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Transition pattern of Indian states across different categories of growth and development: Post economic liberalisation experience

***Shalini Saksena*[1], *Moumita Deb*[2]**

[1]*Delhi College Of Arts & Commerce, University Of Delhi, New Delhi, India*
[2]*India Development Foundation, Gurugram, Haryana, India*

corresponding e-mail: ssaksena@dcac.du.ac.in
address: E-1/19, Vasant Vihar (Residence) New Delhi 110057, India

This paper analyses the emerging trends in twenty eight major states in India in respect of few key parameters which have an intrinsic bearing on social and economic development and establishes the economic growth (EG) - human development (HD) nexus in the post economic reforms era (1990s to 2010s). Data for the period 1990 to 2011/12 is used to analyse the relative performance of Indian states on human development and growth indicators and determine if inter-state disparity has increased or decreased over time. The two way relationship between EG and HD is empirically estimated using cross section pooled data. Further, states are classified into four different categories of growth and development: (i) vicious cycle (low EG - low HD), (ii) virtuous cycle (high EG - high HD), (iii) lopsided-EG (high EG - low HD) and (iv) lopsided-HD (low EG - high HD), for the years 1993, 1999-2000 and 2011-12. The pattern of transition of states across different categories over the two decades is traced. Such categorization and the shifts therein have obvious policy implications. The paper highlights the need for more focused regional planning and a simultaneous policy thrust on EG and HD to enable states escape the vicious cycle of low growth and development.

JEL Classifications: O15, O47

Keywords: Human development, economic growth, Indian states, economic liberalisation

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Introduction

There is ample empirical evidence to show that the objectives of achieving higher rates of economic growth (EG) and improvements in indicators of human development (HD) are neither mutually exclusive nor perfectly correlated. Benefits of economic growth usually remain concentrated in few hands and do not always trickledown to the bottom automatically (Dréze and Sen, 2013). Similarly, focusing primarily on improving indicators of human development alone may not ensure economic growth (Bhagwati and Panagariya, 2013). Both objectives need to be addressed in tandem in the right perspective while also factoring in the characteristics of a large population base, widening income disparities and climate change disturbances in to the growth-cum-development trajectory of India. Economic growth rate in India, post economic liberalization in early 1990s, picked up significantly. This was accompanied by rapid improvement in various indicators of human development in terms of demographic characteristics as well as social development indicators. While the country made major strides in health and education sectors, the performance on overall human development front has remained 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 (Appendix) on India's HDI and economic growth rates over the corresponding periods.

While the HDI value has been improving successively, lot of ground needs to be covered to address the many shortcomings that are 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 performs poorly on many indicators of inequality, in both absolute as well as relative terms. Given the country's current rate of progress on human development, it may well be a couple of decades before India reaches the 'high' development category of HDI.

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

In this paper, the emerging trends in respect of a few key parameters which have an intrinsic bearing on social and economic development are analysed. 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. Data for the period 1990 to 2011/12 are used to analyse the relative performance of these states on human development and growth indicators and determine if inter-state disparity has increased or decreased over time. Further, the two way relationship between EG and HD (i.e., growth-induced HD and HD induced EG) is empirically estimated. States are classified into four different categories of growth and development: (i) vicious cycle (low EG - low HD), (ii) virtuous cycle (high EG - high HD), (iii) lopsided-EG (high EG - low HD) and (iv) lopsided-HD (low EG - high HD). This is done for the years 1993, 1999-2000 and 2011-12, thus covering the period of two decades post the introduction of economic reforms in the country. More importantly, the paper identifies how states have shifted across different categories over the two decades. Such categorization and the shifts therein have obvious policy implications for more focused regional planning aimed at achieving sustainable improvements in HD and EG for lifting the states from the vicious to virtuous cycle category.

Insights from literature on the dynamics of the EG-HD relationship

Overall development of a country encompasses more than just economic development. Improvements in different indicators of human development are increasingly being identified as equally important and fundamental goals of development, which further act as crucial contributors to EG over time. The dynamics of the links between EG and HD are identified and explored in many empirical studies and the two-way link has been rigorously established in the literature. Ranis and Stewart (2005) study the important determinants of the two-way relationship between EG and HD by exploring the possible links that exist between the two. In chain A, EG provides the resources required for improvements in indicators of HD. On the other hand, in chain B, improvements in HD result in a healthier and more educated population, which is more productive and in a better position to contribute to overall economic growth. The analysis however concludes that these connections are not 'automatic'. There are instances where two countries with the same level of per capita income depict very different levels of attainment in terms of HD indicators. The link in chain A depends on various factors such as the propensities of

households to spend on HD improving activities like health and education when bestowed with a higher income. The study also finds that a more 'equal' distribution of income in an economy is beneficial for improvement in HD indicators. Additionally, female ownership of a household's resources is found to increases HD related expenditures. Policy choices by the government in terms of the proportion of its total expenditure that it decides to spend on various HD boosting measures are also important determinants of the link.

Chain B determines 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 via higher education levels and reduction in income inequality, which in turn feeds into EG. Again, the strength of these connections is not 'automatic', and it must be supplemented with diligent efforts from the policy standpoint.

All countries are thereafter classified into the following four categories based on their performance in achieving EG and HD:

- 'Virtuous' category consisting of countries with high levels of EG and HD, that are on a mutually reinforcing upward spiral of high EG feeding into high HD and vice-versa.
- 'Vicious' category consisting of countries stuck in vicious cycle of low HD leading to low EG, and vice-versa.
- 'HD lopsided' category consisting of countries with relatively strong performance on the HD front and poor performance on the EG front, and
- 'EG lopsided' category consisting of countries with relatively strong performance on the EG front and weak performance on the HD front.

Lopsided development is found to be an unstable phase in a country's development path. More often than not, it is seen that in case of lopsided development, targeted policy interventions help countries to successfully make the transition into the virtuous cycle. However, failure to address lopsided development may result in the country slipping 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 focus only on one of them, the study suggests that the country should opt to pursue the goal of HD rather than that of 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. The study finally concludes that it is crucial that a country works to advance both HD and EG, since it is difficult to sustain lopsided development with progress in only one of the objectives. In particular, significant EG achieved at the cost of neglect of HD indicators cannot be sustained. Therefore, if a country has to make a choice between the two objectives, it must always give precedence to HD over EG.

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. The study provides strong evidence of HD convergence across states, despite 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, they have managed to reduce the gap in terms of HD. This study also classified the Indian states into the four categories of development as defined in Ranis and Stewart (2005), by comparing the performance of each state vis-à-vis the average performance of the country as a whole. An important observation thrown up by this exercise is 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 interventions in a manner that efforts are made to first strengthen the HD front. For uplifting the states from the vicious to the virtuous cycle via the HD-lopsided path, the allocation of resources must shift towards the social sectors to

propel HD. Moreover, it is HD that must be given priority over EG in the policy space, because improvement in HD would likely result in higher 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. Thus, this study concludes by highlighting the superiority of the lopsided-HD path over the lopsided-HD path in attaining a sustainable EG and HD scenario.

An extremely pertinent issue pertaining to environmental sustainability is brought into the discussion by Mukherjee and Chakraborty (2007). Since environment quality 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 and adverse health consequences of environmental degradation. Such a scenario is possible 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 achieving economic growth with little room to accommodate environmental concerns in its economic policy. The study highlights the need 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.

In the Indian context, Roy (2012) presents a more disaggregated study which tests for divergence/convergence in EG and HD between the rural and urban parts across 15 states of India. This study conducts the analysis for a span of four decades. Convergence in incomes, which is an expected outcome of economic liberalisation, is not seen in case of Indian states. Additionally, the divergence in rural-urban per capita income is found to be wider. However, a converging trend is found to exist for various HD indicators, both across states, and within states.

The two-way EG-HD relationship is estimated for Indian states over a period of three decades in Mukherjee et al. (2014). The study highlighted the need for government investment in HD augmenting activities, prominently in health and education, if the country is to harness its full growth potential in the future. It estimates and finds a declining marginal impact of rising incomes on HD improvements. Urban India is found to perform better on the HD front as compared to rural India. The study thus concludes that there are larger gains to be derived from HD improvement in rural areas and the low-income states with the help of targeted policy initiatives. Greater effectiveness of the already existing social sector schemes for HD improvement can be ensured by plugging in the gaps that result in leakages 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. To optimise the positive benefits from such initiatives, it is important to address rural-urban and inter-state disparities. The vital role that EG plays in propelling the central objective of HD improvement needs to be emphasized: 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 in order to successfully make the transition into the virtuous cycle.

While several studies on EG and HD across Indian states have established the two-way relationship, this paper further attempts to classify their performance in to different categories of growth and development (in the style of Ranis and Stewart, 2005) and thereafter identify the transition made by states in and out of different categories over the two decades since the introduction of economic reforms in India in early 1990s.

III. Data and variables used

The data on HD indicators such as infant mortality rate (IMR) and literacy rate (LR), EG indicators such per capita state domestic product (PCSDP) and rate of growth of PCSDP (ROGPCSDP), headcount ratio (HCR), percentage of social sector expenditure (SSE) 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. PCSDP figures are in real terms at constant 2004-05 prices. Data for the three new states formed in the year 2000 i.e. Chhattisgarh, Jharkhand and Uttarakhand are available only post 2000. Data on Human Development Index (HDI) for Indian States is taken from Mukherjee et al. (2014), where state-level HDI is calculated by adopting the NHDR 2001 methodology. The computed HDI comprises of three variables: (i) Inflation and inequality adjusted monthly per capita consumption expenditure (ii) A composite index of educational attainment and (iii) A composite index of health. The variables are first normalized using the following formula:

$$\left(X_{ij} - \min X_i\right) / \left(\max X_i - \min X_i\right)$$

Where X denotes any of the three aforementioned variables, 'i' refers to the particular variable in consideration, and 'j' refers to the state. Average of the normalized values of the three indices thus obtained, is taken, to arrive at the HDI Score for the j^{th} State.

The Monthly Per Capita Consumption Expenditure (MPCE) of a state is first adjusted for inequality by using a state-specific Gini Ratio (GR). The inequality adjusted average MPCE (IMPCE) is calculated as follows:

$$IMPCE_{ij} = \left(1 - GR_{ij}\right) * MPCE_{ij}, \qquad \text{where } 0 \le GR_{ij} \le 1$$

This IMPCE is then adjusted for inflation (IIMPCE: Inequality-cum-Inflation adjusted MPCE) by using state-specific poverty line (PL) in Rupees per capita per month, to enable meaningful inter-temporal and inter-spatial analysis.

$$IIMPCE_{ij} = \left(PL_{1983j} / PL_{ij}\right) * IMPCE_{ij}$$

The IIMPCE of a state thus computed, is then used as an indicator of consumption expenditure in the calculation of the HDI Score. In order to compute the composite indicator of educational attainment, two variables are used: literacy rate for the age group of 7 years and above (e_1) and adjusted intensity of formal education (e_2). The idea is to capture the actual state of educational attainment for which both the literacy rate and the

drop-out rate need to be factored in. In accordance with the NHDR 2001 methodology, weights of 0.35 and 0.65 are assigned to e_1 and e_2, respectively. In order to construct the indicator of 'Intensity of Formal Education', a weighted average of the class-wise enrollment share in the total enrollment is considered for classes I-XII, with increasing weights over successive classes. This is then adjusted by the gross enrollment ratio for the population of children aged 6 - 18 years. The indicator thus obtained is called the 'Adjusted Intensity of Formal Education'.

Finally, the Composite indicator of health is constructed using two variables: Life Expectancy at age one (h_1) and the inverse of Infant Mortality Rate (h_2). Again, in accordance with the NHDR 2001 methodology, weights of 0.65 and 0.35 are assigned to h_1 and h_2 respectively. The HDI is then calculated as the geometric mean of the normalized indices for each of the three dimensions. Definitions and derivation of other variables used in the econometric analysis are explained Table 4 (Appendix).

IV. Inter-state Growth and Development over 1990-2010: Growing Disparity or Convergence

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. Table 2 (Appendix) presents the data relating to growth and human development indicators, where the states have been ranked on the basis of their HDI values. Amongst the 28 states, Kerala continues to be the best performing state over the two decades. 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 the state of Uttar Pradesh 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 state 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, Appendix)). Note that four out the five states that experienced a decline in their HDI values are North eastern states. The last row in Table 2 (Appendix) provides estimates of coefficient of variation (CV) in each series across different states. A quick examination of σ-convergence, based on estimated CV reveals that variation in human development indicators and the HDI have declined across states over the concerned period, while CVs of Poverty headcount ratio (HCR) and PCSDP have been consistently rising. Thus, disparity in incomes and related measures is seen to widen while the performance in terms of development indicators seems to be converging.

Absolute convergence, called absolute β-convergence in different indicators calls for estimating the following convergence equation:

$$\left(\frac{ln(X_{i,t}) - ln(X_{i,t-\tau})}{\tau} \right) = a + bln(X_{i,t-\tau}) + e_{i,t},$$

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, Appendix).

The results of β -convergence test presented in Table 3 (Appendix) are summarized below:

- 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.
- 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.
- 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 when considered over the entire post liberalization 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 states over the two decades under consideration. This indicates that the gap between rich and poor states which is 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.

V. Findings from econometric analysis of the two way relation between EG-HD

The conceptual framework based on Ranis and Stewart (2005) and Ghosh (2006) is applied to examine the relationships between EG and HD in two chains, i.e. chain A and chain B. Since continuous time series data on HD indicators is not available, the two way relationship is examined in a cross-sectional setting by pooling state level data corresponding to three time points: 1993, 1999/00 and 2011/12. Causality is tested by incorporating appropriate leads and lags in the dependent and independent variables. Chain A representing the causality running from EG to HD estimates the effects of PCSDP averaged over the preceding five years (t-5) on HD indicators in a given year (t). Chain B representing the reverse causality (from HD to EG) estimates the effects of HD indicator in a given year (t) on PCSDP averaged over the following three years (t+3). The relationships are specified as follows:

Chain A regression:

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

Chain B regression:

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

Where '*log*' is natural logarithm and the dummy variables *D1* and *D2* are included in the equations to see if there has been a structural change in the relationships by the end of 1999/00 and 2011/12. See Table 4 (Appendix) below for definition of variables used in econometric exercise.

Estimated results of chains A and B regressions are presented in Tables 5 and 6 (Appendix). Given that data is cross-sectional, the estimates are also corrected for heteroscedasticity using White's correction. Table 5 presents three models estimated 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 show that economic growth measured by average PCSDP has a significant positive effect on all the HD indicators. The coefficient of log(PCSDP) is positive and statistically significant in all models. 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 coefficient of the dummy variable D2 in all models 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 is found to remain stable during the 1990s. However, model III for LITRATE shows a significant structural change both in the 1990s and the 2000s.

Based on probabilities associated with F-statistic, it can be said that all specifications of chain A regressions fit the data well and are significant at 1 percent level. Thus, the models well explain the deviations in different HD indicators.

Table 6 (Appendix) reports the estimated results of three models of chain B regressions measuring the influence of different indicators of HD on EG. In order to capture the lagged impact of HD initiatives on EG, the variable chosen to measure EG is average PCSDP over succeeding three years. In all the models, the indicator of HD (HDI or IMR or LITRATE) is found to have to have a statistically significant positive coefficient (at 1% level of significance), implying a definite positive impact of improvements in HD indicators on EG. 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). Based on probabilities associated with F-statistic, it can be said that all specifications of chain B regressions fit the data well and are significant at 1 percent level. Thus, the models well explain the deviations in PCSDP across states.

In summarizing the findings of Tables 5 and 6 (Appendix), it can be said that there exist significant positive effects of EG on HD and of HD on EG. In other words, the empirical findings in this paper confirm the two-way relation between EG and HD by way of many, if not all, of those links that data constraints permitted. For Chain A, in addition to the positive impact of economic growth, HD improvement was larger in states with higher percentage of social sector expenditure, higher literacy rate and lower poverty headcount levels. For Chain B, the relationship between HD and EG was stronger in states with higher rates of growth of PCSDP. The results also indicate that several links exist in the two chains to deliver good results. Thus, if some links are found to be weak, the results suggest that strengthening certain other links can help in achieving the desired result. As an example one can attain improvements in HD indicators via higher rates of EG even in the face of high poverty rates. This can be achieved by increasing the percentage of social sector expenditure by the government.

Indian states classified in to Virtuous, Vicious and Lopsided cycles of development

The empirical results obtained in previous section reinforce the findings of several micro and macro studies in the literature that strongly support the existence of two chains linking HD and EG. Different countries or states within a country may find themselves on a mutually reinforcing upward spiral, with high levels of HD resulting in high EG and

high EG further promoting HD. Similarly, some others may experience weak performance in HD indicators resulting in low rates of EG, which further reduces their capacity to improve their 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.

Following Ranis and Stewart's (2005) typology, the performance of Indian states are 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 links, such as low percentage of social sector expenditure by the government. 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 shift to the vicious cycle, or the further strengthening of crucial linkages may result in a shift to the virtuous cycle.

Figure 2 (Appendix) depicts per capita net state domestic product (PCNSDP) plotted versus the state's HDI for the year 2011-12. It is evident that there is a clustering of states towards the north-east and south-west in the scatter plot. The grey lines in the plot represent national averages, plotted to assist classification of states into the four different categories of growth and development. In this paper, states are classified based on the comparison of each state's performance on HD and EG over the two decades under consideration, with the national average performance, where the national average is arrived at by estimating a weighted average of performance of all the states taken together. The weights assigned correspond to the population share of each state. To this end, we use state-wise data on HDI for each year against the triennium average value of PCNSDP centering around the year for which the HDI data is available. Thus, the state-wise HDI data for 1993, 1999/00 and 2011/12 are used along with the average value of PCNSDP during 1992 to 1994, 1998 to 2001 and 2010 to 2012 respectively. National weighted average PSNSDP and HDI are estimated to classify states into four categories. See the classification in Table 7 (Appendix).

The clustering of states in virtuous (NE quadrant) and vicious (SW quadrant) categories is evident through the two decades. Only a few states show HD-lopsided pattern (NW quadrant) and EG-lopsided pattern (SW quadrant). Through the decades, some states have shifted from one category to other and such states have been highlighted in Table 7. Identifying the shift across the quadrants of states over time provides useful information regarding the paths adopted by them towards attaining the virtuous category of self-reinforcing growth and development.

The classification depicts a strong regional pattern. A cluster of nine states continues 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. Another cluster of nine states continues 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).

Most of the states stuck in the vicious cycle are North-Eastern and BIMARU states. The North-Eastern states of India comprise of eight states, namely, Arunachal Pradesh,

Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. This region is remote and largely a hilly region with rocky terrain. Its geographical isolation is intensified by lack of developed transport infrastructure and communication channels which make the region hard to access. This secluded region has been a fertile ground for a lot of ethnic turmoil and armed insurgencies. It is characterized by widespread problems of poverty, gender disparity, rural-urban disparity and poor health of the people. Troubled by geopolitics, this region has remained one of the most backward regions of India.

BIMARU is an acronym that was coined to refer to the laggard Indian states of Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh. These states are characterized by high fertility, high infant and maternal mortality ratio, high population growth rate, low literacy rate and high disparity in male-female literacy rate. These states display underdevelopment and poor performance in most social indicators. Lack of basic infrastructure has posed serious challenges in the effective provisioning of social services.

Thus, most states in the vicious cycle category 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. 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.

Nine states have shown some movements across categories which are discussed below. At the beginning of the decade 2000-2010 (column II of Table 7, Appendix), the following changes were observed:

(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) The North-Easter states of Tripura and Manipur dropped from the HD-lopsided to the Vicious category.

At the beginning of the decade 2011 onwards (column III of Table 7), the following changes were observed:

- The state of Jammu and Kashmir dropped from the Virtuous category back to the HD-lopsided category.
- Nagaland dropped from the Virtuous to EG-lopsided category.
- Uttarakhand moved up 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.
- Tripura moved from the Vicious to the EG-lopsided category.
- Arunachal Pradesh fell from the HD-lopsided category back to the Vicious category.

The classification of states in Table 7 (Appendix) over the two decades throws up some interesting trends. 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 this paper, the newly formed state of Uttarakhand is seen making the direct transition from the Vicious to Virtuous category during the last decade. Tripura and Manipur dropped from the HD-lopsided to the Vicious category. There is also evidence of two states which dropped out of the Virtuous cycle, a category that supposed to be characterized by self-reinforcing EG and HD. While the state of Jammu & Kashmir dropped to the HD-lopsided cycle, Nagaland dropped to the EG-lopsided cycle. Lot of movement in and out of categories is seen during the post-reforms period. Also, the number of states in the vicious and virtuous categories increased. It must be kept in mind that in this paper the categorization of states is based on their achievements in inequality adjusted HDI (different from the HDI measures used in Ghosh (2006) and Ranis & Stewart (2005)).

Given the observations above, there emerge clear implications for the required policy thrust. There is 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. Most states that find themselves close to the border in the lopsided categories (Figure 2, Appendix), need to focus on attaining both the objectives simultaneously, else they may drop back in to the vicious cycle. In fact, this paper finds evidence of states dropping out of the virtuous cycle, a finding that highlights the need for policy assistance even after a state has made the transition to the virtuous category until the links are strengthened enough to become self reinforcing.

Conclusion

For sustaining the impressive growth performance of India, there is need to focus on the growth and socio-demographic indicators of development in the lagging states in eastern and northern India. Wide inter-state disparities need to be addressed as part of the overall national objective of attaining sustainable growth and development. This paper evaluates the relative performance of 28 Indian states on growth and human development indicators during 1991-2011. Cross-sectional growth regression reveals strong evidence of convergence in HDI and literacy rates across states despite considerable divergence in per capita SDP 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 and EG clearly demonstrates strong two-way relationship between them. The empirical exercise 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. The classification of states and the temporal changes in states' classification across different categories of EG-HD highlights the need to promote *both* EG and HD to sustain progress in either. States with resource crunch may not be able to foster efforts to promote both EG and HD. However, it is evident from experience of different states in the country that EG, which is an important input into HD improvement, is itself not sustainable without improvement in HD. Similarly, improvements in HD without EG are not sustainable for long. Thus a simultaneous thrust on both EG and HD is required to enable states move out of vicious or the lopsided categories of growth and development, and sometimes even after the state has made the transition to the virtuous category.

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Appendix

TABLE 1. HUMAN DEVELOPMENT AND ECONOMIC GROWTH IN INDIA: 1990 TO 2014

HUMAN DEVELOPMENT INDEX VALUE	HD CLASSIFICATION	ANNUAL RATE OF GDP GROWTH
0.428 in 1990; 0.496 in 2000	Low HD	6% p.a. during 1991-2000
0.586 in 2010	Medium HD since 2002	8% p.a. during 2001-2010
0.609 in 2014	Medium HD	6% p.a. during 2011-2014

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

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%

TABLE 4. DESCRIPTION AND DEFINITION OF VARIABLES USED IN REGRESSION ANALYSIS

Variable name	Description	Units / range	Definition	Expected sign
		CHAIN A DEPENDENT VARIABLES		
HD_t	Human Development Indicator		Different indicators of HD at time t include HDI, IMR and LITRATE	
HDI	Human Development Index	0 – 1	Human Development Index for each state corrected for inflation and income inequality.	
IMR	Infant mortality rate	0 – 1000	Number of deaths under one year of age per 1,000 live births in a given geographical area during a given year.	
LITRATE	Literacy rate	%	Percentage of the population of an area aged seven years or above who can read and write with understanding.	
		CHAIN A INDEPENDENT VARIABLES		
$(PCSDP)_{t-5}$	Average per capita State Domestic Product over last five years	Rupees	Per capita State Domestic Product at constant 2004-05 prices averaged over the five years preceding year t	+
SSE	Social sector expenditure ratio	%	Ratio of social sector expenditure to total state government expenditure	+
HCR	Headcount Ratio	%	Poverty headcount ratio measured as the percentage of population below state specific poverty line.	-
		CHAIN B DEPENDENT VARIABLE		
$(PCSDP)_{t+3}$	Average per capita income over the following three years	Rupees	Per capita State Domestic Product at constant 2004-05 prices averaged over the three years following year t	
		CHAIN B INDEPENDENT VARIABLES		
$(ROGPCSDP)_{t-3}$	Average annual rate of growth of PCSDP over the preceding three years	%	Annual rate of growth of PCSDP averaged over three years preceding year t	+
D1	Dummy variable for 1999/00	0 or 1	D1 = 1 for t = 1999/00, but 0 for 1993 and 2011/12	+ / -
D1	Dummy variable for 2011/12	0 or 1	D2 = 1 for 2011/12, but 0 for 1993 and 1999/00	+ / -

TABLE 5. CHAIN-A REGRESSIONS: FROM EG TO HD

	MODEL I	MODEL II	MODEL III
Dependent Variable ➔	$LOG(HDI)_T$	IMR_T	$LITRATE_T$
Variables ↓	Coefficient (probability)	Coefficient (probability)	Coefficient (probability)
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: * - implies significance at 1%, ** - implies significance at 5%, *** - implies significance at 10%.

TABLE 6. CHAIN-B REGRESSIONS: FROM HD TO EG

Dependent Variable ➔	$LOG(PCSDP)_{T+3}$		
	MODEL I	MODEL II	MODEL III
Variables ↓	Coefficient (probability)	Coefficient (probability)	Coefficient (probability)
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: * - implies significance at 1%, ** - implies significance at 5%, *** -implies significance at 10%

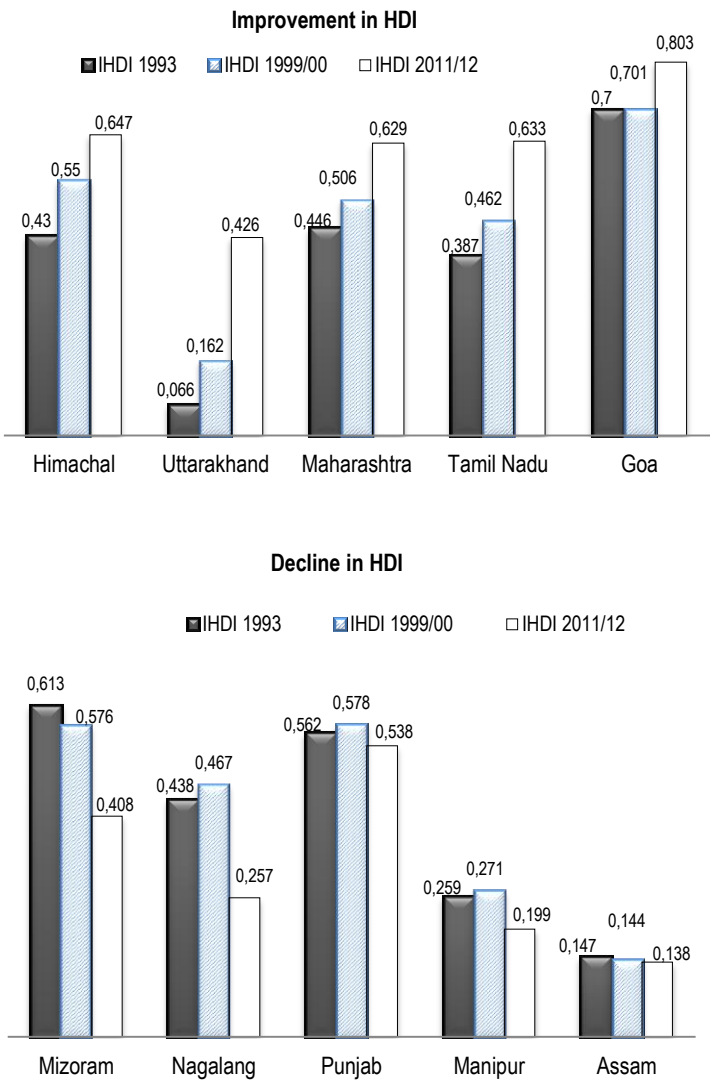
TABLE 7. CLASSIFICATION OF STATES' PERFORMANCE

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

Note: * - Denotes the new states carved out of existing states in the year 2000; Highlighted names are of those states that have shifted.

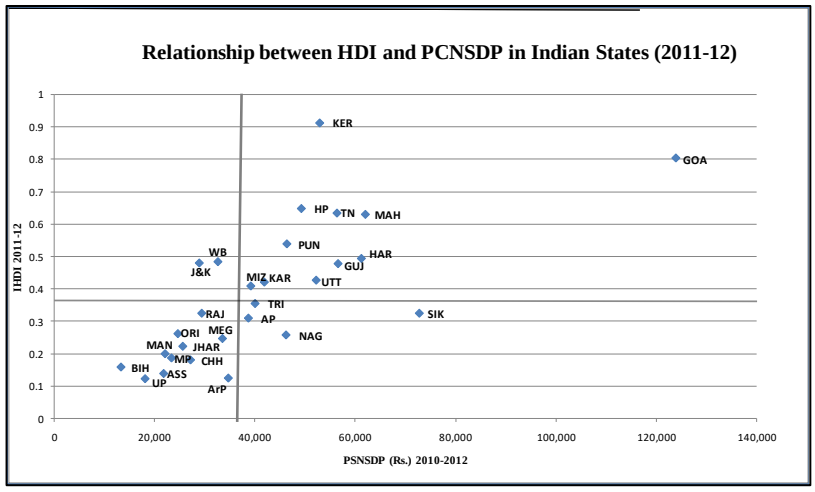
Source: Authors' own classification based on data from Mukherjee et al. (2014); State Domestic Product (State Series), Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India, New Delhi (http://mospi.nic.in)

FIGURE 1. BEST AND WORST PERFORMERS ON HDI OVER THE PERIOD 1990-2010



Source: Charts based on data from Mukherjee et al. (2014).

FIGURE 2. BEST AND WORST PERFORMERS ON HDI OVER THE PERIOD 1990-2010



Source: Scatter plot 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).