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Economic Growth and Human Development: An Empirical Analysis of Major States of India During the Period 1993-94 to 2004-05

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Abstract

The objective of this study is to inspect the two links between economic growth and human development in the Indian context during the study period 1993-94 to 2004-05 for the 15 major states. To test these links regression technique has adopted for all the three (high, low and total) group states. Further this link has explored for the starting and ending periods of the study period as it is considered "level-wise analysis" and also for the total study period as it is known as "change analysis". To conduct level wise analysis per capita income values and human development index values for the years 1993-94 and 2004-05 are chosen as they are representing starting and ending years of the study period. To examine the change analysis, growth rates of per capita income and human development index values of the total study period have taken. The dummy variable model results of per capita income as dummy variable points out that there are significant differences between low and high growth group states for the level-wise analysis and the absence of differences between these groups for change analysis. On the contrary, the dummy variable model results of human development index as dummy variable shows that there are no significant differences between low and high human development group states for both level-wise and change analysis.

Keywords: Economic Growth, Human Development, Growth Rate, Dummy Variable Model

The human development paradigm performs an important service in questioning the presumed automatic link between expanding income and expanding human choices. Such a link depends on the quality and distribution of economic growth, not only on the quantity of such growth. A link between growth and human lives has to be created consciously through deliberate public policy – such as public spending on social services and fiscal policy to redistribute income and assets. This link may not exist in the automatic workings of the market place, which can further marginalize the poor. But we must be careful. Rejecting an automatic link between income expansions and flourishing human lives is not rejecting growth itself. Economic growth is essential in poor societies for reducing or eliminating poverty. But the quality of this growth is just as important as its quantity. Conscious public policy is needed to translate economic growth into people's lives (Mahbub-ul-Haq, 2004)[1].

Dholakia (2003)[2] found a two-way causality between human and economic development in India over the last two decades. Joseph (2004)[3] found a high correlation between economic prosperity and social progress. Sekhar (2005)[4] concluded that economic growth is neither a necessary nor a sufficient condition for social development while social development is a necessary but not a sufficient condition for economic growth. Ghosh (2006)[5] investigated the two way link between economic growth and human development of the 15 major states in India during the period 1981-2001. Through Granger causality test he found the presence of two-way causality between human development and economic growth in India. Mukherjee and Chakraborty (2010)[6] analysed the relationship between economic growth and human development for 28 major Indian States during four time periods ranging over last two decades: 1983, 1993, 1999-00 and 2004-05. They concluded that the per capita income is not translating into human well being.

In this context the objective of this study is to inspect the two links between economic growth and human development in the Indian context during the study period 1993-94 to 2004-05 for the 15 major states.

Limitations of the Study

The focus has been narrowed down to 15 most populous states in India, which excludes the Himalayan States, the northeastern states except Assam, and the seven union territories. Thus, the study includes the 15 major States viz. Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. The included states have a combined population of 995 million (approximately 96.8 per cent of India's population), cover 2.9 million km (87 per cent of India's total land area) and account for 92.4 per cent of India's domestic product according to 2001 Census Data which is the latest Census in India till today. Thus, these 15 states are selected for the study. Regarding the selection of the time period the availability of data on both economic growth and human development indicators are taken into account. On economic growth front the data is available year wise but not for human development indicators. The study mainly concentrates on post reform period i.e. after 1991 from which India has entered into the globalization era. Hence, the data on Per Capita Net State Domestic Product (PCNSDP) which is considered for economic growth side is available at factor cost at constant prices with the base year

[1]Mahbub-ul-Haq (2004) The Human Development Paradigm In Sakiko Fukuda-Parr and Shiva Kumar, A.K. (eds.), *Readings in Human Development: Concepts, Measures and Policies for a Development Paradigm*, Oxford University Press, pp: 17-34.

[2]Ravindra H Dholakia (2003) Regional Disparity in Economic and Human Development in India, *Economic and Political Weekly*, September 27-October 3, 38 (39), 4166-4172.

[3]Mathew Joseph (2004) Performance of the Northern States – A Comparative Analysis, *Economic and Political Weekly*, February 7-13, 39 (6), 564-579.

[4]Sekhar, CSC (2005) Economic Growth, Social Development and Interest Groups, *Economic and Political Weekly*, December 10-16, 40 (50), 5338-5347.

[5]Madhusudhan Ghosh (2006) Economic Growth and Human Development in Indian States, *Economic and Political Weekly*, July 29-August 4, 41 (30), 3321-3329.

[6]Sacchidananda Mukherjee and Debashis Chakraborty (2010) Is there any relationship between Economic Growth and Human Development? Evidence from Indian States, available at http://mpra.ub.uni-muenchen.de/22997/

1993-94. The selection of the end period is 2004-05 which is based on the availability of data on human development indicators. The Government of India first published its National Human Development Report (NHDR), 2001 in 2002. As the study is focused on post-reform period, i.e. after 1991, the State wise human development reports are not published regularly. The latest state human development report is published by the Govt. of Andhra Pradesh, Hyderabad in 2008 as "Andhra Pradesh Human Development Report – 2007". In this report the selected major states data for the Human Development Index (HDI) and its sub-components are available for the two periods of 1993-94 and 2004-05. Hence, the study is confined to the period 1993-94 to 2004-05.

Data Sources

PCNSDP at factor cost at constant prices with base year 1993-94 is obtained from *Handbook of Statistics on Indian Economy, 2006-07* published by Reserve Bank of India, Mumbai. Human Development Index and its components values for the selected states have been taken from *Andhra Pradesh Human Development Report, 2007* published by the Govt. of Andhra Pradesh and Centre for Economic and Social Studies, Hyderabad in 2008.

Methodology

To examine the two links between Economic Growth (EG) and Human Development (HD) two models are used. In the first model, states are classified into two groups based on per capita income growth rate. Median growth rate value is considered to grouping states as high and low growth group states. The annual compound rate of growth has been worked out applying the log-linear model for a variable say 'Y' with respect to time (t). The form of the log-linear model is:

$\text{Log } Y = a + bt$ …….....(1)

where 'b' is said to represent instantaneous rate of growth. To derive the compound growth rate, the antilog of 'b' has taken, subtract 1 from it, and multiply the difference by 100. This is achieved by transforming the compound growth formula

$Y = A(1+r)^t$

Into a regression equation

$\text{Log } Y = a + bt$

Where $b = \log(1+r)$

and the growth rate 'r' = {(antilog 'b') – 1}

where 'b' represents the regression coefficient (Shetty, S.L., 2003)[7].

In the second model median value of annual average growth rate in HDI is considered to grouping states into two groups such as high and low human development group states. To compute annual

[7]Shetty, S.L. (2003) Growth of SDP and Structural Changes in State Economics – Interstate Comparisons, *Economic and Political Weekly*, 38 (49), 5189-5200.

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average growth rate of a variable between the period t and t-ô the following formula is used (Madhusudan Ghosh, 2006)[8].

$[\ln (X_{it}) - \ln (X_{i,t-\tau})] / T$ …….....(2)

$\ln (X_{it})$ natural logarithm of a variable at time 't'

Where

$\ln (X_{i,t-\tau})$ natural logarithm of a variable at time 't-τ'

T = length of the time period

In this Study dummy variable model has been used to examine whether the high and low growth group states effect on improving human development is differ and high and low human development group states effect on improving economic growth is differ.

Variables that assume 0 and 1 values are called dummy variables. Such variables are thus essentially a device to classify data into mutually exclusive categories such as male or female.

It is not absolutely essential that dummy variables take the values of 0 and 1. The pair (0, 1) can be transformed into any other pair by a linear function such that Z = a + bD (b'"0), where a and b are constants and where D = 1 or 0. When D = 1, we have Z = a + b, and when D = 0, we have Z = a. Thus the pair (0, 1) becomes (a, a+b). This expression shows that qualitative or dummy variables do not have a natural scale of measurement. That is why they are described as nominal scale variables.

Dummy variables can be incorporated in regression models as easily as quantitative variables. A regression model may contain regressors that are all exclusively dummy, or qualitative, in nature. Such models are called Analysis of Variance (ANOVA) models. ANOVA models are used to assess the statistical significance of the relationship between a quantitative regressand and qualitative or dummy regressors. They are often used to compare the differences in the mean values of two or more groups or categories, and are therefore more general than the *t* test which can be used to compare the means of two groups or categories only.

To introduce dummy variable in the regression model the method used is m-1, where m is the number of categories of variable for which the dummy variable is creating. For each qualitative regressor the number of dummy variables introduced must be one less than the categories of that variable.

The category for which no dummy variable is assigned is known as the base, benchmark, control, comparison, reference, or omitted category**.** All comparisons are made in relation to the benchmark category.

The functional form of the dummy variable equation is such as

$Y_i = \alpha + \beta_1 D_{1i} + u_i$ ……(3)

where
Y_i = Dependent Variable

[8] Madhusudan Ghosh (2006) *op. cit.*

α = Intercept of the model *or* Mean value of benchmark category

β_1 = Coefficient of D_{1i} *or* Mean difference between benchmark and non-benchmark category

D_{1i} = Dummy Variable which takes the value of 1

u_i = Error term of the regression equation which distributes normally and independently as zero mean and constant variance.

The intercept value (α) represents the *mean value* of the benchmark category. The coefficient attached to the dummy variable is known as the differential intercept coefficient because it tell by how much the value of the intercept that receives the value of 1 differs from the intercept coefficient of the benchmark category.

Mean value of non-benchmark category is obtained by adding the intercept (α) value and the value of the coefficient (β_1) attached to the dummy variable (D_{1i}).

To know whether the difference between mean values of benchmark and non-benchmark categories is statistically significant the usual *t* test for the slope coefficients has been performed.

The difference between the mean values of benchmark and non-benchmark categories exists if the slope coefficient is statistically significant and *vice versa* (Gujarati Damodar, N., 2003)[9].

Empirical Testing of Differences between Groups of States in Improving Economic Growth and Human Development

Table-1 presents the growth rates of PCNSDP and HDI for the period 1993-94 to 2004-05 along with state ranks. West Bengal (5.55%) topped the list of PCNSDP growth rates and occupied 1st rank. Karnataka (5.34%), Andhra Pradesh (4.71%), states have shown higher growth rates than the remaining states and have been placed at 2nd and 3rd ranks respectively. Assam (1.31%), Uttar Pradesh (1.41%) and Madhya Pradesh (1.82%) have registered below two per cent growth rates and became the least PCNSDP growth rate registered states and received 15th, 14th and 13th ranks respectively. In the case of growth rate of HDI for the selected states Uttar Pradesh (0.023) occupied 1st rank followed by Bihar (0.019) and Orissa (0.019) which have been stood at 2nd and 3rd ranks respectively. Kerala (0.007) state is placed at the bottom of the HDI growth and has been got 15th rank which was followed by Maharashtra (0.011) and Punjab (0.011) and received 14th and 13th ranks respectively.

To test the links between EG and HD regression technique has adopted for all the three (high, low and total) group states. Further this link has explored for the starting and ending periods of the study period as it is considered "level-wise analysis" and also for the total study period as it is known as "change analysis". To conduct level wise analysis per capita income values and human development index values for the years 1993-94 and 2004-05 are chosen as they are representing starting and ending years of the study period. To examine the change analysis, growth rates of per capita income and HDI values of the total study period has taken. Table-2 presents the classification of states based on median value of growth rates of PCY and HDI.

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[9]Gujarati Damodar, N. (2003) *Basic Econometrics*, 4th Edition, Tata McGraw Hill, New York.

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The objective of the paper is to test the two links between economic growth and human development during the study period. For this ANOVA model is used. The results are presented in the following sections.

Table 1: Growth Rates and Ranks during the period 1993-94 to 2004-05

Sl. No.	States	PCNSDP (PCY)	PCNSDP (PCY) Rank	HDI	HDIRank
1.	Andhra Pradesh	4.71	3	0.016	5
2.	Assam	1.31	15	0.014	8
3.	Bihar	2.02	12	0.019	2
4.	Gujarat	3.67	5	0.012	12
5.	Haryana	3.56	7	0.014	9
6.	Karnataka	5.34	2	0.013	11
7.	Kerala	4.29	4	0.007	15
8.	Madhya Pradesh	1.82	13	0.017	4
9.	Maharashtra	3.15	9	0.011	13
10.	Orissa	3.05	10	0.019	3
11.	Punjab	2.53	11	0.011	14
12.	Rajasthan	3.25	8	0.014	10
13.	Tamil Nadu	3.67	6	0.016	6
14.	Uttar Pradesh	1.41	14	0.023	1
15.	West Bengal	5.55	1	0.016	7

Note: PCNSDP and HDI Growth Rates are Compound Annual and Annual Average Growth Rates respectively. Bold figures in the Table indicates median value and rank
Source: See Supplementary Tables 1 and 2 respectively.

Table 2: States Classification based on Growth Rates of Per Capita Income (PCY) and HDI

Category	States
High Growth Group States	Andhra Pradesh, Gujarat, Haryana, Karnataka, Kerala, Tamil Nadu, West Bengal
Low Growth Group States	Assam, Bihar, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Uttar Pradesh
High HD Group States	Andhra Pradesh, Bihar, Haryana, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal
Low HD Group States	Assam, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Rajasthan

ANOVA Model Results with Per Capita Income as Dummy Variable

Table-3 presents the results of ANOVA model for the two periods 1993-94 and 2004-05 and also for total period.

Here, the mean differences between two groups of states in enhancing human development is observed by introducing dummy variable for high growth group states which became benchmark category for comparison with another group i.e., low growth group states. From the Table 2, for the period 1993-94 the mean value of high growth group states is 0.477. The differential intercept coefficient indicates the difference between mean values of high and low growth group states and it is -0.067. The original mean value of low growth group states is obtained by adding the intercept value to the differential

intercept coefficient, and then the value is 0.410. The *t* value of differential intercept coefficient is statistically significant at ten per cent level as per *p* value. This indicates that the mean value of low growth group states is statistically significantly lower by 0.067 points than the high growth group states in increasing human development index value. The R^2 value reveals that the high and low growth group differences together explained only 22.7 per cent of variation in human development index for the year 1993-94.

Table 3: ANOVA Model Results with Per Capita Income as Dummy Variable

Model	$HDI_{(1993\text{-}94/2004\text{-}05/HDI\ GR)}\ Y = \alpha + \beta_1 D_i\ (PCY) + \mu_i$						
Parameters	α	t (α)	Sig t (α)	$\beta_1 D_i$	t ($\beta_1 D_i$)	Sig t ($\beta_1 D_i$)	R^2
				1993-94			
Estimated Values	0.477	19.000	0.000	-0.067	-1.956	0.072	0.227
				2004-05			
Estimated Values	0.559	26.158	0.000	-0.065	-2.226	0.044	0.276
				1993-94 to 2004-05			
Estimated Values	0.013	9.000	0.000	0.003	1.301	0.216	0.115

For the period 2004-05 α value is 0.559 and β_1 value i.e., mean value of low growth group states is lowered by 0.065 points. The absolute value of low growth states is 0.494. The *t* value of β_1 coefficient is statistically significant at five per cent level thus it indicates that there is difference between mean values of high and low growth states in improving human development index at 2004-05 level. When compared to 1993-94 level, R^2 value increased and explained 27.6 per cent of variation of human development index due to differences in high and low growth group states.

Regarding the total period, the estimated high growth states group mean value is 0.013 and the differential intercept coefficient value is 0.003. That is low growth states group mean value is higher than high growth states group by 0.003. The value of low growth group states mean value is 0.016. The *t* value of the differential intercept coefficient is not statistically significant thus there is no difference between high and low growth group states mean value in improving human development index when total period is considered. It is surprising to note that during the study period i.e., 1993-94 to 2004-05 in human development index the explanatory power of high and low growth group differences accounts to 11.5 per cent only.

ANOVA Model Results with Human Development Index as Dummy Variable

Table-4 presents the results of ANOVA model for level wise and change wise with human development index as dummy variable.

For the 1993-94 level, the mean value of high human development states group which is represented by intercept is 6743.571 and the differential intercept coefficient which represents low human development states group mean value is higher by 1880.304. The actual mean value of low human development states group is 8623.875. The *t* value of differential intercept coefficient is not statistically significant even at 10 per cent level. Thus, it has been understood that there is no difference between low and high human development state groups mean value in accelerating the per capita income in the year 1993-94. Only 12.3 per cent of variation in per capita income is explained by the differences between low and

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high human development group states.

Table 4: ANOVA Model Results with Human Development as Dummy Variable

Model	$PCY_{(1993\text{-}94/2004\text{-}05/PCYCGR)}$ $Y = \alpha + \beta_1 D_i$ (HDI) $+ \mu_i$						
Parameters	α	t (α)	Sig t (α)	$\beta_1 D_i$	t ($\beta_1 D_i$)	Sig t ($\beta_1 D_i$)	R^2
				1993-94			
Estimated Values	6743.571	6.619	0.000	1880.304	1.348	0.201	0.123
				2004-05			
Estimated Values	10368.714	6.132	0.000	2562.661	1.107	0.288	0.086
				1993-94 to 2004-05			
Estimated Values	3.424	6.622	0.000	-0.254	-0.359	0.725	0.010

Same results are obtained in 2004-05 level also. The mean value of high human development states group is 10368.714. The differential intercept coefficient value, i.e. the difference between low and high human development group states is 2562.661. The low human development states group mean value is 12931.375 and the *t* value is not significant. It indicates that there exist no differences between these two groups in improving per capita income in the year 2004-05. Here, the R^2 value is lower than at 1993-94 level and explains only 8.6 per cent of variation of per capita income due to differences in low and high human development state groups.

Regarding total period, the mean value of high human development group states is 3.424. The differential intercept coefficient value is -0.254 which reveals that low human development group states are lower in improving per capita income during the period 1993-94 to 2004-05 when compared to high human development states group. The actual mean value of low human development group states is 3.170. The *t* value of the differential intercept coefficient is not statistically significant thus leads to the conclusion that there is no differences between two groups of states in enhancing per capita income. During the study period the capacity of explaining the variation of per capita income because of differences in low and high human development group states is only one per cent.

From the above ANOVA model it has been observed that there are differences between low and high growth group states at 1993-94 and 2004-05, but when total period is considered the differences did not appear in improving human development based on the per capita income classification of states. There are no differences between low and high human development group states in improving per capita income both at level and change.

Summary

Dummy variable models are used to test the two links between economic growth and human development during the study period between two groups of states which is based on per capita income and human development index.

The ANOVA results of per capita income as dummy variable points out that the mean value of low growth group states is lower than the high growth group states for the period 1993-94 and it point out that there are significant differences between these two groups. The same results are obtained in the year 2004-05 also. When the total period is considered though the mean value of low growth group

states is higher than the high growth group states, it is very minute level and the group differences do not statistically exist.

The ANOVA results of human development index as dummy variable in 1993-94 shows that the mean value of low human development states are higher when compared to high human development states. There is no significant difference between the two groups. As in 1993-94, in 2004-05 also the two groups are having similarity in advancing mean per capita income; the mean value of low human development group is higher than the high human development group. When the total period is considered, the low human development group states are lower when compared to high human development states group and the two groups are having no difference.

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Appendix

Table 1: Per Capita Net State Domestic Product (Per Capita Income)

Sl. No.	Period	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
1.	Andhra Pradesh	7416	7711	8071	8514	8191	9144	9445	10195	10639	10876	11756	12352
2.	Assam	5715	5737	5760	5793	5796	5664	5785	5943	6122	6254	6466	6721
3.	Bihar	3037	3306	2728	3338	3100	3210	3282	3831	3340	3851	3396	3773
4.	Gujarat	9796	11535	11649	13206	13018	13735	13298	12489	13321	14194	16302	16878
5.	Haryana	11079	11598	11545	12591	12389	12728	13308	13848	14228	14712	15752	16872
6.	Karnataka	7838	8097	8368	8990	9416	10549	10912	11854	11857	12212	12634	13820
7.	Kerala	7983	8598	8868	9145	9265	9819	10430	10714	10762	11605	12328	13321
8.	Madhya Pradesh	6584	6550	6790	7089	7301	7621	8248	7195	7708	7062	8149	8238
9.	Maharashtra	12183	12158	13220	13464	13925	14199	15257	14233	14656	15764	16765	17864
10.	Orissa	4896	5054	5204	4773	5382	5471	5742	5549	5803	5747	6640	7176
11.	Punjab	12710	12784	13008	13705	13812	14334	14809	15071	15308	15407	16119	16756
12.	Rajasthan	6182	7134	7216	7862	8601	8754	8555	8175	8763	7903	10010	9853
13.	Tamil Nadu	8955	9932	10147	10451	11260	11592	12167	12994	12484	12696	12976	13999
14.	Uttar Pradesh	5066	5209	5256	5706	5518	5432	5675	5575	5603	5830	5975	6138
15.	West Bengal	6756	7094	7492	7880	8408	8814	9320	9796	10380	10987	11608	12271

Source: Handbook of Statistics on Indian Economy, 2006-07 published by Reserve Bank of India, Mumbai.

Table 2: States HDI Values during the years 1993-94 and 2004-05

Sl.No.	Name of the State	HDI Values	
		1993-94	2004-05
1.	Andhra Pradesh	0.415	0.503
2.	Assam	0.429	0.509
3.	Bihar	0.349	0.441
4.	Gujarat	0.462	0.535
5.	Haryana	0.470	0.558
6.	Karnataka	0.448	0.526
7.	Kerala	0.621	0.673
8.	Madhya Pradesh	0.369	0.452
9.	Maharashtra	0.499	0.570
10.	Orissa	0.360	0.453
11.	Punjab	0.518	0.588
12.	Rajasthan	0.391	0.463
13.	Tamil Nadu	0.481	0.586
14.	Uttar Pradesh	0.363	0.476
15.	West Bengal	0.442	0.533

Source: Andhra Pradesh Human Development Report - 2007, published by the Govt. of Andhra Pradesh and Centre for Economic and Social Studies, Hyderabad, 2008.

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