Analysis of Public Debt and Fiscal Sustainability for Haryana

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10 March 2016

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1. Introduction

Subnational government finances have gained importance with increasing expenditure requirements of the states and constrained revenue by nature of federal structure in India. Sub national Governments in India incur more than three-fourths of the total expenditure on social services and more than half of that on economic services and they collect one-third of the total government sector receipts. The constitution of India has adopted a federal system of polity and governance, originally envisaging a two-tier structure, central government and state governments. With 73rd and 74th the constitution amendments rural and urban local bodies have been accorded constitutional status as the third-tier of government. The constitution provides for preparation of annual budgets and borrowings by the centre, respectively, under articles 112 and 292 and by the states under articles 202 and 293(Gopinath, 2009).

Owing to mismatch in resource availability and revenue generation by states, the studies of sub-national finances and their sustainability are gaining importance. The reasons for this are obvious. With decentralization sub-national governments role and responsibilities increases and so their expenditure and debt. The structural imbalance in state finances stemmed from their limited resource base vis-à-vis growing expenditure requirements. They resorts to debt financing to tide over the mismatch. Experiences of Argentina and Brazil, two of the most decentralized developing countries, reminds the potential danger of fiscal decentralization for macroeconomic stability. Fiscal decentralization can result in problem of fiscal indiscipline due to problem of moral hazard and may result in fiscal problems at the central government level. There is need to control, register, account, manage and pay back public debt at subnational level. The subnational debt can have serious implications for national finances and fiscal stability. The fiscal performance of the States in India has been an area of concern for quite some time. Persistently large revenue deficits had led to higher fiscal deficit and the build-up of a large debt stock (World Bank, 2004).

2. Literature Review - debt sustainability at sub-national level

The state governments debt in India and their debt sustainability has been area of concern and many studies empirically tested at individual state level and at aggregate level also. In a report submitted to the Twelfth Finance Commission by the Dholakia, Mohan & Karan (2004) observed that there was a debt problem of credible magnitude and SNGs debt position is deteriorating fast. They concluded that fiscal stance adopted by the SNGs was highly unsustainable. Ianchovichina et al. (2006) studied fiscal sustainability in the state of Tamil Nadu. They presents a framework for analyzing subnational fiscal sustainability and applies it to the case of Tamil Nadu where fiscal adjustment has been ambitious and politically challenging. The analysis suggests that the fiscal adjustment in Tamil Nadu has left fiscal space for increases in infrastructure investment which may be achieved without threatening fiscal sustainability. The paper concluded that though the state's efforts to remove constraints to growth, minimize recurrent expenditures, and maximize its revenue potential will be critical for fiscal sustainability and the quality of fiscal adjustment in the long run, national policies feature prominently in subnational fiscal adjustment as they influence wages and pensions, interest rates, tax policy, fiscal transfers and the borrowing regime. Raju (2007) seeks to address the sustainability of State finances in India and tries to examine whether State governments in India can continue on their current revenue-expenditure paths indefinitely and maintain solvency. The paper finds evidence indicative of unsustainable fiscal policies adopted by state level (sub-national) governments in India and serious concern about the fiscal health of state level governments in India. Each of the deficit measures considered in the paper reveals a different facet of fiscal health and state governments (consolidated) have scored poorly on almost all except the overall gap indicator. Nayak and Rath (2009) studied debt sustainability of seven special category states for period 1991-2009 using Domar sustainability criteria. The study found debt sustainability conditions met except Arunachal Pradesh. They observed that outstanding guarantee of the State governments could pose a challenge to Debt Sustainability in a situation when the borrower defaults. Dutta et al. (2010) in their study on fiscal and debt sustainability of Assam for the period 1991-2010 found stress in state finances for some years of the period but overall state could maintain fiscal sustainability during the period. Makin and Arora (2012) examined fiscal sustainability at the state level in India for the time period 1990-91 to 2009-10. The paper reveals that despite relatively high effective interest rates on public debt, the risk of public debt growing without bound above present levels is minimal, because economic growth rates at state level are high. However, paper cautioned that the existing levels of public debt as a proportion of respective GSDPs are well above the recommended 25% level. The study observed that economic slowdown may increase probability of debt default and higher interest risk premia demanded by creditors may push state budget outlays in a vicious circle. The paper has stressed that the primary budget balance is the key intermediate target on which India's states need to focus in order to lower their public debt to income levels. In a detailed study, Das (2013) assessed debt sustainability of Kerala, Punjab and West Bengal. None of the states however accomplished fiscal sustainability fully. Excepting West Bengal, they attained partial sustainability as their debt-deficit system slowly restores long run equilibrium. West Bengal is far away from sustainability because its future surpluses are not enough to service the debt. The study suggests that a sound adjustment in fiscal position on revenue account is essential for all states and that West Bengal needs special attention to achieve equilibrium in the long run. Dutta & Dutta (2014) in their study on fiscal and debt sustainability of Assam, covering the period 1991-2010, pointed out that a persistently large and fluctuating fiscal deficit has been a serious weakness of the state finance in Assam in recent decades. Paper found that occurrence of revenue deficit has contributed towards increase in fiscal deficit of the state during the period of study. The paper observed that 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. Kaur et.al(2014) assessed the debt sustainability of the state governments in India through indicator-based analysis as well as empirical exercises covering 20 Indian states for the time period 1980-81 to 2012-13. The study revealed that there is a co-integrating relationship between government expenditure and revenues in India, which tantamount to satisfying the inter-temporal budget constraint. Moreover, the estimated fiscal policy response function indicated that the primary fiscal balance in Indian states responds in a stabilising manner to the increase in debt. Thus, both the results indicate that the current debt situation at the state level is sustainable in the long-run. Maurya (2014) analysed fiscal sustainability of Uttar Pradesh for the period 1991-92 to 2012-13 using three approaches - Domar debt sustainability, indicator analysis and budget constrain approach. The paper observed that the results of different approaches differed. Cointegration test indicates absence of long run equilibrium which means long run debt sustainability has not been found in the case of Uttar Pradesh.

3. Theoretical framework

The debt sustainability can be assessed by applying three commonly used approaches viz. Domar sustainability condition, sustainability indicators analysis, and present value budget constraints approach. Empirical studies dealing with the issue of debt sustainability start with the financing constraint of the government. This constraint relates the primary deficit plus nominal debt servicing to changes in outstanding debt.

3.1 Domar Stability Condition

The Domar stability condition has been defined as:

$$y - r > 0 \qquad \ldots\ldots(1)$$

$$r = (IP)_t/(OD)_{t-1} \qquad \ldots\ldots(2)$$

where:

y = Growth of GDP at Current Market Prices

r = Average Interest Rate

IP = Interest Payment

OD = Outstanding Debt

t = Time Period

Equation (1) and (2) imply that the debt/GDP ratio (d/y) is stable if the nominal GDP growth (g) exceeds the nominal interest rate (r) on government debt. According to the Domar stability condition, larger the gap between the interest rate and growth rate the higher will be the d/y. Thus, to stabilise debt/GDP ratio (d/y), rate of interest should be lower than the output growth ($r<g$). Here, the Domar stability condition has been tested in respect to market related borrowings rates and administered interest rates for Haryana.

3.2 Sustainability Indicators

Traditionally, debt sustainability has been assessed in terms of indicator analysis. The indicators broadly enable an assessment of the ability of the state government to service its interest payments and repay its debt as and when they become due through current and regular sources of revenues excluding temporary or incidental revenues as grants or capital revenue resulting from sale of assets. Alternatively, debt and debt service indicators are monitored to assess relationship of existing debt to different types of expenditures or as ratios to various fiscal balances so as to gauge sustainability of both debt and fiscal situation (Rajaraman, Bhide, and Pattnaik 2005; Maurya, 2014; Kaur, 2014).

Table-1: Sustainability Indicator: Measures, Nations and Intepreстations

Sl. N.	Indicators	Symbolical Representation	Interpretation
1	Rate of Growth of GDP (Y) should be more than Rate of Growth of Debt(D)	Y-D>0	Assess the sustainability in aggregate terms and test the essential condition that growth of income must exceed growth of debt. Real output growth (y) should be higher than rate of interest.
2a	Real Output Growth (y) should be higher than Real Interest Rate (r) Growth.	y-r>0	
2b	Rate of growth of debt (D) should be lower than effective interest rate (i)	D - i < 0	
3a	Primary Deficit(PD) should not be rising faster than GDP	PD/GDP<0	Tests the sustainability from the point of view of revenue account. Additional condition that primary deficit must be declining and sufficient surplus must be generated to repay current debt stock. There should be positive primary revenue balance.
3b	Primary Revenue Balance(PRB) should be in surplus and adequate enough to meet interest Payments(IP)	[PRB-IP>0]	
4	Proportion of Repayments (REP) to Gross Borrowing(TGB) should be falling over time.	[REP/TGB ↓↓]	Measures debt trap situation. If the interest payment and repayment exceed total gross borrowings, economy said to be in debt trap.
5	Interest Payments (IP) and Repayments (REP) adjusted for Primary Revenue Balance (PRB) should not exceed Total Gross Borrowings(TGB)	[(IP+REP-PRB)/TGB)<1]	
6a	Interest Burden Defined by Interest Payments (IP) to GDP ratio should decline over time	[IP/GDP ↓↓]	Interest payment as proportion to GSDP, revenue receipts, as well as revenue expenditure should be falling over time.
6b	Interest Payments (IP) as a per cent of Revenue Expenditure (RE) should decline over time.	[IP/RE ↓↓]	
6c	Interest Payments (IP) as a per cent of Revenue Receipts (RR) should decline over time.	[IP/RR ↓↓]	
7a	Debt to revenue receipts ratio should decline over time	D / RR ↓↓	Debt as proportion to revenue receipts, as well as Tax and non tax revenue should be falling over time
7b	Debt to tax revenue ratio should decline over time	D / TR ↓↓	
7c	Debt to own tax revenue ratio should decline over time	D/OTR ↓↓	

Note: (i) Net Primary Revenue Balance (NPRB) = RD – (IP-IR) (ii) Primary Revenue Balance (PRB) = RD – IP (iii) REP - Repayments of Government Debt (iii) TGB = Total Gross Borrowing

3.3 Present Value Budget Constraint Approach(PVBC)

Another approach to assess the sustainability is the present value of budget constraint. Solvency requires that the future primary surpluses should be sufficient to repay the current stock of public debt. According to this approach, the present value (*PV*) of the sum of future primary surpluses should not be less than the current outstanding liabilities of the Government. Following the methodology set out in the contemporary literature, the testing of the sustainability under this approach involves discounting of nominal stock of government debt backwardly to a given date with an appropriate discount rate. Thereafter the discounted series is tested for stationarity. If the series is non-stationary it implies the insolvency of the debt. Whereas the PVBC guides the theoretical approach to debt sustainability, the empirical strategy is within the cointegration framework. Cointegration between revenues and expenditures is a necessary condition for debt sustainability analysis. If expenditure is increasingly greater than revenue overtime, the accumulated budget deficits eventually develop into a domestic debt burden.

Typically, conventional debt sustainability analysis is an accounting based approach linked to the *inter-temporal budget constraint(see* Kumar & Woo, 2010;). The debt stock changes during a given period of time as long as there is an imbalance between expenditure and revenues. Thus, if expenditure exceeds revenues, the government has to borrow to finance the difference and thus the public debt stock increases and vice-versa. The so-called dynamic government budget constraint formalizes this accounting principle and states that the change in the public debt stock in year t is

$$Debt_t - Debt_{t-1} = r\, Debt_{t-1} - PB_t \qquad \text{------ (3)}$$

where $Debt_t$ denotes the Outstanding public debt at the end of year t, the interest bill is assumed to depend on the inherited debt stock $Debt_{t-1}$ and an average nominal interest rate 'r'. $Debt_t$ equals past period debt including interest payments but adjusted for primary balance(PB), depending on whether there is primary surplus (PS) or primary deficit (PD). The right side of the equation is the overall deficit, i.e. the difference between total expenditure and total revenues, with the former disaggregated into primary expenditure and the interest bill. Given the time paths for r and Z_t, the government financing constraint in (3)describes the time path of the stock of debt, i.e., the dynamics of debt accumulation or decumulation[1]. Iterating Eq.(3)forward s periods and summing up we get:

$$Debt_{t-1} = \sum_{s=0}^{\infty} \frac{PB_{t+s}}{(1+r)^{1+s}} + \frac{Debt_{t+s}}{(I+r)^{1+s}} \qquad \text{------ (4)}$$

If the last term in (4) approaches zero as the number of periods increases, then the No-Ponzi-Game Constraint[2] will be satisfied, i.e.,

$$\lim_{s\to\infty} \frac{Debt_{t+s}}{(1+r)^{1+s}} = 0 \qquad \text{------ (5)}$$

The No-Ponzi-Game Constraint in (5), also known in the literature as the intertemporal solvency condition is stating that the present value of the government's debt in the indefinite future converges to zero. For this to occur, debt Bin the numerator must grow more slowly than the rate of interest r. The government cannot finance interest payments on debt by continuously issuing new debt. This will happen when Eq.(5)is not violated, and Eq.(4) reduces to

$$Debt_{t-1} = \sum_{s=0}^{\infty} \frac{PB_{t+s}}{(1+r)^{1+s}} \qquad \text{------ (6)}$$

Which can be alternatively written as

$$Debt_{t-1} = \sum_{s=0}^{\infty} \frac{R_{t+s}}{(1+r)^{1+s}} - \sum_{s=0}^{\infty} \frac{G_{t+s}}{(1+r)^{1+s}} \qquad \text{------ (7)}$$

where G is government expenditures defined to exclude interest payments, and R is government tax revenues. If we assume that public debt is growing over time at a constant rate δ to have $Debt_{t+s}=(1+\delta)\ Debt_{t+s-1}$, $\forall$ s, we can rewrite Eq.(5) as follows

[1] According to Eq.(1), If the government runs a primary surplus equal to zero (*PB*=0), the stock of debt will grow at a rate equal to the interest rate: $\Delta Debt_t=rDebt_{t-1}$. If the government runs a primary deficit (PB_t<0), the stock of debt will grow at a rate exceeding the interest rate. If the government runs a primary surplus (PB_t>0), the stock of debt will grow more slowly than the interest rate. If the surplus more than offsets payments on existing debt (i.e. the conventional surplus, $PB_t + rDebt_{t-1}$ is positive), then the debt will actually shrink over time(Neame, 2015).

[2] The no-Ponzi game condition (also calley condition) essentially means that the government does not service its debt (principal and interest) by issuing new debt on a regular basis.

$$\lim_{s\to\infty}\left[\frac{1+\delta}{1+r}\right]^{s} Debt_0 \;=\; 0 \qquad \text{------ (8)}$$

For Eq.(8) to converge to zero, δ should be less than r, i.e., the rate of growth of debt should be less than the real interest rate. The stock of public debt is not an important variable per se in analyzing fiscal sustainability because its relevance has to be assessed in relation to the repayment capacity of the government, often captured by GSDP as a summary of tax bases. The public debt-to-GDP ratio is widely used in practice as a measure of debt burden. Expressing eq.(4) as ratios to GDP and referring small letters as ratios of the corresponding variable as ratio of GDP, it can be be re-written as:

$$d_{t-1} = \sum_{s=0}^{\infty}\frac{pb_{t+s}}{(1+r)^{1+s}} + \lim_{s\to\infty}\frac{d_{t+s}}{(1+r)^{1+s}} \qquad \text{------ (9)}$$

where '*d*' denotes debt-GDP ratio; the rate *r* is defined as $r = (i - y)/(1+y)$, where the numerator is the difference between the nominal interest rate *i* and the growth rate of nominal GDP *y*, which is often referred to as the interest rate-growth differential (or growth-adjusted interest rate). '*pb*' denotes the primary balance-to-GDP ratio in year and by definition '*pb'* is difference between revenue-to-GDP and primary expenditure-to-GDP ratios. Assuming PDV = 0 we have intertemporal budget gap (IBG) measures imbalances as the difference between the debt stock and the PDV of projected primary balances. Symbolically

$$IBG = d_{t-1} - \sum_{s=0}^{\infty}\frac{pb_{t+s}}{(1+r)^{1+s}} \qquad \text{------ (10)}$$

The transversality condition relating to the long-term solvency of public debt, when expressed in terms of GDP ratio states that the GDP growth rate has to be lower than the interest rate so that the discounted terminal period debt ratio converges to zero. This implies that in case of a positive initial public debt, the sum of the cumulated discounted future public surpluses should exceed the sum of the cumulated discounted future public deficits. However, if the rate of growth of GDP is higher than the interest rate, there would be reverse stabilising effect on the ratio of debt to GDP even if a sub-national government is accumulating primary deficit.

Based on above discussion and literature (Wilcox, 1989, Trehan & Walsh 1988, 1991; Das 2013) the econometric tests to be carried out rest on the two frameworks that is stationarity and cointegration tests. The algebraic estimation of the long run equilibrium relationship involves a formal econometric test of cointegration between the time series d (debt) and pb. If the budget deficit is stationary, i.e., integrated of order zero, I(0)then according to Trehan and Walsh (1988) this constitutes a sufficient condition to conclude that fiscal policy is sustainable. That is, the government deficit will not grow without bound, and the actual deficit will asymptotically converge to zero over time. The convergence to zero of the government deficit means that the PVC or the intertemporal solvency condition in eq. (6&7)is actually satisfied. Neaime (2015) highlighted that an equivalent empirical test would be to test for the existence of unit roots in the government expenditures (inclusive of debt service: $G_t+r_tDebt_{t-1}$) and revenues series. If the two series do not contain a unit root, then the budget deficit will be integrated of order zero and the intertemporal solvency condition (6)will be satisfied pointing to the sustainability of fiscal policy. According to Hakkio & Rush (1991), if the two series contain a unit root (i.e., are integrated of order 1) then one must search for a long-run equilibrium relationship between them. If such relationship does not exist, debt would be unsustainable. Hence, the sustainability in government fiscal stance for any state under our study indicates a statistical cointegration in its time series debt and primary balance. In this study, the debt sustainability of a SNG requires statistical cointegration in debt and primary deficit time series of the state.

Co-integrating Regression Equations

$$R_t = \beta_1 + \beta_2 G_t^{*} + e^r \qquad \text{------ (11)}$$

As discussed $G_t^* = G_t - rDebt_{t-1}$ is government expenditure inclusive of interest payments ($r.Debt_{t-1}$), R_t denotes total revenue (including grants) and e^r is the error term.

Now we test that $0< \beta_2 \leq 1$ to derive conditions for sustainability.

- If $\beta_2 = 1$ and revenues and expenditures are cointegrated, then we obtain a strong form of sustainability;
- If $\beta_2 = 1$ and revenues and expenditures are not cointegrated, then we obtain a weak form of sustainability;
- If $\beta_2 \neq 1$ then the process has an unsustainable fiscal position.

.4. Data Source and Methodology:

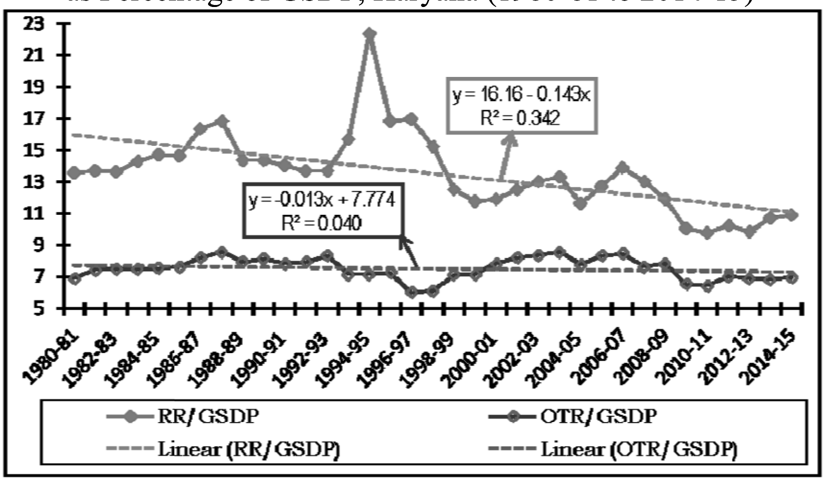
The study is based on secondary data. Data pertaining to the work are collected from various reports and publications of different government and other organisations such as the Department of Economic and Statistical Analysis, Haryana, RBI's Handbook of Statistics on

State Government Finances – 2010 for the data pertaining from 1980-81 to 2009-10, RBI study of State Government Finances for period after 2009-10, Handbook of Statistics on Indian Economy and data on GSDP (Gross State Domestic Product) data are collected from Central Statistical Organisation, Government of India. 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 other sustainability indicators 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.

5. Results and Discussions

The Revenue receipt as percentage of GSDP has shown decreasing trend for the period. The trend line of RR/GSSDP reveals a decline trend which is decelerated from a high of 22.41 percent in 1994-95 to 9.81 percent in 2010-11. The average RR/GSDP has been 13.58 percent for the period 1980-81 to 2014-15. The own tax revenue as percentage of GSDP has also shown declining trend during the period. For the period under study the average OTR/GSDP has been 7.53 percent during the period. It has been 7.82 percent in the period 1980-81 to 1992-93, it reduced to 7.26 percent for the period 1993-94 to 2003-04 which again increased to 7.89 percent for 2004-05 to 2009-10. The OTR/GSDP ratio again reduced to 6.84 percent in last five years of the period.

Chart-1: Revenue Receipt(RR) and Own Tax Revenue as Percentage of GSDP, Haryana (1980-81 to 2014-15)



The average OTR/GSDP ratio for the whole period has been 7.53 percent per annum. It was 7.82 percent for the period 1980-81 to 1992-93, 7.26 percent for 1993-94 to 2003-04, 7.89

percent for 2004-05 to 2009-10 and only 6.84 percent in 2010-11 to 2014-15. The comparison of revenue indicators presented in table-2 indicates that for the period 2010-13 and 2008-10, Haryana has least RR/GSDP ratio in the country. This shows that state has not been able to garner enough revenue resources. For last three years Haryana has less than average of all NSC states OTR/GSDP ratio. Current Transfers from the centre as percentage of GSDP are significantly lower in Haryana as compared to other states. It may be noted that Fourth State Finance commission recommended state government to improve its OTR/GSDP ratio to 8.6% from 2013–14 onwards and state has failed to achieve it.

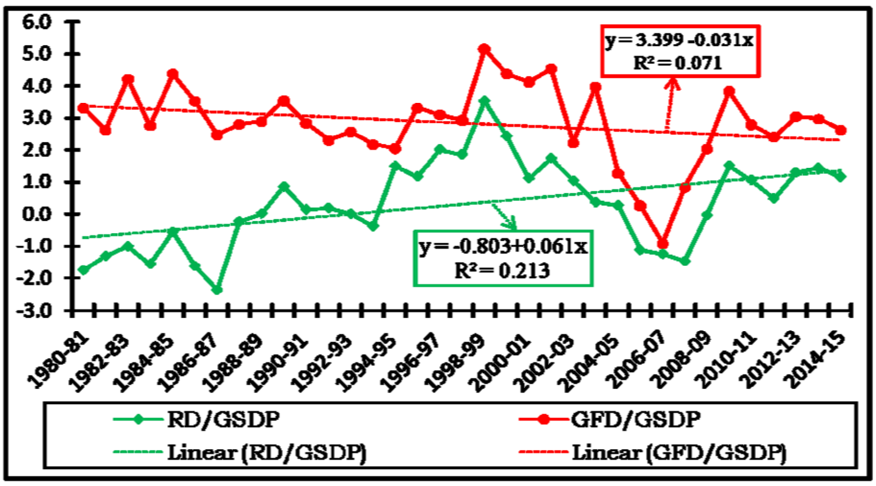
Table-2. Indicators of Revenue Receipts of State Governments

Period	RR/GSDP			OTR/GSDP			ONTR/GSDP			CT/GSDP		
	Haryana	NSC States	All States	Haryana	NSC States	All States	Haryana	NSC States	All States	Haryana	NSC States	All States
2004-08 (Avg.)	12.8	13.5	11.9	8.1	7.0	5.7	3.0	1.6	1.4	1.8	4.9	4.7
2008-10 (Avg.)	9.7	13.4	12.1	6.1	6.7	5.7	1.5	1.6	1.4	2.1	5.1	5.0
2010-13 (Avg.)	10.2	13.8	12.5	6.7	7.4	6.2	1.4	1.3	1.2	2.1	5.2	5.1

Source: RBI – Study of State Finances 2014-15.

Note: Avg. : *Average;* RR : *Revenue Receipt*; OTR : *Own Tax Revenue*.
CT : *Current Transfers*; ONTR: *Own Non-Tax Revenue;* GSDP : *State GDP*

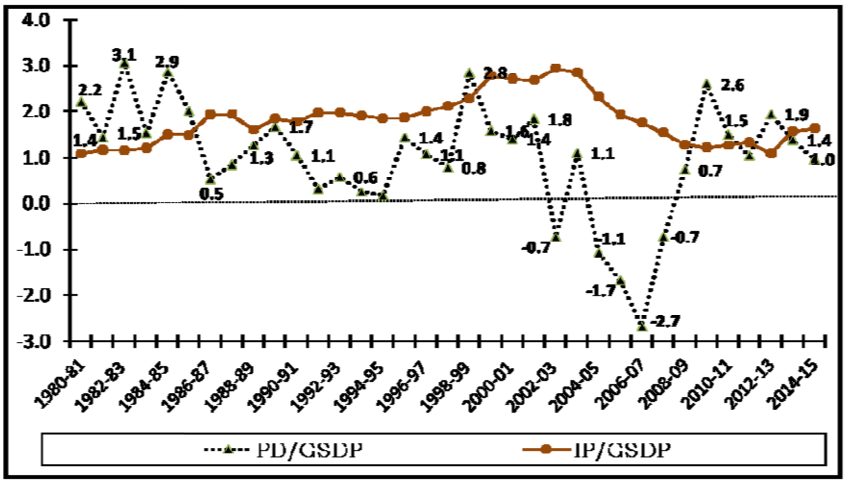
Chart-2: Revenue Deficit (RD) and Gross Fiscal Deficit(GFD)
as percentage of GSDP, Haryana, 1980-81 to 2014-15



Broad deficit indicators of – revenue and fiscal primary deficits – for the period -1980-81 to 2014-15 as ratio of Gross State Domestic Product (GSDP) at current prices are depicted in chart-2. A cursory look at the chart reveals declining trends in GFD/GSDP but increasing trends in RD/GSDP. The average GFD/GSDP for the entire period was 2.83 percent. The GFD/GSDP increased sharply after 2006-07 (GFD was in surplus in 2006-07). The average GFD was 3.08 percent from 1980-81 to 1992-93, 3.39 percent for the period 1993-94 to 2003-04, 1.61 percent for the period 2004-05 to 2009-10 and 2.76 percent for last five years. The revenue deficit has also been in deficit after 2010-11.

Fourth state finance commission observed that the fiscal situation of Haryana remained under stress since nineties and continued to incur revenue deficits till the fiscal 2004-05. These adverse trends in state finances led to siphoning of capital funds i.e. borrowings to meet revenue or consumption expenditure. As a result, the debt liability vis-à-vis, interest liability increased sharply. Due to this fiscal stress, the development process in the State got impacted to a large extent. Consequently, the state government resorted to several effective corrective measures to restore fiscal balances by virtue of which state revenue account turned into surplus and, thereby, the State remained revenue surplus from 2005–06 to 2007–08. But due to slow down in state economy and Sixth Pay Commission liability the State again incurred revenue deficits from 2008–09 to 2011–12. Over the last 35 years (1980–81onwards) Haryana has confronted revenue deficit for 23 times. Still Haryana has manageable gross fiscal deficit as FC-XII target of 3.0 percent for the year 2014-15 is well above fiscal deficit of 2.6 percent realised by Haryana. But the state is not able to bring its revenue deficit to zero as mandated by 13th Finance Commission.

Chart-3:Interest Payment(IP) and Primary Deficit(PD)
as percentage of GSDP, Haryana for the period 1980-81 to 2014-15



The same trend is also observed in case of primary deficit(PD/GSDP). The interest payments as percentage of GSDP has declined considerably after 2002-03(2.941 percent) and it is around 1.64 percent in the year 2014-15. Chart-3 clearly shows that primary deficit has been in deficit for most of the times during the period under study. It has been in surplus for a short period after introduction of FRBM Act. But it has again observed a steep increase after 2006-07 and primary balances are in deficit in recent years. Data presented in table-3 indicate a disturbing trend regarding fiscal management of the state. the revenue deficit(RD), gross fiscal deficit(GFD) had been more than NSC state's average and all states average. In fact among NSC states for the period 2008-10 only West Bengal(5.1 percent) has higher GFD than Haryana and similarly only three states Kerala, Punjab and West-Bengal has higher RD than Haryana for the sub-period. Same trend was observed in RD for the period 2010-13.

Table-3. Deficit Indicators of Haryana

Period	RD/GSDP			GFD/GSDP			PD/GSDP			PRD/GSDP		
	Haryana	NSC States	All States	Haryana	NSC States	All States	Haryana	NSC States	All States	Haryana	NSC States	All States
2004-08 (Avg.)	-0.9	0.2	0.0	0.4	2.7	2.3	-1.5	0.0	0.0	-2.8	-2.5	-2.3
2008-10 (Avg.)	1.5	0.3	0.1	4.1	3.1	2.7	2.8	1.0	0.9	0.3	-1.7	-1.7
2010-13 (Avg.)	0.8	-0.1	-0.2	2.5	2.4	2.1	1.1	0.6	0.5	-0.5	-1.8	-1.7

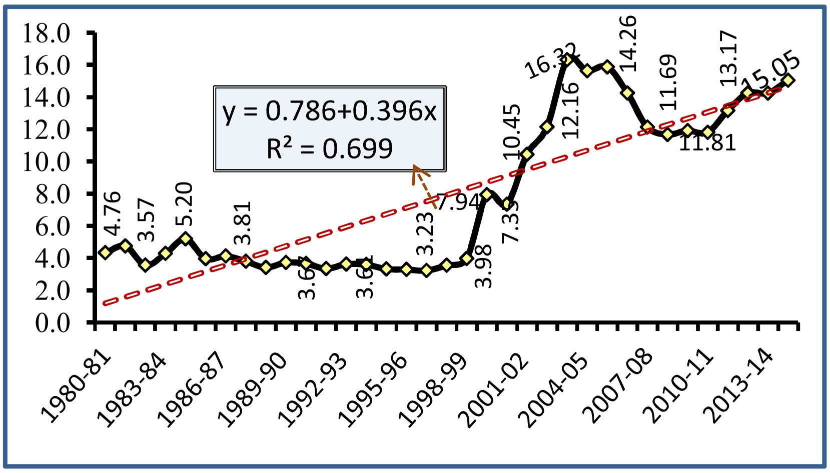
Source: RBI State Finances: A Study of State Budgets(various issues)

Note: Avg. : *Average;* RD-*Revenue Deficit*; GSDP-*Gross State Domestic Product* PD-*Primary Deficit*; GFD-*Gross Fiscal Deficit*; PRD- *Primary Revenue Deficit*

Primary revenue deficit and primary deficit of Haryana has also been higher than NSC states and all states average. This indicates that though Haryana has fiscal deficits with limits set by FRBM Act but it had higher deficits than most of other states in the country and state is able to bring revenue deficit to zero as mandated by FC-XIII. Haryana Fiscal Responsibility and Budget Management (FRBM) Act, 2005 which stipulated that (i) Revenue Deficit to be reduced to zero by 2008 – 09 (ii) Fiscal Deficit to be brought down to 3% of GSDP by 2009 (iii) Debt Liability to be contained to 28% of GSDP by 2010. As per the guidelines of Ministry of Finance, Government of India, the Government of Haryana has amended its FRBM Act, 2005. Now the Government of Haryana has to attain zero revenue deficit target from 2011–12 and maintain the same till 2014–15, fiscal deficit to be brought down to 3% of GSDP from 2011–12 and maintain the same till 2014–15. The total debt liability to be retained at 22.4% of GSDP in 2010–11, at 22.6% in 2011–12, 22.7% in 2012–13, 22.8% in 2013–14 and 22.9% in 2014–15.

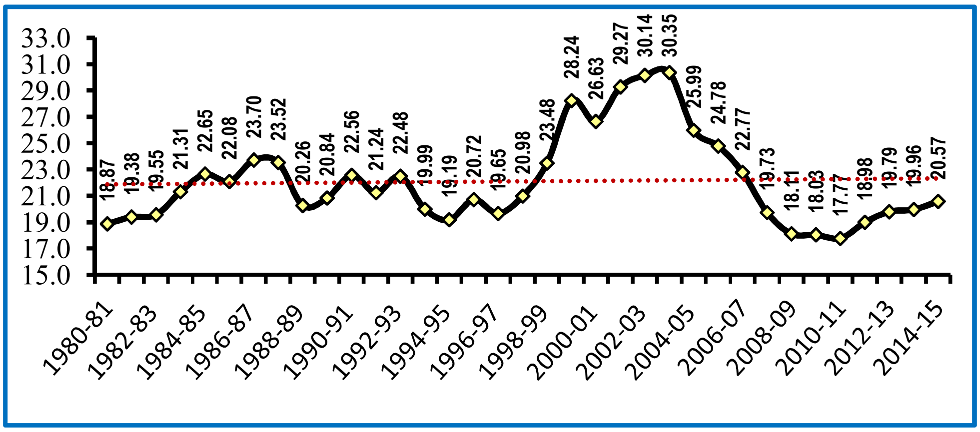
The debt-GSDP ratio during the period has shown sharp increase after 1999-2000(3.98 percent). The ratio has accelerated to 16.32 percent upto 2003-04. The ratio has been 15.05 percent in the year 2014-15. Though the debt-GSDP ratio is well below the targeted ratio as per FRBM and finance commission recommendation but given sharp increase in absolute terms must be a cause of concern for the state financial managers.

Chart-4: Debt-GSDP Ratio, Haryana (1980-81 to 2014-15)



The trend growth rate of internal debt(Nominal Values) of the state has been 13.78 percent for the period from 1980-81 to 1992-93. The internal debt has increased steeply at the rate of 32.29 percent per annum for the period from 1993-94 to 2003-04. From the period 2004-05 to 2014-15 the debt has increased at the rate 19.14 percent.

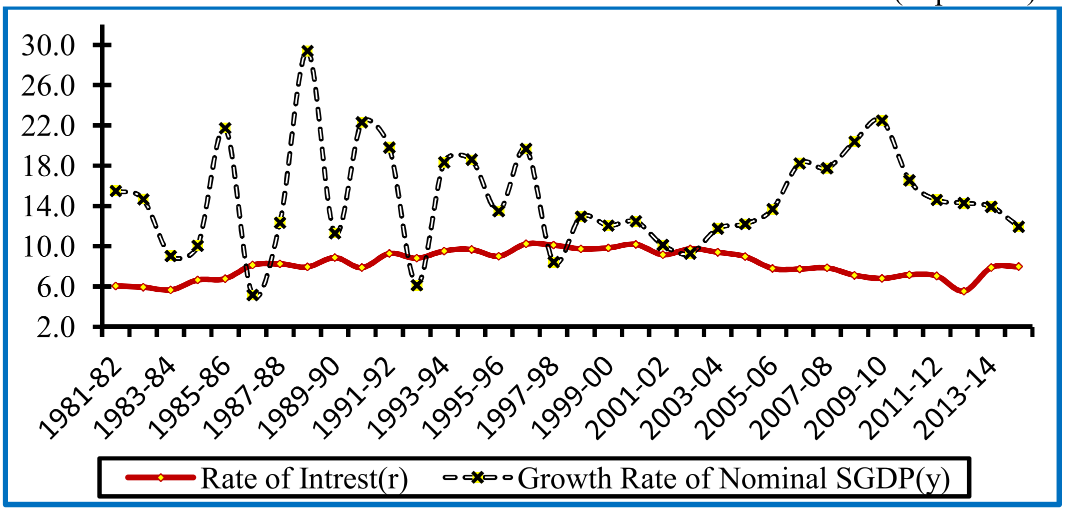
Chart-5: Outstanding Liabilities-GSDP Ratio, Haryana (1980-81 to 2014-15)



The debt liability of the state are well below the target level of 22.9% in 2014–15 under FRBM Act. The liabilities has been as high as 30.35 percent in 2003-04, which observed deceleration after 2003-04. According to the Domar stability condition the rate of interest should be lower than the output growth ($r < y$). Using the methodology of domar conditions in eq.(2), we estimated the rate of implied interest rate and is plotted along with growth.

Chart-6: Growth of Nominal SGDP(y) and Interest Rate (r) for Haryana

(in percent)



The movement of growth vis-à-vis interest rate shows except for the years 1986-87, 1992-93, 1997-98 and 2002-03 SGDP growth rate (y) was higher than interest rate (r). The positive gap (g-r) is more persistent during post FRBMA period which observed decrease in interest rate and consistently increase in growth rate particularly upto 2009-10. The movements in the average interest rates vis-à-vis nominal GSDP growth reflect that the Domar stability condition has been fulfilled in case of Haryana.

5.1 Sustainability Indicators

For the purpose of the sustainability indicators analysis, the whole time period is divided into phases- 1980-81 to 1992-93, 1993-94 to 2003-04, 2004-05 to 2009-10 and 2010-11 to 2014-15. The values are period averages of the different phases. The sustainability conditions $Y-D>0$ and $y-r>0$ were not satisfied during period 2010-11 to 2014-15 indicating strains on fiscal sustainability of the state. The condition $D-i<0$ is not satisfied for none of the sub-periods indicating growth of debt consistently higher than interest rates. On revenue account, though, primary balance is negative. There has been significant declining trend in IP as percentage of RR and RE in last two phases, implying more resources in the hands of the state government.

Table-4: Sustainability Indicators for Haryana(1980-81 to 2014-15)						
Sl. N.	Indicators	Symbolical Representation	1980-81 to 1992-93	1993-94 to 2003-04	2004-05 to 2009-10	2010-11 to 2014-15
1	Rate of Growth of Nominal GDP (Y) should be more than Rate of Growth of Debt(D)	Y	15.09	12.95	17.80	14.21
		D	13.78	17.49	14.47	17.34
		Y-D>0	1.31	-4.54	3.33	-3.13
2a	Real Output Growth (y) should be higher than Effective Interest Rate (r) Growth.	y	5.86	5.93	9.56	7.07
		r	7.27	9.64	8.05	7.12
		y-r>0	-1.41	-3.71	1.51	-0.05
2b	Rate of growth of debt (D) should be lower than effective interest rate (i)	D - r< 0	6.51	7.85	6.42	10.22
3a	Primary Deficit(PD) should not be rising faster than GDP	PD/GDP<0	0.024	0.116	-0.973	-0.057
3b	Primary Revenue Balance(PRB) should be in surplus and adequate enough to meet interest Payments(IP)	[(PRB-IP)/GSDP>0]	-0.026	-0.010	-0.022	-0.003
4	Proportion of Repayments (REP) to Total Gross Borrowing(TGB) should be falling over time.	[REP/TGB ↓↓]	3.38	11.38	13.62	6.78
5	Interest Payments (IP) and Repayments (REP) adjusted for Primary Revenue Balance (PRB) should not exceed Total Gross Borrowings(TGB)	[(IP+REP-PRB)/TGB)<1]	8.91	6.06	4.35	0.75
6a	Interest Burden Defined by Interest Payments (IP) to GDP ratio should decline over time	[IP/GDP ↓↓]	1.469	2.282	1.86	1.52
6b	Interest Payments (IP) as a per cent of Revenue Expenditure (RE) should decline over time.	[IP/RE ↓↓]	11.48	15.32	14.15	12.11
6c	Interest Payments (IP) as a	[IP/RR ↓↓]	10.98	17.0	13.79	13.37

	per cent of Revenue Receipts (RR) should decline over time.					
7a	Debt to revenue receipts ratio should decline over time	D / RR ↓↓	27.69	50.84	111.9	131.3
7b	Debt to tax revenue ratio should decline over time	D / TR ↓↓	42.95	78.42	155.94	182.6
7c	Debt to own tax revenue ratio should decline over time	D/OTR ↓↓	108.08	208.26	558.8	1041.70

Source: Calculated from the data collated from various agencies.

5.2 Test for Stationarity

It is well known that the usual techniques of regression analysis can result in highly misleading conclusions when variables contains stochastic trend. In particular if the dependent variable and at least one independent variable contain stochastic trend, and if they are not cointegrated, the regression results are spurious. As non-stationary series could lead to false regression, we must first identify whether the variables belong to stationary or non-stationary series by the unit root test. This test was initially introduced by Dickey and Fuller, and the Augmented Dickey-Fuller (ADF) test is now a standard unit test to check the stationarity of the data series. The equation of the form is as follows:

$$\Delta X_t = \alpha_0 + \alpha_1 t + \theta X_{t-1} + \sum_{i=1}^{m} \phi_i \Delta X_{t-i} + u_t . \qquad \text{.........}(1)$$

Here X_t is the series under investigation, Δstands for first difference and the lagged difference terms on the right hand side of the equations are designed to correct for serial correlations of the disturbance terms. The lagged differences are selected by using AIC and BIC criteria. If $\theta = 0$, the series X_t contains a unit root and therefore an I(1) process governed by a stochastic trend. To examine the stationary property of the variables used in this paper, we have carried out the ADF and KPSS unit root tests. All the tests have been conducted with and without trend. If the data generating process is following a unit root and therefore non-stationary, then the data has to be transformed into first differences and unit root test has to be repeated. If the data in first differences follow a stationary process, or if data in different forms is stationary, then the variables in levels form have to be tested for any Co integrating relationships (Engel and Granger 1987) and Johansen and Juselius (1990).

The results in Table-5 clearly show that Debt series is stationary at second difference level whereas deficit is stationary at first difference. As debt and deficit are both stationary at different level of integration, hence we are unable to proceed with co-integration analysis. But as discussed earlier, sustainability can also be analysed using testing procedure given in eq(11). Accordingly, we tested Stationarity for R_t and G_t. Unit root analysis reveals that both R_t and G_t are integrated of same order I(1) and hence we proceed for co-integration test.

Table-5: Results of unit root test

Series	Best Fitted Model	Lag-length	p-value	τ -static	5% critical Values	Level of Stationarity
Debt	ADF(α, t)	1	0.00000	-11.766	-3.562	I(2)
Deficit	ADF(α, t)	7	0.01889	-3.755	-3.652	I(1)
Revenue (R_t)	ADF(α)	4	0.00078	-4.157	-2.865	I(1)
Expenditure (G_t)	ADF(α)	1	0.03463	-7.796	3.581	I(1)

Notes: ADF (α, t) stands for augmented Dickey-Fuller model with drift (α) and deterministic trend (t); ADF lag length is selected on the Akaike/Schwarz criterion; test statistic τ is compared with the critical value at 5 % level for null hypothesis of unit roots.

5.3 Co-integration test

To further analyze the long-term equilibrium relation between Revenue and Expenditure, the paper makes co-integration test on two set of the variables: Revenue(R_t) and Expenditure(G_t). Now, Engle-Granger two-step residual-based testing procedure based on regression techniques was used to make co-integration test between Revenue(R_t) and Expenditure(G_t). It may be noted that residual-based unit root test does not consider drift and trend since they appear in the initial cointegrating regression.

Table 6: Engel-Granger Co-integration Test Results

	Test Value	**P Value**
τ –static	2.081	0.4948
τ –static first Difference	-5.954*	
Critical value (5 %)	*-4.21*	
Critical value (10 %)	*-3.79*	
Co-integration result	**Single or partial cointegration**	

Notes: * indicate rejection of null hypothesis no-cointegration at 5 % levels;

The result indicates that we do not find evidence of strong consistency for cointegration. However the attained partial cointegration indicating an imperfect equilibrium as the system slowly restores long run sustainability.

6. Conclusion

In this paper, the debt sustainability of the Haryana was assessed through indicator-based analysis as well as PVBC exercise. The indicator-based analysis revealed that while most of the debt sustainability indicators showed significant improvement during 2004-05 to 2009-10 but period after 2009-10 show signs of fiscal stress and increasing debt burden. The state government will have to keep its primary expenditure under control in order to avoid their dependence on debt. Traditional debt sustainability indicators and cointegration analysis support the view that debt liabilities of the state are sustainable but debt position of Haryana on sustainability indicators vis-à-vis other NSC states for the period 2010-11 to 2014-15 has deteriorated. The state government is required to manage its finances prudently and efficiently given the fact that from year 2018-19, interest burden is likely to increase as 22.9 percent of its securities will be maturing during 2018-20 period and 67.9 percent state debt liabilities of Haryana would be maturing after 2020 and overall repayment pressure could be further aggravated from 2018-19

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