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A SYSTEMATIC REGRESSIONAL ANALYSIS OF THE VARIATION OF NET STATE DOMESTIC PRODUCT GROWTH RATE IN INDIAN STATES IN 2014-15

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Abstract:
Net State Domestic Product (NSDP) is defined as a measure, in monetary terms, of the volume of all goods and services produced within the territorial boundaries of the state during a given period of time after deducting the wear and tear or depreciation, accounted without duplication.This paper attempts to understand the regional dimensions of economic growth in India. The aim of impartial economic development is to enable income levels of poorer states to reach the levels of the richer states. For this to happen the incomes of poorer states must rise faster than those of the rich for a long period. Inter-state disparities in income levels and growth rates as measured by the coefficient of variation increased over time. If a state sustains high growth in labor-intensive sectors, it is likely to be more successful in creating jobs.
Key words: Net state domestic product growth rate, coefficient of variation, labor-intensive

I INTRODUCTION

Net State Domestic Product (NSDP) is defined as a measure, in monetary terms, of the volume of all goods and services produced within the territorial boundaries of the state during a given period of time after deducting the depreciation, accounted without duplication. The period of economic liberalization has been marked by growing differences in Net state domestic product across States, although the trend has varied across decades. In this Model we try to see how influencing are factors like NSDP per capita, Manufacturing, infrastructure, Geographical location etc. in affecting the Net State Domestic Product across different states in India.The other issue is to reduce the disparities at the regional level within the state. India in order to sustain its higher growth rate, the major bottlenecks have to be addressed in a phased manner. These are infrastructure, slowdown of agriculture growth, poverty and inequality, financial regulations and corruption free governance.

II REVIEWf OF LITERATURE

Barro (1991) explains the possibility of conditional convergence for the states that differ in their steady states. The states which are below the steady state should grow at a faster rate.

Abramowitz (1956) and Solow (1957) emphasize the significance of total factor productivity (TFP) to output growth since mid-fifties.

ISSN- 2394-5125 VOL 7, ISSUE 09, 2020

Citing the findings of Shand and Bhide (2000), regarding the growth performances across states, Haryana, Punjab and Maharashtra achieved the highest average annual growth rates during the 1970s. In the 1980s, states like Rajasthan, Haryana and Maharashtra were the top three performers with Gujarat and Tamil Nadu close behind. In the period of 1991-1992 and 1994-1995, the top performers were Maharashtra, Kerala and Gujarat, with West Bengal close behind. Therefore, new states have emerged among the high performers in the 1980s and 1990s although Gujarat and Maharashtra have appeared more often in this category.

III OBJECTIVES

In this study, the main objective is to find out the magnitude of the factors that are affecting NSDP growth rate across Indian state.

IV RESEARCH METHODOLOGY

Data source: The data are collected from the secondary sources, mainly NITI Aayog, RBI Handbook of Statistics on Indian States 2000-01 to 2017-2018, Basic Road Statistics of India.

Line of Analysis: In order to obtain the desire result, the T-test, linear and nonlinear regression model has been used. The total 12 Indian states have been considered for the study.

V RESULTS AND DISCUSSION

To explain the variation of NSDP Growth rate across Indian States, several factors like NSDP per capita, percentage of manufacturing in NSDP, Roads per 1000 square km, percentage of agriculture in NSDP, Literacy rate and location of states (Mountainous Dummy variable) are considered and the following two model have been formulated.

Multiple Linear Regression Model:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 D_i + U_i$$

Where,

Dependent variable: Y_i = Net State Domestic Product Growth rate (current Price) of i^{th} state in 2010-11.

Independent variable: X_{1i} = Net State Domestic Product Per Capita current Price) of i^{th} state

X_{2i} = Percentage of manufacturing in NSDP of i^{th} state

X_{3i}= Roads per 1000 square km of of i^{th} state

X_{4i} = Percentage of Agriculture in NSDP of i^{th} state

X_{5i} = Literacy rate of i^{th} state

D_i= Location of states (Dummy variable) of i^{th} state

0= Mountainous State

1= Others

ISSN- 2394-5125 VOL 7, ISSUE 09, 2020

i= No. of state (=1,2, 3,…….,12)

U=Error term

Coefficient: β_0 =mean

β_1 = Coefficient of NSDP Per Capita of i^{th} state

β_2 =Coefficient of percentage of manufacturing in NSDP of i^{th} state

β_3 = Coefficient of roads per 1000 square km of of i^{th} state

β_4 = Coefficient of percentage of Agriculture in NSDP of i^{th} state

β_5 = Coefficient of literacy rate of i^{th} state

β_6 = Coefficient of state location of i^{th} state

Table1: Description of variables

Variable's name	Variable symbols	Descriptive statistics		
		Mean	Median	S.D
NSDP Growth	Y_i	6.92	6.82	1.46
NSDP Per Capita	X_1	100051	104382.5	46463.55
Manufacturing in NSDP	X_2	14.97	12.36	10.50
Road	X_3	49.10	42.65	29.83
Agriculture in NSDP	X_4	9.97	9.79	6.62
Literacy	X5	78.77	77.13	9.28
State location	D	0.75	1	0.44

Source: Author's Calculation

The mean, median and standard deviation of the variables are tabulated in the table1. The expected sign of the coefficient are positive except state location.

With SPSS software we got the following result:

Table2: Results of Regression Analysis (Impact on industrial growth):

Variables/constant	Estimated coefficient	Standard error	t value	Significance level
β_0	14.59***	2.76	5.287	.000
X_1	7.85	.000	1.01	.325

ISSN- 2394-5125 VOL 7, ISSUE 09, 2020

X_2	-.038	.028	-1.35	.193
X_3	.013	.012	1.030	.318
X_4	-.017	.058	-.297	.770
X5	.103***	.034	-3.003	.008
D	-.292	.596	-.4902	.631
R^2	.516			
F-statistic (6, 24)	3.016			.034

Source: Author's Calculation

Note: ***, ** and * indicates level of significance at 1%, 5% 10% respectively.

In this table, Results of the multiple regression model are tabulated. The R^2 value is .516 which means that our independent variables explain 51.60% of the variation in endogenous variable i.e NSDP growth rate. It means the model give a average good fit.F value indicated overall significance of the fitted model. Here its value is 3.016 which is significant at 5% percent level of significant. The coefficient of the explanatory variable such as Literacy is.103 which is significant at 1% level of significance. The other explanatory variables i.e NSDP PC, Roads, percentage of manufacturing, percentage of agriculture and state location (D) are not significant which implies these factors are not significantly impact on NSDP growth rate in Indian state.

5.1 Nonlinear regression or Log linear regression

To explain the variation of NSDP Growth rate across Indian states, several factors like contribution of manufacturing, length of roads, literacy rate, governance index and state location (dummy variable) are considered and the following Nonlinear regression model has been formulated-

$$Y_i = \beta_0 P^{\beta 1} M^{\beta 2} R^{\beta 3} A^{\beta 4} L^{\beta 5} e^{Di} e^{Ui}$$

$$\text{Or } \log Y_i = \log\beta 0 + \beta 1 \log P + \beta 2 \log M + \beta 3 \log R + \beta 4 \log A + \beta 5 \log L + Di + Ui \log e$$

Where, logP = NSDP Per Capita of i^{th} state

logM = Percentage of manufacturing in NSDP of i^{th} State

logR = Roads per 1000 square km of of i^{th} state

logA = Percentage of agriculture in NSDP of i^{th} state

logL = Literacy rate of of i^{th} state

logD = State location (dummy variable) of i^{th} state

where, 0 = Mountainous state

ISSN- 2394-5125 VOL 7, ISSUE 09, 2020

1 = non mountainous

U = Error term, i = no. of states (1,2,3,4,.....,24)

β0 = constant, β1, β2, β3, β4, β5 and B6 are the respective explanatory variable's coefficient.

Table3: Description of variables

The mean, median and standard deviation of the variables are tabulated in the table3. The expected sign of the coefficient are positive except state location.

Variable's Name	Variable symbols	Descriptive statistics			Expected sign of the coefficient
		Mean	Median	S.D	
NSDP Growth Rate	Yi	0.830518	0.834265	0.094482	
NSDP Per pita	X1	4.954368	5.018612	0.20829	
Percentage of Manufacturing in NSDP	X2	1.035518	1.09202	0.418958	
Roads	X3	1.631792	1.628048	0.22099	
Percentage of Agriculture in NSDP	X4	0.760361	0.990909	0.727473	
Literacy rate	X5	1.893471	1.887222	0.051437	
State location	D	0.75	1	0.442326	

With SPSS software we got the following result:

Table 4: Results of Non-Regression Analysis (Impact on NSDP growth rate)

Variables/constant	Estimated coefficient	Standard error	t value	Significance level
β_0	2.697***	.897	3.007	.008
X_1	.062	.115	.537	.598
X_2	.054***	.048	-1.124	.007
X_3	.039	.120	.324	.750
X_4	.034**	.040	-.851	.047
X5	1.137**	.397	-2.866	.011

ISSN- 2394-5125 VOL 7, ISSUE 09, 2020

D	-.002	.046	-.048	.962
R^2	.502			
F-statistic (6, 24)	2.853			.077

Note: ***, ** and * indicates level of significance at 1%, 5% 10% respectively.

In this table, Results of the log linear regression model are tabulated. The R^2 value is .502 which means that our independent variables explain 50.20% of the variation in endogenous variable i.e NSDP Growth rate. It means the model give an average good fit.F value indicated overall significance of the fitted model. Here its value is 2.853 which is significant at 10 percent level of significant. The constant (β_0) is 2.697

The coefficient of Literacy rate is 1.137, which is significant at 5% level of significance . The other explanatory variables i.e NSDP Per capita, Roads and state location (D) are not significant which implies that these factors have no significant impact on NSDP Growth rate in Indian states.

The Independent Samples t Test compares the means of two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different. The Independent Samples t Test is a parametric test. In our sample data, we consider two variables mountainous and NSDP growth rate of different states. The variable mountainous has values of either '0' (mountainous) or '1' (others). In this Independent sample t test, we consider mountainous as the independent variable. On the other hand, the variable NSDP Growth rate is considered as dependent variable.

With SPSS software the following results got

Group Statistics

	Mountainous	N	Mean	Std. Deviation	Std. Error Mean
Rate of Growth of NSDP of Different States in the year 2014-15	mountainous state	10	5.2565	3.65939	1.15720
	others	22	7.7582	2.29888	.49012

Source: Author's calculations

Hypotheses

The null hypothesis (H_0) and alternative hypothesis ($H_{1)}$ of the independent samples T test can be expressed in two different but equivalent ways:

H_0: $\mu_{\text{mountainous}} = \mu_{\text{others}}$ ("the mountainous and others means are equal")

H_1: $\mu_{\text{mountainous}} \neq \mu_{\text{others}}$ ("the mountainous and others means are not equal)

ISSN- 2394-5125 VOL 7, ISSUE 09, 2020

Where $\mu_{mountainous}$ andμ_{others} are thepopulation means for mountainous and others states respectively.

F is the test of overall significance of variables

Significant is the p value

Here, p is .055 at the 10% level of significance so, we reject null hypothesis(H_0) and accept the alternative hypothesis(H_1) which implies that the variance in NSDP Growth Rate across Indian states of mountainous state is significantly different than that of non-coastal state.

VI CONCLUSION

It is found from the above regression analysis that there are factors which impact significantly to the net state domestic product. Among these factors, Agriculture, literacy rate, manufacturing are the main. This means that state which are good at or which are performing good in agriculture, literacy and manufacturing relatively have higher net state domestic product than those state which are performing poorly in these factors.

NSDP growth rate is the main indicator which tells overall development of the Indian states. Since agriculture and manufacturing sectors are the main factors which contribute the NSDP growth rate, so it is important for the government to make policies which improves these sectors.

From the above study it can be recommended that the government should take initiatives for economic reforms by giving importance to the factors that has impact on NSDP growth rate in India. Growth in the different states in India during 1990-2018 was characterized by instability and volatility. The degree of volatility was very high in some states. It would be instructive to extend the analysis to sectoral growth rates and identify the sectors contributing to volatility and instability. Inter-state disparities in income levels and growth rates as measured by the coefficient of variation increased over time. However, the relative positions of many states remained unchanged.

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ISSN- 2394-5125 VOL 7, ISSUE 09, 2020

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