1. Introduction

To achieve 10% GSDP growth at constant prices in our state as envisaged in the State Budget 2013-14, the effective Management of the state finance plays a very crucial role. Sound and efficient management of the state finance with qualitative and effective liquidity and cash management is a critical factor for the sustainable growth rate in Gross State Domestic Product. A new trend in GSDP in Odisha has been noticed since FY 2003-04. There is a structural break in the growth in GSDP at current prices in 2003-04 with a record rise in 22.30%. From 2003-04 to 2012-13, the annual average growth rate in GSDP has been 17.76%. This growth pattern is quite impressive if it is compared with national average as well as other developed states. On five year moving average basis, the GSDP at constant prices has registered a growth rate of 9.5% as compared to national average of 7% per cent since FY 2003-04. There is a clear evidence of structural upward break in GSDP in 2003-04. Besides, since FY 2004-05, per capita income of Odisha is rising at a rate which higher than the national average.

Both revenue deficits and fiscal deficit, thus, reveal the fiscal health of an economy. Either revenue deficit ratio or fiscal deficit ratio is due to the deliberate decisions to spend beyond revenue collection or because of low tax revenue yield which is not in tune with cash outflow of the economy. The fiscal situation of Odisha represented by the various deficit indicators has worsened during entire 1990s. Chart -1 gives a snapshot of various deficit indicators from 1992-93 to 2012-13.

Improvement in revenue deficit (RD) ratio, fiscal deficit(FD) ratio and primary deficit (PD) ratio have started improving from 2000-01 onwards. In 1999-2000, all these ratio peaked to a maximum level which was quite alarming. In 2012-13, Odisha is a revenue surplus state with revenue deficit at +0.18% and moderate level of fiscal deficit ratio and primary deficit ratio reported at – 3% and – 1.30% respectively which is quite below the limit given in the FRBM Act.

It is also interesting to note that during the improvement of these fiscal deficit indicators, the year on year growth rate in GSDP has also improved and shown upward trend which is depicted in the Chart-2.

Besides, ways and means advance is not availed since FY 2006-07 which again proves efficient liquidity management in state finance of Odisha. In fact, Odisha is the only state which has not availed ways and means for 6 years consecutively. As a result of paradigm shift in fiscal
indicators and efficient liquidity management, the state has witnessed rise in growth in GSDP.

In this backdrop, the objective of this paper is to examine whether there exists a causal relationship between expenditure ratio and revenue ratio of the Odisha State Finance. All these ratio are defined with respect to GSDP at current prices. Any deficit ratio can be impacted through the interaction between expenditures and receipts – either by augmenting revenues or curtailing expenditures or implementing both. However, over inter dependence between expenditures and receipts may adversely affect the efforts for deficit management. However, if revenue increases lead to increased expenditure then raising revenues would lead to increased spending. At the contrary, if rise in revenue has a negative impact on revenue expenditure, then deficit management would be effective. However, it needs conscious policy decision for those economy where deficit is at an alarming stage. Similarly, if the policy decision to raise revenues and to increase expenditure are taken simultaneously then it would have an ambiguous impact on deficits.

The plan of this paper is paper to provide the theoretical background in Section 2.

Section 3 deals with empirical evidence of co-integration and bi-directional causality expenditure ratios by splitting them into four pairs of revenue. Section-4 provides the Policy Prescription, Summary, Conclusion and Suggestions. Section-5 outlines further scope of research. The data from 1992-93 to 2012-13 is employed to make the empirical analysis.

2. Theoretical Background

The relation between government expenditures and revenues is examined by testing.

(i) Friedman hypothesis: increased revenues cause increased expenditures.

(ii) Barro hypothesis: higher revenue expenditures cause negative impact on the growth of the economy.

Friedman is of the view that ‘increasing taxes will simply lead to more government spending’. That is, the deficit cannot be reduced by raising taxes (revenues) as increasing revenues result in more spending (Swati, 2004). According to Friedman, Government spends what government receives plus as much more as it can get away with (Friedman, 1982). Hence increasing taxes (revenues) would imply at large a deficit but at a higher level of government spending. Barro (1979) offers a contrasting view. Barro suggests that higher spending forces the growth of economy downwards. The causality exercise can result in any of the following: (i) revenue growth can cause growth in government expenditure – Friedman hypothesis (ii) expenditure growth can cause growth in Gross Domestic Product.


This study, using the annual data from 1992-93 to 2012-13, examines the causal relation between state government revenue and expenditure. Stationarity of a time series is checked as it is crucial as the use of a non-stationary time series can result in spurious relationship. Therefore, unit root tests and co-integration tests were made for all the variables used in this analysis. The variables used in the study are:

TRRGSD – Ratio of Total Revenue Receipts and GSDP
TEXGSDP – Ratio of Total expenditure and GSDP
TAXGSD – State Own Tax Revenue as a ratio of GSDP
COGSD – Capital Outlay as a ratio of GSDP
TREGSD – Total Revenue Expenditure as a ratio of GDP

Dickey Fuller (DF) and Augmented Dickey Fuller (ADF) tests are carried out for each of these variables to test stationarity. All these variables were integrated of order one i.e. I processes. To find out long run equilibrium relationship, the concept of cointegration is used. Co-integration is an equilibrium relationship that provides a formal framework for testing and estimating long run (equilibrium) relationship among selected variables. The DW test statistic can be used as a quick test of cointegration. Under the null of no cointegration, the DW value will not be significantly different from zero. If, a Cointegrating Regression Durbin-Watson of (CRDW) test statistic of Sargan and Bhargava (1983) different from zero implies cointegration. CRDW co-integration test was carried out on each of these fiscal variables and the results of our co-integration tests are given in Table 1. The results of our co-integration tests show that all these variables are co-integrated. The CRDW test statistic is significant for all variables at the 1% level, implying that these variables are co-integrated by rejecting the null hypothesis of no cointegration. The co-integration ADF test, or CADF test on residuals implies the absence of auto-correlation in the error term. We can safely derive that there exists a long term equilibrium associationship between these fiscal variables.

Table 1: Results of Cointegration Test

<table>
<thead>
<tr>
<th>Fiscal Variables</th>
<th>CRDW Stat</th>
<th>ADF stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRRGSD</td>
<td>1.99</td>
<td>5.22</td>
</tr>
<tr>
<td>TEXGSDP</td>
<td>1.91</td>
<td>5.61</td>
</tr>
<tr>
<td>TAXGSD</td>
<td>1.95</td>
<td>4.67</td>
</tr>
<tr>
<td>COGSD</td>
<td>1.96</td>
<td>5.37</td>
</tr>
<tr>
<td>TREGSD</td>
<td>1.96</td>
<td>4.67</td>
</tr>
</tbody>
</table>

Critical values for CRDW: # 1% 0.511; ** 5% 0.386; * 10% 0.322 (Engle and Granger, 1987)

Critical value for the ADF test: 10% -3.04 (McKinnon, 1990)

Now we can check whether they have a causal relationship with each other. We have carried out bivariate causality test on the following pair of fiscal variables.

Pair 1: TRRGSD & TREGSD
Pair 2: TAXGSD & COGSD
Pair 3: TAXGSD & TREGSD
Pair 4: TRRGSD & TEXGSDP

In this paper, we have attempted to examine the causal relationship between the revenue variables such as total revenue receipt, state own tax revenue and expenditure variables such as capital outlay, revenue expenditure and total expenditure. All these variables are taken as ratio of Gross State Domestic Product at current Prices.

Granger Causality framework is used to examine the dependency between these four pairs of fiscal variables.

3.1 Granger Causality

The concept of causality defined by Granger (1969) is widely used to analyze cause and effect relationships between macro-economic and financial (fiscal) variables.

The original Granger causality test has been developed for analysis of the effect of one time series on another one. Suppose we have two stationary time series \( X = X(t) \) and \( Y = Y(t) \) and we intend to study whether \( X \) causes \( Y \) or not. Granger causality analysis is based on two principles.

1. The cause happens prior to the effect.
2. The cause makes unique changes in the effect. In other words, the causal series contains
unique information about the effect series that is not available otherwise.

To test the hypotheses on the relation between revenue ratio and expenditure ratio, we use the Granger-causality framework. Thus, we estimate the following equations to examine their relation over the years:

\[
\text{Revenue Ratio}_t = f(\text{Revenue Ratio}_{t-1}, \text{Expenditure Ratio}_{t-1}) + \epsilon_t \quad \ldots \ldots \quad (1)
\]

\[
\text{Expenditure Ratio}_t = f(\text{Revenue Ratio}_{t-1}, \text{Expenditure Ratio}_{t-1}) + \epsilon_t \quad \ldots \ldots \quad (2)
\]

Where, the subscript \(t\) denotes the time dimension, and \(\epsilon_t\) is the error term.

Equation (1) tests whether changes in Revenue ratio precedes variations in expenditure ratio, while equation (2) evaluates whether changes in expenditure ratio precede variations in Revenue ratio. We use two lags that appear reasonable given the annual frequency of our data.

It must be noted here that since all the variables are integrated of order one (i.e. are I(1) processes), the Revenue Ratio\(_t\) and Expenditure Ratio\(_t\) in equations (1) and (2) should be identified with \(\text{Revenue ratio, TEG}\) and so on.

The results of Granger causality of these three pairs of fiscal variables are given below.

**Table 2: Pairwise Granger Causality Tests (Pair 1)**

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREGSD does not Granger Cause TRRGSD</td>
<td>19</td>
<td>1.93976</td>
<td>0.1805</td>
</tr>
<tr>
<td>TRRGSD does not Granger Cause TREGSD</td>
<td>3.88285</td>
<td>0.0455</td>
<td></td>
</tr>
</tbody>
</table>

From the Table-2, null hypothesis is accepted indicating of total revenue expenditure ratio does not cause total revenue expenditure ratio. Whereas, null hypothesis of total revenue receipt ratio not causing total revenue expenditure ratio is rejected implying total revenue expenditure ratio is the outcome of total revenue receipt ratio.

Therefore, we have modeled total revenue expenditure ratio as dependent variable and total revenue receipt ratio as an independent variable in form of simple regression model (OLS Method) using Engle-Granger two step procedure (Engle and Granger, 1987). The equations are given below.

\[\text{Eq(3)} : \text{TREGSD} = 0.23 - 0.44 \text{TRRGSD} (-2)\]

\[\text{t stat} : (8.1) (-2.3) \quad \text{p value} : 0.03\]

In the second step, the residuals of the equation (3) is tested for unit root at level and found to be stationary implying that the total revenue ratio during two years ago, reduces the total revenue expenditure ratio in the current year by 0.44. This is also corroborated in Chart-3.

A structural break has been observed in chart1 both in Revenue Receipt and Total Revenue expenditure ratio since 2005-06. Downward trend in Revenue Expenditure ratio is followed by upward break in Revenue receipt ratio. As a result, the revenue deficit of the state, which was reported to be at peak of 5.38%, turned to a surplus of 0.57% (Economic survey of Odisha, 2012). This surplus further went up to 2.30% in 2008-09. In 2012-13, it is reported at 0.18%. This negative impact of revenue receipt ratio on expenditure ratio is because of conscious effort of boosting the state own revenue and curtailment of revenue expenditure. The structural downward break of total revenue expenditure ratio is given in the equation (4) that captures the dummy variable. Dummy variable takes the value
‘0’ from 1992-93 to 2004-05 and ‘1’ from 2005-06 to 2012-13.

Equation (4): 
\[
\log(TREGSD) = 0.168 - 0.0135 \text{ Dummy}
\]
\[t \text{ stat: } 36.64 \quad 5.29 \quad p \text{ value: 0.004}\]

Equation (5): 
\[
\log(TRRGSD) = 0.136 + 0.0297 \text{ Dummy}
\]
\[t \text{ stat: } 36.64 \quad 5.29 \quad p \text{ value: 0.000}\]

Similarly, the upward break in the TRRGSD ratio in 2005-06 is observed in total revenue receipt ratio in equation 5, using the same methodology as in equation 4. In both, equation 4 & 5, the statistical parameters are significant.

During the period of analysis, SOR has increased at annual CAGR of 14.51% and total revenue expenditure has increased at annual CAGR of 12.2% coupled with 12.44% rise in GSDP at current prices on annual CAGR basis. Therefore, in terms of GSDP ratio, the growth in revenue receipt has further increased as compared to growth revenue expenditure.

Thus from the empirical results we conclude that the relationship is unidirectional, running from revenue to spending. These findings support the tax-and-spend hypothesis in Odisha. This implies that growth in government expenditure in Odisha has been influenced greatly by the availability of funds to finance this spending following the prediction by Friedman and Buchanan-Wagner. The results show a negative relationship, which means that as revenue increases spending also decreases. Therefore, revenue deficit can be controlled by raising state own revenue in Odisha.

Table 3: Pairwise Granger Causality Tests (Pair 2)

<table>
<thead>
<tr>
<th>Sample: 1992-93 to 2012-13</th>
<th>Lags: 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null Hypothesis: COGSD does not Granger Cause TAXGSD</td>
<td>Obs: 20</td>
</tr>
<tr>
<td>TAXGSD does not Granger Cause COGSD</td>
<td>0.04708</td>
</tr>
</tbody>
</table>

The null hypothesis of capital outlay does not cause tax to GSDP ratio is rejected at lag 1 level, indicating, the previous year’s capital outlay influence the current year state own tax revenue.

To estimate the impact, we have run simple regression model, using two step Engle-Granger procedure, wherein, the residuals of the model is checked for stationarity. However, the residuals are found be non-stationary (unit root problem), implying that the long run causality from capital outlay to state own tax revenue does not exist.

From, policy point of view, this result is very concerning for the state finance of Odisha. More, capital outlay by the government should induce more business opportunities by creating a positive investment climate through creation of more infrastructural development. Also, more capital outlay by the Govt. should bring in more private investment if there is complementarity between public and private investment.
Essentially, our result raises the efficiency of our tax policy. If we compare our tax to GSDP ratio, it is reported at 5.9% in 2012-13 (Budget at a Glance 2013, Govt. of Odisha). Compared to the tax performance of Odisha in the 1990s and earlier, a tax-GSDP ratio of around six per cent is an improvement but compared with other states of India, it is actually on the lower side, and could stand a steady increase. Only Bihar and West Bengal had a lower tax-GSDP ratio as compared to Odisha; the two contiguous states of Chhattisgarh and Andhra Pradesh had ratios well above seven per cent, while the highest ratio (Karnataka) was above nine per cent. Obviously, there is plenty of scope to raise the same in Odisha to the level of other states. Therefore, tax policy as a public policy is not able to encourage the trade and commerce in the state from which the yield on tax could have been more.

From Table-4, it is clear that the feedback effect (Bi-directional causality) between total revenue expenditure and tax to GSDP ratio is absent. This indicates that tax yield is not sufficient to bridge the revenue deficit. This is evidenced from the Chart-4 given below. It can be concluded that the decline in revenue deficit ratio has happened in our state, since, 2005-06, because of curtailment of revenue expenditure, but not because of rise in tax revenue.

Table 5: Pairwise Granger Causality Tests (Pair 4)

Sample: 1992-93 to 2012-13
Lags: 2

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEXGSD does not Granger Cause TRRGSD</td>
<td>19</td>
<td>0.43063</td>
<td>0.6584</td>
</tr>
<tr>
<td>TRRGSD does not Granger Cause TEXGSD</td>
<td>2.12353</td>
<td>0.1565</td>
<td></td>
</tr>
</tbody>
</table>

The feedback effect between total expenditure ratio and total revenue receipt is not proved in Table-5. Total expenditure includes both revenue and capital expenditure ratio. The total revenue expenditure, total capital outlay and total revenue receipt have shown an increase of 12%, 12% and 14% respectively on CAGR basis during the period 1992-93 to 2012-13. Since, GSDP at current prices has increased at a 12.44% on CAGR basis during the same period; the total expenditure ratio and total revenue receipt ratio do not show any feedback effect. In order to get further insight, the trend in fiscal deficit ratio is examined.

Chart -5 depicts the trend in total revenue receipt ratio, total expenditure ratio, capital outlay ratio and fiscal deficit (FD) ratio during 1992-93 to 2011-12. The total expenditure ratio has significantly declined during 2002-03 to 2007-08 as compared to previous years. In post 2007-
rise of total expenditure ratio, however, has remained below pre 2002-03. Hence, there is a declining trend in total expenditure ratio in post 2007-08 as compared to pre 2007-08. During 2002-03 to 2005-06, there is slight compression in capital outlay ratio, however, during the entire period of analysis, the capital outlay ratio has remained at same level. Hence, it can be inferred that the decline in total expenditure ratio is mainly due to decline in total revenue expenditure ratio.

In Chart-6, the declining trend in revenue expenditure ratio is quite discernible. However, the total revenue receipt ratio reported at 17% in 2007-08 remained at almost same level in post 2007-08 (16.4%). Hence, the feedback effect between total expenditure ratio and total revenue ratio is not established.

However, the fiscal deficit ratio has improved since 2002-03 (Chart 3) mainly because of compression in revenue expenditure ratio and near stagnated capital outlay ratio. Total revenue receipt ratio has no role in improving the fiscal deficit ratio.

The increase in total expenditures of the state exchequer has a negative effect on growth (Barro 1991). Barro’s finding reveals that government revenue expenditure share of GDP to be negatively related to per capita growth. In our analysis, the decline in revenue expenditure ratio since 2002-03 has resulted in CAGR of 17.6% at current prices. Both theory and data suggest that accepting the decline in revenue expenditure ratio has a significant positive impact on the growth rate of Odisha’s GSDP.

We could establish that between the Friedman hypothesis and the Barro hypothesis, the support for the Barro hypothesis is applicable to state financial policy of Odisha.

### 4. Policy Prescription, Summary, Conclusion and Suggestions

The purpose of this analysis is to find out the feedback effect between expenditure ratio and revenue ratio of Odisha by employing the annual data for the period 1992-93 to 2012-13. The ratios are defined with respect to the GSDP of the respective years at current prices. In examining the existence of a causal relationship between state government revenues and expenditure ratio, we find on-directional causality from total revenue receipt ratio to total revenue expenditure. The rise in revenue receipt ratio decreases the revenue expenditure ratio. No causality has been established between tax ratio & capital output ratio, tax ratio and revenue expenditure ratio and total revenue receipt ratio & total expenditure ratio. We find the Friedman hypothesis is not applicable to Odisha’s state finance as rise in revenue does not increase the expenditure. Therefore, the support for Barro’s hypothesis – decline in revenue expenditure ratio has a positive effect on the growth of GSDP is established from the data. We can thus conclude that efforts to reduce the deficit, both revenue and fiscal deficit, by increasing revenues may not be very effective while attempts to reduce the deficit through revenue expenditure containment would be more effective. Hence, the policy intervention of state finance policy has contemplated measures to curb revenue expenditure growth and to boost the growth of GSDP of the state.

However, rise in economic activity in terms of record rise in GSDP has not been translated to higher tax to GSDP ratio, which is an efficiency parameter of state taxation. Causality between tax ratio and capital ratio is not established. This raises a concern on productivity of capital and tax elasticity on GSDP. Though, GSDP has shown a record rise, the tax to GSDP
ratio is still below the benchmark, thereby, the efficiency of tax policy is questioned.

The deficit ratios have improved in post 2001-02 because of compression of revenue expenditure. At the same time, the capital outlay ratio has been stagnated. Therefore, policy measures to be to increase the capital outlay ratio for creating more economic and business activities. Since our fiscal deficit is well below the FRBM stipulation, there is a need to push the fiscal deficit further, at least by 0.5%, by increasing the capital outlay ratio.

5. Further Scope of Research

Since the causality between capital outlay ratio and tax to GSDP ratio could not be established, further investigation is required on capital productivity of our state and the tax elasticity on GSDP. This may open up new policy initiatives to generate more business activities and...
generating more tax revenue from these activities which in turn will augment the tax to GSDP ratio.

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