Economic Growth, Relative Inequality, and Equity: The Case of India

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Abstract

This paper examines the links between economic growth, relative inequality, and equity (defined as an unambiguous reduction in poverty as well as an increase in social welfare) in the Indian context. For this purpose, the equivalent analytical results on poverty and social welfare orderings are applied to the price-adjusted size distributions of consumer expenditure for the rural, urban, and entire (rural plus urban) population of India over eight time-points between 1970 and 1989. Unambiguous improvement in poverty and social welfare was indicated in as many as 20 (rural), 21 (urban), and 22 (entire) populations out of 28 binary comparisons each. Improvement under somewhat more stringent assumptions was indicated in eight more cases. As many as 32 out of 71 comparisons involving improved equity were characterized by a rise in relative inequality. These results indicate that contrary to the earlier widely held perceptions, compared with the 1970s which was characterized by slow economic growth, the faster rate of growth in India in the 1980s was associated with more frequent equitable distributional outcomes.

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The relationship between economic growth and inequality has always dominated debates about the desirable path of development for low-income developing countries. In this connection, Kuznets (1955) is often quoted in support of the assertion that rapid economic growth necessarily leads to greater relative inequalities. The widening of relative inequalities, in turn, is axiomatically taken to be inequitable and hence socially unacceptable. The tacit acceptance of these propositions also appears to be responsible for the widespread suspicion that policymakers have of rapid economic growth and increases in relative inequalities.[1] This is reflected in India's Second Five-Year Plan (1956-1961) (Government of India [GOI] 1956) and Third Five-Year Plan (1961-1966) (GOI 1961), which contain interesting discussions of the possible ways to contain the rise of relative inequalities.[2] While inequity was equated with a widening of relative inequalities in these earlier plan documents, the later plans, especially from the Fifth Five-Year Plan (1974-1979), identified inequity with a deterioration in absolute poverty. The Draft (Sixth) Five-Year Plan (1978-1983) (GOI 1978), formulated by the non-Congress government, was most explicit in preferring a lower growth target (4.7 percent per annum compared with 5.5 percent in the earlier Plans) which, it contended, would generate higher employment (than an alternative higher growth target) and hence would reduce absolute poverty (p. 6, para 1.43). This stance has also been endorsed by the radical intelligentsia, who expressed apprehensions about the possible unequalizing effects of a high rate of economic growth. Thus, when the agricultural transformation process was initiated in the mid-1960s with the new chemical and biological technology (described as the green revolution), there were apprehensions about the immiserising consequences of a higher rate of agricultural growth (see, for example, Frankel 1974). These apprehensions are no longer heard (for a recent review of the experience of the green revolution in India, see Parthasarathy 1991).

Again, in the 1980s, when the growth rate of real gross domestic product (GDP) per capita more than doubled,[3] in comparison with the three decades ending in fiscal year (FY) 1979/1980, similar apprehensions were expressed about the unequalizing consequences of faster growth (see, for ex- ample, Bagchi 1990, Kelkar and Kumar 1990). Does the experience bear out these perceptions regarding the Indian growth process? Was faster growth associated with inequitable distributional outcomes? These are important empirical questions for development policy. It would, therefore, be instructive to examine the quantitative evidence regarding the distributional outcomes of the faster rate of economic growth of the 1980s and compare them with the 1970s, when growth was slower.

It is necessary at this point to clarify the meaning of the term "equity". It refers to fairness in distribution from the point of view of society. The traditional approach of economists has been to judge equity in terms of an improvement in social welfare defined as an aggregation of welfare enjoyed by individual members of society. This is an inclusive concept as it relates to the entire population. This approach, however, ignores the state of social deprivation at the lower end of the income distribution in terms of inability to afford a socially acceptable minimum living standard. It has been argued that the concept of social deprivation is particularly important in low-income countries, where equity should be judged in terms of improvement of the welfare of those below a certain minimum standard of living. This

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1 We quote three representative statements of the 1970s. The first is by Ahluwalia (Chenery et al. 1974,4): "The fact of poverty is not new... What is new is the suspicion that economic growth by itself may not solve or even alleviate the problem within any 'reasonable' time period. Indeed it is often argued that the mechanisms which promote economic growth also promote economic concentration and a worsening of relative and perhaps even absolute income position of the lower income groups". The second is by Taylor and Bacha (1976, 216): "There is not just a trade-off between equity and growth, rather the growth process itself forces a decrease in equity." The third is from Adelman and Morris (1973, 189): "An even more disturbing implication of our finding is that development is accompanied by an absolute as well as relative decline in average incomes of the very poor."

2 The former document states: "Economic development has in the past often been associated with growing inequalities of income and wealth... The process of reducing inequalities is a two-fold one. It must raise incomes at the lowest level and it must simultaneously reduce incomes at the top" (para 19, 32-33). For discussion, see Tendulkar (1983,98-113).

3 Factors underlying the accelerated growth rate of the 1980s are being explored in a separate paper.

is an exclusive concept because the entire focus is solely on the poor section of the population. These two approaches may give conflicting results in terms of equity. Recent analytical developments (Atkinson 1987; Foster and Shorrocks 1988a, 1988b) provide us with operational criteria for ordering two distributional situations that enable us to bring together the inclusive (social welfare) and exclusive (social deprivation) dimensions. In view of this, we define equity as an unambiguous reduction in poverty as well as an increase in social welfare.

Three introductory clarifications are called for regarding the scope of the present paper. First, in India, information on the size distributions of income is not as readily available[4]4 as that on the size distributions of house- hold consumer expenditure. Distributional questions in India have always been examined on the basis of surveys of household consumer expenditure, which have been conducted since 1950 by the National Sample Survey Organisation on a reasonably continuing basis. In this paper, we cover the period 1970 to 1989, for which eight consumer expenditure surveys are available. This provides us with four time-points each in the 1970s and the 1980s. Data on more time-points would have been desirable but are not available. Second, intertemporal comparisons of size distributions of consumer expenditure are meaningful only at constant prices. This requires information on the consumer price indices for population subgroups (arranged in ascending order of per capita total expenditure) called fractile groups. As such indices could be developed only from 1970/1971 onwards, 1970/1971 is the starting year of our investigation. Third, given the existing analytical developments and the available database, it is not possible to establish a direct empirical link between economic growth and its distributional outcomes. This paper attempts to examine the distributional consequences associated with and influenced by economic growth. These consequences are taken to be reflected in the size distributions of per capita total expenditure.

This paper does not claim any analytical innovations. Its novelty lies on two empirical counts. First, while poverty and social welfare orderings have been undertaken across countries (Shorrocks 1983, Kakwani 1984), this is possibly the first study that attempts such comparisons over multiple time-points and in price-adjusted terms. Second, it juxtaposes the comparisons of social welfare with those of social deprivation for India, a densely populated low-income country with 16 percent of the world population and a sharp rural-urban divide, which earlier saw a lively debate on the unequalizing consequences of growth (see Chenery and Ahluwalia in Chenery et al. 1974, Ch. XI).

The paper is organized as follows. The second section discusses the operational criteria for evaluating the distributional outcomes over time. It may be noted that these intertemporal comparisons indicate only the end results and do not throw any light on the underlying mechanisms and processes. This takes us to an examination of the conceptual issues relating to the links between the process of economic growth, income inequalities, and the resulting distributional outcomes. These issues are taken up in the third section. Empirical results are presented in the fourth section. The fifth section provides a summary and conclusions.

Criteria for Poverty and Social Welfare Orderings

As mentioned above, we identify equitable distributional outcome with an unambiguous reduction in absolute poverty and an increase in social welfare. In this section, we state the analytical results from the recent literature that provide us with the operational criteria for ranking the entire size distributions with reference to directional changes in absolute poverty and social welfare incorporating equity-enhancing properties.

Changes in poverty are known to be sensitive to (a) the specific numerical value of the poverty norm, called the poverty line, and (b) the specific poverty measure calculated with that poverty line. Recent contributions to poverty measurements (Atkinson 1987; Foster and Shorrocks 1988a, 1988b) provide criteria that are robust with respect to both (a) and (b) and enable us to make inferences

[4] The latest available income distribution survey at the all-India level relates to 1975

simultaneously about changes in absolute poverty and social welfare. These criteria are based on the following three poverty measures, which are special cases of the class of Foster-Greer-Thorebecke poverty index (Foster, Greer, and Thorebecke 1984).

If x_i is the income of the ith individual and $x_1 \le x_2 \le x_3 ..... \le x_N, z$ is the prespecified poverty line, and *M* is the number of individuals having income *z* or lower, the three poverty measures are defined and interpreted as follows.

The first measure is the proportion of the population having an in- come below the poverty line. This is the most widely used poverty measure, usually described as headcount ratio (HCR or H) and is given by

$$H=M/N \tag{1}$$

We now define an intermediate measure known as the poverty gap ratio *(R)*. It is given by

$$R=\sum_{i=1}^{M}(z-x_i)/(<M_Z) \tag{2}$$

The numerator is the actual aggregate poverty gap of all those below the poverty line. The denominator can be interpreted as the maximum possible aggregate poverty gap if everyone below the poverty line received zero income. Thus the poverty gap ratio represents the ratio of the actual to the maximum possible poverty gap for the poor population.

The second poverty measure is the poverty gap index (PGI), given by

$$PGI=\sum_{i+1}^{M}(z-x_i)/(N_Z)$$
$$= H \text{ times } R \tag{3}$$

The PGI indicates the ratio of the aggregate poverty gap to the minimum normative aggregate income (N_z) for the entire (poor as well as nonpoor) population. This is described as the "depth" of poverty. The reasoning is as follows. If we have two situations with the same population and the same headcount ratio, the situation with a higher PGI has a larger number of poor who are farther from the poverty line.

The third poverty measure is given by

$$FGT^*=H\left[R^2+(1-R)^2+CVP^2\right] \tag{4}$$

where CVP^2 is the squared coefficient of variation[5] for the poor population (having income equal to or below the poverty line). Because of its distributional sensitivity (as reflected in CVP^2) and because it incorporates HCR and a variant (R) of PGI, this is regarded as the most comprehensive measure that captures the severity of poverty.[6]

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[5] This is the summary indicator of relative variability used widely in statistics. It is given by

$$CVP^2=\sum_{i=1}^{M}\left(x_i/\bar{x}-1\right)2/M$$

where $\overline{x_p}$ is the average income of the poor population, This indicator reflects relative income inequality among the poor.

[6] As noted earlier, HCR, PGI, and *FGT** are three special cases corresponding to parameter α = 1,2, and 3 respectively of the general poverty measure defined by

Appendix A provides a formal (technical but nonrigorous) presentation of the suggested criteria for ranking two size distributions of income. Here, we present an intuitive justification of the poverty ordering criteria. When the numerical value of the poverty line is fixed, a lower value of a given poverty measure for one size distribution than for the other would clearly indicate that the first size distribution is better in terms of the poverty situation than the second distribution. This result, however, holds only for that fixed numerical value of the poverty line. It is widely recognized that there are inherent and irreducible elements of arbitrariness in fixing a particular numerical value for the poverty line. This can be corrected if the poverty line is permitted to take all possible values while devising the poverty ordering criterion for comparing the two size distributions. Accordingly, Foster and Shorrocks (1988a, 1988b) suggest parametrically varying the poverty line over the entire range of income of the two size distributions to be compared, and then comparing a given poverty measure calculated at each possible value of the poverty line. If, for all possible numerical values of the poverty line, one size distribution yields values of the given poverty measure uniformly no higher than those for the other size distribution, then the first size distribution is unambiguously better placed in terms of the poverty situation than the other distribution, of course with respect to the given poverty measure. In this situation, the first size distribution is defined to dominate the other in an unrestricted domain. If lower values of the given poverty measure are obtained over a certain range only and not for all possible values of the poverty line, it is described as restricted (or partial) dominance.

If in the above procedure, the given poverty measure is taken to be HCR, PGI, and *FGT*,* we obtain the first order, second order, and third order dominance respectively, in the unrestricted or the restricted domain of the poverty line. In order to establish the explicit connection between the dominance criteria and the corresponding poverty measures, we call the first, second, and third order dominance as HCR, PGI, and *FGT** dominance (D) respectively, in the unrestricted (prefix U) or the restricted (prefix R) domain. Accordingly, the codes UHCRD, UPGID, and *UFGT*D* used henceforth refer to the unrestricted first, second, and third order dominance respectively. Similarly, the codes RHCRD, RPGID, and *RFGT*D* refer to the restricted first, second, and third order dominance respectively.

Atkinson (1987) has proved the result that the first order dominance in the unrestricted domain implies lower poverty not just in terms of head- count ratio but also in terms of a wider class of poverty measures.

The intuitive meaning of the above unrestricted dominance criteria should be obvious, namely, headcount ratio or depth or severity of poverty being uniformly lower in one size distribution than the other for all possible values of the poverty line. In the case of the poverty line taking a fixed numerical value, the three poverty measures of headcount ratio, depth, and severity are exclusive measures focusing entirely on a part of the population falling below the fixed poverty line. But permitting parametric variation in the numerical value of the poverty line over the entire range of income pro- vides the meeting ground with the inclusive notion of social welfare.

That an unambiguous reduction in poverty leads to more equitable distributional outcome would be universally conceded. However, for an in- crease in social welfare to be deemed more equitable, the social welfare function (SWF) has to satisfy the following plausible properties of fairness on which social consensus can be forged. These properties have been suggested in the literature on the measurement of relative inequality (see, for example, Champernowne 1973).

- *Symmetry condition:* This condition can be interpreted as delinking incomes from their recipients, i.e., there is a purely random correspondence between incomes and their recipients. This is a plausible condition since the observed size distribution of income results from complex

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$$FGT_{\alpha} = \frac{\sum_{i=1}^{M} (z - x_i)^{\alpha - 1}}{Nz^{\alpha - 1}}$$

This was suggested by Foster, Greer, and Thorebecke (1984).

interactions in the continuous process of production and distribution in the economy. In this situation, any given individual has no control over the shape of the entire size distribution or their relative positions in that distribution. In our view, this is the most basic prior condition to be satisfied by SWF for arriving at the social consensus regarding its other acceptable properties discussed below.[7]

- *Monotonicity* condition*:* The SWF rises with an increase in any given income level, all other incomes remaining the same.
- *Equality Preference condition:* Any progressive transfer from a higher income to a lower income (without reversing the relative positions) increases social welfare. This is also known as the Dalton criterion.
- *Transfer Sensitivity condition:* The positive welfare impact of any progressive transfer at a lower income level will always outweigh the negative welfare impact of a comparable regressive transfer taking place at a higher income level (see Foster and Shorrocks 1988b, 192).

Foster and Shorrocks (1988a, 1988b) provide the following analytically equivalent results on poverty ordering and social welfare ordering while comparing the two size distributions.

A size distribution with uniformly lower[8] headcount ratio also generates a higher social welfare for all possible SWF satisfying the properties of symmetry and monotonicity. This is defined as the first order social welfare dominance.

A size distribution with a uniformly lower depth of poverty also generates a higher social welfare for all possible SWF satisfying the properties of symmetry, monotonicity, and equality preference. This is defined as the second order social welfare dominance.

A size distribution with a uniformly lower severity of poverty also generates a higher social welfare for all possible SWF satisfying the properties of symmetry, monotonicity, equality preference, and transfer sensitivity. This is defined as the third order social welfare dominance.

The analytical results stated above enable us to draw equivalent inferences regarding unambiguous directional changes in the poverty as well as social welfare situation.

Notice that the results on the first, second, and third order dominance in the unrestricted domain are quite general in the following sense. As regards the poverty situation, they hold for all possible numerical values of the poverty line. Equivalently, they hold for all possible specifications[9] of SWF satisfying certain general and plausible equity-enhancing properties discussed above. The importance of these results can be appreciated in terms of their ability to overcome two seemingly intractable problems. One, it is impossible to forge a social consensus about the specific numerical value of the poverty line given the inherent and inescapable elements of arbitrariness involved in it. Two, it is equally impossible to reach a societal agreement regarding the mathematical and numerical specification of the social welfare function. The generality of the dominance results in the sense explained above overcomes both these problems while providing operational criteria for the empirical implementation along with easily comprehensible interpretation.

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[7] The condition of symmetry implies that we ignore the characteristics of individuals (including their particular identity) other than incomes. This is inconsistent with the capability approach suggested by Sen (1988). While characteristics of individual other than income (which are included in the capability concept) are indeed relevant for policy, they cannot be observed in a large-scale (often sample) survey-based measurement of size distribution of income. The latter is used for assessing the order of magnitude of the economywide relative inequality. We regard this problem of measurement as important in itself and distinct from the problem of policy formulation for correcting individual-specific handicaps or deprivations.

[8] To avoid excessive repetition, we use the expression "uniformly lower" to mean lower for all possible values of the poverty line,

[9] For the mathematically discerning readers, the dominance results hold strictly for the additively separable class of poverty measures as well as social welfare functions. In our view, this is hot a major limitation if our justification of the symmetry condition is conceded.

Foster and Shorrocks (1988a, 1988b) prove the result that the occurrence of the first order dominance in the unrestricted domain necessarily implies, but is not implied by, the second order dominance in the unrestricted domain. Similarly, the occurrence of the second order dominance in the unrestricted domain implies but is not implied by the third order dominance in the unrestricted domain. These results, which have been expressed in technical jargon, can be interpreted in concrete and intuitive terms as follows.

A size distribution with a uniformly lower headcount ratio has been shown to be characterized also by uniformly lower depth as well as severity of poverty. However, the converse does not hold. Similarly, a size distribution may have a higher headcount ratio for some parametric value(s) of the poverty line (and hence for the corresponding segment(s) of the population), but if it shows a uniformly lower depth of poverty it would always be characterized by a uniformly lower severity of poverty. Furthermore, a size distribution may be characterized by a higher headcount ratio as well as a greater depth of poverty for some value(s) of the poverty, but it may have a uniformly lower severity of poverty. Thus, moving from a lower to a higher order of dominance involves tradeoffs among different dimensions of poverty.

It should be obvious on a priori grounds that changes in relative inequalities and those in absolute poverty need not necessarily go together. For example, changes in the Lorenz curve, if confined to the nonpoor segment of the population, would leave the poverty situation unchanged. Similarly, changes in relative inequalities would bring about a change in the poverty situation only if those changes took place for the population below the poverty line.

From the point of view of social welfare orderings, the first, second, and third order dominance criteria require, as a necessary condition, a rise in mean income. But each of them can be consistent with a rise in relative inequality. Dominance cases involving a rise in both mean income and relative inequality obviously involve a trade off between these two dimensions. Resolution of this trade off would require increasingly more stringent conditions on the underlying SWF.

How a trade off between the mean income and the relative inequality in the underlying size distribution gets resolved so as to result in an improvement in social welfare and poverty situation is an interesting question. One clear-cut situation is analogous to the Pareto-improvement condition used by economists. Monotonicity and symmetry conditions together guarantee that social welfare would improve with a rise in some income(s) while other incomes remain unchanged. More generally, implicitly and intuitively, some potential compensation principle must be at work whereby, in moving from one static situation to another, the gainers can compensate the losers so as to restore the losers' status quo before the change and the gainers can still be better off after the compensation.

An important lesson follows from the foregoing discussion. Contrary to the widely held perceptions noted in the first section, an increase in relative inequalities, if accompanied by a sufficient rise in mean income, may result in equity improvement with reference to all SWF satisfying plausible equity-enhancing properties as discussed above.

Links between Economic Growth, Income Inequality, and Resulting Distributional Outcomes: Some Analytical Issues

It may be noted that comparison of two static situations with respect to the poverty and (equivalent) social welfare orderings does not shed light on the underlying mechanisms and processes that bring about the observed distributional outcomes. If we wish to interpret a rise in mean income as reflecting the outcome of economic growth, it becomes necessary to consider the underlying growth process operating in time. These mechanisms and processes belong to the area of our collective ignorance. We feel, however, that it should be possible to combine the results on poverty and (equivalently) social welfare orderings with the insights into the link between economic growth and distributional outcomes conceptualized by Kuznets (1955, 1963) and Lewis (1976). Drawing on these contributions, we offer a few speculative remarks to facilitate the interpretation of the empirical results.

The possible tendency for structural changes during the early stages of rapid economic growth to widen relative income inequalities was noted by Kuznets (1955). Two points require emphasis. First, Kuznets treated this as a tendency and not an inevitable consequence. Second, he made this observation while conceptualizing the growth-inequality relationship in the context of predominantly market-driven growth that had historically taken place in the then developed countries. Kuznets attributed this tendency to (a) the rise in intersectoral inequality in product per worker due to the uneven impact of technological changes across sectors and across production units within a given sector, (b) the greater concentration of asset incomes and their higher rewards because of deficiency of capital relative to labor in the early (than in the later mature) stages of growth, and (c) the predominance of self-employment incomes in the early stages with inherently greater variability than wage and salaried incomes. It is this aspect of the growth-inequality relationship for which Kuznets is widely known. He is less widely known for the other and equally important aspect of the same relationship, which relates to what he called "income mobility" in his later study (Kuznets 1.963). Income mobility refers to shifts in the relative income positions of individuals during the growth process. These shifts may involve varying combinations of a change in location (e.g., from rural to urban), a change in occupation (e.g., from craft-based to education-based), a change in industry of attachment (e.g., from agrobased to nonagrobased) as well as a change in employment status (e.g., from self-employed to employee). It is brought about by new economic opportunities generated by structural changes during the growth process. The availability of (real) income-enhancing opportunities is governed by improvements in the efficiency of resource utilization, improved functioning of economic organization, and by a rise in total factor productivity brought about by technological progress. The impact of these factors is known to be uneven across sectors, over different locations in a large country, and across different segments of the work force. Some sectors and production units affected by the foregoing factors would be expanding rapidly, whereas others may become obsolete, resulting in unemployment or a deterioration in the relative income position of those employed in these lagging sectors and units. Consequently, the growth process may engender income mobility in either direction. However, during the process of rapid economic growth, newly generated opportunities leading to upward income mobility will far outweigh those leading to unchanged income position or downward income mobility. Kuznets (1966, 205) correctly noted that, in the presence of income mobility, "there is no persistent economic class-consciousness and there is little meaning in the question whether the poor are getting poorer and the rich richer". The phenomenon of income mobility thus tends to soften the adverse social consequences of widening income inequalities that might be experienced in the growth process. The rise in living standards resulting from upward income mobility would have obvious links with social welfare improvements. Lewis (1976) provides an interesting discussion, in his dual economy framework, of the positive as well as negative effects of interactions between the modern (industrial) and the traditional (mostly agricultural) sectors in the growth process. His discussion of various mechanisms can be easily interpreted to contribute to upward or downward income mobility. A preliminary analysis of income mobility, and barriers to income mobility and how they interact with the institutional framework in the growth process, is presented in Tendulkar (1992), who explores the link between economic growth, inequality, and poverty.

In this paper, we compare the distributional outcomes with respect to poverty and social welfare in the 1970s, with a low growth rate of a little I over one percent per annum in real GDP per capita, with the 1980s, which 1 recorded a more than doubling of that growth rate (Appendix B, line 2). The gross domestic fixed capital formation (as percent of GDP), at constant 1980/1981 prices, increased by about three percentage points between 1970/1971 and 1980/1981, whereas it rose by only 1.5 percentage points between 1980/1981 and 1990/1991. It thus appears that the significant rise in the growth rate of real GDP per capita has been achieved more by better utilization of resources than by expanding resource availability. Some evidence in favor of higher total factor productivity for the organized manufacturing sector in India in the 1980s compared with the 1970s is available (Ahluwalia 1991, 1992). It may also be noted that the 1980s were characterized by a higher annual growth rate as well as greater stability of the annual growth rate over the decade (as reflected in higher squared correlation coefficients, Appendix B).

It is therefore reasonable to expect that opportunities leading to upward income mobility in the Kuznets sense would have been greater in the 1980s than in the 1970s.

Conceptually, (real) income-enhancing opportunities arising from a faster rate of economic growth would be reflected in the returns accruing to the factors of production. These, in turn, would be reflected in the size distribution of household income (before taking into account transfers on public and private account). Usually, the reported incomes in household income surveys are inclusive of the impact of transfers on public and private account. In India, household income surveys are much less frequent than consumer expenditure surveys. We have, therefore, based the present exercise on the size distributions of per capita household consumer expenditure available from the National Sample Survey Organisation in India.

How would the impact of the economic opportunities generated by faster growth in real GDP per capita be reflected in the per capita household consumer expenditure whose size distributions are examined in this paper? At the aggregate level, private final consumer expenditure (PFCE) per capita at 1980/1981 prices (based on National Accounts Statistics [NAS]) grew at an annual rate of 2.21 percent during the 1980s, which is one percentage point slower than that of real GDP per capita (Appendix B, lines 2 and 7). How- ever, during the 1970s, real PFCE per capita and real GDP per capita grew at almost the same annual growth rates of 1.1 percent. This indicates that the gross domestic savings rate increased during the 1980s. That household consumer expenditure grows more slowly than household income during the rapid growth process is an established macroeconomic stylized fact. How- ever, a stable and monotonic relationship over time between (per capita) household consumer expenditure and (per capita) household income, which is usually postulated at the macroeconomic level, may not be reflected at the micro level and hence in the size distribution of per capita consumer expenditure examined in this paper. There are at least two major reasons for this. One, there are transitory elements in both household income and consumer expenditure, more so in the former than in the latter, especially when climatically governed agriculture in a continental country like India provides the major source of livelihood for at least two thirds of the work force and their dependents. The transitory element is further reinforced by the predominance of self-employment in nonagriculture, which is known to be inherently more variable than regular wage and salaried income. The impact of these transitory elements may not be predictably related to the income positions of households. Equally, the behavioral responses to these transitory elements may also vary across households. Nevertheless, two statements are possible. At the upper end of the size distribution, there usually exists a cushion in current consumption over the minimum necessary level. For these households, the transitory elements would moderate an immediate rise in consumer expenditure in response to a rise in household income, smoothing fluctuations in consumption. At the lower end of the size distribution, there is a more direct relationship between income and consumer expenditure in the absence of an adjustable cushion at the subsistence level. These factors would tend to moderate year-to-year changes in overall average per capita total consumer expenditure in real terms.

Is it possible to establish a direct and causal link between the (trend rate of) economic growth and the resulting changes in the observed size distribution of per capita household consumer expenditure? The answer to this question is negative for the following reasons. First, the uneven impact of transitory factors on incomes across households and their reflection in household consumption, as mediated through varying behavioral responses as mentioned earlier, are relevant in this context as well. Second, household consumer expenditure would incorporate the impact of transfers on public and private account. These transfers at the household level cannot be expected to bear any predictable relationship to economic growth. Third, the important variable of household size that mediates between the current living standard (as reflected in household consumer expenditure per capita) and household income is governed by demographic factors and household preferences in respect of consumption saving choices. These are only remotely related to the economic growth process. For these reasons, it is not possible to postulate a direct causal link between (trend rate of) economic growth and observed year-to-year changes in the size distribution of per capita household consumer expenditure. However, it would not be correct to deny the overarching influence of economic growth in shaping the changes in the size distribution of per capita

consumer expenditure via income mobility. Consequently, our attempt in this paper is to examine the distributional outcomes (as reflected in the size distributions of per capita household consumer expenditure adjusted for intertemporal price variations) of a high or a low rate of economic growth. The distributional outcomes, in turn, are studied in terms of their directional implications for poverty and social welfare orderings (with reference to the entire size distribution of per capita house-hold consumer expenditure) over time.

Empirical Results

This study undertakes pairwise comparisons of size distributions of monthly per capita total expenditure (MPCTE) at eight time-points with reference to poverty and social welfare ordering. For this purpose, we have generated the required size distributions of MPCTE at constant 1970/1971 prices for each of the eight time-points between 1970/1971 and 1988/1989 (four each in the 1970s and in the 1980s), separately for the rural, urban, and entire (rural plus urban) population. The data sources and computational procedures employed in this connection are described in Appendix C. We present pairwise comparisons in which every later time-point is compared with each of the earlier time-points for ranking the entire size distributions with respect to unambiguous reduction in poverty and increase in social welfare, using the dominance criteria discussed in Section II. With eight time-points, these pairwise comparisons give 28 cases each for the rural, the urban, and the entire population. To apply the dominance results, we have used a uniform numerical approximation by treating the absolute difference of 0.0004 or less as negligible in the values of HCR, PGI and *FGT** at any given parametric value of the poverty line at constant 1970-1971 prices at two time-points.[10]

In organizing our empirical findings, we use the analytical result that the occurrence of unrestricted first order (or HCR) dominance necessarily implies the occurrence of the unrestricted second order (or PGI) dominance which, in turn, implies the occurrence of the unrestricted third order (or *FGT*)* dominance. We have already elaborated the concrete implication of this result in Section II. On this basis, we devise mutually exclusive and exhaustive categories of dominance possibilities with a clear-cut interpretation with reference to equitable distributional outcome or equivalently unambiguous improvement in the poverty as well as the social welfare situation.

We classify the two-point comparisons with reference to their temporal occurrence, (i) within the decade of the 1970s, (ii) within the decade of the 1980s, and (iii) time-points in the 1980s compared with those in the 1970s. This is done with a view to comparing the distributional outcomes associated with the slow growth of the 1970s and those associated with the faster growth of the 1980s. Recalling our discussion in Section II, we classify the totality of comparison cases belonging to each of the three temporal- location types, into the following four broad, mutually exclusive and exhaustive categories of social welfare and poverty ordering:

(a) *Unrestricted Headcount Ratio dominance (UHCRD):* It implies unambiguous improvement in both the poverty and the social welfare situation under the weakest assumptions and hence (by implication) the most robust dominance criterion.

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[10] To our knowledge, there are no well-established criteria for numerical approximation in assessing the unrestricted dominance of different orders. We have, however, (arbitrarily) adopted a uniform absolute numerical yardstick mentioned in the text after considering various other (equally arbitrary) alternatives. For a given order of dominance, poverty orderings explore the dominance in the unrestricted domain so that if one happens to be conservative at the upper end of the distribution, the converse would hold at the other end. Moreover, even though different poverty measures lie between zero and unity, they differ in terms of their usual numerical range, especially when approaching the upper limit of unity, so percentage approximation error would also differ across poverty measures. As such, we have chosen to minimize the subjective discretion by making the numerical approximation independent of both the poverty measure selected as well as its level in a given comparison.

The remaining cases falling in the complement of category (a), i.e., Restricted Headcount Ratio dominance (RHCRD), can be further classified into the following categories:

b) *Unrestricted Poverty Gap Index dominance (UPGID) along with RHCRD:* It is consistent with deterioration in poverty in terms of headcount ratio for certain segment(s) of population but unambiguous improvement in terms of the depth of poverty.

c) Unrestricted FGT* dominance (UFGT*D) combined with RHCRD and restricted PGI dominance (RPGID): It refers to the occurrence of unambiguous reduction in the severity of poverty measured by FGT* which may coexist with a deterioration in the depth of poverty and an increase in the headcount ratio for certain segment(s) of the population.

d) Restricted FGT* dominance (RFGT*D): This category comprises the residual inconclusive cases of comparisons with regard to social welfare and poverty ordering. It is also associated with increased severity of poverty for certain segments of the population.

As noted earlier, mean per capita consumer expenditure ($\overline{X}$) for the dominating distribution has to be necessarily higher under all the three dominance criteria (a), (b), and (c). However, under the restricted dominance category (d), $\overline{X}$ can be higher or lower. It is well known that policymakers tend to judge distributional outcomes entirely on the basis of relative inequality, which is often assessed solely in terms of a reduction in the Gini coefficient (G), a widely used summary measure of relative inequality based on the Lorenz curve. We call this the Gini criterion. Here, it is worth noting that it is the Lorenz curve, and not the summary measure G, that captures the actual relative inequality of a distribution. For it is recognized by experts that the same value of the Gini coefficient can be associated with very different Lorenz curves reflecting very different kinds of relative inequalities. With a view to comparing the consistency between results based on the Gini criterion and those based on the dominance criteria, cases under unambiguous categories (a), (b), and (c) are classified into two subcategories each, namely,

(1) increase in $\overline{X}$ combined with a decline in G; and

(2) increase in $\overline{X}$ combined with an increase in G.

The policymaker would prefer (1) to (2), because (1) involves a decline in relative inequality. However, there is no rational basis for this preference ordering based on a summary measure of Gini coefficient alone. The two subcategories (1) and (2) under categories (a), (b), and (c) can be separately distinguished under UHCRD, UPGID, and *UFGT*D* criteria, respectively.

Similarly, inconclusive cases falling under RFGT*D in category (d) can be classified into the following mutually exclusive subcategories with reference to decline or rise in $\overline{X}$ and G:

(d.1) increase in $\overline{X}$ combined with a decline in G;

(d.2) increase in $\overline{X}$ combined with an increase in G;

(d.3) decline in $\overline{X}$ combined with a decline in G;

(d.4) decline in $\overline{X}$ combined with an increase in G;

Among these subcategories too, on the basis of the Gini coefficient, the policymaker may (incorrectly) prefer (d.1) and (d.3) to (d.2) and (d.4),

Table 1 provides a summary of 84 cases (28 each for the rural, the urban, and the entire population), in respect of their temporal location and dominance categories (a), (b), (c), and (d), and subcategories (according to change in Gini coefficient) under each of them as mentioned above. The following regularities emerging from Table 1 are supplemented by comments based on the more detailed table in Tendulkar and Jain (1995).

Table 1: Mutually Exclusive and Exhaustive Classification of Binary Temporal Comparisons among Eight NSS Years, with Reference to Poverty and Social Welfare Orderings and Relative Inequality: All-India Rural, Urban, and Entire (Rural plus Urban) Population

S1. No. (1)	Category (2)	Description of Category (3)	Number of Pairwise Comparisons: Within 1970s Rural (4)	Within 1970s Urban (5)	Within 1970s Entire (6)	Within 1980s Rural (7)	Within 1980s Urban (8)	Within 1980s Entire (9)	1980s over 1970s Rural (10)	1980s over 1970s Urban (11)	1980s over 1970s Entire (12)
1	(a)	UHCRD	2	–	1	2	5	5	16	16	16
2	(a. 1)	UHCRD with $\overline{X}_1 > \overline{X}_2$ & $G_1 < G_2$	2	–	1	2	–	4	14	3	8
3	(a.2)	UHCRD with $\overline{X}_1 > \overline{X}_2$ & $G_1 > G_2$	–	–	–	–	5	1	2	13	8
4	(b)	UPGID	1	–	1	3	1	1	–	–	–
5	(b.l)	UPGID with $\overline{X}_1 > \overline{X}_2$ & $G_1 < G_2$	1	–	1	3	–	–	–	–	–
6	(b.2)	UPGID with $\overline{X}_1 > \overline{X}_2$ & $G_1 > G_2$	–	–	–	–	1	1	–	–	–
7	(c.2)	UFGT*D with $\overline{X}_1 > \overline{X}_2$ & $G_1 > G_2$	–	1	–	–	–	–	–	–	–
8	(d)	RFGT*D	3	5	4	1	–	–	–	–	–
9	(d.l)	RFGT*Dwith $\overline{X}_1 > \overline{X}_2$ & $G_1 < G_2$	–	2	–	1	–	–	–	–	–
10	(d.2)	RFGT*D with $\overline{X}_1 > \overline{X}_2$ & $G_1 > G_2$	3	1	3	–	–	–	–	–	–
11	(d.3)	RFGT*D with $\overline{X}_1 < \overline{X}_2$ & $G_1 < G_2$	–	2	1	–	–	–	–	–	–
12	All cases		6	6	6	6	6	6	16	16	16

Notes: (1) and G refer to mean level of per capita total expenditure (PCTE) and Gini coefficient, respectively.
(2) UHCRD, UPGID and UFGT*D, respectively, indicate unrestricted Headcount ratio dominance or First Order Dominance, unrestricted PGI dominance or Second Order Dominance, and unrestricted FGT* dominance or Third Order Dominance.
(3) Empty categories (c.1) and (d.4) are not listed.

First, the largest number of inconclusive cases exhibiting restricted *FGT** dominance (belonging to category (d)) appear in the 1970s with three rural, five urban, and four cases (entire population) out of the total number of six comparisons each. There is only one rural case (1987/1988 compared with 1986/1987) in this category (d) from the 1980s. In this case, deterioration in the severity of poverty is confined to the top four percent of the rural population (arranged in ascending order of MPCTE). However, in all the three rural cases from the 1970s (1972/1973 and 1977/1978 compared with 1970/1971, and 1977/1978 compared with 1973/1974), the fractile groups covering 6 to 99 percent of the population (arranged in ascending order of MPCTE) experienced deterioration in the severity of poverty. Among the five urban cases (1973/1974 and 1977/1978 compared with both 1970/1971 and 1972/1973, and 1977/1978 in comparison with 1973/1974) of this category, in three cases bottom fractile groups suffer and top ones do not, whereas in the remaining two cases, the situation is reversed. For all four cases in the 1970s relating to the entire (rural plus urban) population and falling into this category (d), 6 to 97 percent of the population (arranged in ascending order of MPCTE) suffer increased severity of poverty.

Second, unambiguous improvement in both poverty and social welfare was indicated by the unrestricted first order dominance test in as many as 20 cases for the rural, 21 cases for the urban, and 22 cases for the entire population, out of 28 cases each. Notice that the largest number of such cases in category (a) appear in the 1980s rather than in the 1970s. There are a total of six cases of comparisons each in the 1970s and the 1980s. In the 1980s, five out of six cases appear in this category for both the urban and the entire population in contrast to none and one respectively out of the six comparisons in the 1970s. For the rural population, there are two cases each in the 1970s and the 1980s. Across the two decades, there are 16 cases (Table 1, columns (10) to (12) and all of them fall in category (a). Thus, each

year of the 1980s dominated over each year of the 1970s under the most robust criterion, indicating unambiguous improvements in both poverty and social welfare.

Third, the unrestricted PGI dominance in combination with restricted HCR dominance (category (b) in Table 1) also appears more frequently in the 1980s than in the 1970s.

To recapitulate, it should be obvious that, compared with the 1970s, the doubling of annual growth rate of real per capita GDP in the 1980s was more frequently associated with improvements in both the poverty and the social welfare situation.

It would be interesting to compare these conclusions based on dominance criteria with those which would emerge if policymakers were to judge equitable distributional outcome on the basis of a decline in Gini coefficient, the Gini criterion. Notice that the dominance criteria, being based on the comparison of the entire distribution, provide a rational basis for the ranking of two situations, whereas the Gini criterion, being based only on a summary measure of relative inequality, does not.

Let D-A and D-R stand for acceptance and rejection of a later time-point in pairwise comparison in terms of occurrence and nonoccurrence of equitable distributional outcome as judged by the dominance criteria.[11] Similarly, let G. A and G- R stand for acceptance and rejection of a later time-point in pairwise comparison in terms of occurrence and nonoccurrence of equitable distributional outcome as judged by the Gini criterion. The case presented in Table 1 can be regrouped so as to obtain their two-way classification, i.e., (D-A, D-R) against (G-A, G-R). Here we present all cases relating to the rural, urban, and entire population, while retaining their temporal location types. These are presented in Table 2. Notice that two possible errors can arise. A comparison gets rejected on Gini criterion while it should have been accepted on dominance criteria (D-A, G-R). Conversely, a comparison gets accepted on the Gini criterion whereas, in fact, it should have been rejected on the dominance criteria (D-R, G-A). The results of Table 2 warrant the following conclusions.

Among 71 cases (out of 84) exhibiting unambiguous equitable outcomes as indicated by dominance results, 32 comparisons were consistent with a rise in relative inequality as reflected in the Gini coefficient (D-A, G-R combinations). Thus, these 32 cases exhibited unambiguous improvements in both the poverty and the social welfare situation, despite a widening of relative inequalities. Among these 32 cases, 23 involved comparisons of time- points in the 1980s with those of the 1970s. Dominance criteria lead to the acceptance of 6 out of 18 comparisons in the 1970s, 17 out of 18 in the 1980s, and all the 48 comparisons of the 1980s with the 1970s (Table 2, last column lines 1, 4, and 7). Thus, dominance criteria indicate a higher frequency of equitable distributional outcomes in the 1980s than in the 1970s. In contrast, under the Gini criterion, 10 comparisons each in the 1970s and in the 1980s would be acceptable, so that in terms of the frequency of equitable outcomes, 1 the 1980s do not stand out in comparison with the 1970s. Furthermore, 23 out of 48 cases involving timepoints in the 1980s in comparison to those in the 1970s are rejected under the Gini criterion. In other words, on the basis of the Gini criterion, there was nothing to choose between the two decades in terms of the frequency of equitable distributional outcomes. The Gini criterion thus reverses the inference on the growth-equity connection indicated by the more rational dominance criteria (based as they are on the comparison of the entire size distribution in the two situations).

[11] We take D-A to cover cases satisfying dominance criteria (a) to (c) and the remaining inconclusive cases indicated by dominance criterion (d) falling under D-R.

Table 2: Two-way Classification (with Reference to Dominance Criteria and Gini criterion) of Number of Pairwise Comparisons

SI. No. (1)	G D (2)	G-A (3)	G-R (4)	Total (5)
			(A) Within the 1970s	
1	D-A	5	1	6
2	D-R	5	7	12
3	Total	10	8	18
			(B) Within the 1980s	
4	D-A	9	8	17
5	D-R	1	0	1
6	Total	10	8	18
			(C) 1980s in comparison with 1970s	
7	D-A	25	23	48
8	D-R	0	0	0
9	Total	25	23	48

Notes: (1) D stands for dominance criteria explained in text.
(2) G stands for the Gini criterion explained in text.
(3) A and R stand for acceptance and rejection of a later time-point in pairwise comparison in terms of occurrence and nonoccurrence of equitable distributional outcome judged by the given criterion.

What would happen if policymakers were to adopt a more stringent criterion for judging the equity, namely, a rise in mean income as well as a reduction in Gini coefficient? Among the cases accepted under the Gini criterion, three would be rejected (Table 1, line 11, columns (5) and (6)) under the stringent criterion. All the three rejected cases being in the 1970s, this stringent criterion would give the 1980s an edge over the 1970s in terms of a greater number of accepted cases. This would bring his judgment nearer to the dominance criterion. However, in terms of the individual comparisons going wrong (namely, cases under (G-A, D-R) plus (D-R, G-A)), the judgment would still go wrong in as many as nine cases in the 1980s compared with three cases in the 1970s.

It is not suggested that policymakers would be as naive as reflected in their opting for the Gini criterion or its more stringent version. Nevertheless, these criteria do capture the broad mindset of suspicion of rapid economic growth associated with a rise in relative inequality, which needs revision in the light of the more appropriate dominance criteria.

One final point needs to be highlighted from the results of Table 2. Notice that out of the 18 pairwise comparisons in the 1980s (which is characterized by faster growth than in the 1970s), as many as 17 indicated acceptance under the dominance criteria (line 4 of Table 2). Nine of these 17 cases showed a decline in relative inequality. Similarly, 25 out of the total 48 cases involving comparisons of time-points from the 1980s with those from the 1970s also showed a decline in relative inequality (line 7 of Table 2). In other words, contrary to the widely held perception erroneously attributed to Kuznets (1955), the faster growth of the 1980s was not always unequalizing in character. The cases mentioned above constitute a happy combination of rapid growth and a reduction in relative inequality in the Indian context.

Recapitulation and Concluding Observations

We start with a brief summary of our empirical findings.

- Out of the total of 28 possible pairwise comparisons each for the rural, the urban, and the entire (rural plus urban) population, unambiguous improvement in both poverty and social welfare

emerged in as many as 20 (rural), 21 (urban), and 22 (entire population) cases. They were based on the weakest possible restrictions both on the class of poverty measures and on the class of admissible social welfare functions. They appeared more frequently in the 1980s than in the 1970s. Each year of the 1980s marked a distributional improvement over each year of the 1970s. Many of the cases of improvement involved worsening of relative income inequalities.

- At the other extreme, the largest number of inconclusive cases (involving restricted *FGT** dominance) appeared in the 1970s. They included three (rural), five (urban), and four (entire population) out of the total of six possible comparisons. In contrast, only one (rural) case in this category came from the 1980s and, in this case too, the worsening of severity of poverty was confined only to the top four percent of the population.
- The unrestricted PGI dominance in combination with restricted HCR dominance appeared more frequently in the 1980s than in the 1970s.
- We also carried out an exercise to check the consistency in judging equity on the basis of (a) dominance criteria, (b) reduction in Gini coefficient only, and (c) increase in mean income as well as a reduction in Gini coefficient. Being based on the comparison of entire size distributions, we argued that (a) constitutes the most comprehensive evidence for the occurrence of equitable distributional outcome, whereas (b) and (c) may be looked upon as rules of thumb for judging equity. While the 1980s outshine the 1970s in terms of more equitable outcomes on the basis of (a), this very important conclusion does not follow on the basis of (b), and holds only weakly on the basis of (c).

It should be obvious that, judging by the poverty and social welfare ordering criteria, the doubling of the annual growth rate of real per capita GDP in the 1980s was associated with more equitable outcomes despite the worsening of relative inequalities in certain cases (especially for the urban population) than the slower growth of the 1970s. In other words, the apprehensions expressed by the radical intelligentsia about the inequitable distributional outcomes expected to be associated with a faster rate of growth were not borne out by experience. Just as certain cases in the 1980s were associated with a widening of relative inequalities without proving inequitous, the remaining cases in the 1980s indicating dominance constituted a happy combination of rapid growth, decline in relative inequalities, and improvement along the equity dimension. It is thus equally important to highlight the fact that the doubling of the growth rate in the 1980s compared with the 1970s was not unequalizing all the time. The Indian case in the 1980s is thus consistent with the international experience surveyed recently by Fields (1995).

Critics of the rapid but unequalizing growth thesis may argue that, in comparison with the 1970s, the 1980s were marked by the greater role of government policies focused on direct antipoverty programs and it was these policies that reversed the inequitable outcomes associated with faster growth. While increased emphasis on antipoverty policies certainly coincided with a higher rate of economic growth in the 1980s, the impact of centrally initiated direct antipoverty programs has been found to be limited in terms of coverage even for the rural population (Tendulkar, Sundaram and Jain 1993, Ch. 5 and 6). It is ad hoc public works programs combined with comfortable public stocks of foodgrains in years of agricultural dips which seem to alleviate rural poverty more effectively (Tendulkar and Jain 1994). The second plank of the antipoverty strategy, the public distribution system (PDS), was connected to the growth process, as it could not have been maintained without higher and more stable agricultural growth in the 1980s. There were no public works or other antipoverty programs for the urban population. Moreover, PDS in urban areas was universal and hence not specifically targeted toward the poor. It is also known that employment growth in the organized industrial sector in the 1980s was negative (Ahluwalia 1991). Consequently, improvements in the urban poverty and welfare situation in the 1980s could not have been brought about in the absence of accelerated growth rate and the resulting employment generation in the urban informal sector where the urban poor are concentrated. It is important to note that the equitable distributional outcomes emerged for the urban population despite descriptively adverse

movements in the urban relative inequalities. The role of the faster rate of economic growth in general and foodgrains output growth in particular should thus be obvious in bringing about distribution ally more favorable outcomes in the 1980s compared with the 1970s.

What lessons can we draw for development policies? Contrary to earlier perceptions, the widening of relative inequalities, if accompanied by rapid economic growth in the sense of rapid expansion of productive capacity and its effective utilization, need not necessarily lead to a deterioration in either poverty or social welfare. Introspection seems to be clearly warranted regarding the instinctive suspicion in the minds of policymakers and the radical intelligentsia of rapid growth as well as rising relative inequalities. In the same way, it is also important to emphasize, on the basis of a priori reasoning as well as empirical evidence, that rapid economic growth need not always be unequalizing in character. The basic point is that, just as it is wrong to treat every increase in relative inequalities as inequitous, it is equally wrong to regard rapid growth to be always unequalizing. Finally, only rapid economic growth can play an enduring instrumental role[12] in the alleviation of poverty in low income, densely populated agricultural economies. Redistributive government action, if undertaken at the considerable cost of growth, is unlikely to be sustained and effective. This is more likely to be the case where per capita GDP is low and the poor population forms a significant proportion of the total population (Srinivasan 1977). The argument for rapid growth is further reinforced in an open democratic system of government which rules out radical changes in production and distribution processes, and where the development path has necessarily to be based on consensus, gradualism, an noncoercive means.[13]

[12] This was precisely the role that was assigned to rapid economic growth in a study carried out by the Perspective Planning Division (1962, 1974) more than 30 years ago.

[13] "When incomes are rising, the objectives of growth and social justice are easier to reconcile. In conditions of relative stagnation, however, the progress toward these objectives is beset with very considerable difficulties; particularly in the context of a democratic parliamentary system of Government" (GOI.1969,21).

Appendix A

Formal Presentation of Poverty and Social Welfare Ordering Criteria

Drawing on Foster and Shorrocks (1988a, 1988b), we define the criteria for ordering two (entire) size distributions of income in terms of poverty. For this purpose, we denote X_1 and X_2 to be the two size distributions. A given poverty measure with subscripts 1 or 2 indicates that it has been calculated for distributions X_1 or X_2. Notice that since each poverty measure is a function of the exogenously given poverty line z, the ordering criteria involve varying the poverty line z parametrically between the minimum and maxi- mum values of income for the two distributions.

The unrestricted first order dominance or the unrestricted headcount ratio dominance (UHCRD) is given by

HCRl(z) is no higher than *HCR2(z)* for all *z,* and

HCRl(z) is lower than *HCR2(z)* for at least some z (AI)

Atkinson (1987) has proved that this dominance holds for a more general class of poverty measures which satisfy reasonably mild conditions. Dominance holds not only for headcount ratio, but also for the class of poverty measures that is continuous, separable, symmetrical, and weakly monotonic.

When conditions (AI) are violated, we get restricted HCR dominance (RHCRD). In such situations, the ordering criterion is provided by the unrestricted second order dominance or unrestricted PGI dominance (UPGID), given by the conditions

$PG1_1$ *(z)* is no higher than *PGI2(z)* for all *z,* and

PGI_1 *(z)* is lower than *PGI2(z)* for at least some z (A2)

In turn, when conditions (A2) are violated, we get restricted PGI dominance (RPGID). In such situations, the ordering criterion consists in applying the more stringent test for the unrestricted third order dominance in terms of *FGT** or unrestricted *FGT** dominance *(UFGT*D),* given by the conditions

FGT_1*(z)* is no higher than *FGT2*(z)* for all *z,* and

FGT_1*(z)* is lower than *FGT2*(z)* for at least some z (A3)

The intuitive meaning of conditions (AI) to (A3) is that the dominating distribution exhibits lower poverty in terms of the measures HCR, PGI, and *FGT** respectively, at each possible value of the poverty line z varying parametrically over the entire range of income.

It should be obvious that UHCRD, UPGID, and *UFGT*D* involve progressively more stringent conditions with reference to the admissible class of poverty measures.

Foster and Shorrocks (1988a, 1988b) prove the following equivalent results for dominance in terms of social welfare functions (SWF) satisfying plausible properties incorporating the concept of equity (see Section II on page 4 for discussion and interpretation of these properties). The first order dominance in terms of HCR in the unrestricted domain implies agreement among all SWF which satisfy symmetry and monotonicity conditions.

The second order dominance in terms of PGI in the unrestricted domain implies generalized Lorenz dominance (Shorrocks 1983) and hence agreement among all SWF exhibiting symmetry, monotonicity, and equality preference.

The third order dominance in terms of *FGT** in the unrestricted domain implies agreement among all SWF satisfying symmetry, monotonicity, equality preference, and transfer sensitivity conditions.

It has been shown that the unrestricted first order dominance implies but is not implied by the unrestricted second order dominance, which in turn implies but is not implied by the unrestricted third order dominance.

Appendix B

Table B.1: Exponential Trend Growth Rates, over the 1970s and 1980s

No.	Variable	Exponential Trend Growth Rate Sl (percent per annum) 1970/71 to 1980/81	1980/81 to 1990/91
(1)	(2)	(3)	(4)
1	Gross Domestic Product (GDP) at factor cost	3.38 (0.9344)	5.32 (0.9897)
2	Per Capita GDP at factor cost	1.12 (0.6003)	3.18 (0.9709)
3	Total Population	2.26	2.14
4	GDP Originating in Agriculture	1.80 (0.5613)	3.08 (0.8608)
5	GDP Originating in Nonagriculture	4.45 (0.9797)	6.59 (0.9971)
6	Aggregate Private Final Consumer Expenditure (PFCE)	3.33 (0.9391)	4.35 (0.9910)
7	PFCE Per Capita	1.07	2.21
8	Index Number of Agricultural Output (1967-68 to 1969-70=100)	2.24 (0.5724)	3.28 (0.8125)

Notes: (1) The National Accounts-based variables (S1. Nos. 1 to 7 except 3) are measured at constant 1980/1981 prices.

(2) In deriving the trend growth rate of PFCE per capita (Line 7), we have used the implicit trend growth rate of population given in Line 3.

(3) Figures in brackets indicate squared correlation coefficient for the semi-log trend equation on time. This is used as the descriptive indicator of the extent of stability for the (descriptive) trend annual growth rate over the underlying entire period.

Sources:

(1) Central Statistical Organisation (1992), for 1970/1971 to 1980/1981.

(2) Central Statistical Organisation (various years), for 1980/1981 to 1990/1991.

(3) Ministry of Finance (various years), for Line 8.

Appendix C

Data Sources and Computation Procedures

This study uses the grouped data available from the published reports of the National Sample Survey (NSS) relating to all the eight rounds between 1970 and 1989 in which information on household consumer expenditure was collected.

Table C.l: Description of Data Sources

SI. No. (1)	NSS round (2)	Survey period (3)	Abbreviation for survey period (4)	Data source (5)
1	25th	July 1970–June 1971	1970/1971	NSS Report No. 231
2	27th	Oct 1972–Sept 1973	1972/1973	*Sarvekshana* 11(3), Jan 1979
3	28th	Oct 1973–June 1974	1973/1974	*Sarvekshana* 1(1), July 1977
4	32nd	July 1977–June 1978	1977/1978	*Sarvekshana* 1X(3), Jan 1986
5	38th	Jan 1983–Dec 1983	1983	*Sarvekshana* 1X(4), Apr 1986
6	42nd	July 1986–June 1987	1986/1987	*Sarvekshana* XII(4), Apr–June 1989
7	43rd	July 1987–June 1988	1987/1988	*Sarvekshana* XV(I), July–Sept 1991
8	44th	July 1988–June 1989	1988/1989	*Sarvekshana* XIV(3), Jan–Mar 1991

Table C.1 gives the NSS round number, survey period of each round, the published sources from which the data have been drawn, and the abbreviation used for each survey period.

Information available from the NSS reports provides the distributions of the rural and urban population according to prespecified ranges of absolute monthly per capita total expenditure (MPCTE) and mean MPCTE within every given range. To derive the MPCTE for prespecified fractile groups of population (arranged in ascending order of MPCTE) for each round of NSS, we have used the general interpolation procedure suggested by Kakwani (1976). This procedure of Kakwani consists in fitting a third degree polynomial concentration curve within each fixed class interval of MPCTE except the first and the last open-ended class intervals, where Pareto-type curves are fitted. We have generated a detailed size distribution for each year according to 24 fractile groups specified in percentage units, namely, 0.0 to 1.0, 1.0 to 2.5, 2.5 to 5.0, 5.0 to 10.0, 10.0 to 15.0, ..., 85.0 to 90.0, 90.0 to 95.0, 95.0 to 97.5, 97.5 to 99.0, 99.0 to 100.0. For each of these groups, we have developed consumer price indices (CPO with 1970/1971 = 100 for all the eight years considered in this study (for details, see Jain 1989 and Tendulkar and Jain 1992). These indices assume that prices faced by different fractile groups are the same but the budget shares and hence, weighting diagrams differ across fractile groups. It is a known fact that for cereals, quality and hence prices may differ across fractile groups. In the absence of relevant data, this aspect could not be incorporated into the construction of the fractile group-specific consumer price indices. Using these consumer price indices, we get the price-adjusted size distributions (in terms of 24 fractile groups) at constant 1970/1971 prices for the eight years, separately for the rural and the urban population. Using (a) the urban versus rural consumer price differential for 1970/1971, assumed to be same for each fractile group, and (b) the rural-urban population weights in a given year, we derive the all-India fractile group-specific mean MPCTE for the entire (rural plus urban) population for that year at 1970/1971 rural prices. These price-adjusted fractile group-specific mean MPCTE for the 24 fractile groups, for eight time-points and for each of the three population types, are not re- ported in order to conserve space. However, interested readers may refer to Appendix tables A.2, A.3, and AA of our recent study (Tendulkar and Jain 1995).

For the two years 1977/1978 and 1988/1989 (urban), data adjustment was deemed necessary for the open-ended top MPCTE class. The reasons along with the methods used are spelled out in Jain and

Tendulkar (1989) and Tendulkar and Jain (1992). The results in this paper are based on the adjusted size distributions.

As noted in Section II, for examining the poverty and social welfare ranking over two given time-points, we apply the unrestricted first, second, and third order dominance conditions. For this purpose, we are required to obtain for each of the two time-points the headcount ratio curve HCR(z), poverty gap index curve PGI(z), and *FGT** curve *FGT*(z),* by parametrically varying the poverty line z over the range MPCTE in the year 1970/1971. For this purpose, we take a set of 26 poverty lines at 1970/1971 prices covering practically the entire population at each time-point. The general interpolation procedure of Kakwani (1976) is then employed to obtain the real size distribution for each year with 26 values of the poverty line constituting the upper terminal values of 26 successive class intervals of MPCTE. This, in turn, is utilized to work out values of HCR(z), PGI(z), and FGT*(z) corresponding to the same set of 26 different values of the poverty line z, for each of the eight time-points. This is done separately for the rural, the urban, and the entire (rural plus urban) population.

We may note that our comparisons of size distributions of the price-adjusted average MPCTE over time for the same fractile group, do not refer to the identical set of households but to the same set of identically rank-order-situated households, ranked according to the level of MPCTE during the survey period. This is because NSS is a non panel, sample survey. We are, in effect, comparing the real living standards in average terms of the same rank-order-situated population which happens to be located in a given fractile group over time. This is in line with the symmetry assumption in the social welfare function specified in the analytical results on welfare dominance.

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