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INCOME DISTRIBUTION AND SOCIAL WELFARE: A TEMPORAL ANALYSIS ON INDIAN EXPERIENCE

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The article attempts to examine whether the economic prosperity, India achieved during the two decades in recent past, advances the welfare of the rural people. The concepts of Lorenz dominance, generalized Lorenz dominance and stochastic dominance have been used for this purpose. The study uses grouped household data, provided by National Sample Survey Organization between 1987-88 and 1999-2000. The analysis reveals a systematic well off of the people in rural India over time by dominance criterion.

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Key Words: *Inequality; Social Welfare; Lorenz dominance; Stochastic dominance.*

Introduction

A brief look at the Indian economic scenario of two recent past decades provides a backdrop to this paper. The decade of eighties was marked by a doubling of the rate of growth of real per capita GDP compared to its trend growth till the end of seventies. On the other after about fifty years of planned development based on the dominance of government and public sector institutions and import substitution strategies, at the begining of nineties (in1991), India launched a number of structural adjustment programs (SAP) intended to improve economic performance through a greater use of market–based incentives and competition. The program sought to withdraw the state from many areas of activity where the private sector could operate better. India has made significant progress in several areas of economic development and the economy has diversified substantially during these two decades. Food production has grown to provide adequate levels of food security. Net production of food grains increased substantially from 105.7 million tones in 1979-80 to 180.9 million tones in 1999-2000. Public distribution of food grains could be raised from 9.1 million tones to 15.35 million tones during this period (Economic Survey 2005-06). On the other infrastructure development has proceeded a pace; domestic savings and capital formation have increased substantially; and a high level of technological development has been taken place (Table 1) during the period.

A litmus test to ascertain the performance of an economy is to find out how deeply these macroeconomic gains percolate to the masses. The distribution of national income to the people takes place through a number of structural, institutional, policy and distribution mechanisms. While in India there has been a net increase in national wealth

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Table 1
Selected Indicators of Economic, Technological and Infrastructural Development in India

National income	*1979-80*	*1989-90*	*1999-2000*
net national product at factor cost (base year 1993-94) in Rs. crore	374640	648108	1137185
per capita net nationalproduct (at 1993-94 prices) in Rs.	5092	7087	10071
gross domestic savings (base year 1993-94) in Rs.crore	24314	106979	468681
gross domestic capital formation (base year 1993-94) in Rs.crore	25824	115035	458262
Progress of electric supply:			
installed plant capacity (thousand MW)	31.3	71.8	112.6
energy generated (gross) (billion KWH)	112.9	268.4	532.2
Indian rail ways: (thousand km.) :			
route open for traffic	60.93	62.2	62.8
Road (km.):			
total road length	1491873	1983867	2525989
surfaced road length	644017	1016386	1448629
Merchant shipping fleet:			
coastal trade: no. of vessels	57.5	156.5	269
overseas trade: no. of vessels	324	255	241
Civil aviation:			
domestic services: aircraft kilomtres flown (lakh km.)	414.5	600	1286
international services: aircraft kilomtres flown (lakh km.)	416	535	645

Source: Economic Survey 1985-86, 1992-93, 2005-06: Ministry of Finance, Government of India; Statistical Abstract India 1982, 1987, 1997, 2002: Central Statistical Organization, Government of India; Statistical Pocket Book 1990, 1992: Central Statistical Organization, Government of India.

both in absolute and per capita terms, it is nonetheless necessary to investigate whether this type of economic prosperity has contributed to the welfare of the masses.

The issues relating to poverty and inequality in India have been discussed by Tendulkar and Jain (1995a), Suryanarayana (1996), Sen (1996), Datta and Ravallion (1998), Jha (2000), Dev (2000), Sundaram (2001), Deaton and Dreze (2002), Bhalla (2003), Deaton (2003), Sen and Himanshu (2004) etc. Relatively very few studies (Tendulkar and Jain 1995b, Tendulkar and Jain 1995c, Tendulkar and Jain 1996) have been made on social welfare implications of distributional change emerging over time.

The primary objective of three studies made by Tendulkar and Jain (1995b, 1995c, 1996) were to examine the distributional outcome of the sharp rise in the rate of growth of real per capita GDP during the eighties. With this intention these papers were basically on social welfare orderings to the price adjusted size distributions of consumer

expenditure for the rural, the urban and the entire (rural + urban) population of India over eight time points between 1970-71 and 1988-89. Using the technique of the fractile graph dominance, Lorenz dominance and generalized Lorenz dominance criterion they showed that all the intra-decade comparisons in the eighties show unambiguous social welfare improvements for both the rural and the urban population and that the eighties dominate over the seventies in terms of welfare dominance criterion.

The limited objective of this article is to examine the distributional outcome of the economic prosperity and its welfare implications for the rural population during the recent past two decades. More specifically intention of this work is to examine whether the macro level prosperity or policies have brought any improvement in welfare of rural people on the basis of consumer expenditure data collected and made available by the National Sample Survey Organization (NSSO) over the period of 1977-78 to 1999-2000. The empirical results derived over the study period are based on the methods of welfare dominance (Lorenz dominance, generalized Lorenz dominance and stochastic dominance).

The paper is organized as follows: section 2 describes the data; section 3 is a brief discussion on methodology; section 4 presents the results and discussions; finally section 5 concludes.

Data

Description of Data Set and Sample

National Sample Survey Organization (NSSO) is an India Government Organization for conducting surveys all over the country in rural as well as urban sector. Consumer expenditure and Employment Unemployment surveys are carried out simultaneously every five years. Six quinquennial surveys were carried out during 27th round (1972–1973), 32nd round (1977–1978), 38th round (1983), 43rd round (1987–1988) and 50th round (1993–1994) and 55th round (1999-2000). In other rounds of NSS consumer expenditure inquiry on a reduced scale is being carried out from the 42nd round (1986-1987) onwards. From the 45th round (1989-1990) onwards the subject coverage of the schedule was expanded to include some important key characteristics of employment-unemployment so that an annual series of consumer expenditure and employment unemployment data is available.

In the NSS consumer expenditure surveys the expenditure incurred by a household unit on domestic consumption during the reference period is defined as consumer expenditure. This consumer expenditure is the total monthly values of consumption of various groups of items. The consumption may be out of (a) purchases made during the reference period or earlier; (b) home grown stock; (c) receipt in exchange of goods and services; (d) any other receipt like gift, charity, borrowing, and (e) free collection. To avoid double counting, transfer payments like charity, loan advance, etc., made by the households are not considered on consumption for items of groups like food, clothing and footwear etc; since transfer receipt of these items have been taken into account.

As mentioned in previous section that the present study is based on five rounds of National Sample Survey (NSS) on consumer expenditure over 1977-78 to 1999-2000 (from second to sixth quinquennial rounds). The yearly surveys are carried out on thin samples, that is on an reduced scale, and on the other quinquennial surveys are carried out on large scale, sample size being quite larger compared to the annual rounds, providing more reliable data source. Accordingly, the present exercise is confined only to five large sample rounds. The sample of the present study includes only the all-India rural.

Data Limitations

To make the available data set comparable over the rounds we need two adjustments. One is for converting size distributions at current prices to those of constant prices. For each survey year NSSO gives monthly per capita expenditure (MPCE) class wise estimates of average monthly per capita expenditure (AMPCE) with the corresponding MPCE class wise estimates of population. These estimates then were expressed at 1977-78 prices by using Bardhan's (1974) all India consumer price index number for agricultural labourers (ALCPI) as deflator.

Secondly, an attempt is made to 'adjust' the 55th round estimates to achieve comparability with the earlier rounds. The possibility of adjusting the 1999-2000 data arises from the fact that the 55th round questionnaire included some new items like expenditure on education, medical purposes, entertainment etc (NSSO, 2001). To make comparable of 55th round data with the earlier rounds these new items have been excluded and only expenditure on items common to other earlier rounds have been considered. Another departure from other earlier rounds is that the principal results of those rounds were based on a reference period of 30 days for all the items whereas the principal results of 55th round are based on data having reference period of last 365 days for few items (clothing, footwear, education, medical (institutional) expenses and durable goods) and last 30 days for rest of the items (NSSO, 2001). Any adjustment for this factor will need making of some assumptions (Deaton and Dreze, 2002; Sundaram and Tendulkar, 2003) and validity of the results so will be dependent upon those assumptions. So in the present exercise only those common items for which reference period is last 30 days have been taken into consideration.

Method

The objective of the study is to judge the social welfare implications of the entire size distribution of consumer expenditure over time. The empirical results derived over the last two decades are based on the conventional Lorenz curve (Atkinson 1970; Dasgupta, Sen, and Starrett 1973 and Rothschild and Stiglitz, 1973) or its generalization (Shorrocks 1983). Let us briefly state the theoretic frame of these two concepts.

Following Tendulkar and Jain (1995) three major assumptions have been made. Since the data relate to per capita total consumer expenditure of a household as a unit of primary observation, it is needed to assume that (i) per capita household welfare is

determined solely by per capita household consumer expenditure, (ii) that household welfare is given by per capita household welfare multiplied by household size and (iii) that social welfare is a function of the welfare of households constituting the society.

Now given an expenditure distribution $\underset{\sim}{x} = (x_{1,..}, x_n)$, where x_i is the per capita expenditure (PCE) of the i^{th} individual in the population, (i=1,.., n). Let the corresponding social welfare be measured as $sw = f(\underset{\sim}{x})$, where $f(.)$ is the functional form. Now to ensure that the social welfare is measured in the same unit as individual welfare, so that proportional changes in all X's may have the same proportional effect on the aggregate (i.e., making the function homogeneous of degree one), we rewrite sw as, $sw = \bar{x}\ f(x_1/\bar{x},.....,x_n/\bar{x})$, where $\bar{x}$ is the mean of the X's. To make the decomposition of change in social welfare due to changes in the mean and change in the measure of inequality possible, we assume that the function $f(.)$ is such that $f(1,.....1) = 1$, so that when there is perfect equality social welfare is equal to that mean value of x. In other words, we may write $sw = \bar{x}(1-I_x)$ where I_x represents the cost of inequality or the amount by which social welfare falls short of the maximum that would be attained under perfect equality. This implies, for given $\bar{x}$, if I_x increases, sw will decrease. Thus, if there is any mean preserving redistribution of x, sw will change. As is well known, Lorenz curve is useful for measuring mean preserving redistribution of x. But when both $\bar{x}$ and I_x, change, Lorenz curve would fail to provide valid social welfare comparison. The concept of GLC rectifies this deficiency of the Lorenz curve (Deaton 1994). The concept of the GLC may be described as follows:

Suppose we have for the t^{th} NSS survey year the PCE classwise average monthly PCE data as $(\bar{x}_{it}, p_{it})$, where $\bar{x}_{it}$ is the mean PCE (at the constant prices) for i^{th} PCE class and p_{it} is the proportion of persons in the i^{th} class and $\bar{x}_t$ is the corresponding mean PCE at constant prices for the t^{th} survey year. Let (Q_t, P_t) denote the cumulative share of consumer expenditure and the corresponding cumulative proportion of population measured from the x distribution, the Lorenz curve is a plot of Q_t against P_t and the GLC is a plot of $Q_t.\bar{x}_t$ against P_t. In other words the GLC plots the cumulated expenditure against the corresponding cumulated population proportion. If the GLC of one year lies completely above the GLC of another year, it implies that for all θ between 0 to 100, the poorest θ per cent of the population have more resources in aggregate in the former year's distribution. The distribution of the former year will therefore be preferred by any equity respecting social welfare function. However, if GLC for two years intersect one another, neither distribution will dominate the other from the social welfare point of view and complete ordering of distributions can not be achieved.

The ranking of income distributions are sometimes made more straightforward by using the concept of stochastic dominance (Deaton, 1994). The conceptual frame work can be breefed as satted below.

Suppose we have for the t^{th} NSS survey year, the PCE classwise average monthly PCE data (at the constant prices), ($\bar{x}_{it,}\ p_{it}$), i = 1,…,n. Next, suppose the i^{th} class interval for the t^{th} year is (z_{i-1t} - z_{it}). We define cumulative proportion of persons upto x = z_{it} as $p(x \leq z_{it}) = \sum_{k=1}^{i} p_{kt} = P_{it}$, say. Now, we have the cumulative distribution of PCE for the t^{th} year given by ($z_{it,}\ p_{it}$). Let us denote the cumulative distribution function of real PCE for the t^{th} year by $P_{it} = F_t (z_{it})$, i=1,..,n. Now the real PCE distribution of the t^{th} year is said to stochastically dominate the corresponding distribution of another year, say 's', if and only if $F_s (Z) \geq F_t (Z)$ for all Z. The distribution of t^{th} year will be preferred to the distribution of s^{th} year as social welfare is higher for the former year. Using this concept of stochastic dominance we may compare the cumulative distribution functions of real mean PCE of any two years and find whether or not the change in the PCE distribution led to any significant welfare change.

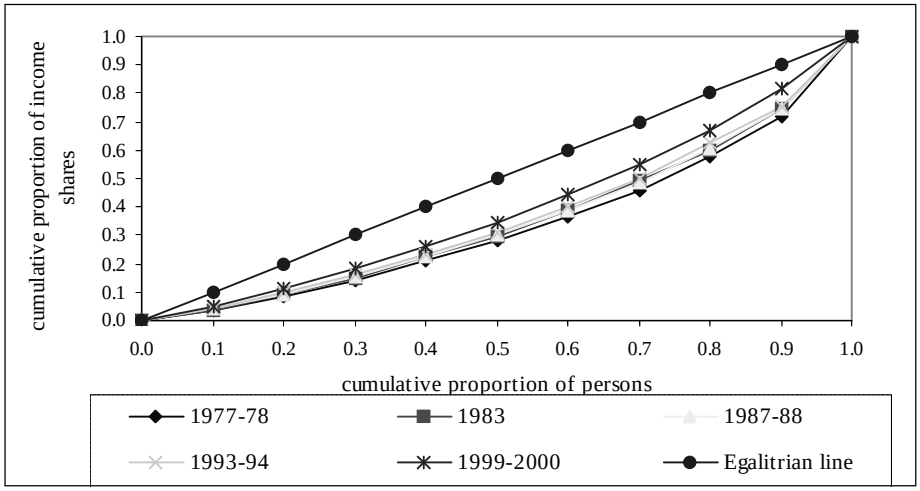
Empirical Results

We start with the ordinary Lorenz curves for the years 1977-78, 1983, 1987-88, 1993-94 and 1999-2000. Lorenz curve is a representation of cumulative income shares against cumulative population shares. The cumulative decile shares of income for the five years are shown in Table 2 and the corresponding Lorenz curves are presented in figure 1. It is easy to see that the Lorenz curve for 1999-2000 dominates the Lorenz curves for all other years. On the other the Lorenz curve of 1977-78 lies at the bottom of all other Lorenz curves of succeeding years. The Lorenz curves of 1983, 1987-88 and 1993-94 are very close to each other so that no clear dominance can be observed.

Table 2
Cumulative Income Shares, 1977-78 to 1999-2000, All India Rural

Decile Groups	*Share in Total Expenditure*				
	1977-78	*1983*	*1987-88*	*1993-94*	*1999-2000*
First	0.035	0.038	0.040	0.041	0.048
Second	0.084	0.090	0.093	0.096	0.110
Third	0.143	0.151	0.156	0.160	0.181
Fourth	0.208	0.220	0.225	0.231	0.260
Fifth	0.284	0.299	0.303	0.311	0.347
Sixth	0.367	0.388	0.390	0.400	0.443
Seventh	0.461	0.487	0.489	0.500	0.550
Eighth	0.575	0.601	0.605	0.616	0.671
Ninth	0.716	0.744	0.747	0.757	0.814
Tenth	1	1	1	1	1

Figure 1
Lorenz Curves 1977-2000, Rural India



Thus ordinary Lorenz domination does not make any clear welfare judgement in the present data set. So, the second order dominance that is generalized Lorenz domination is called for. As generalized Lorenz domination considers both mean income and inequality judgement so before going into the generalized Lorenz domination, changes in these two factors may be examined. Table 3 presents the decile group-wise estimates of average MPCE at constant prices over time for rural India. The bottom row presents the Lorenz ratios for different survey years. The overall picture that emerges from table 3 is one of rising trend in real average MPCE for most of the decile groups for all survey years under consideration. Interestingly, real average MPCE shows a declining trend for top two or three deciles during last decade. With a brief look at Table 4, presenting period specific and decile group specific rates of growth of real average MPCE, we see that the phase of 1983 to 1987-88, saw very large increase in real consumption for each section of the population and particularly by the upper decile groups.

Table 3
Real Average MPCE by Decile Groups, 1977-78 to 1999-2000, All India, Rural

Decile Groups	*1977-78*	*1983*	*1987-88*	*1993-94*	*1999-2000*
First	23.92	26.99	31.48	32.81	36.39
Second	33.85	37.16	41.92	43.72	46.53
Third	40.82	43.96	49.11	50.16	53.15
Fourth	44.94	48.99	54.65	56.87	59.58
Fifth	52.03	56.76	60.99	63.36	65.47
Sixth	56.96	63.61	69.04	70.65	72.70
Seventh	65.39	70.62	77.42	79.89	80.53
Eighth	78.37	82.10	91.58	91.79	90.93
Ninth	97.25	102.32	112.01	111.69	107.47
Tenth	195.41	182.91	199.03	193.3	140.38
Lorenz Ratio	0.34	0.29	0.30	0.28	0.22

Table 4
Rates of Growth of Decile Group Specific Real Average MPCE

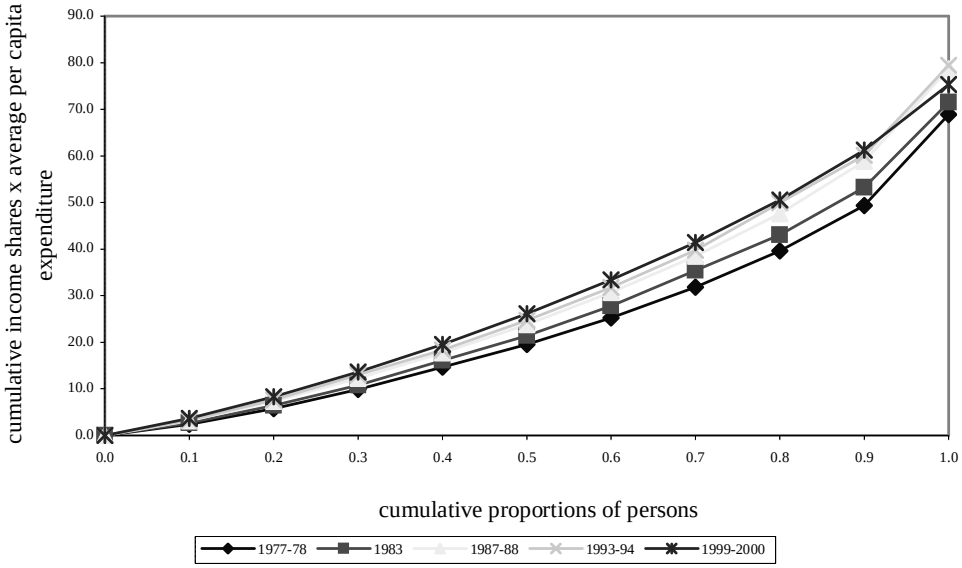
Decile Groups	*1977-78 to 1983*	*1983 to 1987-88*	*1987-88 to 1993-94*	*1993-94 to 1999-2000*
First	0.56	1.00	0.22	0.60
Second	0.60	1.06	0.30	0.47
Third	0.57	1.14	0.18	0.50
Fourth	0.74	1.26	0.37	0.45
Fifth	0.86	0.94	0.40	0.35
Sixth	1.21	1.21	0.27	0.34
Seventh	0.95	1.51	0.41	0.11
Eighth	0.68	2.11	0.04	-0.14
Ninth	0.92	2.15	-0.05	-0.70
Tenth	-2.27	3.58	-0.95	-8.82

Now coming to the welfare ordering by generalized Lorenz criterion one have to identify dominance, or locate the intersection of the GLCs. This can be done more easily with the help of the figures in Table 5. In table 5 the ordinates of GLCs are presented. It is clear from this table that the GLC of the year 1999-2000 dominates those of all other periods; only it crosses GLC of 1993-94 at tenth decile and this is due to the fact that expenditure on durable goods in 1993-94 was exorbitantly higher compared to other years as is evident from the NSSO report (2001). This implies that social welfare for bottom nine deciles was higher in 1999-2000 than it was in any of the other years. The GLCs for rural India for the period of 1983 and 1987-88 were happened to be very close to one another though GLC for 1987-88 was marginally above the GLC for 1983. Thus as a whole GLCs for five survey years indicate a systematic upswing of social welfare in the rural India.

Table 5
Ordinates of Generalized Lorenz Curves, 1977-78 to 1999-2000
All India, Rural

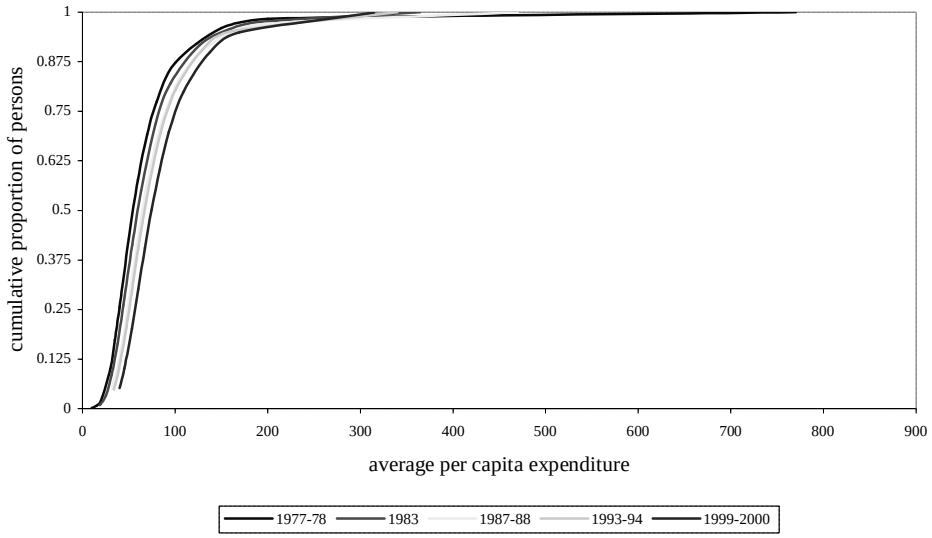
Decile Groups	*1977-78*	*1983*	*1987-88*	*1993-94*	*1999-2000*
First	2.39	2.70	3.15	3.28	3.64
Second	5.78	6.42	7.34	7.66	8.29
Third	9.86	10.81	12.25	13.01	13.61
Fourth	14.71	16.10	17.72	18.36	19.57
Fifth	19.56	21.39	23.82	24.69	26.11
Sixth	25.25	27.75	30.72	31.76	33.38
Seventh	31.79	35.38	38.46	39.75	41.44
Eighth	39.63	43.02	47.62	49.92	50.53
Ninth	49.35	53.25	58.82	60.10	61.28
Tenth	68.89	71.54	78.72	79.43	75.31

Figure 2
Generalized Lorenz Curves 1977-2000, Rural India



The orderly shifts of the cumulative distribution functions as have been depicted in Figure 3 also confirms the gradual betterment of rural people. The cumulative distribution functions for consecutive years first order stochastically dominate the cumulative distribution functions of all previous years.

Figure 3
Distribution Functions of Aveage Per Capita Expenditure 1977-2000, Rural India



Conclusion

The present exercise has primarily examined whether any systematic betterment in social welfare over past two decades has been achieved in rural India. While inequality measures provide useful insight into how distributional changes occur over time in a society, they do not provide adequate information regarding the well-off of the members of the society in one period over another. Using the concept of Lorenz dominance and stochastic dominance how the changes in real mean per capita expenditure and those in the distribution of expenditure have contributed to the changes in social welfare over 1977-78 to 1999-2000 have been brought out in this paper. Our analysis reveals a systematic well off of the people in rural India over time by dominance criterion. The empirical results also indicate a greater implication that the structural adjustment programs that India launched in 1991 have taken part in enhancing the welfare of the masses rather than improving only the urban upper class elite.

The major limitation of the study is the assumption that per capita household welfare is determined solely by per capita household consumer expenditure**.** Up to the middle of seventies, it was the belief of the economists that economic growth would automatically lead to overall development of the society. According to these economists ceteris paribus, countries with higher income levels could be expected to have higher levels of achievement in basic capabilities such as longevity and knowledge simply, because of these countries have more resources to spend on health care and education (Anand and Ravallion, 1993; Kakwani, 1993). But experience shows that economic prosperity measured in terms of per capita income does not always ensure enrichment in quality of life reflected in broader dimensions of well being like in indicators on longevity, literacy etc. The case of Sri Lanka is often cited in this context. Sri Lanka has extremely high achievements in longevity with life expectancy at birth being 74.0 years in 2003 as well as education with a literacy rate of 92 per cent in 2003 (HDR, 2005). These figures compare very well with those of developed countries, though its real GDP per capita is far lower (only 3778 pppUS$ in 2003). Contrarily, per capita GDP of South Africa is (19780 pppUS$ in 2003) comparable with highly developed country with life expectancy at birth being only 43.3 years (HDR, 2005). The performance of two Indian states, Haryana and Kerala, is also worth mentioning here. The star performer Haryana in terms of per capita state domestic product performs consistently poorly in health and education. At the other end, Kerala is consistently at the top in health and education indicators, although in terms of per capita state domestic product, it performs rather poorly (NHDR 2002). So the empirical results ensures a systematic well-off of rural population in terms of economic well-off, but it does not ensure development of other dimensions of human lives.

This suggests a reorientation of development policies in India towards three directions. One is that alternative mechanisms have to be adopted so that the economic gains may be more eventually distributed among small (0.22 is the minimum Lorenz ratio, India could achieve in 1999-2000, so far). Secondly, policies are to be taken so that the economic prosperity can bring an overall prosperous life of the people; and thirdly, to enhance social sector spending.

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