Economic Growth and Human Development in Indian States after two decades of Economic Reforms

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Abstract

This paper examines the relative performance of 28 major Indian states over the two decades (1990-2010) on economic growth and human development indicators by empirically confirming the two-way nexus between economic growth (EG) and human development (HD) and identifying other important links in the relationship from cross-sectional growth regressions. The paper finds a strong and consistent convergence in indicators of human development across states even as incomes have diverged over the two decades. Further, the classification of the states into vicious, virtuous, HD-lopsided and EG-lopsided categories and the shifts across categories of different states over the two decades reveal the importance of the requirement of simultaneous thrust on EG and HD in order to escape the vicious cycle.

Keywords: Human Development, Economic Growth, Indian States

Introduction

Since the economic reform process which began in earnest in 1991, economic growth rates have picked up significantly. Also, there has been accelerated improvement in various indicators of human development, whether it is in the case of demographic characteristics or social development indicators. While the country has made major strides in health and education sectors, the performance on overall human development front remains inadequate. India's HDI ranking has dropped (though more countries have been ranked successively) and it continues to be classified in the Medium HD category. See Table 1 on Economic Growth Rates and HDI over the corresponding periods.

Table 1. Economic Growth and Human Development in India: 1990 to 2014

Annual Rate of GDP Growth	Human Development Index Value	HD Classification
6% p.a. during 1991-2000	0.428 in 1990; 0.496 in 2000	Low HD
8% p.a. during 2001-2010	0.586 in 2010	Medium HD since 2002
6% p.a. during 2011-2014	0.609 in 2014	Medium HD

Source: http://hdr.undp.org/en/composite/trends

At India's present rate of progress on human development, it may take us a couple of decades to reach the 'high' development category of HDI. While our HDI value has been improving successively, there is a lot of grim news buried in the details. For instance, India accounts for a mammoth 40 per cent of those who suffer from 'multi-dimensional poverty' (HDR, 2014). The country also does poorly on many indicators of inequality, in both absolute as well as relative terms.

While there is a broad consensus on the overall improvement of the economy and quality of life during the period under consideration, there are significantly differing perceptions about the distributional impacts of these gains. While several efforts to reduce regional disparities have been undertaken, achievements have not often been commensurate with these efforts. Considerable regional disparities remain and the on-going economic reforms since 1991, with focus on stabilisation and deregulation policies, seem to have further widened the existing regional disparities. The seriousness of the emerging acute regional imbalances calls for serious public attention.

The scope of analysis in this paper is restricted to an analysis of the emerging trends in twenty eight major States in respect of a few key parameters which have an intrinsic bearing on social and economic development. The evolution of the economic growth (EG)-human development (HD) nexus in India across its 28 states over two decades of Growth and Development in the Post-reforms era (1990s to 2010s) is traced. We use data for the period 1990 to

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2011/12 to analyse the relative performance of these states on human development and growth indicators and determine if regional disparity has increased or decreased over time. Further, we investigate the two way relationship between EG and HD (i.e., growth-induced HD and HD induced EG) and explore the movement of states across the vicious cycle (low EG - low HD), virtuous cycle (high EG – high HD), lopsided-EG (high EG – low HD) and lopsided-HD (low EG – high HD) categories. Such categorization and the shifts therein have obvious policy implications for more focused regional planning aimed at achieving sustainable improvement in HD for lifting the states from the vicious to virtuous cycle category.

The Dynamics of the EG-HD relationship

The main objective of development is increasingly being identified as *human development* (HD) instead of economic growth (EG) alone. Improvements in HD are no longer sought as only the fundamental goal of development; they are identified as crucial contributors to EG over time. Exploring the dynamics of the links between EG and HD helps identify the major links between the two objectives with crucial policy implications. For long, the widely held notion was that to start off with, a country needs to focus solely on EG. Once the country reaches a certain level of economic prosperity, where it has at its disposal, a sufficient stock of resources, then it can take care of its HD concerns. In short, HD issues will have to wait until a country has attained a certain level of EG.

The two-way link between economic growth (EG) and human development (HD) has been rigorously established in the literature. Ranis and Stewart (2005) shed light on the dynamic forces that are at play behind the functioning of the chains from EG to HD, and vice-versa. They explore the two-way relationship between EG and HD in terms of the possible links that exist between the two. In chain A, EG is responsible for providing the resources required to be pumped in, if the objective is to improve HD. On the other hand, in chain B, improvements in HD will make the people healthier and more educated. This will render them as more productive and in a position to better able to contribute towards the process of their nation's EG. However, their analysis concludes that these connections are not 'automatic'. For instance, two countries having the same level of GNP can have very different HD performances. It depends on various factors; for instance, the propensities of households to spend on HD improving activities like health and education, when bestowed with a higher income. Also, a more 'equal' distribution of income in an economy has been shown to be beneficial towards HD improvements. Additionally, female ownership of a household's resources increases HD related expenditures. It also depends on the policy choices made by the government; for example, the proportion of its total expenditure that it decides to spend on HD boosting measures. Hence, although there exist strong connections running from EG to HD, but, they depend heavily on a host of factors, some of which a country can intelligently control for the betterment of its HD.

The same holds true for the link running in the opposite direction, i.e. from HD to EG. HD is not only an important end in itself, but is also a vital contributor to sustaining EG. This materialises not only through an increased labour productivity that accompanies higher HD, but also because with higher education levels, income inequality reduces, which in turn feeds into EG. Again, the strength of these connections is not 'automatic', but must be supplemented with diligent efforts from the policy standpoint.

Given these two way causal chains, it is possible to classify all countries into four categories: (i) 'virtuous', where a country is on a mutually reinforcing upward spiral of a high HD feeding to high EG, and vice-versa; (ii) 'vicious', where a country is stuck in a harmful cycle of low HD leading to low EG, and vice-versa; (iii) 'HD lopsided', where a country has a relatively strong performance on the HD front, but performs weakly in EG; and (iv) 'EG lopsided', where a country has a relatively strong performance on the EG front, but lags behind when it comes to HD.

Lopsided development has been seen to be an unstable phase in a country's development story. More often than not, it has been found that if the weak partner in the cycle is strengthened through policy interventions, then the country may successfully make its transition into the virtuous cycle; however, failure to do so will see the country slip into the vicious cycle. Additionally, though the two objectives of EG and HD must be jointly pursued in balance, however, if certain resource constraints force a country to pick one, then the country should opt to pursue the goal of HD, preferring over EG. This is because, almost all EG lopsided countries have been observed to fall into the vicious cycle. However, there are some countries that have managed to sustain themselves in the HD lopsided category, while most of them have succeeded in moving to the virtuous cycle, which after all, is the ultimate objective of any country.

Thus, Ranis and Stewart (2005) conclude that it is crucial that a country works to advance both HD and EG, since it is difficult to sustain progress in only one of them, without the support of the other. Also, any EG that has neglected to take care of HD, cannot be sustained. Therefore, a country must always give precedence to HD over EG, if forced to make a choice.

At an intra-country level, Ghosh (2006) comprehensively establishes the two-way positive EG-HD nexus for Indian states and tested for divergence/convergence in EG and HD among the states of India over the decades of 1980s and 1990s. This paper is based on a similar conceptual framework and it extends the analysis to another decade, i.e. 2001-2010. Ghosh (2006) provides strong evidence of HD convergence across states, despite of considerable divergence in real per capita income. This indicates that although the poor states have failed to catch up with the rich ones in terms of per capita income, however, they have managed to reduce the gap in terms of HD. This study also classified the states into the four categories of development, by comparing them to the average performance of the country as a whole. A very important observation that this exercise threw up was that a movement directly from the vicious to the virtuous cycle category seems to be virtually impossible. Therefore, in order to enter into the virtuous cycle, the states must aim to sequence their policy in such a manner that efforts are made to strengthen the HD front first and foremost. For uplifting the states from the vicious to the virtuous cycle via the HD-lopsided path, we must look at allocating more resources to the social sectors, which would have the effect of propelling HD. Moreover, it is HD that must be given priority over EG in the policy space, because improvement in HD would likely result in advancing EG. However, EG on its own may not prove to be sustainable if HD improvement is not undertaken simultaneously or prior to it. Hence, contrary to conventionally held wisdom, the states must not wait until they attain a certain level of EG before investing in sectors like health and education. This is owing to the superiority of the lopsided-HD path in attaining a sustainable EG and HD scenario.

At a more disaggregated level, Roy (2012) tests for divergence/convergence in EG and HD between the rural and urban parts across 15 states of India. This paper looked at this analysis for a span of four decades. Convergence in incomes is an expected outcome of liberalisation. However, this does not seemed to have occurred among the Indian states. Additionally, the divergence in per capita income was found to be wider in the comparison of rural parts of states, relative to urban areas. On the other hand, a converging trend was found to exist for various HD indicators, both across states, and within states.

Taking this work forward, Mukherjee et al (2014) focussed on the trend of HD across 28 Indian states and its impact on EG, over a time period of three decades. It highlighted the need for government investment in HD augmenting activities in the current period, prominently health and education if India is to harness its full growth potential in the future. This study also confirmed the positive two-way relationship between EG and HD. Additionally, it was shown how rising incomes are associated with smaller and smaller HD improvements. Urban India was found to perform better on the HD front as compared to rural India. This study also pointed out that there are larger gains to be seen for HD improvement in rural areas and the low-income states, if the policy makers are to invest in such initiatives there. It is crucial that these lagging areas witness special policy actions in order to address the weak HD scenario there, if we are to avoid getting trapped in a vicious cycle.

There are numerous steps that the policy makers must concentrate on, to move ahead in this direction. We need to ensure greater effectiveness of the already existing social sector schemes for HD improvement, by plugging in the gaps that result in leakage and prevent the target groups from reaping in the desired benefits. To do so, efficient government mechanisms and better supporting institutions need to be in place. Also, if we are to optimally enjoy the positive benefits from the EG-HD spiral, it is important to take care of rural-urban, as well as across-the-states disparities, in order to create a balanced atmosphere. Again, we must not forget about the vital role that EG plays in propelling our central objective of HD improvement: it provides a larger fiscal base through taxation, which secures greater resources for financing HD improving measures. Thus, through careful choices and persistent efforts, it is of utmost importance that the laggard states step up their spending and efficiently utilise their already allocated funds towards HD initiatives, so that they can successfully make their development transition into the virtuous cycle.

Mukherjee and Chakraborty (2007) attempt to bring the extremely pertinent issue of environmental sustainability into this discussion. Since the quality of the environment has a great bearing on the quality of life, it is also necessary that in the fervent pursuit of development, a country does not grow at the cost of ignoring its environmental concerns. Such a development will indeed not be ‘sustainable’. If not associated with the requisite level of governance, increasing levels of growth might bring about impacts like natural resource depletion, adverse health consequences of environmental degradation, for example, pollution. Such a scenario is possible to imagine if

some states choose to grow by hosting several environmentally damaging but fast-growing industries. Additionally, a 'one-size-fits-all' Nation-wide Environmental Policy is unlikely to work. Individual states must regularly assess their environmental performance, and must accordingly adopt environmental management practices based on their specific needs, in order to achieve sustainable EG.

The relationship between EG and environmental sustainability becomes significantly more complex in the context of a developing country like India, where a large section of the population is heavily dependent on natural resources for their livelihood. Post liberalisation, India focussed its efforts on growth, and created little room to accommodate environmental needs in its economic policy. Hence, now it becomes even more vital for us to integrate environmental sustainability in the process of development, by carefully balancing HD activities alongside maintaining a stable environment that consistently provides resources and protects people from natural disasters. It must also be noted here that HD and EG improvement can raise the demand for a better environment, thus effectively providing a demand side solution to the issue of addressing the need for environmental sustainability.

It is argued that in order to test for the 'Environmental Kuznets Curve' accurately, it is important to develop a composite indicator of environmental quality. The EKC relationship implies an inverted U-shaped curve: with the rise in Per Capita Income, environmental degradation continues up to a certain level, but improves later, as with increasing prosperity, the country shifts to employing cleaner production technologies and spends more on pollution abatement. Thus arises the importance of a figure like the Environmental Performance Index, to be computed on a regular basis.

Database and Empirical Findings

In this section, we evaluate the relative performance of 28 Indian states on economic growth rates and different indicators of human development based on the σ-measure and the β-test of convergence and establish the relationships between EG and HD. The data on HD indicators such as infant mortality rate (IMR) and literacy rate (LR), EG indicators such per capita state domestic product (PCSDP), rate of growth of PCSDP, headcount ratio etc. are all obtained for three time points i.e., early 1990s, 2000s and around 2010, from the Planning Commission's and Central Statistical Organisation's databases. Data for the three new states formed in 2000 i.e. Chhattisgarh, Jharkhand and Uttarakhand are available only post 2000. We use the Human Development Index (HDI) for Indian States as calculated by Mukherjee et al. (2014). They adopt the NHDR 2001 methodology for calculation of the HDI figures for Indian states by considering three variables, namely – average monthly per capita consumption expenditure adjusted for inflation and inequality; composite index of health attainment and educational attainment respectively. Thus the HDI figures are akin to the Income Inequality adjusted HDI (IHDI) calculated in the Human Development Reports by UNDP for all countries.

EG and HD across States (1990-2010): Growing Disparity or Convergence

Table 2 presents the data relating to growth and human development indicators, where the states have been ranked on the basis of their HDI values. Data depicts that Kerala continues to be the best performing state during 1990-2010 period. Bihar and later Jharkhand were the worst performing states in terms of HDI until 2009-10. However, the most recent HDI calculations for the year 2011-12 reveal that UP is now the worst performing state. Odisha had the highest IMR until 2000 while Assam and Madhya Pradesh had the highest IMR in 2013. So far as LR is concerned, Bihar remained the worst performing s through the two decades under consideration. The poverty rate was highest for Bihar in 1993-94, Odisha in 1999-2000 and Jharkhand and Manipur in 2011-12.

Over the years, the HDI figures have shown wide interstate variation. The estimated value of HDI varies from 0.061 to 0.805 in 1993, 0.074 to 0.815 in 1999-00 and 0.122 to 0.911 in 2011-12. While Himachal Pradesh, Uttarakhand, Maharashtra, Tamil Nadu and Goa were amongst the biggest gainers in HDI value, Mizoram, Nagaland, Punjab, Manipur and Assam experienced a decline in their HDI values (see figure 1). Note that four out the five states that experienced a decline in their HDI values are North eastern states.

Table 2. HD indicators and EG across States in India (1990 to 2010)

		IHDI 1993		IHDI 1999/00		IHDI 2011/12		Infant Mortality Rate			Literacy Rate (%)			Headcount ratio (%)			PC NSDP (Triennium average) Rs.		
	States	VALUE	RANK	VALUE	RANK	VALUE	RANK	1992-93	2000	2013	1991	2001	2011	1993-94	1999-2000	2011-12	1992-1994	1998-2000	2010-2012
1	Andhra Pradesh	0.217	17	0.288	14	0.309	17	70	65	40	44	60	67	22	16	9	15,506	20,345	38,636
2	Arunachal	0.11	22	0.168	21	0.124	27	40	44	33	42	54	65	39	33	35	18,042	19,540	34,627
3	Assam	0.147	21	0.144	25	0.138	26	89	75	55	53	63	72	41	36	32	14,540	14,760	21,720
4	Bihar	0.061	27	0.074	28	0.158	25	89	62	43	38	47	62	55	43	34	6,438	7,011	13,198
5	Chhattisgarh	0.069	23	0.155	23	0.18	24	85	79	46	43	65	70			40	13,822	15,117	27,080
6	Goa	0.7	2	0.701	2	0.803	2	32	23	10	76	82	89	15	4	5	46,869	69,839	123,974
7	Gujarat	0.362	10	0.39	11	0.477	10	69	62	37	61	69	78	24	14	17	20,505	25,408	56,535
8	Haryana	0.396	8	0.49	7	0.493	7	73	67	42	56	68	76	25	9	11	24,117	28,810	61,188
9	Himachal	0.43	7	0.55	5	0.647	3	56	60	36	64	76	83	28	8	8	19,191	26,136	49,205
10	Jammu	0.316	13	0.406	10	0.479	9	45	50	37	-	56	67	25	3	10	17,190	19,424	28,830
11	Jharkhand	0.061	28	0.077	27	0.222	21	89	70	38	41	54	66			37	11,221	16,254	25,535
12	Karnataka	0.326	12	0.379	12	0.42	12	65	57	32	56	67	75	33	20	21	16,909	23,382	41,819
13	Kerala	0.805	1	0.815	1	0.911	1	24	14	13	90	91	94	25	13	7	19,154	24,721	52,866
14	Madhya Pradesh	0.069	24	0.152	24	0.186	23	85	88	55	44	64	69	43	37	32	12,337	14,963	23,281
15	Maharashtra	0.446	5	0.506	6	0.629	5	51	48	25	65	77	82	37	25	17	24,225	29,978	61,986
16	Manipur	0.259	15	0.271	16	0.199	22	42	23	10	60	71	79	34	29	37	13,913	16,121	22,003
17	Meghalaya	0.225	16	0.26	18	0.246	20	64	58	48	49	63	74	38	34	12	14,277	18,731	33,452
18	Mizoram	0.613	3	0.576	4	0.408	13	15	21	37	82	89	91	26	19	20			39,113
19	Nagalang	0.438	6	0.467	8	0.257	19	17		23	62	67	80	38	33	19	26,558	26,175	46,148
20	Odisha	0.159	19	0.175	20	0.261	18	112	96	51	49	63	73	49	47	33	11,965	13,680	24,558
21	Punjab	0.562	4	0.578	3	0.538	6	54	52	27	59	70	76	12	6	8	25,941	30,221	46,316
22	Rajasthan	0.155	20	0.265	17	0.324	15	73	79	49	39	60	66	27	15	15	13,343	16,768	29,318
23	Sikkim	0.217	18	0.236	19	0.324	16		49	25	57	69	81	41	37	8		20,776	72,756
24	Tamil Nadu	0.387	9	0.462	9	0.633	4	68	51	21	63	73	80	35	21	11	18,950	25,412	56,320
25	Tripura	0.28	14	0.285	15	0.354	14	76	41	30	60	73	87	39	34	14	11,627	17,291	39,967
26	Uttar Pradesh	0.066	25	0.142	26	0.122	28	100	83	52	42	56	68	41	31	11	10,892	11,930	18,012
27	Uttarakhand	0.066	26	0.162	22	0.426	11	100	50	32	58	72	79			29	14,798	17,816	52,169
28	West Bengal	0.353	11	0.371	13	0.483	8	75	51	33	58	69	76	36	27	20	13,463	18,383	32,552
	CV	0.686		0.568		0.541		0.395	0.367	0.364	0.230	0.149	0.109	0.303	0.533	0.560	0.443	0.513	0.526

Source: Mukherjee et al. (2014); State Domestic Product (State Series), Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India, New Delhi (http://mospi.nic.in)

A quick examination of σ-convergence, based on the estimate of coefficient of variation (CV, last row of table 2) reveals that CVs of human development indicators and the HDI have declined over the concerned period, while CVs of Poverty headcount ratio (HCR) and PCSDP have been consistently rising.

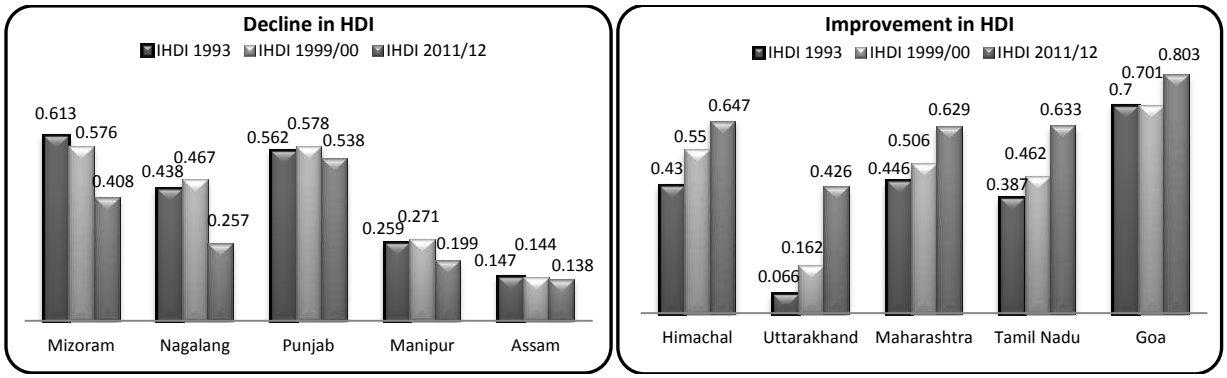

Figure 1. Best and Worst Performers on HDI over the period 1990-2010
Source: Charts based on data from Mukherjee et al. (2014).

Test for absolute β-convergence requires estimating the following convergence equation:

$$\left(\frac{\ln(X_{i,t}) - \ln(X_{i,t-\tau})}{\tau}\right) = \alpha + \beta \ln(X_{i,t-\tau}) + \varepsilon_{i,t}$$

where the left hand expression represents the i^{th} state's annual average growth rate of variable X (with higher values being preferred) between the period t and t-τ, and ln(X) is the natural log of variable X. A significant negative coefficient of β implies evidence of a negative correlation between the variable's initial value and its subsequent growth, i.e. absolute β-convergence. The convergence equations estimated using Ordinary Least Squares (OLS) method, provide the following results (see table 3).

Table 3. Results of the β –convergence test:

Dependent Variable	Period	Coefficient on Initial Level	Probability	R-squared
Growth in HDI	1993 to 1999/00	-0.121*	0.000	0.392
	1999/00 to 2011/12	-0.055***	0.089	0.125
	1993 to 2011/12	-0.019	0.268	0.022
Growth in LITRATE	1991 to 2001	-0.001*	0.000	0.710
	2001 to 2011	-0.0004*	0.000	0.634
	1991 to 2011	-0.001*	0.000	0.760
Growth in PCSDP	1993 to 1999/00	3.9×10^{-7}	0.237	0.028
	1999/00 to 2011/12	2.93×10^{-7}	0.125	0.029
	1993 to 2011/12	3.02×10^{-7} *	0.025	0.269

Source: Authors' own calculations.
Note: *: Significant at 1%
**: Significant at 5%
***: Significant at 10%

β -convergence test results presented in Table 3 suggest the following:
(i) There is significant convergence in HDI figures observed during 1993 to 1999/2000 period at the rate of 12% per annum. This convergence trend continued, albeit not as strongly during 2000 to 2011/12 period at the rate of 5.5% per annum.
(ii) There has been a strong tendency of convergence in LR. The estimated rate of convergence in LR varies from 0.04 per cent to 0.01 per cent per annum.
(iii) The coefficient on initial level of PCSDP is found to be positive in all the time periods considered, although a strong trend of divergence in PCSDP is observed only over the entire period of 1993 to 2011/12.

Thus, while the HDI and LR exhibit significant declining trend in regional disparity during 1990-2010, PCSDP displays significant divergence across the states over the two decades under consideration. This indicates that the gap between rich and poor states observed for PCSDP has been reduced for HDI and LR figures. Despite significant divergence in PCSDP, the high rates of convergence in HDI and LR have made it possible to achieve sustained reductions in the regional disparity of HDI. This result implies that the poor states that failed to catch up with the rich ones in terms of per capita income have at least managed to catch up in terms of other indicators of human well-being.

Empirical findings on the two way relation between EG-HD

Using the conceptual framework based on Ranis and Stewart (2005) and Ghosh (2006), this section examines the relationships between EG and HD in the two chains (A and B). In the absence of continuous time series data on HD indicators, we have examined the two way relationship in a cross-sectional setting, by testing causality using appropriate leads and lags in the dependent and independent variables, respectively. To study the causality running from EG to HD (i.e., chain A), we have examined the effects of average PCSDP over the preceding five years (t-5) on HD indicators in a year(t), specifying the relationship as:

$$log(HD)_t = \alpha + \beta log(PCSDP)_{t-5} + \gamma(SSE)_t + \theta(HCR)_t + \delta_1(D1) + \delta_2(D2) + \varepsilon_t$$

And, to study the reverse causality (i.e., chain B), we have examined the effects of HD in a year (t) on the triennium average PCSDP of succeeding three years (t+3). The relationship is specified as:

$$log(PCSDP)_{t+3} = \mu + \varphi log(HD)_t + \mu(ROGPCSDP)_{t-3} + \omega(HCR)_t + \pi_1(D1) + \pi_2(D2) + \epsilon_t$$

where HD is human development indicator (HDI, IMR and LITRATE). $(PCSDP)_{t-5}$ is average per capita SDP over the five years preceding the period t; $(PCSDP)_{t+3}$ is average per capita income over the succeeding three years. 'log' is natural logarithm; $(ROGPCSDP)_{t-3}$ is the average annual rate of growth of PCSDP over the preceding three years; SSE is the ratio of social sector expenditure to total state government expenditure; HCR is the poverty headcount ratio (% population below poverty line); D1 is a dummy variable for 1999/00 (D1 = 1 for t = 1999/00, but 0 for 1993 and 2011/12); D2 is a dummy variable for 2011/12 (D2 = 1 for 2011/12, but 0 for 1993 and 1999/00). The dummy variables are included in the equations to see if there has been a change in the structure of the relationships by the end of 1999/00 and 2011/12.

Chain A regressions provide estimated equations for three HD indicators (HDI, IMR and LR) estimated by the OLS method with the pooled state-wise data corresponding to three time points: 1993, 1999/00 and 2011/12. The estimated results of chain A regressions reported in Table 4 clearly show that economic growth measured by average PCSDP has a significant positive effect on all the HD indicators, the coefficient on log(PCSDP) being positive and statistically significant in all the cases. It can also be seen that the social sector expenditure (SSE) has contributed significantly to improvement in HDI levels and literacy rates. Reduction in poverty headcount ratio (HCR) has significantly (at the 1 per cent level) contributed in improving the HDI levels.

A significant negative coefficients of the dummy variable D2 for all runs indicates a structural change in the relationship between EG and HD indicators in the second decade under consideration. The structure of the relationship for HDI and IMR remained stable during the 1990s. However, the same for LITRATE changed significantly also in the first decade under consideration.

Table 4. Chain-A Regressions: From EG to HD

	Equation 1	Equation 2	Equation 3
Dependent Variable ➔	$LOG(HDI)_T$	IMR_T	$LITRATE_T$
Variables ↓	Coefficient		
C	-10.091 (0.000)*	269.795 (0.000)*	-113.032 (0.000)*
$LOG(PCSDP)_{T-5}$	0.905 (0.000)*	-22.545 (0.000)*	16.166 (0.000)*
SSE_T	0.017 (0.035)**	0.298 (0.420)	0.381 (0.061)***
HCR_T	-0.019 (0.000)*	0.042 (0.853)	-0.035 (0.739)
D1	-0.151 (0.175)	-2.888 (0.612)	7.827 (0.006)*
D2	-0.674 (0.000)*	-11.844 (0.054)***	7.332 (0.016)**
Adjusted R-squared	0.676	0.487	0.643
Probability (F-statistic)	0.000	0.000	0.000
N	75	74	74

Source: Authors' own calculations.
Note: *: Significant at 1%
**: Significant at 5%
***: Significant at 10%

Table 5. Chain-B Regressions: From HD to EG

Dependent Variable ➔	$LOG(PCSDP)_{T+3}$		
	Model A	Model B	Model C
Variables ↓	Coefficient		
C	10.504 (0.000)*	10.749 (0.000)*	9.329 (0.000)*
$LOG(HDI)_T$	0.412 (0.000)*		
IMR_T		-0.007 (0.000)*	
$LITRATE_T$			0.017 (0.001)*
$ROGPCSDP_{T-3}$	2.596 (0.000)*	3.213 (0.002)*	2.243 (0.005)*
HCR_T	-0.008 (0.029)**	-0.019 (0.000)*	-0.017 (0.000)*
D1	0.023 (0.749)	-0.091 (0.257)	-0.179 (0.074)***
D2	0.492 (0.000)*	0.219 (0.036)**	0.138 (0.319)
Adjusted R-squared	0.808	0.771	0.770
Probability (F-statistic)	0.000	0.000	0.000
N	75	74	74

Source: Authors' own calculations.
Note: *: Significant at 1%
**: Significant at 5%
***: Significant at 10%

The estimated results of chain B regressions measuring the influence of HD on EG are reported in Table 5. The variable chosen to measure EG is average PCSDP over succeeding three years. It can be seen that all the indicators of HD have significantly positive effects on EG, the coefficients on these variables being positive and statistically significant (at 1% level of significance) in all the cases (models A, B and C have log(HDI), IMR and LITRATE as the human development indicator respectively). The rate of growth of PCSDP over the three preceding years (ROGSDP) has the expected positive and significant effect. HCR has the expected negative and significant coefficient. Moreover, the structure of the relationship for HDI and IMR changed significantly in the second decade

(significant coefficient of D2) while that of LITRATE depicts a change (significant at 10%) in the first decade itself (significant coefficient of D1).

In summary, in exploring the two chains, we find significantly positive effects of EG on HD and of HD on EG. In other words, our empirical findings confirm the two-way relation between EG and HD by way of many, if not all, of those links that data constraints permitted us to consider. For Chain A, in addition to the positive impact of economic growth, HD improvement was larger the higher the percentage of social sector expenditure, the higher literacy rate and the lower the poverty headcount levels. For Chain B, apart from the positive impact of HD on growth, the relationship between HD and EG was stronger the higher the rate of growth of PCSDP. The results also indicate that the two chains can deliver good results in a variety of ways by relying on the strength of particular links in the chains, thereby making up for the weakness of other links. For example, a state can achieve good HD progress by good EG, even in the face of high poverty rates, as long as the percentage of social sector expenditure by the government is high.

Classification in to Virtuous, Vicious and Lopsided cycles of Development

The existence of two chains linking HD and EG is supported strongly both by micro and macro studies in the literature, and by our own empirical results. Countries /states may be on a mutually reinforcing upward spiral, with high levels of HD resulting in high EG and high EG further promoting HD. Conversely, weak HD may result in low rates of EG and, consequently, poor performance in HD indicators. The strength of the crucial links in the two chains influences the extent of mutual reinforcement between EG and HD in either direction, i.e., positively or negatively.

Accordingly, a state's performance can be classified into four categories: (i) *virtuous*, (ii) *vicious* (iii) HD-*lopsided* (i.e., lopsided with relatively strong HD along with weak EG) and (iv) EG-*lopsided* (i.e., lopsided with relatively weak HD along with strong EG). In the virtuous cycle case, improvements in HD indicators enhance EG, which, in turn, further promotes HD, and so on. In the vicious cycle case, poor performance on HD indicators tends to slacken EG performance, which further depresses future HD achievements, and so on. The strength of the linkages in these two chains determines the strength of the two-way relation between EG and HD in either direction. Cases of lopsided development may occur where certain linkages are weak. On the one hand, significant EG may not bring about large improvements in HD indicators if, for example, there are weak linkages, such as a low social sector allocation ratio; on the other hand, good HD performance may not result in higher rates of EG if complementary resources are missing or inadequate such as low public investment rates. Cases of lopsided development are unlikely to persist. In lopsided cycles, either the weak partner eventually dominates and negates any positive impact of the other partner, leading to a vicious cycle case, or the strengthening of crucial linkages may result in a virtuous cycle.

One way of classifying the states into the four categories was to compare their performance on HD and EG over the two decades under consideration, with the average performance of all the states taken together (see figure 2 for the classification in 2011/12). The vertical and horizontal grid lines represent the weighted average performance of all the states, with states' SDP and HDI weighted by their populations in 1991, 2001 and 2011. To this end, we use the state-wise data on HDI for each year against the triennium average value of per capita SDP centering each year of HDI. Thus, the state-wise HDI data for 1993, 1999/00 and 2011/12 are classified respectively against the average value of per capita SDP during 1992-94, 1998-2001 and 2010-12 (Table 6). We find that most states appear as either virtuous (NE quadrant), or vicious (SW quadrant); some show HD-lopsided pattern (NW quadrant), and some depict EG-lopsided pattern (SW quadrant). The movements of states across the quadrants over time provide useful information regarding the paths adopted by them towards attaining the virtuous position of self-reinforcing growth and development.

A strong regional pattern emerges. Nine states continue to remain in the virtuous category through the two decades which include Kerala (KER), GOA, Punjab (PUN), Maharashtra (MAH), Himachal Pradesh (HP), Haryana (HAR), Tamil Nadu (TN), Gujarat (GUJ) and Karnataka (KAR). Most of them are coastal states. Nine states continue to remain in the vicious category through the two decades which include Meghalaya (MEG), Odisha (ODI), Rajasthan (RAJ), Assam (ASS), Madhya Pradesh (MP), Uttar Pradesh (UP), Bihar (BIH), Chhattisgarh (CHH) and Jharkhand (JHA). Thus one third of the states stayed in the virtuous category and another one third remained in the vicious cycle category, justifying the self-reinforcing characteristic of these categories.

Table 6. Classification of States' Performance

Column I		Column II		Column III	
1993		**1999-2000**		**2011-2012**	
HD-Lopsided	**Virtuous**	**HD-Lopsided**	**Virtuous**	**HD-Lopsided**	**Virtuous**
28. West Bengal 25. Tripura 16. Manipur	13. Kerala 6. Goa 21. Punjab 15. Maharashtra 19. Nagaland 9. Himachal Pradesh 8. Haryana 24. Tamil Nadu 7. Gujarat 12. Karnataka 10. Jammu & Kashmir	28. West Bengal	13. Kerala 6. Goa 21. Punjab 15. Maharashtra 19. Nagaland 9. Himachal Pradesh 8. Haryana 24. Tamil Nadu 7. Gujarat 12. Karnataka 10. Jammu & Kashmir	28. West Bengal **10. Jammu & Kashmir**	13. Kerala 6. Goa 21. Punjab 15. Maharashtra 9. Himachal Pradesh 8. Haryana 24. Tamil Nadu 7. Gujarat 12. Karnataka *18. Mizoram* **27. Uttarakhand**
Vicious	**EG-Lopsided**	**Vicious**	**EG-Lopsided**	**Vicious**	**EG-Lopsided**
17. Meghalaya 20. Odisha 22. Rajasthan 3. Assam 14. Madhya Pradesh 26. Uttar Pradesh 4. Bihar	1. Andhra Pradesh 2. Arunachal Pradesh	**25. Tripura** **16. Manipur** 17. Meghalaya 20. Odisha 22. Rajasthan 3. Assam 14. Madhya Pradesh 26. Uttar Pradesh 4. Bihar *5 Chhattisgarh** *11. Jharkhand** *27. Uttarakhand**	1. Andhra Pradesh 2. Arunachal Pradesh *23. Sikkim*	16. Manipur 17. Meghalaya 20. Odisha 22. Rajasthan 3. Assam 14. Madhya Pradesh 26. Uttar Pradesh 4. Bihar 5 Chhattisgarh 11. Jharkhand **2. Arunachal Pradesh**	1. Andhra Pradesh 23. Sikkim **25. Tripura** **19. Nagaland**

Source: Authors' own classification based on data from Mukherjee et al. (2014); State Domestic Product (State Series), Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India, New Delhi (http://mospi.nic.in)

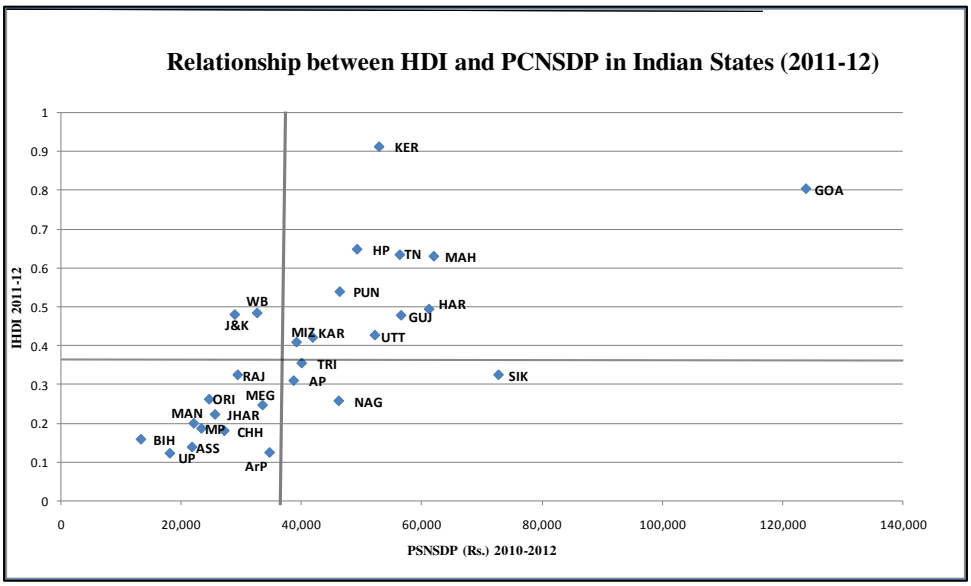

Figure 2.

Source: Chart based on data from Mukherjee et al. (2014); State Domestic Product (State Series), Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India, New Delhi (http://mospi.nic.in)

Most of the states stuck in the vicious cycle are North-Eastern and BIMARU states. Most of these states started with very low levels of HD which have constrained their growth potential. Their low PCSDPs have posed as severe constraints in generating the adequate resources for improvements on the HD indicators. They need to adopt a holistic approach towards attaining both a higher rate of growth as well as improve their human development indicators.

Nine states have shown some movements across categories which are discussed here. At the beginning of the decade 2000-2010 (column II of Table 6), we find the following:
(i) The three new states formed during the year 2000, viz. Chhattisgarh, Jharkhand and Uttarakhand, carved out of states belonging to the BIMARU group, belonged to the Vicious cycle at the beginning of the decade of 2000-2010.
(ii) Tripura and Manipur dropped from the HD-lopsided to the Vicious category.

At the beginning of the decade 2011 onwards (column III of Table 6), we find the following:
(i) Jammu and Kashmir fell from the Virtuous category back to the HD-lopsided category.
(ii) Nagaland fell from the Virtuous to EG-lopsided category.
(iii) Uttarakhand moved from the Vicious to the Virtuous category by 2011/12. This is the only example of a state jumping directly from the Vicious to the Virtuous category.
(iv) Tripura moved from the Vicious to the EG-lopsided category.
(v) Arunachal Pradesh fell from the HD-lopsided category back to the Vicious category.

Earlier studies like Ghosh (2006) and Ranis and Stewart (2005) find no evidence of states / countries moving directly from the vicious to the virtual category, or moving from EG-lopsided to the virtuous category. They mostly find that states/ countries in the HD-lopsided category make the successful transition to the virtuous category sooner or later. In our paper, we find the newly formed state of Uttarakhand making the direct transition from the Vicious to Virtuous category during the last decade. We find the drop of Tripura and Manipur from the HD-lopsided to the Vicious category. We find two states dropping out of the Virtuous cycle, namely Jammu & Kashmir falling to the HD-lopsided cycle, and Nagaland dropping to the EG-lopsided cycle. While we find greater movement during the post-reforms period, we also find more members in the vicious and virtuous categories. One must keep in mind that our analysis is over a different period and we have categorised states based on their achievements in inequality adjusted HDI (different from the HDI measures used in Ghosh (2006) and Ranis & Stewart (2005)).

These findings clearly have some strong implications for policy thrust. They show the need for balance in promoting HD and EG because it is very difficult to sustain one without the other. There have been cases where states have dropped from both HD-lopsided and EG-lopsided categories to the vicious cycle. Our findings here reveal that it is not possible to reach the ideal of a virtuous cycle by focusing only on EG or HD while neglecting the other, since any EG or HD attained in this way will not be sustained. Most states that find themselves close to the border (figure 2), need to focus on attaining both the objectives simultaneously, else they drop back in to the vicious cycle, often even after managing to graduate to the virtuous category.

Summary and Conclusion

Reduction of regional disparities is an important national objective. The strength of a building depends on the strength of its weakest pillar. Similarly, the bottom-line of India's growth and human development will depend on the incomes and socio-demographic indicators of development in eastern and northern India. This paper evaluates the relative performance of 28 Indian states on human development during 1991-2011. The issue of convergence is addressed and the extent to which measures of human well-being (viz, HDI, LR and IMR) alternative to real per capita income are converging across the states is examined. Cross-sectional growth regression reveals strong evidence of regional convergence in HDI and LR despite considerable divergence in PCSDP over the two decades under consideration. There is thus the evidence of poorer states catching up with the richer states in terms of the indicators of HD.

The investigation into the determinants of HD progress and EG clearly demonstrates the importance of the two- way relationship between them. The empirical work confirms the significance of a number of links in the two chains—including poverty rate and percentage of social sector expenditure in Chain A, and the rate of growth of PCSDP in Chain B, in addition to the important inputs of EG and HD, respectively. Moreover, it is found that, even in the presence of certain weak links in a chain, it is possible to achieve significant progress by particularly strong performance in other links. Because of the strong two-way relationship between EG and HD established here empirically and based on the temporal changes in states' classification across different categories of EG-HD, one can infer that promotion of *both* EG and HD are crucial to sustain progress in either. EG, which is an important input into HD improvement, is itself not sustainable without improvement in HD, just as improvements in HD without EG are not sustainable for long. These findings contradict the view that EG (or HD improvement) needs to be postponed until HD-improvement (or economic resource expansion) takes place. Economic policies with focus on any one of these two major objectives will result in unsustainable outcomes.

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