Distribution of Human Development, Child Labor and Poverty in India

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1. Introduction

Policy makers have shown great concern for the variations in human development and in the incidence of child labor in most developing countries. Growth pole dynamics and the inverted-U hypothesis postulate that regional inequalities within developing countries will be eventually reduced through factor mobility. In particular, neoclassical growth theory highlights the mobility of supply side factors including capital stock and technical change and labor as reasons for the eventual reduction in such inequalities. On the other hand, dependency and structural change theories postulate that regional inequality is an inevitable outcome of capital accumulation and profit maximization.

Following Barro and Sala-i-Martin (1995), the recent growth literature has focused extensively on the issue of convergence amongst countries. There are two views on how convergence can take place: β-convergence, where poor regions will tend to grow faster than the more developed regions (as the diminishing marginal returns to capital prevail in the latter regions) and σ-convergence, which relates to cross-regional inequalities naturally tending to decrease over time. There is evidence that these two types of convergence have taken place in the developed countries of the world (Barro, Sala-i-Martin, 1995; Coulombe, 2003). Are these observations applicable to the analysis of regional inequalities within a developing country? While convergence may have taken place in advanced countries, there is some evidence pointing to regional divergence rather then convergence within developing countries (Fedorov, 2002; Vanderpnye-Orgle, 2002; Wei and Kim, 2002; Dreze and Sen., 1995).

The empirical assessment of convergence is controversial. Most of the controversy has centered on the level of convergence, i.e. between regions or between

countries. In both cases, the more rigorous analyses of convergence in both developed and developing countries have tended to focus on macroeconomic indicators, neglecting social and quality of life phenomena. But it is the reduction of disparities in human development and living standards that is the ultimate goal of international development. An overall objective of this paper is to analyze regional disparities in human development and living standards in India. Moreover, a growing literature on the economics of child labor provides evidence that the incidence of child labor in developing countries has a high association with the incidence of poverty and with human development indicators. Does this imply that a reduction in regional disparities in human development and poverty would be highly associated with reductions in regional disparities in child labor incidence?

While various notions of inequality are prevalent in the historical economics literature and in empirical applications, the recent literature has introduced the concept of "polarization" which is distinct from inequality. The concept of polarization has to do with clustering of income distribution along key dimensions, which can have features that are quite distinct from inequality (Esteban and Ray, 1994). One of the goals of this paper is to introduce a recently developed measure of polarization and test empirically the evolution of regional polarization in Indian states.

The specific objectives of this paper are to: (1) analyze regional development disparities amongst various states in India to determine if they are on a convergent course; (2) analyze the evolution of regional inequalities amongst states with respect to a a number of socioeconomic indicators and factors that have been suggested to affect the incidence of child labor; (3) investigate the evolution of regional polarization in Indian

4

states; and (4) investigate whether regional indices of human development and child labor incidence follow similar patterns.

The paper is organized as follows. Section 2 discusses the measures of convergence and polarization used in this study. Section 3 addresses availability and limitations of the data. Section 4 investigates the evolution of relative inequalities between Indian states. Section 5 presents trends in regional polarization. Section 6 concludes by summarizing the major findings.

2. Measuring Convergence and Polarization

In a statistical sense, economic series in different regions converge when the differences in the series becomes arbitrarily small over time or, alternatively, when the probability that the series differ by more than some specified small amount approaches 1. The simplest measure of convergence involves a decline over time in the cross-sectional dispersion of economic variables of interest. This is often called σ-convergence. Previous studies of convergence examined the evolution over time of the standard deviation of output per capita across regions or states. Barro and Sala-i-Matin, 1991, 1992; Baumol, 1986; Durlauf and Johnson 1992, use the mean reversion procedure to test for convergence. Essentially, they try to determine whether poor countries grow faster than wealthier ones, which is related to identifying a negative correlation between a country's initial per capita output and subsequent growth for a fixed time period.

In this paper, we measure real convergence and the evolution of inequalities between Indian states by using two approaches. First, we examine a series of socio-economic characteristics of human development and the incidence of child labor in

5

Indian states for selected periods of time: 1961, 1971, 1981 and 1991. The particular variables we examine are: state domestic product (SDP) per capita, proportion of urban population, relative index of infrastructure, total fertility rates, literacy rates, gross primary school enrollment ratio, gross middle school enrollment ratio, the per capita expenditure on education, female labor force participation rates, and infant mortality rates; percentage of population below poverty line; and incidence of child labor (measured by the total child labor population).

To begin our investigation of convergence/divergence amongst Indian states, for each variable we compute the evolution over time of the coefficient of variation (CV) and the Gini Concentration Coefficient (GiniC) across Indian states. The exact functional forms of the coefficient of variation and Gini Concentration coefficient are as follows:

$$CV = \frac{\sqrt{\sum_{i=1}^{N}(X_i - \bar{X})} \Big/ N}{\bar{X}} \tag{1}$$

$$GiniC = \frac{2COV(X, r_X)}{N \bar{X}} \tag{2}$$

where $COV(X, r_X)$ is the covariance between the indicator X and the ranks of all states according to X, $\bar{X}$ is the mean of X (see Pyatt et al., 1980) and N is the number of observations. Note that $GiniC$ is in fact a measure of the concentration of indicator X; hence it is called $GiniC$ in order to distinguish it from the population weighted Gini coefficient which we will employ later in the paper.[‡]

[‡] Milnovic (1997) shows that the Gini coefficient is approximately equal to the product of three elements: a constant, the coefficient of variation (CV) and the correlation between the attribute and its rank.

For each sub-period and variable under consideration we compute the value of the *CV* and *GiniC* of the dispersion.

The preceding measures do not account for the share of the population residing in each state. We therefore also calculate population share-weighted state disparity measures in the form of: Lorenz-consistent Gini coefficient (Gini) and the Generalized Entropy (GE) set of measures, which are also Lorenz-consistent (Cowell, 1995; Shorroks, 1980, 1984; Fedorov, 2002). The first measure of inequality amongst the states can be presented as:

$$Gini = \frac{1}{m}\sum_{i=1}^{N}\sum_{j=1}^{N} f(x_i)f(x_j)\left|x_i - x_j\right| \tag{3}$$

where x_i is the value of the indicator in state i, $f(x_i)$ is the population share of state i in the total population and m is the *country* mean value for the indicator under consideration.

The Generalized Entropy measures are sensitive to various characteristics of the distributions of economic variables, and take the general form

$$GE = \begin{cases} \sum_{i=1}^{N} f(x_i)\left[\left(\dfrac{x_i}{m}\right)^{l} - 1\right], l \neq 0,1 \\ \sum_{i=1}^{N} f(x_i)\left(\dfrac{x_i}{m}\right)\log\left(\dfrac{x_i}{m}\right), l = 1 \\ \sum_{i=1}^{N} f(x_i)\log\left(\dfrac{m}{x_i}\right), l = 0 \end{cases} \tag{4}$$

where all variables are as defined previously. For $l = 0$, the mean logarithmic deviation is defined which is more sensitive to the lower segment of the distribution. For $l = 1$ this measure (the Theil Entropy measure) is sensitive to effectively all segments of the distribution, and setting $l \neq 0,1$ makes the measure more sensitive to the middle

segments of the distribution. Convergence between the relevant series occurs when *CV* or *GiniC* or *Gini or GE* decreases over time.

When studying regional polarization and polarization in distribution in general, it is important to bear in mind that inequality and polarization are two different concepts, where the former is concerned with the overall distribution, and the latter implies the existence of some sort of clustering in the distribution. One could think of polarization as a distributional phenomenon when a population is becoming grouped into clusters, such that within each cluster members are very similar, but between clusters members are different. Inequality measures do not impose a condition of such clustering within distribution. Therefore, none of the above mentioned inequality measures, including GC and GE, can be used as valid measures of polarization. Thus, specifically designed measures of polarization should be used instead. Below we present a recently developed measure of polarization, the Esteban and Ray (1994) index, and apply it to the regional data on human development indicators and the incidence of child labor.

The Esteban and Ray measure (*ER*) can be presented as follows:

$$ER = A\sum_{i=1}^{N}\sum_{j=1}^{N}\boldsymbol{p}_i^{\,1+a}\boldsymbol{p}_j \mid x_i - x_j \mid, \qquad\qquad (5)$$

where $\boldsymbol{p}_i$ is the size of population in region *i*, *N* is the number of states (regions), x_i is the mean **value** of an indicator in state *i,* and *A* is a normalization scalar. The parameter $\boldsymbol{a}$ reflects the degree of polarization whose range is between [0, 1.6]. The higher is $\boldsymbol{a}$, the higher the weight attached to polarization. We set $\boldsymbol{a}$ =1.5 in order to give high weight to polarization. This is also the most common value employed in the empirical literature on polarization, for example see Zhang and Kanbur (2001) and Fedorov (2002). We

use $A = \dfrac{100}{m}$, i.e., normalizing by the mean and multiplying by 100 to make the

magnitude of *ER* comparable to *GC*.

3. DATA

The subject of this study is 15 major states of India. All states with a population of above 5 million in 1991 have been selected, although Assam, Jammu, and Kashmir had to be excluded due to the lack of data for the subsequent analyses in the paper. The data used in this paper are drawn from official publications of India including CMIE, Basic Statistics Relating to the Indian Economy; various issues of the census of India (1961, 1971, 1981, & 1991); and NCERT, All India Educational Survey, (third, fourth, sixth rounds).

Regional inequality can be understood by examining different variables. In the literature, most empirical studies on convergence/inequality have tended to focus on macroeconomic indicators, neglecting social and quality of life. But it is the reduction of disparities in human development and living standards that is the ultimate goal of international development. Therefore, in order to investigate regional inequalities in human development amongst Indian states we have selected indicators which reflect various aspects of economic and human development: per capita state domestic product (SDPP) (constant prices, 1970-71 in Rs), proportion of urban population (Urban), relative index of infrastructure (RII), total fertility rates (TFR) (per woman between 15-49 years of age), literacy rate (LR), gross primary school enrollment ratio (GPSER), gross middle school enrollment ratio (GSSER), per capita expenditure on education (PCEE) (in Rs.),

percentage of female in labor force (% of main workers) (PFLF), percentage of people below poverty line (PBPL), and infant mortality rates per 1000 live births (IMR) . We do realize that in order to have truly comprehensive analysis of regional inequality in human development we should ideally have more indicators, though this is limited by the availability of data.

Moreover, a growing literature on the economics of child labor provides evidence that the incidence of child labor in developing countries has a high association with the incidence of poverty, high total fertility rates, literacy rates, and female labor force participation rates.[§] Thus, one of our policy questions is to examine whether reductions in regional disparities in human development and poverty would be highly associated with reductions in regional disparities in child labor incidence? To answer this question, we investigate regional inequality in child labor amongst Indian states and compare it with the trends in regional inequalities in human development indicators that are supposed to be the driving force for the incidence of child labor. For this purpose, we have collected the data on the incidence of child labor in Indian states over the decades of 1961-91 from Chaudhri, D. P. (1996), A Dynamic Profile of Child Labor in India (1951-1991).

4. Regional Inequalities in India

The preliminary examination of the data in Appendix A generates cause for concern. In 1981 the per capita state domestic product for Bihar was less than 33% of that of Punjab. A decade later the difference was markedly more or less the same, if not worse; the same

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[§] Chaudhri, D.P., A. L. Nagar, E. J. Wilson, and Tauhidur Rahman (2003), Chaudhri, D. P. (1996, 1997a, b, c), and Dreze, J. and A. Sen (1995a).

for Bihar was less than 35% of the figure for Punjab. The literacy rate in 1981 in Bihar was less than 30% of that of Kerala. It remained more or less the same after a period of a decade in 1991. The percentage of people below the poverty line in the 1980s in Bihar was nearly four fold higher than in the top state (which has the lowest incidence of poverty), Punjab. This has increased nearly five fold in the 1990s. Similarly, the infant mortality rate in 1981 in Bihar was nearly three folds higher than in the top state, Kerala. This increased to nearly four folds in 1991.

We employ two kinds of measures to analyze the changes in regional inequality over the decades of 1961-1991. The first includes the coefficient of variation (CV) and the Gini concentration coefficient (GiniC). However, as noted earlier, these two measures do not take into account the population share of each state despite the fact that they are either in per capita form or ratios. Thus, we employ a set of measures which take into account the population share of each state. These measures are the Lorenz-consistent Gini coefficient (GC) and the Generalized Entropy (GE) set of measures, which are also Lorenz-consistent.

The measures appearing in Table 1.1 give an account of the relative dispersion between states in per capita state domestic product and the level of urbanization. From the Table we observe that for SDDP there was decline in CV, GiniC, Gini, GE (1), and GE (2) from 1961 to 1971, and then the measures increase over the decades 1971-91. Also, notice that the GE (0), which is more sensitive to the lower segments of distributions, has worsened steadily over the entire four decades period. It is disconcerting to observe that over a period of 30 years there has been no improvement in income inequality between Indian states. This is more cause for concern given the fact

that income is presumed to be the principal means of achieving various goals relating to health and economic development.

Table 1.1 Regional Inequalities

Variable	State Domestic Product Per Capita (SDDP)				Urbanization			
	1961	1971	1981	1991	1961	1971	1981	1991
CV	0.374255	0.270447	0.352101	0.331425	0.536464	0.401401	0.357212	0.339512
GiniC	0.291349	0.252891	0.297966	0.32597	0.297248	0.299126	0.210537	0.197626
Gini	0.207609	0.153913	0.194794	0.184118	0.440504	0.436039	0.369492	0.353399
GE(0)	0.020045	0.111515	0.131334	0.133283	0.178842	0.031564	0.007696	0.039195
GE(1)	0.061549	-0.04769	-0.04125	-0.02745	0.008187	0.121711	0.102717	0.062477
GE(2)	0.119885	-0.09772	-0.08262	-0.05464	0.005799	0.247089	0.208116	0.122868
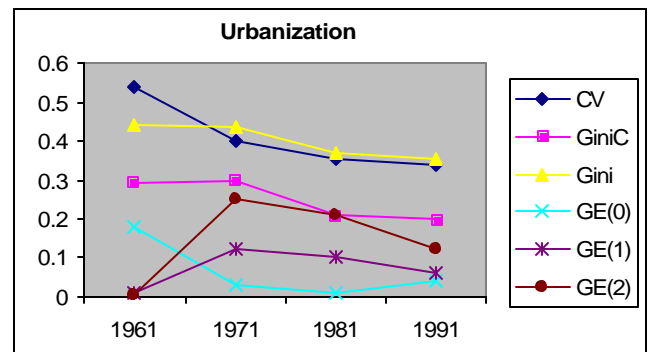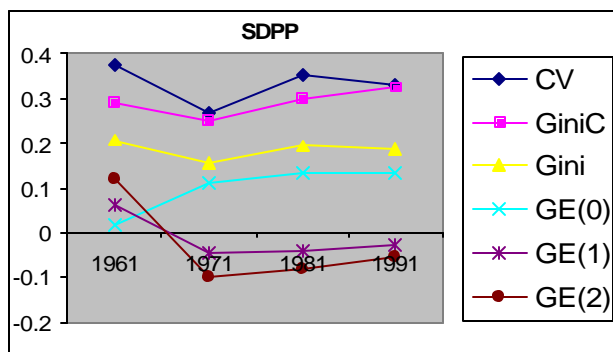
For level of urbanization we notice that, except for GE (0) and GE (1) which shows an increase from 1961 to 1971, there has been considerable improvement over the entire period. The level of urbanization is an indicator of industrialization and movement from reliance on agriculture sector towards the industrial and service sectors. It is also a proxy for a collection of potential negative and positive health related factors, such as pollution, congestion, and access to medical care. Therefore, the net effect of urbanization on health outcomes such as mortality is uncertain. However, Indian states do exhibit movement towards convergence in urbanization.

Table 1.2 Regional Inequalities

Variable	Relative Index of Infrastructure (RII)				Total Fertility Rate (TFR)			
	1961	1971	1981	1991	1961	1971	1981	1991
CV	0.390483	0.393441	0.337217	0.309224	0.227382	0.163544	0.202899	0.284311
GiniC	0.226661	0.228284	0.189078	0.167081	0.132905	0.095845	0.118204	0.160714
Gini	0.351754	0.337106	0.271104	0.220503	0.248603	0.187747	0.245342	0.350278
GE(0)	0.057784	0.070703	0.078965	0.077166	-0.01393	-0.04598	-0.1101	-0.15127
GE(1)	0.046755	0.02813	-0.01025	-0.02766	0.067744	0.077536	0.175383	0.289976
GE(2)	0.093672	0.056966	-0.02087	-0.05408	0.135512	0.156777	0.357969	0.60391
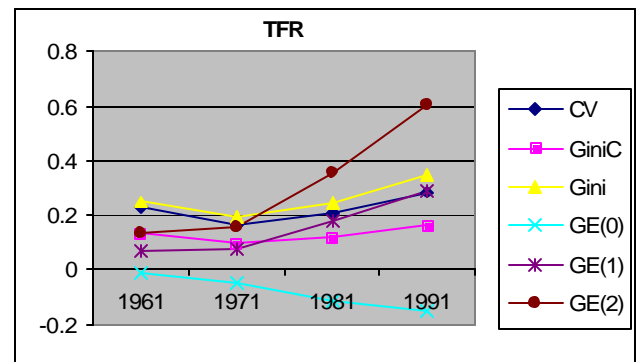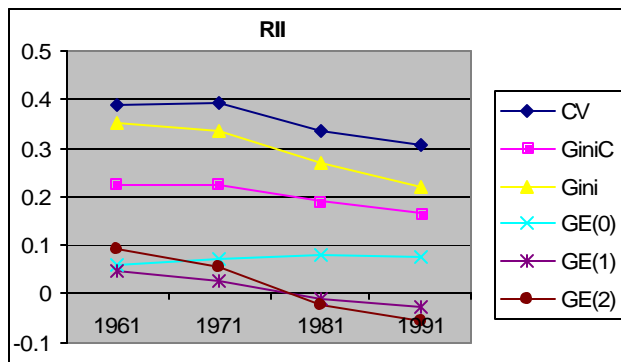
Table 1.2 presents the regional inequality trends for the relative index of infrastructure (RII) and the total fertility rates (TFR). It is clear from the above table that in terms of RII there has been steady improvement between the states of India over 30 years period. However, the picture is not at all optimistic for the TFR. In fact all measures of regional inequality have worsened sharply for the TFR. This is worrisome in light of the vast evidence that the total fertility rate is one of the main contributing factors to the incidence of child labor. Moreover, notice that RII is an overall indicator of the level of infrastructural development in a region, which in our case shows steady improvements between Indian states. However, it is surprising to observe that the decreasing inequality in RII amongst Indian states has not translated into a decrease in TFR.

Table 1.3 Regional Inequalities

Variable	Literacy Rate (LR)				Gross Primary School Enrollment Ratio (GPSER)			
	1961	1971	1981	1991	1961	1971	1981	1991
CV	0.341443	0.312834	0.273346	0.241772	0.270457	0.199936	0.2002	0.18742
GiniC	0.18395	0.166065	0.14759	0.132388	0.154977	0.1139	0.118216	0.107174
Gini	0.30497	0.297429	0.2654	0.226321	0.277883	0.202646	0.209003	0.221499
GE(0)	0.074464	0.086669	0.081881	0.101023	0.084998	0.045546	0.054947	0.038969
GE(1)	0.006786	-0.00706	-0.01596	-0.04842	-0.01641	-0.00802	-0.01725	0.001415
GE(2)	0.017291	-0.01128	-0.03086	-0.09744	-0.03394	-0.01717	-0.03533	0.003246
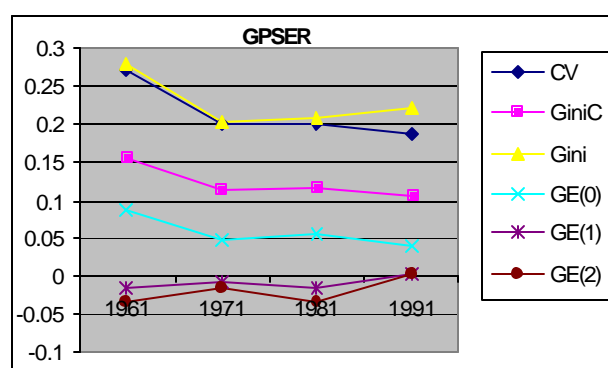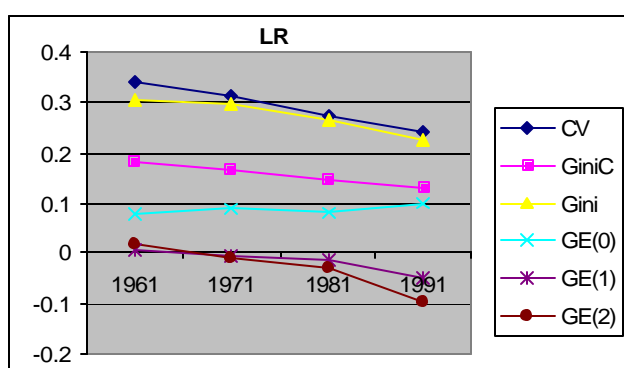
Table 1.3 shows the trend in regional inequalities for the literacy rate (LR) and gross primary school enrollment ratio (GPSER). All measures of regional inequality, except GE (0), show constant improvement for LR. However, the same does not apply to GPSER. In fact GPSER shows slight improvement from 1961 to 1971, but after that there is no clear trend over the remaining period of 1971-91.

Table 1.4 shows inequality trends for gross secondary school enrollment ratio (GSSER) and the percentage of females in the labor force (PFLF). GSSER shows a slight decline from 1961 to 1971, and then an increase from 1971 to 1981, and then again there has been some additional improvement from 1981 to 1991.

Table 1.4 Regional Inequalities

Variable	Gross Secondary School Enrollment Ratio (GSSER)				Percentage of Women in Labor Force (PFLF)			
	1961	1971	1981	1991	1961	1971	1981	1991
CV	0.488347	0.373503	0.436223	0.332043	0.439051	0.601915	0.460705	0.451403
GiniC	0.264133	0.208524	0.234276	0.189951	0.256634	0.356342	0.272133	0.263477
Gini	0.365426	0.310478	0.343144	0.325567	0.415984	0.617378	0.522767	0.467308
GE(0)	0.196813	0.147601	0.206126	0.152383	0.122617	0.180449	0.155177	0.143832
GE(1)	-0.03759	-0.04407	-0.06098	-0.04301	0.039603	0.142248	0.102999	0.060447
GE(2)	-0.0688	-0.08701	-0.1198	-0.09035	0.065373	0.275453	0.187758	0.103597
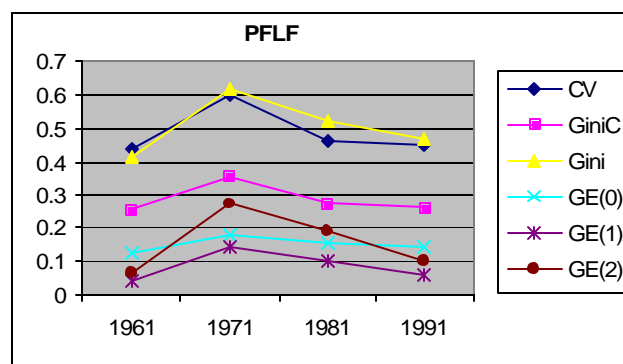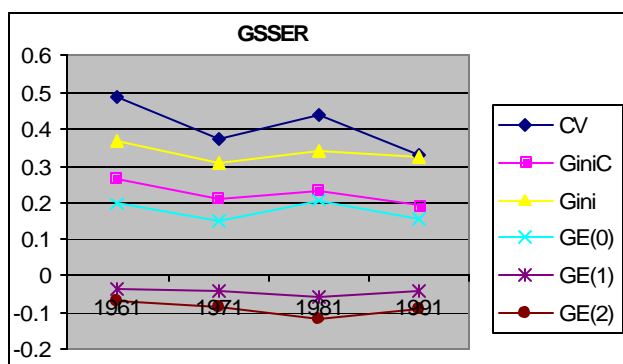
PFLF has worsened from 1961 to 1971, but then it shows steady improvement over the remaining period of 1971-91.

Table 1.5 shows the inequality trends for per capita expenditure on education (PCEE) and the percentage of people below poverty line (PBPL). There has been some improvement in the inequality in education expenditure from 1961 to 1991, but given the length of the period, three decades, the gain is rather trivial. On the other hand, the inequality in PBPL has substantially worsened over the period of 1971-91. In fact the PBPL exhibits a rather pronounced upward trend. This is an indication of increasing disparities amongst the states of India in achieving even a minimum level of standard of living.

Table 1.5 Regional Inequalities

Variable	Per capita Expenditure on Education (PCEE)				People Below Poverty Line (PBPL)			
	1961	1971	1981	1991	1961	1971	1981	1991
CV		0.332338	0.395111	0.341092		0.301014	0.357158	0.443581
GiniC		0.190035	0.214665	0.183128		0.16913	0.206471	0.257053
Gini		0.346892	0.278031	0.243537		0.196963	0.283136	0.344478
GE(0)		0.164769	0.207322	0.175173		-0.07095	-0.11676	-0.11216
GE(1)		-0.04068	-0.09957	-0.09664		0.12613	0.210396	0.265173
GE(2)		-0.09027	-0.20493	-0.19881		0.250579	0.424136	0.532208
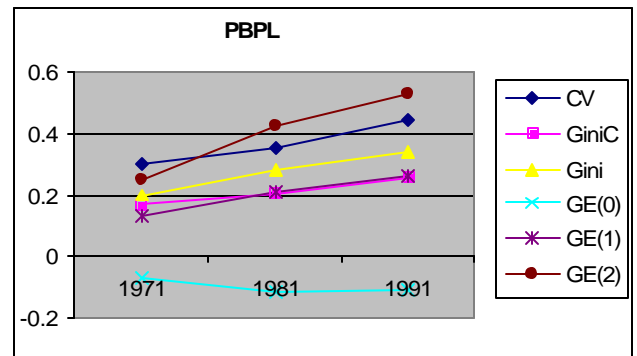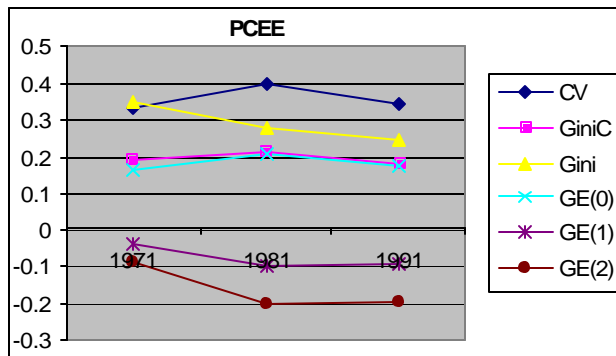
Table 1.6 presents the trends in regional inequalities relating to infant mortality rates (IMR) and the incidence of child labor (CL). CV, GiniC and Gini (0) have worsened sharply for the IMR over the period of 1971 to 1991. Gini, GE (1) and GE (2) indicate some inequality increases for the IMR from 1971 to 1981, and then show some improvements, which once again given the length of the period, a decade, are not significant.

Turning to the incidence of child labor, Table 1.6 indicates that regional disparities in the incidence of child labor have worsened over the period 1961-1991. However, we must emphasize that worsening of regional disparities in the incidence of child labor is not necessarily a negative outcome because disparities between the states might worsen if some states pursued significant reductions in the child labor phenomenon while others did not; or some states experienced significant increase in child labor, while

others made some progress towards its elimination. Nevertheless, increasing disparities in the incidence of child labor can generally be construed as a disappointing outcome because the existence of child labor itself often hinders children's ability to attend school, and more so when it is considered illegal in India .

Table 1.6 Regional Inequalities

Variable	Infant Mortality Rate (IMR)				Total Child Labor			
	1961	1971	1981	1991	1961	1971	1981	1991
CV		0.239484	0.310168	0.356346	0.631389	0.611235	0.648318	0.680947
GiniC		0.136162	0.180533	0.189615	0.351615	0.344026	0.359468	0.375112
Gini		0.260993	0.347991	0.327181	0.735362	0.69648	0.754846	0.803495
GE(0)		-0.05079	-0.03901	0.019612	-0.18819	-0.17934	-0.17918	-0.18395
GE(1)		0.110834	0.140893	0.089124	0.602238	0.555738	0.609849	0.66469
GE(2)		0.2244	0.285546	0.176727	1.351782	1.232857	1.37802	1.517051
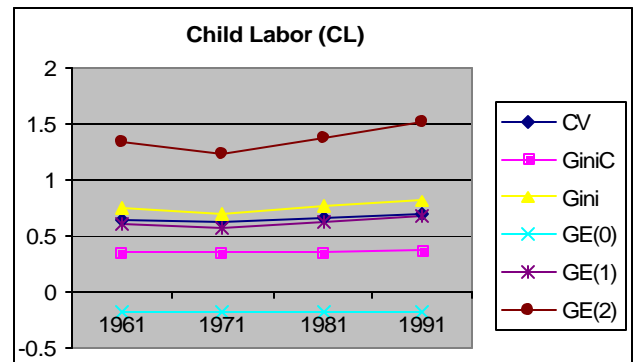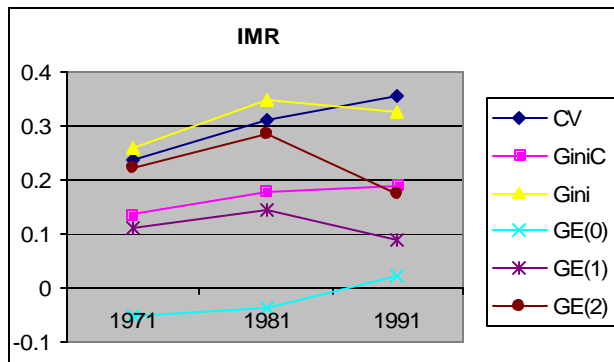
5. Regional Polarization in India

The measures discussed above relate to the regional distribution of human development, poverty and the incidence of child labor but do not show the degree of concentration in clusters within regions or states. Recent literature on inequality makes a distinction between inequality and polarization. The latter relates to the phenomenon of a *disappearing middle class* and *clustering around extremes* in a distribution which may be

existing and/or take place over time.[**] Polarization in the context of regions may be described as a situation where there are groups of regions at extremes of the distribution with high intra-group homogeneity but with a high inter-group heterogeneity. This reflects a different feature of the distribution than that of inequality. Technically speaking, an equalizing transfer of welfare, of Pigou-Dalton type, from a region above the median of the distribution to a region below the median would reduce inequality and polarization, provided that none of the regions move to the other side of the median because of the transfer (Noorbakhsh 2003). However, if such a transfer was from a region on the one side of the median to another region on the same side then inequality would decrease but polarization would increase (Wolfson 1997).

According to Esteban and Ray (1994) the phenomena of polarization in a society is linked to the generation of tensions and social unrest. In the context of regions the convergence of regions may take place around local means at extremes of the distribution as opposed to the global mean. That is, regions will cluster around the highly developed and highly backward poles (Esteban and Ray, 1994).

Numerical values of ER for Indian states are provided in Table 2. The subsequent figures in Table 2 present the dynamics of ER polarization indices for 12 human development, poverty, and child labor factors. From the figures in Table 2 two observations become both clear and important: *First*, there is no indication of polarization amongst the states of India in the context of the level of urbanization, relative index of infrastructure, literacy rates, percentage of females in the labor force, per capita expenditure on education, and infant mortality rates. *Second*, regional polarization in

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[**] See for example Esteban and Ray (1994) and Wolfson (1994 and 1997) on the concept and measurement, Noorbakhsh (2003), Fedorov (2002), and Zhang and Kanbur (2001) on the application of the recommended measures.

Table 2. Esteban-Ray Index of polarization

Year	SDDP	URBAN	RII	TFR	LR	GPSER	GSSER	PFLF	CL	PCEE	PBPL	IMR
1961	0.0082	0.0126	0.0092	0.0075	0.0084	0.0082	0.0092	0.0125	0.0266			
1971	0.007	0.0127	0.0084	0.0059	0.0083	0.0055	0.0079	0.0175	0.0239	0.0103	0.0045	0.0084
1981	0.008	0.0107	0.0068	0.0076	0.0074	0.0057	0.0086	0.0161	0.0266	0.0076	0.0075	0.0108
1991	0.0096	0.0106	0.0054	0.0115	0.0063	0.0068	0.0091	0.0141	0.0289	0.007	0.0087	0.0093
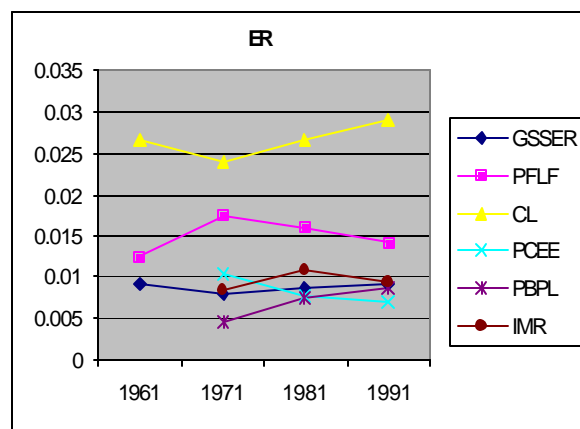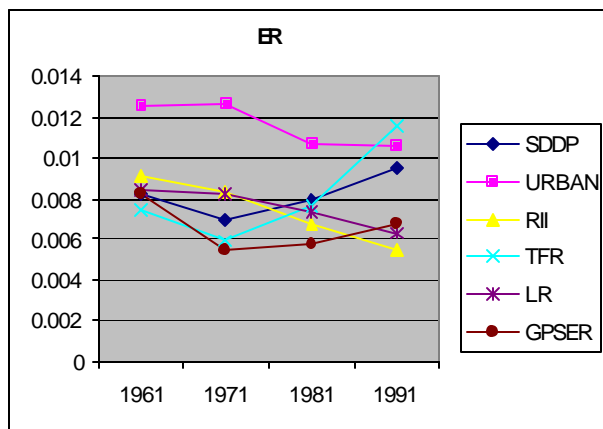
India has been increasing since 1971 in per capita state domestic product, total fertility rate, gross primary school enrollment ratio, gross secondary school enrollment ratio, percentage of people below the poverty line and incidence of child labor. The second observation is very important from a policy point of view because the factors in which polarization is increasing in India are among the main reasons behind the phenomena of child labor, and therefore, increasing polarization in those factors along with polarization in the incidence of child labor point towards empirical evidence that increasing/decreasing disparities amongst Indian states in human development indicators would be highly associated with increasing/decreasing disparities in the incidence of child labor.

Often questions are asked about dynamics of polarization between some exogenously given clusters, e.g., North/South, East/West, and the like. Unfortunately, ER

measure cannot be used to answer these types of questions. ER indices measure phenomena in the distributions such as "clustering around extremes". It takes a distribution of an indicator, e.g., per capita state domestic product, and attempts to identify the presence of clustering without drawing conclusions about the nature of such clustering. In other words, ER indices can detect the presence of polarization, but cannot establish the dimensions along which polarization occurs.

Chaudhri, D.P. et al (2003), while attempting to track mainly supply side factors that affect the incidence of child labor, showed that these factors have a high association with the incidence of poverty, and based on factor analysis of these determinants of child labor, grouped the states of India into two groups: those which are part of the *Virtuous Spiral* and those which are still caught in the *Vicious Spiral*. States like Andhra Pradesh, Uttar Pradesh, Madhya Pradesh, Rajasthan and Bihar are in the Vicious Spiral while Kerala, Himachal Pradesh, Punjab, Tamil Nadu and Gujarat are in the Virtuous Spiral. We must emphasize that "supply side factors" of child labor are among the variables for which we found increasing polarization amongst Indian states along with polarization in the incidence of child labor. Thus, we have indirect but sufficient evidence to claim that regional polarization *is* taking place amongst Indian states along the lines of exogenously given states: those states in a Virtuous Spiral and those in a Vicious Spiral

6. Concluding Remarks

Through various measures of inequality on numerous indicators of human development, poverty, and incidence of child labor, we have found that regional inequalities in India, initially high in 1960s, have not been reduced significantly during

the decades of 1961-1991, and judging by a number of measures, have increased in some aspects. There is little evidence to suggest that any convergence of ß-type or of s-type is taking place amongst the states in India. On the contrary the evidence points divergence rather convergence.

Polarization has followed more or less the same pattern. By using the Esteban and Ray (1994) index of regional polarization, it was demonstrated that since 1971 regional polarization increased in terms of per capita state domestic product, total fertility rate, gross primary school enrollment ratio, gross secondary school enrollment ratio, percentage of people below the poverty line, and incidence of child labor.

This result is important from a policy perspective because the dimensions (factors) in which polarization is increasing in India are among the main factors behind the phenomena of child labor, and therefore, increasing polarization in those factors along with polarization in the incidence of child labor point towards high association between increasing disparities in human development and increasing disparities in the incidence of child labor.

Two inferences are of particular relevance to policy-makers. Firstly, Indian states are on a divergence course and this may be due to lack of infrastructure, development, and persistence of poverty in backward states, which are caught in a vicious circle of deprivation. Therefore, unless public action, regional inequalities amongst the states in India will be reinforcing and might accelerate in the future. Secondly, in order to eliminate the incidence of child labor, quality of primary and secondary schooling should be improved. Since these variables are highly associated with the incidence of poverty,

dealing with poverty is the main instrument that can effectively eliminate child labor and

consequently minimize regional polarization amongst states in India.

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Appendix A 1. Data for the Selected Indicators for the year 1961.

STATES	SDPP	URBAN	RII	TFR	LR	GPSER	GSSER	PCEE	PFLF	PBPL	IMR	CL
Andhra Pradesh	530	17.4	93	4.6	25.0	68.3	16.8	NA	41.3	NA	NA	9224996
Bihar	389	8.4	98	7.9	22.0	50.7	17.1	.	27.1	.	.	12495293
Gujarat	687	25.8	111	7.1	36.0	72.1	26.3	.	27.9	.	.	5575323
Haryana	650	47.2	129	8.9	20.3	60	30.1	.	14.2	.	.	2252082
Himachal Pradesh	48	6.3	60	6.7	20.0	80	40.2	.	55.8	.	.	670535
Karnataka	526	22.3	90	5.3	30.0	73.8	22.4	.	32.0	.	.	6452716
Kerala	509	15.1	135	5.6	55.0	108.2	58.3	.	19.7	.	.	4678209
Madhya Pradesh	508	14.3	53	5.6	21.0	49.2	15.5	.	44.0	.	.	7913164
Maharashtra	745	28.2	117	5.9	35.0	77.3	27.8	.	38.1	.	.	10142716
Orissa	236	6.3	69	4.3	25.0	63.7	9.0	.	26.6	.	.	4369236
Punjab	790	23.1	201	6.7	29.0	50.8	29.4		14.2	.	.	2846381
Rajasthan	519	16.3	59	6.6	18.0	40.9	14.5	.	35.9	.	.	5354581
Tamil Nadu	558	26.7	171	3.7	36.0	85.5	31.6	.	31.3	.	.	8057402
Uttar Pradesh	453	12.9	107	7.6	21.0	44.7	16.6	.	18.1	.	.	18889772
West Bengal	737	24.5	152	6.8	35.0	64.9	21.7	NA	9.4	NA	NA	9041214

Sources:

Appendix A2. Data for the Selected Indicators for the year 1971.

STATES	SDPP	URBAN	RII	TFR	LR	GPSER	GSSER	PCEE	PFLF	PBPL	IMR	CL
Andhra Pradesh	585	19.3	91	4.6	29.0	70.3	23.6	14.3	24.2	43.6	106	11564453
Bihar	402	10.0	106	5.6	33.0	53.5	20.1	8.6	8.9	56.3	130	16166772
Gujarat	829	28.1	122	5.6	42.0	84.6	36.1	15.9	10.3	38.9	144	7635236
Haryana	877	17.7	148	6.7	32.0	70.7	40.3	18.5	2.4	25.2	72	3061947
Himachal Pradesh	651	7.0	64	5.2	37.0	92.7	50.9	11.4	20.8	27.0	113	930011
Karnataka	641	24.3	101	4.4	37.0	84.3	32.1	18.4	14.2	50.8	95	8212931
Kerala	594	16.2	202	4.1	70.0	117.3	69.8	28.1	13.5	48.4	58	5779093
Madhya Pradesh	484	16.3	60	5.6	26.0	79.1	25.8	11.9	18.6	50.6	135	11520370
Maharashtra	783	31.2	115	4.6	46.0	89.7	36.1	19.5	19.7	50.6	105	13585164
Orissa	478	8.4	75	4.7	31.0	74.5	21.9	11.0	6.8	65.1	127	6169018
Punjab	1070	23.7	206	5.2	39.0	89.3	47.1	22.2	1.2	16.4	102	3833832
Rajasthan	651	17.6	70	6.2	23.0	57.1	26.2	16.1	8.3	33.6	130	7385480
Tamil Nadu	581	30.3	173	3.9	45.0	104.1	47.9	17.6	15.1	52.8	113	9922564
Uttar Pradesh	486	14.0	116	6.6	25.0	77.8	30.8	8.5	6.7	49.7	167	24004063
West Bengal	722	26.7	142	5.4	39.0	83.9	30.6	15.7	4.4	52.2	110	12552123

Appendix A3. Data for the Selected Indicators for the year 1981.

STATES	SDPP	URBAN	RII	TFR	LR	GPSER	GSSER	PCEE	PFLF	PBPL	IMR	CL
Andhra Pradesh	647	23.3	98	4.0	35.7	76.7	27.9	43.1	33.5	36.4	86	14138294
Bihar	441	12.5	97	5.7	32.0	74.1	21.2	33.8	14.9	49.5	118	19782633
Gujarat	904	31.1	125	4.3	52.2	96.5	45.9	53.1	20.7	24.3	116	8981496
Haryana	1060	21.9	154	5.0	43.9	71.4	45.6	56.5	10.6	15.6	101	3684747
Himachal Pradesh	711	7.6	79	3.8	51.2	101.5	57.5	105.1	31.9	13.5	71	1143923
Karnataka	687	28.9	101	3.6	46.2	91.3	38.3	46.6	25.3	35.0	69	10062257
Kerala	621	18.8	137	2.8	81.6	101.2	91.4	85.3	16.6	26.8	37	6180026
Madhya Pradesh	516	20.3	62	5.2	43.2	61.4	29.7	33.0	30.6	46.2	142	14437706
Maharashtra	957	35.0	118	3.6	55.8	105.7	44.8	60.8	30.6	34.9	79	16606086
Orissa	477	11.8	82	4.3	41.0	81.1	27.4	41.0	19.8	42.8	135	7334421
Punjab	1354	27.7	215	4.0	48.1	108.8	59.6	82.8	6.2	13.8	81	4200614
Rajasthan	535	20.9	77	5.2	30.1	58.5	27.3	42.6	21.1	34.3	108	9720864
Tamil Nadu	584	33.0	153	3.4	54.4	109.9	51.5	50.0	26.5	39.6	91	11555559
Uttar Pradesh	519	18.0	107	5.8	33.3	71.6	28.5	31.7	8.1	45.3	150	31280964
West Bengal	797	26.5	132	4.2	48.6	80.6	30.5	45.3	8.1	39.2	91	14862246

Appendix A4. Data for the Selected Indicators for the year 1991.

STATES	SDPP	URBAN	RII	TFR	LR	GPSER	GSSER	PCEE	PFLF	PBPL	IMR	CL
Andhra Pradesh	975	26.9	98	2.8	44.1	93.2	49.2	179.1	34.3	31.6	73	16655656
Bihar	626	13.1	97	4.6	38.5	73.1	32.9	149.7	14.9	40.7	69	23585809
Gujarat	1358	34.5	124	3.2	61.3	105.7	67.7	256.0	26.0	11.7	69	9952794
Haryana	1677	24.6	156	3.8	55.9	83.8	68.6	236.9	10.8	11.7	68	4308223
Himachal Pradesh	1050	8.7	86	3.1	63.9	110.1	100.0	458.5	34.8	9.1	75	1241683
Karnataka	1045	30.9	93	2.9	56.0	119.2	67.0	218.8	29.4	32.0	77	11083831
Kerala	1103	26.4	138	1.7	89.8	96.1	100.5	282.3	15.9	17.0	17	5983926
Madhya Pradesh	862	23.2	72	4.4	44.2	98.0	55.0	160.5	32.7	36.5	122	16740647
Maharashtra	1775	38.7	111	2.9	64.9	118.8	81.6	270.5	33.1	29.1	60	18650065
Orissa	789	13.4	86	3.1	49.1	100.6	50.0	183.6	20.8	37.9	126	7704761
Punjab	1794	29.6	211	3.1	58.5	84.6	65.6	328.9	4.4	7.0	53	4702876
Rajasthan	906	22.9	85	4.5	38.6	85.1	46.2	213.6	27.4	23.6	77	11992321
Tamil Nadu	983	34.2	139	2.2	54.6	143.5	103.4	241.5	29.9	32.8	57	11979383
Uttar Pradesh	750	19.8	111	5.2	41.6	75.7	46.6	149.6	12.3	33.0	93	37021048
West Bengal	1030	27.5	115	2.9	57.7	104.2	53.1	203.4	11.3	27.6	70	17105523