Northeast Journal of Contemporary Research, December 2019. Vol. 6 No. 1, pp. 74-80
ISSN 2349-3089

Growth Analysis of NSDP at Constant Prices: A case study for the state of Orissa for the period 1991-2014

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ABSTRACT

The idea of 'economic development' is such that it attempts to give a picture of the social and economic health of any particular geographical unit. Economic development is a multi-dimensional concept unfolding in a series of events. 'Economic growth' is the fulcrum in the prism of this wide spectrum of activities that is economic development. Economic growth is the most significant benchmark that is to be attained in order to comprehend the economic progress or development of any particular economy. Alternatively, it can be understood as an economy's ability to produce goods and services. The growth rate of real GDP of a country is often used as an apt indicator of the general health of the economy whereby an increase in real GDP is interpreted as a sign that the economy is doing well. When talked about State specific growth, the NSDP data is considered to be the required indicator. The paper attempts at analyzing the growth trend of NSDP at constant prices for the period 1991-2014 for the State of Orissa which is known to be one of the fastest growing economies in India.

Key words: Economic Development, Economic Growth, real GDP, NSDP, Growth trend

INTRODUCTION

'Growth' is an important subset for economic development in any nation. It is considered to be a significant indicator as it indicates the growth in economic output irrespective of how it is measured, by GDP, GNP, GVA or any other. Growth however does not occur in isolation and can be positive or negative. Positive economic growth leads to rise in national income, national output and total expenditure, which also eventually enables rise in consumption of goods and services and higher standards of living. In economics, growth is indicated by an outward shift in its production possibility curve (PPC).

More specifically, when talked about the State Domestic Product (SDP) be it Net State Domestic Product (NDSP) or Gross State Domestic Product (GSDP) to study trend in growth, it means the total value of goods and services produced during any financial year within the geographical boundaries of a State. The GSDP is arrived at by adding the consumption of fixed capital and NSDP is arrived at by deducting the consumption of fixed capital. These however can be measured in current prices or constant prices. The former makes no adjustment for inflation and uses actual prices in the respective financial years as a measure. The latter however, enables us to measure the actual changes in output where the effects of inflation are taken care of by using a base year for measurement.

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SCOPE OF THE PAPER

The paper is aimed at analyzing the trend in growth of NSDP at constant prices using econometric tools. The idea is to make an observation as to how a mere trend of ever increasing GDP figure(s) may not necessarily imply accelerating patterns of growth, but can also indicate deceleration, or both.

The area of the study is confined to the State of Orissa which is pronounced to be one of the fastest growing economies among the Indian States since several years and till date. Data sources have infact also revealed that the State's economy had witnessed high growth rates between 2011-12 and 2017-18 where the NSDP expanded at a compound annual growth rate of 10.08%. An important point to be noted here is that, the paper is primarily focused at examining the post economic reforms trend in NSDP (in Rs. Lakh) measured at constant prices of 2004-05. This is why data since 1991-2014 is taken into consideration. Post 2014 trend is beyond the purview of the scope of the paper because data with the same constant prices since 1991 till recent years could not be availed. The study is moreover based on constant prices because it allows measuring the actual changes in output and not just an increase in output due to effects of inflation which seems deceptive.

METHODOLOGY

The study is primarily based on secondary data. For the purpose of the analysis, econometric tools (like linear trend model) and software (STATA) have been used. The NSDP data for the period 1991-2014 in 2004-05 constant prices for the state of Orissa is collected from the website of the Directorate of Economics and Statistics, Govt. of Orissa.

RESULTS AND DISCUSSION

NSDP of Orissa from 1991-2014

The center of the present paper is to conduct a growth analysis of the state of Orissa based on its NSDP figures (in lakh) over time from 1991-2014 (a time series analysis) measured at constant prices of 2004-05 and see trend in growth. For this purpose, its annual compound rate of growth is traced from the NSDP data which is observed to have shown an exponential trend. This trend in the time series has been represented by the figure as given below (figure 1) where it can be seen that, on an average throughout time (1991-2014), the growth in NSDP shows an 'increasing trend'.

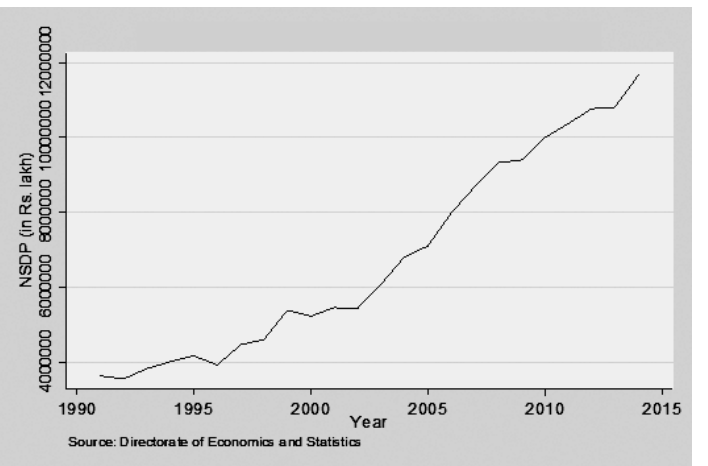

Figure 1. NSDP of Orissa from 1991-2014

So, it can be concluded that the graph indicates an increasing NSDP over the years (1991-2014). But whether it implies acceleration in growth of the economy of Orissa that can be examined in the following paragraphs.

For this purpose, an econometric model has been formulated and the necessary estimation(s) are thereafter made.

Model and Estimation Procedure

The understanding with regard to the model formation and estimation procedure has been developed from the 'Basic Econometrics' textbook by D. Gujarati. The econometric model formulation and further estimation is done using the following data set:

YEAR	**NSDP (Rs. Lakh) at 2004-05 prices**
1991-92	3625338.561
1992-93	3539942.879
1993-94	3816406.368
1994-95	4009160.233
1995-96	4164616.21
1996-97	3913537.968
1997-98	4464812.756
1998-99	4592378.835
1990-00	5372881.252
2000-01	5223399.849
2001-02	5448027.982
2002-03	5432170.895
2003-04	6078415.181
2004-05	6798702
2005-06	7100496.987
2006-07	7984484.274
2007-08	8669191.296
2008-09	9320665.324
2009-10	9395723
2010-11	9987971.508
2011-12(3rd R)	10362763.18
2012-13(2nd R)	10766374.65
2013-14(1st R)	10808071.8
2014-15 (AE)	11656558.32

Source: Directorate of Economics and Statistics, Govt. of Orissa

The exponential trend in growth of NSDP is to be captured by the natural logarithmic function of the NSDP series in the proposed model.

The general exponential growth function can be written as

$\mathbf{Y_t = Y_0 (1 + r)^t}$, where the value of $\mathbf{Y_t}$ for a given **t** (time) can be derived only if the growth rate **r** is known. The growth rate (r) can be estimated, but a logarithmic transformation must be used to estimate the model using Ordinary Least Square (OLS) estimation. Moreover, the original model in our study isn't linear in parameters, but a logarithmic transformation of the model can generate the desired linearity. The model formulation is described in the following lines:

To begin with an exponential growth model as

$$\mathbf{Y_t = Y_0 (1 + r)^t}$$

Taking log of both sides,

$\mathbf{\ln Y_t = \ln Y_0 + t \ln (1+r)}$ **------ (1)**

Here, let,

$\boldsymbol{\alpha = \ln Y_0}$

$\boldsymbol{\beta = \ln (1+r)}$

$\mathbf{r = e^{\beta} - 1}$

where, **β** – exponential growth rate

r – annual compound growth rate

Therefore equation (1) can be re-written as follows,

$$\mathbf{\ln Y_t = \alpha + \beta t}$$

Adding the disturbance term the model obtained is,

$\mathbf{\ln Y_t = \alpha + \beta t + U_t}$ **---- (2)**

Therefore, equation (2) is the proposed regression model after the semi-log transformation.

Here,

α = intercept term (instantaneous growth)

β = the slope coefficient measuring the constant, proportional or relative change in Y (in this case $\ln Y_t$) for a given absolute change in the value of the regressor (in this case the variable t)

$\mathbf{U_t}$ = disturbance or error term with standard OLS assumptions

Variable Description

Table 1.

Variable (s)	Description
$\mathbf{\ln Y_t}$ (dependent variable)	Natural log of NSDP of Orissa at constant prices (2004-05)
t (independent variable)	Time period (1, 2, 3, …, 24)

Data Description

Table 2.

Variable (s)	Observation	Mean	Std. Dev.	Min	Max
$\mathbf{Y_t}$ **(NSDP)**	24	6772170	2702993	3539943	11656558
$\mathbf{\ln Y_t}$ **(lnNSDP)**	24	15.65123	0.4022999	15.07962	16.27138

Interpretation of Results

As the proposed regression model is derived at, the next step is to estimate the model. The estimation is done using the computer software STATA and the results are summarized as follows in Table 3 and 4.

Regressing $\mathbf{\ln Y_t}$ on **t** gives the following results:

Table 3.

No. of observations	F(1, 22)	Prob > F	R-square	Adj R-square
24	1092.17	0.0000***	0.9803	0.9794

Note: *** shows statistically significant at 1% level

Table 4.

Variables	Coefficient	Standard error	t values	$p > \lvert t \rvert$
T	0.0563293	.0017045	33.05	0.000***
Constant	14.94712	.0243546	613.73	0.000***

Note: *** shows statistically significant at 1% level

- From table 3, it is seen that R-square is significantly high denoting the fact that the model explains almost all the variability of the response data around its mean.
- From table 3, it can also be observed that the F value is statistically significant at 1% level as the *p* value of F is sufficiently small (i.e., 0.000). This implies that the regressor have significant impact on the regressand.
- From table 4, it is to be noted that, the coefficient of t (i.e., **β)** is .0563293 which implies that over the period 1990-91 to 2014-15, the NSDP has shown an increase which is at the rate of 5.63 percent(yearly), and the annual compound growth rate is 5.79 percent ($e^{0.0563293}$ -1 =0.0579).
- Since the constant (i.e., **α**) is lnNSDP at the beginning of the period 1, so Rs. 3100642.791 lakh is obtained as NSDP in 1989 in constant prices 2004-05.
- In the model, $\mathbf{U_t}$ obtained is equal to 0.073501947.

From the above calculated values, the estimated regression equation can be re-written as follows,

$$\widehat{Y_t} = \mathbf{14.947+0.0563t}$$

Now in order to capture the trend of growth (whether accelerating or decelerating), the following quadratic model is used,

$$\mathbf{\ln Y_t = \alpha + \beta_1 t + \beta_2 t^2 + U_t}$$

Here, if, $\beta_2 > 0$ and significant then it signifies an accelerating trend and if $\beta_2 < 0$ and significant it signifies a decelerating trend.

After running regression, the obtained results are summarized as follows in Table 5.

Here, it can be observed that the coefficient of t^2 (i.e. β_2) is insignificant as the *p* value is significantly large, so it can be inferred that the growth trend of Orissa shows neither accel-

Table 5.

Variables	Coefficient	Standard error	t values	$p > \lvert t \rvert$
t	0.0463753	0.0069225	6.70	0.000
t^2	0.0003982	0.0002688	1.48	0.153
Constant	14.99025	0.0375596	399.11	0.000

eration nor deceleration in growth, even if the NSDP figures for the period 1991-2014 showed to have an increasing trend.

CONCLUSION

The present paper has attempted to conduct a time-series analysis on the growth trend of NSDP (in Rs. Lakh) for the state of Orissa throughout the years from 1991-92 to 2014-15. In the analysis, time is taken to be the factor to describe how NSDP is growing throughout time. From the above analysis, in conclusion it can be stated that, the NSDP growth trend of Orissa neither shows acceleration nor deceleration.

Therefore, we can conclude that simple observation of NSDP figures does not tell us the reality about the trend in growth, whether it implies acceleration, deceleration, both or none. Hence, an in-depth analysis is quite essential.

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