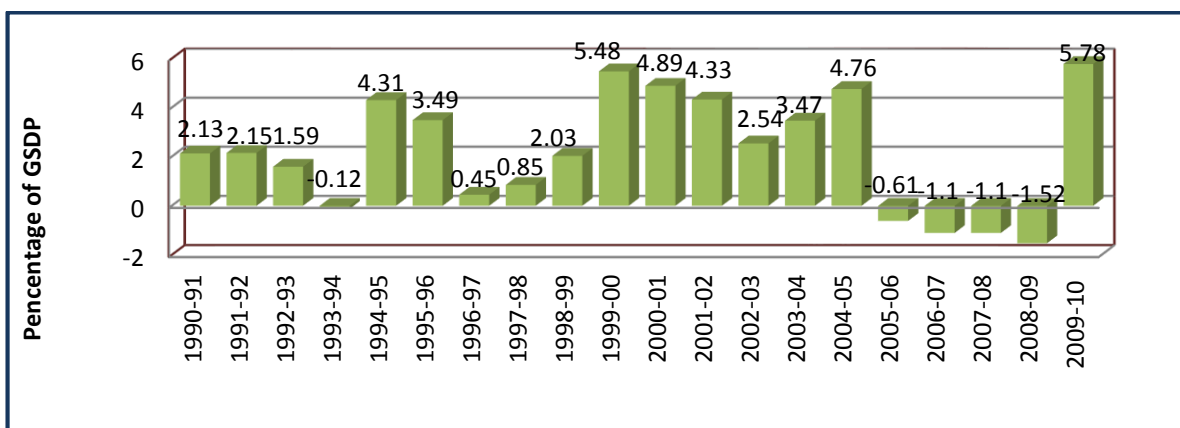
4. Fiscal Sustainability of Assam:

Fiscal sustainability is a concept that refers to the ability of a government to sustain its current spending, tax and other policies in the long run without threatening government solvency or defaulting some of its liabilities or promised expenditures. There is no precise or exact definition of fiscal sustainability (Chalk and Hemming 2000). The trend and composition of the deficit indicators provide vital inputs towards sustainability status of a government. Considering this, sustainability of fiscal position of the state government has been examined with the help of those deficit indicators.

4.1 Composition and Trend of Fiscal Deficit in Assam:

Fiscal deficit is defined as the excess of aggregate expenditure over non-debt receipt⁴. It, therefore, represents net incremental liabilities of the government. Fiscal deficit results in creation of fiscal liabilities which makes the issue of debt sustainability critically dependent on fiscal deficit and application of resources so arranged. The rising fiscal deficit may lead to an increase in debt-GSDP ratio. Increasing debt and resultant interest payments reduces the flexibility of the governments in the matter of expenditure and also increases its committed obligations. This is due to the fact that the debt stock is added to by the fiscal deficit incurred in every year as shown in equations 12 and 13 in the previous section. Fiscal deficit of Assam as a % of Gross State Domestic Product (GSDP) of the state is shown in figure 1.

Figure 1 Fiscal Deficit as a % of GSDP of the State



It is evident from figure 1 that the state has been incurring fiscal deficits for most of the years during the period of study. The state is found to violate the target of Assam Fiscal Responsibility and Budget Management Act (AFRBM)⁵ on Fiscal Deficit in 2009-10 for the first time after the introduction of the Act

in 2005. The fiscal deficit incurred by the state government in the year 2009-10 is found to be greater than the revised target on fiscal deficit of the state as set by the above Act. The state could not achieve the fiscal deficit target of 4 per cent of GSDP as prescribed in the AFRBM Act, 2005 for the year 2009-10. Under these circumstances, it is necessary to examine the composition of fiscal deficit of the state. The composition of fiscal deficit of the Government of Assam in terms of revenue deficit, capital outlay and net lending has been provided in Table 1.

Table 1 Amount and Composition of Gross Fiscal Deficit of Assam during 1990-2010 (Rs in crore)

Year	Revenue Deficit	Capital Outlay	Net Lending ^{*)}	Fiscal Deficit
	As a % of Fiscal Deficit ^{**)}			
1990-91	25.35	43.49	31.16	100
1991-92	-106.3	112.2	94.1	100
1992-93	-77.88	113.94	63.94	100
1993-94	-2447.1	1476.47	870.63	100
1994-95	43.52	39.02	17.46	100
1995-96	30.63	46.09	23.28	100
1996-97	-390.41	331.51	158.9	100
1997-98	-202.11	231.69	70.42	100
1998-99	-26.55	107.37	19.18	100
1999-00	62.54	30.06	7.4	100
2000-01	50.62	36.47	12.91	100
2001-02	60.84	35.43	3.73	100
2002-03	34.38	54.53	11.09	100
2003-04	49.14	44.62	6.24	100
2004-05	14.19	105.98	-20.17	100
2005-06	-423.88	304.78	19.1	100
2006-07	-310.83	204.36	6.47	100
2007-08	-326.71	213.67	13.04	100
2008-09	-272.49	168.66	3.83	100
2009-10	33.34	65.02	1.64	100

(-) implies surplus

^{*)} Net lending is equal to disbursement of loans and advances by the government minus recovery of loans and advances.

^{**)} As fiscal deficit is in current prices and used as a ratio of GSDP, figures in parentheses represent % of this variable to GSDP at current prices

Source: Report of the Comptroller and Auditor General of India, Government of Assam, various issues during 1990-2010

Although revenue deficit, capital outlay and net lending are considered to be the main contributors to fiscal deficit in an economy, there is an imperative to have a look at the trend of revenue deficit in it. The state experienced revenue deficit in some years under consideration. However, there

were quite a few years when the state experienced revenue surplus as well (e.g. 1991-94, 1996-99, etc.). This happened as Assam was declared as a special category state⁶ in 1990-91 which resulted in drastic change in the grants to loan composition ratio of plan assistance from 30:70 to 90:10 (Srivastava et al. 1999). The revenue surplus in these years was available to meet some portion of the capital outlay and also for extending loans for developmental purposes. The grants from Central Government rose from Rs. 591.35 crore in 1990-91 to Rs. 1112.06 crore in 1991-92 registering an increase of 88 % (Government of Assam 2003).

5. Debt Sustainability in Assam:

Public debt is the accumulated stock of government financial liabilities. It is measured by summing the face value of that stock (Rajaraman et al. 2005). In Indian context, public debt refers to all financial liabilities of the government, irrespective of whom they are owed (Lahiri and Kannon 2004). A large accumulation of public debt is considered bad for fiscal health of an economy as it may create problem in terms of repayment of the principal and interest payments. It also raises the issue of sustainability of the current stock of debt. To examine sustainability of public debt, time series data on different variables such as outstanding liabilities, debt-GSDP ratio and interest payments to revenue receipt ratio have been considered.

5.1 Sustainability of Public Debt

In the context of public debt, sustainability embodies concern about the ability of the government to service its debt. Usually, sustainability is measured in terms of debt-GSDP ratio. The simplest way for determining the sustainability of debt of the states has been to arrive at the acceptable level of debt-GSDP ratio and the ratio of interest payments to total revenue receipts. It is very difficult to set a debt-GSDP ratio which is likely to be sustainable. The Twelfth Finance Commission of Government of India recommended 28 % and 15 % as acceptable level of the debt-GSDP ratio and the ratio of interest payments to total revenue receipts respectively. As Assam is a poor and backward state, it has limited revenue raising power. However, as against this, it has extensive expenditure responsibilities including social sector expenditure in health and education. As already mentioned, considering the backwardness of the state, it was declared as a special category state in the year 1990-91. Being a poor state, it has low repayment capacity which makes debt sustainability crucial for the state. The time series data on outstanding liabilities, debt-GSDP ratio and interest payments-revenue receipt ratio (IP/RR) of the state government have been provided in Table 2.

Table 2 Outstanding Liabilities, Debt to GSDP and Interest payments to Revenue Receipts (IP/RR) ratio of the State (Rs in crore)

Year	Outstanding Liabilities	Debt-GSDP ratio	IP/RR
1	2	3	4
1990-91	4341	40.87	14.80
1991-92	4658	39.31	3.85
1992-93	4670	35.79	15.73
1993-94	4675	30.87	14.77
1994-95	5228	29.79	19.89
1995-96	6326	32.59	14.45
1996-97	6402	30.46	14.52
1997-98	6469	28.37	14.77
1998-99	6765	26.47	11.56
1999-00	8666	24.88	19.75
2000-01	10227	27.78	15.35
2001-02	11988	31.29	17.80
2002-03	13099	30.18	18.32
2003-04	15688	33.16	18.62
2004-05	17043	31.92	14.12
2005-06	18401	30.99	12.54
2006-07	19490	30.13	11.09
2007-08	20192	28.41	9.87
2008-09	22900	28.88	8.80
2009-10	27385	29.61	9.14

Source: State Finances: A Study of Budgets, RBI, various issues

The outstanding liabilities of the state government have increased from Rs. 4341 crore in 1990-91 to Rs. 27385 crore in 2009-10 registering an annual compound growth rate of 10.18 % during the period. The total debt of the state government has contributed, on an average, 2.03 % of the all states debt during the period of study. The percentage of state debt to all states debt is found to have declined from 3.39 % in 1990-91 to 1.53 % in 2009-10. The debt-GSDP ratio of the state was found to decline from 40.87 % in 1990-91 to 24.88 % in 1999-00. Since then, the debt-GSDP ratio started increasing and in the year 2003-04, total outstanding debt of the state government constituted 33.16 % of GSDP. However, the figure came down to 29.61 % in 2009-10 although this ratio was found to be higher than the level prescribed by the Twelfth Finance Commission. The debt-GSDP ratio in 2009-10, however, was found to be lower than the sustainable level of debt-GSDP ratio as computed from the theoretical model provided in section 2. The sustainable level of debt-GSDP ratio for the state in the year 2009-10 can be computed from the following relationship:

$$\frac{\text{Debt}}{\text{GSDP}} = \left(\frac{1+g}{g} \right) \left(\frac{\text{Fiscal Deficit}}{\text{GSDP}} \right)$$

$$= \left(\frac{1+.14}{.14} \right) (.04) = .32$$

Thus going by the theoretical framework, the debt-GSDP ratio of the state in 2009-10 is well within stipulated maximum limit (32%). The interest payments-revenue receipts ratio of the state is also found to be within the prescribed limit.

5.2 Primary Deficit and Sustainability of Public Debt in Assam

Available literature says that primary deficit is a key policy variable which actually helps to control the debt-GSDP ratio. But along with primary deficit, growth rate of GSDP and average interest payments are also considered as critical variables for any study of debt sustainability. Under these circumstances, it is necessary to examine the relationship between these variables and see how it has contributed in controlling the debt-GSDP ratio of the state.

Sustainability of the current stock of debt is the main determinant of the overall debt sustainability of a government (Hamilton and Flavin 1986). In simple terms, public debt is considered to be sustainable as long as the growth of income exceeds the interest rate or cost of public borrowings subject to the condition that the primary balance is either positive or zero. The relationship between primary deficit and public debt of the state as provided in the Domar model is discussed in section 2. A zero primary deficit is required for stabilization of debt as percent of GSDP, if the nominal rate of growth of GSDP is equal to the interest rate on inherited debt. Given the rate spread (GSDP growth rate-interest rate) and quantum spread, debt sustainability condition states that if quantum spread together with primary deficit is zero, debt-GSDP ratio would be constant or debt would stabilize eventually. On the other hand, if the primary deficit along with quantum spread is negative, debt-GSDP ratio would be rising and in case it is positive, debt-GSDP ratio would eventually be falling (Rath 2005; Domar 1944). If there is a primary deficit, it is likely that the debt-GSDP ratio will be higher at the close of the fiscal year, unless the growth rate of GSDP during the year is higher than the nominal rate of interest on the inherited debt stock. The quantum spread is calculated by multiplying the rate spread with outstanding stock of debt. The debt stabilization index is computed as the summation of the quantum spread and the primary deficit. The debt sustainability status of the state in terms of interest spread and quantum spread during the study period has been shown in Table 3.

Table 3 Debt Sustainability of Assam in terms of Quantum Spread and Primary Deficit (Rs in crore)

Year	GSDP Growth Rate(at Current Prices)	Average Interest Rate	Rate Spread	Quantum Spread (D _t *Rate spread)	Primary Deficit(-)	Debt Stabilization Index(quantum spread+primary deficit)	Debt-GSDP ratio
1	2	3	4	5	6	7	8
1991-92	11.56	2.07	9.49	550	-162	388	39.31
1992-93	10.13	8.81	1.31	76	203	279	35.79
1993-94	12.79	10.34	2.46	139	508	647	30.87
1994-95	15.90	11.90	4.01	253	-121	132	29.79
1995-96	10.60	8.45	2.15	165	-165	0	32.59
1996-97	8.27	8.80	-0.53	-41	486	445	30.46
1997-98	8.51	9.93	-1.42	-111	497	386	28.37
1998-99	12.07	7.87	4.19	343	183	526	26.47
1999-00	14.50	11.44	3.06	270	-650	-380	24.88
2000-01	5.69	9.16	-3.47	-361	-675	-1036	27.78
2001-02	4.07	9.56	-5.49	-669	-386	-1055	31.29
2002-03	13.30	9.93	3.37	449	317	766	30.18
2003-04	8.98	10.05	-1.07	-170	52	-118	33.16
2004-05	11.05	8.51	2.54	433	-654	-221	31.92
2005-06	11.21	8.52	2.69	495	1866	2361	30.99
2006-07	8.94	8.00	0.94	182	2227	2409	30.13
2007-08	9.87	7.62	2.25	454	2302	2756	28.41
2008-09	14.27	7.39	6.88	1575	3000	4575	28.88
2009-10 (R.E)	13.85	7.29	6.56	1797	-2210	-413	29.61

* Average interest rate = Interest payment/ [(amount of previous year's Fiscal Liabilities + Current year's Fiscal Liabilities)/2]*100

Source: Author's own calculation based on the report of the Comptroller and Auditor General of India, Government of Assam, various issues and GSDP data from CSO reports

As shown in Table 3, a high debt-GSDP ratio of the state of the early nineties came down significantly by 1999-00. The positive rate spread or Domar gap enjoyed by the state in some years during the above time period might have helped to reduce the debt-GSDP ratio. The primary surplus experienced by the state in some of the years such as 1992-94, 1996-99 also might have contributed towards the favourable debt-GSDP ratio of the state. The state had experienced primary deficit for consecutive years during the period from 1999-00 to 2001-02 which actually contributed towards increased debt-GSDP ratio during this period. The unfavourable rate spread also contributed towards increase in debt-GSDP ratio of the state. The state has been able to maintain a stable debt-GSDP ratio in recent years mainly due to the higher growth of GSDP compared to average interest rate on public debt. The growth rate of GSDP is found to be greater than the average interest rate on public debt for consecutive years from 2004-05 to 2009-10. The occurrence of primary surplus in some years also helped to keep the debt-GSDP ratio at a

stable level. The debt stabilization index alternates its sign during the period under study and thus helped to maintain a stable debt path.

6. Long Term Analysis of Fiscal and Debt Sustainability of the State

From the above analysis, some conclusions regarding sustainability of the fiscal position of the state may be drawn from the indicators such as composition and nature of the fiscal and primary deficit, rate spread and debt stabilization index etc. The conclusions based on those analyses provide an idea of sustainability for a particular period of time. To be able to draw inferences in a rigorous manner, more sophisticated tools such as time series analysis needs to be applied covering the whole time period taken for the analysis. Thus, co-integration analysis has been carried out to examine the long term association among the fiscal variables in the state for the period 1990-91 to 2009-10. The idea behind carrying out co-integration analysis is to examine whether the state has maintained the inter-temporal budget constraint during the period of study. The inter-temporal budget constraint tests of sustainability of fiscal policy asks whether past behaviour of revenue, expenditure and fiscal deficits could be continued indefinitely without prompting adverse response from the lenders (Olekalns and Cashin 1999).

The rationale behind the model is that the inter-temporal budget constraint, under the no-Ponzi⁷ scheme rule, imposes restrictions on the time series properties of government revenue and expenditure. For sustainability of the current stock of debt, the government expenditure and revenue must be stationary at least in the first difference. The stationary property restricts the extent to which government expenditure and revenue can deviate from each other over time. In particular, if government expenditure and revenue is integrated of order 1, they may be co-integrated (Gujarati 2004). Co-integration implies that there exists an error correction mechanism pushing government finances towards the levels required by the inter-temporal budget constraint. Lack of co-integration among the variables implies that under unchanged fiscal policies, the debt stock of the state government is unsustainable.

In the current analysis, time series data on revenue receipts and revenue expenditure as well as revenue receipt and total expenditure of the state are considered. The rationale behind taking revenue receipt and revenue expenditure as the relevant variable is that imbalances between the two variables have an impact on fiscal deficit of a state. As discussed in the previous section, an increase in revenue deficit has an implication for the debt stock of the government as it leads to increase in fiscal deficit of the state. Similarly, long run association between revenue receipts and total expenditure helps in ensuring fiscal stability of the state.

Following Hakkio and Rush (1991) and Olekalns and Cashin (1999), sustainability of debt stock is examined by estimating the following two log-linear regressions:

$$\ln RR_t = \alpha_0 + \alpha_1 \ln RE_t + U_t \quad (19)$$

$$\ln RR_t = \beta_0 + \beta_1 \ln TE_t + V_t \quad (20)$$

Here, RR = Revenue Receipt

RE = Revenue Expenditure

TE = Total Expenditure

U= Random disturbance or error term in regression equation (19)

V = Random disturbance or error term in regression equation (20)

The necessary condition for cointegration is that the individual series is integrated of order one. Should only one of the series is I (1), with the other being stationary, the two series will permanently diverge and equation (19) and (20) will not hold (Olekalns and Cashin 1999). For the present analysis, initially, the time period from 1990-91 to 2009-10 was considered. The variables were found to be integrated of order 1. But the R² values of the error correction variables were found to be very less and values of the F- statistic obtained from the regression analyses were found to be insignificant even at the 10 % level. This might be due to less number of observations, not considered suitable for time series analysis. To facilitate better treatment of the models, the analysis has been reworked by taking a few more years into consideration. Accordingly, the two time series models have taken into account the time period of 1980-81 to 2009-10.

The values of the variables, which were in current prices, have been converted into constant 2004-05 prices by using the GSDP price deflator. Dickey Fuller unit root test is used to determine the order of integration where null hypothesis is that respective series have a unit root. The results of the Dickey Fuller unit root test have been provided in Table 4.

Table 4 Dickey Fuller test for Unit Root for Revenue Receipt, Revenue Expenditure and Total Expenditure (For the Time Period 1980-81 to 2009-10)

	Test Statistic (t)	1% critical Value	5% critical value	10% critical value	Mackinnon approximate p value
Ln RR	0.150	-3.723	-2.989	-2.625	0.9693
Ln RE	0.329	-3.750	-3.00	-2.630	0.9962
Ln TE	0.497	3.723	2.989	2.625	0.9962
Using Difference Operator					
Ln RR	-8.196	-3.750	-3.00	-2.630	0.000
Ln RE	-4.323	-3.750	-3.00	-2.630	0.004
Ln TE	-5.356	-3.730	-2.992	-2.626	0.0033

From Table 4, it is clear that all the variables are integrated of order one. In other words, there may be cointegration relationship between these variables. If they are co-integrated, it implies that there is a long term relationship between the two variables and fiscal position of the state is sustainable during that period. For this, the values of the residuals U_t and V_t are computed from equation (19) and (20) such that:

$$U_t = \ln RR_t - \alpha_0 - \alpha_1 \ln RE_t \quad (21)$$

$$V_t = \ln RR_t - \beta_0 - \beta_1 \ln TE_t \quad (22)$$

Now, cointegration requires that the residuals obtained from the equation (21) and (22) be stationary. The standard way of testing whether this requirement is met by the data is to use the Dickey Fuller test of unit root. But since the estimated U_t and V_t are based on the estimated cointegrating parameter α_1 and β_1 respectively, Dickey Fuller critical significant values are not quite appropriate (Gujarati 2004). Engle and Granger (1987) have calculated the critical values of the test. This involves estimating autoregressive parameter from the “second stage” regression.

$$U_t = \phi_1 U_{t-1} + \varepsilon_t \quad (23)$$

$$V_t = \phi_2 V_{t-1} + \vartheta_t \quad (24)$$

Here, ε_t and ϑ_t are the random error terms, ϕ_1 and ϕ_2 are the parameters to be estimated in the model.

If $|\phi_1| < 1$, then there is a cointegrating relationship between revenue receipt and revenue expenditure.

Similarly, if $|\phi_2| < 1$, then there is a cointegrating relationship between revenue receipt and total expenditure. The results of the Engle and Granger cointegration test have been provided in Table 5 and Table 6.

Table 5 Engle-Granger Test of Co-integration between Revenue Receipt and Revenue Expenditure

Variable	Test Statistic (t)	1% critical Value	5% critical value	10% critical value
U_t	-4.923	-3.679	-2.968	-2.623

Table 6 Engle-Granger Test of Co-integration between Revenue Receipt and Total Expenditure

Variable	Test Statistic (t)	1% critical Value	5% critical value	10% critical value
V_t	-7.600	-3.689	-2.972	-2.625

As computed test statistic of both the error terms in absolute value are found to be greater than Engle Granger critical value at 1 % level, residuals are integrated of order 0 i.e.; I (0). In other words, although the variables are non-stationary, the residuals obtained from their regression are stationary. It implies that, there is a long term association among the variables, revenue receipt and revenue expenditure as well as revenue receipts and total expenditure. However, the finding is different from the findings of Olekalns and Cashin (1999), who conducting a study for the period from 1951-52 to 1997-98 for the

Indian states in aggregate, did not find any evidence of cointegration between state government tax revenues and expenditures implying a violation of intertemporal solvency and sustainability.

Along with long term behaviour, it is also necessary to examine short term behaviour of the variables because in the short term, there may be disequilibrium between the fiscal variables. Keeping this fact in mind, the error correction mechanism (ECM) is also incorporated in this analysis to examine short term behaviour among the variables. This test was first used by Sargan (1984) and later popularized by Engle and Granger (1987) to correct for disequilibrium between two time series variable. The test states that if two variables are cointegrated, then the relationship between the two can be expressed as error correction mechanism. The following regression equations are considered to examine the error correction mechanism.

$$\Delta \text{LnRR} = \alpha_0 + \alpha_1 \Delta \text{LnRE} + \alpha_2 U_{t-1} + \epsilon_t \quad (25)$$

$$\Delta \text{LnRR} = \beta_0 + \beta_1 \Delta \text{LnTE} + \beta_2 V_{t-1} + \omega_t$$

Here, Δ denotes the first difference operator.

Again,

$$U_{t-1} = (\text{LnRR}_{t-1} - \alpha_0 - \alpha_1 \text{LnRE}_{t-1}) \quad (27)$$

$$V_{t-1} = (\text{LnRR}_{t-1} - \beta_0 - \beta_1 \text{LnTE}_{t-1}) \quad (28)$$

Where, ϵ_t and ω_t are the random error terms.

The results of the error correction analyses as obtained from the above regression equations have been provided in Table 7 and Table 8.

Table 7 Regression Result of the Error Correction Variable (U_{t-1}) for the Time Period 1980-1981 to 2009-2010

Variables	Estimated Coefficients	t - statistic
ΔLnRE	.5266768	1.70
U_{t-1}	-.7153944***	-5.02
Constant	.0168408**	2.31
R^2	0.5392	
$F(n_1 = 2, n_2 = 26)$	15.21***	

***, ** and * indicate significant at 0.01, 0.05 and 0.10 level respectively

Table 8 Regression Result of the Error Correction Variable (V_{t-1}) for the Time Period 1980-1981 to 2009-2010

Variables	Estimated Coefficients	t - statistic
ΔLnTE	.4265848	2.14
V_{t-1}	-.7715409***	-5.54
Constant	.0109217**	1.16
R^2	0.5586	
$F(n_1 = 2, n_2 = 26)$	16.45***	

***, ** and * indicate significant at 0.01, 0.05 and 0.10 level respectively

It is evident from Table 7 that the error correction variable (U_{t-1}) is negative and significant suggesting that deviation from equilibrium is corrected at 71 per cent per year. Similarly, error correction variable (V_{t-1}) as obtained from table 8 is also found to be negative and significant. In other words, along with the long term association, there exists short term association between these fiscal variables which actually helped the state to maintain a stable fiscal position for most of the years taken for the analysis.

7. Conclusion

It can be inferred from the above discussion that a persistently large and fluctuating fiscal deficit has been a serious weakness of the state finance in Assam in recent decades. It has been found that occurrence of revenue deficit has contributed towards increase in fiscal deficit of the state during the period of study. As sustainability of the fiscal position of the state is mainly dependent on nature of fiscal deficit, a higher proportion of revenue deficit to fiscal deficit may not be good for the fiscal health of an economy. A relatively higher proportion of revenue deficit to fiscal deficit resulted in huge fiscal imbalances in the state in the later part of 1990s. Although the situation improved in the early part of the first decade of the present century, the increase in revenue and fiscal deficit of the state in the year 2009-10 is a matter of concern. The state government has to take corrective measures to restrict the fiscal deficit.

The sudden decline in the debt-GSDP ratio of the state during the first half of 1990s is mainly due to the declaration of the state as a special category state. As loans from the central government constitute the major portion of state's debt during that period, the conversion of the huge amount of loans into grants helped the state tremendously to reduce the debt-GSDP ratio. The state has been able to maintain a stable debt-GSDP ratio in recent years mainly due to positive interest spread enjoyed by the state. Additionally, primary surplus enjoyed by the state during the period under study also contributed towards reduction of debt-GSDP ratio. The incentive provided by the Eleventh and Twelfth Finance Commission of India and subsequent reform measures adopted by the state proved to be crucial in maintaining a stable fiscal position in the later part of the present decade.

The presence of co-integration between revenue receipt and revenue expenditure as well as revenue receipt and total expenditure implies that the state has been able to maintain fiscal sustainability during the period under study. Negative and highly significant error correction variables indicate a short term association among the variables in addition to the long run relationship.

Notes

1. GSDP stands for gross state domestic product which is roughly equivalent to state income.
2. Solvency implies that present outstanding stock of public debt must be equal to the summation of discounted primary surplus of future years expressed in terms of present value.
3. The theoretical model is mainly based on the papers by Rath (2005), Rajaraman et al. (2005) and Lahiri and Kannon (2004) and Domar (1944).
4. Non-debt receipt includes revenue receipts, miscellaneous capital receipts and recovery of loans and advances.
5. Assam Fiscal Responsibility and Budget Management Act, 2003 was enacted by the Parliament of India to institutionalise financial discipline, reduce India's fiscal deficit, improve macroeconomic management and the overall management of the public funds.
6. Special category states are those states which are given special benefits by the central government as these states are economically backward compared to other states. Declaration of a state as a special category state results in drastic change in the grant to loan composition of plan assistance from centre from 30: 70 to 90: 10.
7. A government which does not generate enough current revenues for debt service must either default on its obligations or borrow more to service its past debt as well as to cover ongoing imbalances. Continued borrowings of this kind are known as Ponzi game.

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