Polarization, Inequality and Growth: The Indian Experience

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Keywords: Growth in India; Inequality; Polarization

Abstract

We analyze polarization in India roughly in the past three decades using consumption expenditure data. We show that both bipolarization and multidimensional polarization (on several dimensions: caste, rural-urban, state, region) have increased since the 1990s. In the case of bipolarization, this is a reversal from the earlier trend (in the 1980s). Overall, our results suggest that the high growth that India has been witnessing since the 1990s has been associated with widening disparities. Comparing polarization and inequality trends, we find similarities, but also some differences; we also show how the study of polarization can provide different insights. Our results therefore underscore the importance of studying polarization as distinct from traditional inequality.

1. Introduction

Kingo Gondo (Toshirô Mifune): Why should you and I hate each other?

Ginjirô Takeuchi (Tsutomu Yamazaki): I don't know. I'm not interested in self-analysis. I do know my room was so cold in winter and so hot in summer I couldn't sleep. Your house looked like heaven, high up there. That's how I began to hate you.

- From Tengoku to Jigoku ("High and Low"), directed by Akira Kurosawa (1963)

Among economists working on inequality, particularly on its implications for conflict, one idea that has received considerable attention in recent times is "polarization." As discussed below, there are different views of polarization in the literature, but at the outset, a broad definition is: "the appearance (or disappearance) of groups in a distribution" (Chakravarty 2009, p. 105). In this paper, we explore polarization in the Indian context. In this process, we try to both elucidate this idea using the Indian example, and deepen our understanding of the transformation that India has been going through, roughly in the past two and half decades.

Why focus on polarization? Several authors (Chakravarty (2009; Ch 4) and Esteban and Ray (1994; 2010) and the references therein) have argued that polarization is intimately connected with conflict. In fact, as we discuss below, ideas of polarization are quite old, and in their conception, they embody connections with conflict. The notion that a highly unequal or polarized society may be prone to conflict has been known for some time now, not only to social scientists, but also to other thinkers (as reflected by the above quote from Kurosawa's film). What is new about the recent literature is that it has rigorously formalized, in an axiomatic manner, the idea of polarization. However, although there are some studies, the empirical literature lags considerably behind theory. We believe that to shed light on polarization and the factors that influence it, we need more empirical studies, particularly

from various kinds of contexts (e.g. developing countries, developed countries, societies with considerable ethnic or other heterogeneity etc.). Our paper is motivated by this observation.

Moreover, the axiomatic foundations of polarization (as conceived by several authors – see below) are different from those of traditional notions of inequality (e.g. as represented by the Lorenz curve). Although we are not advocating a consequentialist position, we believe that irrespective of axiomatic differences, the importance of any new concept can be judged based upon additional insights that it can give, compared to older/more traditional concepts. This is an issue that the literature on polarization has had to confront from the outset (e.g. Wolfson 1994; Zhang and Kanbur 2001; Duclos et al. 2004). While Wolfson (1994) (using Canadian data) and Duclos et al. (2004) (using data from the Luxembourg Income Study) find enough support for using polarization measures vis-à-vis traditional measures of inequality, Zhang and Kanbur (2001) (using Chinese data) find the contrary, and therefore propose a new index of polarization. Our paper makes a contribution in this regard by looking at both inequality (traditionally understood, e.g. through the Gini) and polarization in the Indian context.

What is special about the Indian context? India (along with China) is one of the fastest growing economies in the world today,[1] and has therefore captured the imagination of many

[1] The average annual growth rates of real GDP (at factor cost, at 1993-94 prices) during the periods 1950-51 to 1979-80, 1980-81 to 1990-91, and 1991-92 to 2004-05 are 3.5%, 5.4% and 5.9%, respectively. The corresponding figures for real GDP per-capita are 1.4%, 3.2% and 4.1%, respectively. These figures are taken from Nayyar (2006, Table 2) and reveal that there are two high growth phases in the Indian economy – during the 1980s and since the 1990s. Among economies with GDP higher than US$100 billion (2001 PPP), India ranked twelfth in the period 1991-95 and fourth in the period 1996-2001, in terms of growth of GDP (Bery and Singh 2007). More on the Indian growth story below.

social scientists, philosophers and intelligent lay people around the world.[2] Considerable literature has justifiably accumulated on India's growth process.[3] While several issues have been investigated, one issue that has attracted much attention and controversy is how inclusive this growth process has been – whether significant gains have been achieved in poverty reduction, and whether (and how much) inequality has changed. On the latter front, studies have been concerned with inequality in a traditional sense, and to the best of our knowledge no systematic study exists on polarization. Our paper therefore aims to fill this gap.

It is worthwhile to point out here that the study of inequality and polarization in the Indian context (as in many other contexts) is far from a purely intellectual exercise. India has been adopting a set of far-reaching pro-market policy reforms since the early 1990s (although there were antecedents for these policies in the 1980s). Considerable debate exists on how much one can credit these reforms for the growth that India has been experiencing, and on the other consequences of these reforms (e.g. poverty reduction). Inequality has emerged as a contentious issue in this debate: on the one hand are the supporters of the reforms (e.g. Bhagwati 2010; Panagariya 2008, Chapter 8), who argue that inequality is not a cause of concern and/or has not worsened, while on the other hand are several authors (e.g. Sarkar and Mehta 2010; Vakulabharanam et al. 2010; Himanshu 2007; Sen and Himanshu 2004 a, b; Nagaraj 2000) who argue that inequality has worsened. Surely, some of this disagreement has

[2] For example, in a recent work, economic historian McCloskey (2011, p. xiii) writes that: "The Big Economic Story of our times has not been the Great Recession of 2007-09, unpleasant though it was … The Big Economic Story of our times is that the Chinese in 1978 and then the Indians in 1991 adopted liberal ideas in the economy, and came to attribute a dignity and a liberty to the bourgeoisie formerly denied. And then China and India exploded in economic growth."

[3] For various facets of the Indian growth story and the relevant debates, see Balakrishnan (2010; 2011).

to do with different data, different ways of measuring inequality, and even different ways of thinking about inequality.[4] While we cannot resolve this debate by providing definitive answers, we do think that our focus on polarization may provide a different/newer perspective. Our study is related to (and in a sense, complements) the analysis in Vakulabharanam et al. (2010), who use consumption expenditure data to map worsening class (based upon occupational categories) inequalities in India. It is also related to Sarkar and Mehta (2010), who focus on wage inequality. Neither of these studies deals with polarization or the comparison between inequality and polarization trends.

Whether growth in India is leading to significant poverty reduction and improvement in the material conditions of everyone is a moot point. But, even if this is so, as some sociologists (Bourdieu 1999) have emphasized, an individual who occupies the lower rungs in any society (particularly one that is growing rapidly and accumulating wealth on a large scale) could experience "positional suffering," which to an outsider may appear "unreal."[5] We consider this to be important and part of our motivation for studying polarization in the Indian context derives from this.

Given the above, we use the Indian National Sample Survey (NSS) data on monthly consumption expenditure for the years 1983 (38th round), 1993-94 (50th round), 2004-05 (61st round), and 2009-10 (66th round) to investigate changes in polarization. We will describe this data in detail below (in section 3). Focusing on these years will help us understand changes in

[4] For example, Bhagwati (2010) relies on Krishna and Setupathy (2011) who use NSS consumption expenditure data from 1988, 1994, 2000 and 2005 (the incomparable round in 2000 is handled using Deaton's suggested method) to find that inequality rises and then falls after 1991. Sarkar and Mehta (2010) use wage data from the NSS surveys for 1983, 1993-94 and 2004-05 and find that inequality falls during 1983-94, but rises between 1994-2005.

[5] In the language of economics, this may be considered as "relative deprivation."

the decades of 1980s, 1990s and 2000s and will also allow us to contrast two high growth phases (in the 1980s and since the 1990s). Also, we will be able to get a perspective on inequality and polarization before and after economic reforms. It is also worth pointing out that data from the 2009-10 survey has become available only a few months ago, and will help us throw light on recent changes in India.

A broad summary of our findings is as follows: we find that polarization has sharply increased in India since the early 1990s. When it comes to "unidimensional" polarization, this is a reversal from the previous trend (i.e. during the period 1983 to1993-94). Looking at multidimensional polarization, we show that it has increased on several fronts (rural-urban, caste, state and region) since the early 1990s. This is not different from the trend during the period 1983 to 1993-94, but the increase during the 1993-94 to 2009-10 has been sharper on the spatial dimension (state, region). Since causality is hard to establish, we would like to be cautious and argue that our results suggest that the Indian growth process has been *associated* with increasing disparities. We find some differences in polarization and inequality trends, so our belief is that there is merit in exploring polarization in various other contexts.

The remaining part of the paper is organized into four sections. The next section presents a review of the literature on polarization. Section 3 presents a description of the data and the methodology that we follow. Section 4 presents our analysis and results. The final section concludes.

2. Literature Review

Excellent surveys of the literature on polarization are presented in Chakravarty (2009) and Esteban and Ray (2010). In what follows below, we present a description of the basic ideas and a brief summary of some important studies. Our primary attempt is to facilitate the readers in understanding the analysis and inferences given in the remainder of the paper.

As mentioned above, in economics, a burgeoning literature on polarization has emerged in roughly the past two decades. There are broadly two different notions of polarization in this literature. The first, "bipolarization" is motivated by the idea that the presence of a sizeable middle class can mute (at least to a certain extent) conflict that could arise if the population were to be divided into masses of rich and poor.[6] The seminal studies here are Foster and Wolfson (1992) and Wolfson (1994), although the idea that the middle class is a stabilizing force is a rather old one and can be traced back at least to Aristotle. In *The Politics*, Aristotle discusses the virtues of the middle class and how it can balance the vices of the two extreme classes (i.e. the rich and the poor). It is worthwhile to quote Aristotle at length since the polarization literature (to the best of our knowledge) has not discussed his insight,[7] which should be located within the context of ancient Greek city-states.

"It is clear then both that the political partnership which operates through the middle class is best, and also that those cities have every chance of being well-governed in which the middle class is large, stronger if possible than the other two together, or at any rate stronger than one of them. For the addition of its weight to either side will turn the balance and prevent the extravagance of the opposition" (Aristotle 1962, pp. 172-173).

The conception of the process of polarization as one in which the middle diminishes in importance, breaking up the society into groups (poles) is also old. Marx and Engels discuss the class that stands in the middle (i.e. between the proletariat and the capitalists, e.g.

[6] Bipolarization is also close to one of the dictionary meanings of polarization, e.g. the online Merriam-Webster dictionary defines polarization as: "division into two opposites" (http://www.merriam-webster.com/dictionary/polarization, accessed on Apr 27, 2011).

[7] However, see Easterly (2002) for a cross-country analysis that shows the benefits of a larger middle class for development. Easterly (2002) positions his study within the debate on whether inequality does or does not hurt development and uses Aristotle's insight.

the *petty bourgeoisie*) and its fragility - given the likelihood that in the process of capitalist development, people belonging to this class could join the ranks of the proletariat:

"The lower strata of the middle class-the small tradespeople, shopkeepers, and settled tradesmen generally, the handicraftsmen and peasants-all these sink gradually into the proletariat, partly because their diminutive capital does not suffice for the scale on which Modern Industry is carried on, and is swamped in the competition with the large capitalists, partly because their specialized skill is rendered worthless by new methods of production" (Marx and Engels [1848] 1978, pp. 479-80).

They (and Marx separately) also discuss the process of polarization wherein capitalist society gets divided into two classes confronting each other - the capitalists and the workers.[8] Given the richness of Marx's insights and the multiple interpretations that one can drawn from his work, this maybe a simple description,[9] but it will suffice given our purpose, viz. showing that the idea of polarization had antecedents in classical thinking.

[8] "Our epoch, the epoch of the bourgeoisie, possesses however, this distinctive feature: it has simplified the class antagonisms: Society as a whole is more and more splitting up into two great hostile camps, into two great classes directly facing each other: Bourgeoisie and Proletariat." (Marx and Engels [1848] 1978, p. 474). "… accumulation of misery a necessary condition, corresponding to the accumulation of wealth. Accumulation of wealth at one pole is, therefore, at the same time, accumulation of misery, the torment of labour, slavery, ignorance, brutalization and moral degradation at the opposite pole, i.e. on the side of the class that produces its own product as capital" (Marx [1867] 1977, p. 799). Also see the discussion in Esteban and Ray (1994) who motivate their "identification-alienation" framework (discussed below) using Marx's ideas.

[9] See e.g. Giddens (1995) who argues that in his later work, Marx recognized that the middle class was increasing in importance and contributing to the dissipation of conflict between the workers and the capitalists by strengthening the latter. Note that this is also consistent with the above-discussed idea that a strong middle class can mute conflict.

Foster and Wolfson (1992) and Wolfson (1994) demonstrate the main principles/axioms that characterize the process of polarization[10] and distinguish it from inequality (traditionally understood). These are "increasing spread" and "increasing bipolarity." To illustrate the former, consider an income distribution and a transformation that makes a rich person richer or a poor person poorer, without affecting the middle (i.e. median). This would result in a movement away from the middle, thereby increasing polarization. Also consider a transfer from a poor person to a rich person across the middle – this would pull both the rich and poor persons apart from each other (and away from the middle), thereby increasing polarization. To illustrate increased bipolarity, consider transfers from a richer person to a poorer person on the same side as the median. This transfer would result in the moving together of the richer and poorer persons, with one of these moving closer to the middle and the other moving away. Bipolarization postulates that polarization increases on account of this transfer. It is important to note the distinction vis-à-vis inequality - given that this is a progressive transfer, unlike polarization, all commonly used measures of inequality that satisfy the Pigou-Dalton principle (e.g. the Gini) would show a decrease. In the interests of space, we have not shown figures that illustrate the above axioms, but interested readers can refer to Figures B1 and B2 in Foster and Wolfson (1992). Wolfson (1994) illustrates how one can tie a measure of polarization to the Gini and derives a "polarization curve" (akin to the Lorenz curve) that can provide a partial ordering of distributions.[11] Formally, the polarization index derived by Wolfson (1994) is:

[10] Here, we are using the term "polarization" to refer to bipolarization. In the remainder of this section, when we use the term "polarization," its meaning will be obvious from the context.

[11] Note that polarization curves like Lorenz curves, can cross, thereby yielding an ambiguous comparison. Moreover, the polarization index that is derived from the polarization curve would always yield an unambiguous comparison (in a manner similar to the Gini, derived from the Lorenz curve).

$$P^{W*} = \frac{\mu}{m}(\frac{1}{2} - L(0.5) - \frac{G}{2}) \qquad (1)$$

μ and m are the mean and median, respectively. This index lies in [0, 0.25]. *L(0.5)* is the ordinate of the Lorenz curve at the 50th percent, i.e. the share (of income, wealth, expenditure etc.) held by the poorer half of the population, and G is the Gini coefficient. To make the index fall in the interval [0, 1] similar to some commonly used inequality indices (e.g. Gini), Wolfson (1994) suggests multiplying the above index by 4 to obtain:

$$P^{W} = 4P^{W*} = \frac{4\mu}{m}(\frac{1}{2} - L(0.5) - \frac{G}{2}) \qquad (2)$$

Note that the above index is a "relative" index in that it satisfies the property of *Scale Invariance*, which says that scaling all incomes (or wealth, expenditure etc.) by a common positive factor leaves the index of polarization unchanged. An "absolute" counterpart of the above index can be constructed by multiplying it by the median. This absolute index satisfies the property of *Translation Invariance*, which says that increasing or decreasing all the incomes (or wealth, expenditure etc.) by the same amount, leaves the index unchanged.[12]

Many studies building upon this work have appeared since the 1990s, and these have suggested other indices (e.g. Wang and Tsui 2000; Chakravarty and Majumdar 2001; Rodriguez and Salas 2003[13]). For our purposes, it is important to consider the "compromise"

[12] This property that a relative index could satisfy is referred to as the *compromise* property (Chakravarty 2009, p. 106). The relative Wolfson index is not the only one that satisfies this property. We discuss one more example below. Similar concepts and terminology exist in the measurement of inequality, although there, we multiply by the mean, see Chakravarty (2009, Ch. 1).

[13] Rodriguez and Salas (2003), make an interesting contribution by showing that the Wolfson index can be represented as the within-group Gini subtracted from the between-group Gini, thereby showing how polarization and inequality are linked. The two groups are the ones separated by the median, i.e. above and below the median. Since the between-group and within-group components can be interpreted as representing "alienation"

relative bipolarization index of Chakravarty (2009, pp. 115-117), which is based upon the insight that polarization is concerned with deviations from the middle (i.e. median). The main idea is to aggregate these deviations to get a measure of polarization that satisfies some reasonable axioms. These axioms are *Normalization*, *Symmetry*, *Population Principle*, *Increased Spread*, and *Increased Bipolarity* (the last two were discussed above). *Normalization* says that for a perfectly equal distribution, the index of polarization is zero. *Symmetry* is essentially anonymity, implying that only the incomes (or wealth, expenditure etc., and not the people who possess these) matter. *Population principle* guarantees that cloning the entire distribution does not matter for the index of polarization. Since it is a relative index, it also satisfies the property of Scale Invariance (discussed above). Chakravarty (2009, p. 117) shows that such an index has the following form:

$$\frac{(1/n\sum_{i=1}^{n}|m-x_i|^{\varepsilon})^{1/\varepsilon}}{m} \qquad (3)$$

As earlier, m denotes the median, n is the size of the total population, and $(x_1, x_2, \ldots, x_n)$ is the distribution. ε is a positive number between 0 and 1. Note that for ease of exposition, we have slightly simplified the index by assuming that all the income classes are singletons. For a given distribution, the higher the value of ε, the higher is the value of the index – this can be seen by differentiating the index with respect to ε. ε is an inverse measure of the degree to which the index exhibits the increased bipolarity property - the lower the value of ε, the larger is the increase in the index due to a progressive transfer on either side of the median. This can be verified by making a transfer, and then differentiating the change in the index

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and "identification," respectively, they also provide a link to a different notion of polarization, viz., the one in Esteban and Ray (1994),which we discuss in detail below.

with respect to ε. An absolute counterpart of this index can be obtained by multiplying by the median.

Given that there are several bipolarization indices, there is a possibility that these could disagree. Chakravarty (2009, pp. 117-121) has therefore suggested the ideas of "relative bipolarization dominance" and "relative bipolarization curve" similar to the ideas of Lorenz dominance and Lorenz curve, respectively from inequality measurement. The idea again is to look at the deviations from the median. Formally, consider a distribution $x = (x_1, x_2, ..., x_k)$ in non-decreasing order with a median *m*. The relative bipolarization curve is given by:

$$RB(x, j/k) = \frac{1}{km} \sum_{(j \le i < \hat{k})} (m - x_i) \text{ if } x_j < m$$

$$= \frac{1}{km} \sum_{(\hat{k} \le i \le j)} (x_i - m) \text{ if } x_j \ge m \qquad (4)$$

$\hat{k}$ is the index for the individual corresponding to the median. Note that on the horizontal axis, we have the poorest 1%, 2% etc. of the population: *j* (*=1,2,...,k*) is the index for an individual and so *j/k* is the rank of the individual in percentage terms. The ordinate is the aggregate shortfall from a hypothetical distribution where everyone has an income equal to the median, normalized by the total income in such a distribution. A distribution *x* is said to dominate another distribution *y* if the relative bipolarization curve of the former lies nowhere below (and above for at least one point) the same of the latter. In this case, it can be shown that *x* is characterized by higher polarization as compared to *y* according to all relative bipolarization indices satisfying Increased Spread, Increased Bipolarity, Symmetry and Population Principle. As in the case of Lorenz dominance, ambiguous rankings are possible due to crossings – in this case, while some indices could give one ranking, other indices would give a different ranking.

While we have been discussing bipolarization, a second view that one can discern in the literature, focuses on polarization in a more general sense - through an arbitrary number of groupings based upon income (or expenditure, wealth etc.).[14] This has also been referred to as the "identification-alienation" framework: individuals belonging to a particular group identify with one another and are alienated from those belonging to another group. Polarization is a group phenomenon[15] and would increase if there is stronger identification among people within a group or if alienation among groups is more intense. The seminal studies here are Esteban and Ray (1994) and Duclos et al. (2004). Suppose there are n pre-existing groups with group i ($i=1,...,n$) having a size p_i and income (or wealth or expenditure) y_i. Esteban and Ray (1994) characterize the polarization as:

$$K\sum_{i=1}^{n}\sum_{j=1}^{n} p_i^{\alpha+1} p_j \left|y_i - y_j\right| \qquad (5)$$

$K>0$ is a constant and $\alpha \in [1,1.6]$ is a parameter that measures the polarization sensitivity of the index. From the structure of the index, the identification and alienation components are clear: p_i^{α} and $\left|y_i - y_j\right|$, respectively. It is also clear that the higher the value of α, the larger the departure from inequality, which is why α can be interpreted as capturing polarization sensitivity (Note that if $\alpha=0$, the index boils down to the Gini). Duclos et al. (2004) derive an analogue of the above index, which can be used to characterize polarization in the case of continuous distributions and which has the advantage of not assuming knowledge of any pre-existing income (or wealth, expenditure etc.) groups. This index is as given below:

$$\int_0^{\infty}\int_0^{\infty} (f(y'))^{1+\alpha} f(y) \left|y - y'\right| dy dy' \qquad (6)$$

[14] Note that in bipolarization, we are concerned with the poor, the middle and the rich.

[15] In the sense that an individual by him/her self would contribute only marginally.

Here f is the density function for income and $\alpha \in [0.25,1]$ is (as earlier) a parameter that captures the polarization sensitivity. With household survey data, f is approximated by a kernel density function.

One point to be noted here, which has not been sufficiently highlighted in the polarization literature, is the following. With bipolarization, we are concerned with the middle class – there is considerable amount of social theory that tries to understand the middle class and its relationship with other groups in the society, from various settings and from different perspectives.[16] We believe that people, in general, may have an intuitive understanding of the middle class and/or "the middle" in the societies in which they live. In contrast to this, when there are an arbitrary number of groups, the nature and relationship among these groups has been relatively underexplored in social theory. Moreover, although some notions for continuous distributions (e.g. squeeze) have been formalized and used in axiomatization, it is not clear how/how much they correspond with peoples' notions of polarization. These issues have to be kept in mind while interpreting this kind of polarization.

While the above studies look at polarization on one dimension (e.g. income, wealth), a related literature looks at "multidimensional polarization" – here the idea is that there is more than one dimension at play, e.g. race and income; caste and expenditure. The particular form of multidimensional polarization that we are interested in, concerns a situation where groups are defined in terms of pre-determined identities (caste, ethnicity,[17] region etc.) and polarization is measured by looking at cohesion within a group and differences among groups. As explained in Esteban and Ray (2010) and Chakravarty (2009), this is consistent with the "identification-alienation" framework that we discussed above.

[16] e.g. see Vidich (1995) and the references therein. Also see the classical literature that we had cited earlier.

[17] On ethnic polarization, see Montalvo and Reynal-Querol (2005).

A relevant multidimensional polarization index that we will use is due to Zhang and Kanbur (2001), which is based upon the single-parameter entropy family of indices (Shorrocks and Wan 2005). Very well known and widely used members of this family are the log-mean deviation and the Theil. In the presence of subgroups (e.g. regions), it can be shown that the overall inequality can be expressed as a sum of two components: (i) inequality between subgroups, and (ii) a weighted average of the inequality within subgroups. Zhang and Kanbur (2001) use the ratio of the between-group component to the within group component as an index of polarization. This seems reasonable to us given that if there is no alienation across groups, the between component would be zero; similarly, if there is perfect identification among groups, the within component would be zero (thereby making the index large - tending to infinity).[18] However, two limitations of this index are worth discussing. First, as noted by Esteban and Ray (2010), the implicit assumption here is that identification within and alienation among subgroups is based upon incomes – an assumption that may, or may not hold. Second, suppose that both the between and within components fall (or rise) by the same factor, polarization does not change – however, inequality has clearly changed (Jayadev and Reddy 2011).[19]

[18] It is well known that (in general) the Gini index cannot be decomposed in this manner although it is decomposable into "between," "within" and "overlapping" components. Overlapping is related to stratification, a concept that has received widespread attention in sociology. For a discussion of polarization, stratification and relative deprivation and their interrelationships, see Yitzhaki (2010). Decomposing the Gini and discussing the results is beyond the scope of the present paper.

[19] Reddy and Jayadev (2009) and Jayadev and Reddy (2011) conceptualize polarization in the presence of pre-existing identity groups as comprising of three components: segregation, clustering and group inequality. They term these components as Representational Inequality (RI), Sequential Inequality (SI) and Group Inequality Comparison (GIC), respectively. They show that an index capturing these three can be derived, and it will be in multiplicative form: RI*SI*GIC. As is clear, although what they are trying to measure can be thought of as

Before concluding this section, we would like to add that in our reading, the literature on polarization is still unsettled and evolving – much still needs to be achieved in terms of clarifying concepts, axioms and measurement. However, we believe that there is "something out there" in the concept of polarization which cannot be captured by traditional inequality, and which the literature is trying to discover and conceptualize. Our paper partly attempts to throw light on this by focusing on the Indian context.

Also, while the axiomatic approach has its strengths, axioms in social sciences are many times not taken literally as axioms, but rather as assumptions about the real world.[20] Given this, the following questions (which are also relevant in the context of inequality measurement) arise: are the axioms of polarization "realistic"? Do they correspond with subjective notions that individuals or groups hold? In our opinion, more work needs to be done to clarify this although Foster and Wolfson (1992) and Wolfson (1994) present some evidence (based upon Amiel and Cowell (1992)) to argue that people do hold beliefs that justify the use of the notion of bipolarization. Moreover, if axioms are treated as "desirable properties," then it is not entirely clear whether it is unproblematic to take certain axioms used in inequality measurement (e.g. anonymity, replication invariance) and use these in the context of polarization, particularly if criticisms have been raised about them in the context of inequality measurement.[21] This is another issue on which more work needs to be done. These

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multidimensional polarization, their notion of polarization is quite different from the one prevailing in the literature, that we have discussed above.

[20] How else can one explain the enormous empirical literature on the question of whether people are rational (or not) when standard textbooks on microeconomics (e.g. Mas-Colell et al. 1995, p. 5) talk about "rationality axioms"?

[21] For example, on critiques of anonymity and replication invariance, see Cowell (1998) and Subramanian (2006), respectively.

caveats (or rather limitations of the polarization literature) have to be kept in mind while interpreting the analysis and results below.

3. Description of the Data and Methodology

The data that we use is from the Indian National Sample Surveys (NSS) on household consumption expenditure. These are well known, large, nationally representative surveys conducted by the National Sample Survey Organization (NSSO) that are widely used by researchers working on India.[22] The quinquennial (5-year) surveys provide reliable estimates of consumption expenditure and have been conducted in various "rounds" since 1973-4. The sample design, estimation procedure and schedule used are well known and available in NSS reports for various rounds, e.g. for the 61st round, in Appendices B and C of NSSO (2007) and for the 66th round, in NSSO (2011).[23] We use surveys for the years 1983 (38th round), 1993-94 (50th round), 2004-05 (61st round) and 2009-10 (66th round). As mentioned above, the choice of these years will help us map changes before and after the reforms, and also allow us to contrast two high growth phases – in the 1980s and since the 1990s.[24] We use the Uniform Recall Period (URP) data from these rounds, which is comparable across rounds. We do not need to go into detail regarding this issue, but essentially due to differences in survey methodology (i.e. in recall periods) from previous rounds, data from the 55th round

[22] For example, in the 2004-5 survey, 79,726 (45,346) households and 403,207 (206,529) individuals were surveyed in rural (urban) areas spread across all the states and union territories of India (NSSO 2007, p.3).

[23] The reports for various rounds can be downloaded from the NSSO (2011) website, at the following URL: http://mospi.gov.in/nsso_4aug2008/web/nsso/reports.htm

[24] Using data from the NSS 43rd round (1987-88, a few years before the reforms) does not change our results much. Also, as we discuss below, data from the 55th round (1999-2000) is not comparable to that from other rounds.

(1999-2000) was not comparable to that from the other rounds (see e.g. Sen and Himanshu 2004 a, b; Himanshu 2007) – this has been rectified in later rounds.

At the outset, it is important to discuss certain limitations of the data for researchers studying inequality and polarization. Jayadev et al. (2007 a, b) discuss them in the context of wealth inequality, but they are relevant for inequality analysis in general, and also for polarization. Essentially, there is under-representation of the very rich/wealthy in the sample – we do not expect them to answer the survey; to the extent that the rich do answer the survey, there may also be under-valuation and under-reporting of their expenditure. The survey design does not adequately take care of these. Since expenditure (like income or wealth) is usually unequal, a systematic under-representation or under-valuation of the rich will lead to an underestimation of inequality and polarization. Moreover, when we are looking at changes in inequality and polarization, the direction of the bias is not clear (since there is underestimation in both the initial and final periods). However (as discussed below), given these limitations, we have reasons to believe that our results are only stronger – i.e. since we find that polarization has increased, we may be underestimating the magnitude of the increase.

In line with many studies on India that have used NSS surveys and focused on inequality in consumption expenditure (e.g. Deaton and Dreze 2002; Himanshu 2007), we focus on nominal values. Since most measures that we (and others) use are relative, the real versus nominal distinction is relevant only because we need different deflators for different types of individuals (belonging to different regions, occupations, classes etc.).[25] Such indices/deflators, to the extent that they are available or can be constructed, are not without their own problems. This maybe one reason why, as discussed above, many studies on Indian

[25] If the same deflator can be used, given that we are using relative measures, whether we use the deflator or not (i.e. whether we use real or nominal values) does not matter.

inequality have focused on inequality in nominal consumption expenditure. Also, the studies that have used such indices and looked at inequality in real expenditures have not found a very different trend/scenario from those that looked at nominal expenditures (e.g. compare the trends in Himanshu 2007 and Krishna and Setupathy 2011).

Moreover, to the extent that we would like to compare trends in inequality to those of polarization, the nominal-real distinction is not important. Finally, in making inter-personal or inter-group comparisons (which is at the heart of polarization), we believe that there may be an equally valid case for using nominal values.[26]

4. Analysis and Results

Table 1 presents some polarization indices at the rural, urban, and all-India levels for the years 1983, 1993-94, 2004-05 and 2009-10 for monthly per-capita consumption expenditure. We have presented the Wolfson index P^W (see pp. 7-8 above) that lies in the range [0,1] because doing so will make comparisons with the Gini more convenient. Since this is just four times the other index P^{W*} (which lies in [0,0.25]), all the inferences are identical, irrespective of which of the two indices are used. We have computed the compromise index for various values of the sensitivity parameter (ε) and do not find much difference in the inferences we can make with different values. In the interests of space, we have reported the values for $\varepsilon=0.3$.

As we can see, for rural India, the Wolfson index falls sharply during the period 1983 to 1993-94, but then rises during the period 1993-94 to 2004-05 and falls again during the period 2004-05 to 2009-10, although in the year 2009-10, it still remains slightly above its level in 1993-94. The fall in 2009-10 needs further investigation – we need more studies, including field-based ones, to understand this phenomenon. However, one plausible

[26] As is standard in the literature on India (see the above mentioned references, but also most studies on poverty, e.g. Deaton and Dreze 2002), we do not use an explicit equivalence scale.

hypothesis is that this could be due to the implementation of some rural development policies, most important being the Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) 2005 which guarantees hundred days of employment to adult members of a rural household and which could have conferred benefits to the lower classes in the rural economy (e.g. agricultural laborers, small farmers).[27] For urban India, the Wolfson index remains virtually the same during the period 1983 to 1993-94, but then shows a pronounced increase afterwards, i.e. during the period 1993-94 to 2009-10. The increase in the most recent period (2004-05 to 2009-10) is modest compared to the increase during 1993-94 to 2004-05 and this is likely due to the slowing down of the Indian economy as a result of the world-wide recession, which could have adversely affected the income/wealth accumulation of the richer groups.[28] At the all-India level, the index shows a slight downward trend during the period 1983 to 1993-94 and a substantial upward trend during the period 1993-94 to 2009-10. The compromise bipolarization index shows a similar trend as the Wolfson index. The modest increase most recently (i.e. during the period 2004-05 to 2009-10) is likely due to the decrease in rural polarization, modest increase in urban polarization (both discussed above) and a slower increase in the rural-urban polarization, which we discuss in detail below. How does this compare with the trends in inequality? When we look at either the Gini or the generalized single-parameter family of indices (see Tables 1 and 4) at the all-India level, we can see that the patterns are similar, i.e. slight decrease from 1983 to 1993-94 and

[27] See the official website of MNREGA (http://nrega.nic.in/netnrega/home.aspx) and Khera (2011). Another policy that could be relevant is the waiver of loans to farmers, which was presented in the national budget of 2008 and which was subsequently implemented, see http://www.indiabudget.nic.in/ub2008-09/ubmain.htm

[28] See e.g. the Economic Times (2012). The International Monetary Fund has revised India's GDP growth projections downward for the years 2012 and 2013 to 7% (reduced by 0.5 percentage points) and 7.3%, (reduced by 0.8 percentage points) respectively.

sharp increase from 1993-94 to 2009-10. However, the polarization indices are falling more rapidly during 1983 to 1993-94: the Gini fell by 1.3%, and the log-mean deviation by 0.3%, whereas the Wolfson and the compromise bipolarization indices fell by 1.5% and 2.3%, respectively.[29] During 1993-94 to 2009-10, the rates of increase in the polarization indices is lower compared to the same of Gini and much lower than that of log-mean deviation (or Theil): the percentage increases of Gini, log-mean deviation, Wolfson and compromise bipolarization indices are 13.6%, 29.4%, 11.2% and 10.5%, respectively. Overall, at the rural, urban[30] and all-India levels, polarization and inequality display similarities, but also differences. We will discuss this issue and its implications in greater detail below.

Insert Table 1 here

It is also worthwhile to investigate increases in polarization further, to see what is driving the changes in polarization. For this purpose, we will look at the Wolfson index, which is calculated based upon three components: (i) the ratio of the mean to the median, (ii) the share of consumption held by the poorer half of the population (i.e. the Lorenz ordinate at 50%) and (iii) the Gini. An increase in the ratio of the mean to the median, ceteris-paribus (i.e. keeping the other two components fixed) would lead to an increase in polarization. An increase in the share of the poorer half or the Gini, ceteris-paribus, would lead to a decrease in polarization. At the all-India level, the ratio of the mean to the median, which was rising moderately in the period 1983-93 (by about two percentage points) rose sharply during the

[29] We have computed these percentages from the actual (i.e. not rounded-off) values and then rounded these off to one decimal. Hence, they will not exactly match the percentages calculated from Tables 1 or 4. This is also true of the percentages during 1994-2005 that we discuss below.

[30] We do not report the rural and urban rates of change in polarization and inequality indices, but these are available on request from the authors. Comparing these rates for polarization and inequality, we note that they are different.

period 1993-94 to 2009-10 (by about eleven percentage points). The share of the expenditure held by the poorer half of the population, which showed a minor rise during the period 1983 to 1993-94 (by less than a percentage point) fell in a pronounced manner during the period 1994 to 2009-10 (by about two and half percentage points). These figures reinforce the basic story that the polarization indices are telling, viz. the declining importance of the middle (median) in the later (post-reform) period. This decline was more than enough to compensate the effect due to the increase in the Gini, which as we mentioned above, would put downward pressure on polarization. It is worth mentioning that these insights are unavailable if we focus only on inequality in a traditional sense.

One point to note here is that we are talking about the decline of the median, which should not be confused with the "Indian middle class," or the "Indian new middle class" – as these terms have been used by some social scientists (sociologists, anthropologists etc.) to refer to educated, professional/white-collar and largely urbanized people in India (e.g. Fernandes 2006). This assumes particular significance given the classical literature that we discussed above and the literature on inequality and polarization from developed countries. In fact, at the all-India level in 2009-10, if we look at the people below or at the median (i.e. the poorer 50%), about 87% of them live in rural areas; about 81% belong to disadvantaged groups[31] (Scheduled Caste (SC), Scheduled Tribe (ST) or Other Backward Classes (OBC) with about 37% SC or ST and about 44% OBC). Needless to say (given the high rural percentage) most of these individuals are involved in agriculture. When we focus on rural areas, the poorer 50% in 2009-10 comprise largely of SC, ST and OBCs (proportions comparable to those at the all-India level) and are either agricultural laborers (landless) or small farmers (less than 2 hectares). When we focus on urban areas, in 2009-10, the poorer

[31] We discuss these caste groups in detail below, in the context of multidimensional polarization.

half largely comprises of (about 66%) SCs and OBCs[32] and those in low-skilled/low-paying occupations, with those involved in "elementary occupations" (e.g. street vendors, garbage collectors, domestic helpers) being the highest (25%).[33]

As discussed in Section 2 (literature review), there seems to be no consensus on the right index to measure bipolarization – there are several indices that are possible. We therefore construct the Relative Bipolarization (RB) curve that we have discussed earlier for each of the four periods. The data used to construct the curves are shown in Table 2. The comparison of RB curves for 1993-94 and 2004-05 is shown in figure 1a. The comparison for 1993-94 and 2009-10 is shown in figure 1b.

Insert Table 2 and Figures 1a and 1b here

What can we say based upon this? From the table, we can observe that the RB curves for the years 1983 and 1993-94 look very close to each other, which is the reason we have omitted a figure comparing RB curves for these years. The RB curve for 1983 mostly lies above the same for 1993-94, but there is a crossing around the 80th percentile. This implies that although the Wolfson and compromise bipolarization indices agree (as discussed above), there is an ambiguity in comparing polarization in 1983 and 1993-94. As we can see from figure 1a, the result is different when we compare the RB curves for 1993-94 and 2004-05 – the RB curve for 2004-05 lies everywhere above the same for 1993-94 (except of course at 0 and 50%). As we discussed above, this implies that polarization is higher in the latter period

[32] There is a very small percentage (about 3%) of individuals who live in urban areas and who belong to Scheduled Tribes (ST). Given this, a small percentage of ST individuals belong to the poorer half.

[33] The NSS classifies occupations into 9 groups: Legislators, Senior Officials and Managers; Professionals; Technicians and Associate Professionals; Clerks; Service Workers & Shop and Market Workers; Skilled Agricultural and Fishery Workers; Plant and Machine Operators and Assemblers; and Elementary Occupations. Broadly speaking, as one goes down this list, occupations become less skilled and less paid.

according to all measures that satisfy Increased Spread, Increased Bipolarity, Symmetry and Population Principle. Essentially, what this implies is that although there are many indices of polarization, as long as any index satisfies the above axioms, it would indicate that polarization has increased during the period 1993-94 to 2004-05. We believe that this is a strong and unambiguous result that is worth emphasizing. The departure between 1993-94 and 2004-05 is more pronounced after the 80^{th} percentile, which would imply that the very rich/wealthy are much better off (relative to the middle/median) in 2004-05, as compared to their counterparts in 1993-94. Given the limitations of the data that we mentioned in Section 3 (underrepresentation, underreporting etc.), we believe that the difference between 1993-94 and 2004-05 is likely to be more pronounced than what we have found. When we compare the data for 2004-05 and 2009-10, we find that there is a crossing, around 55%. This reflects an ambiguous comparison between these periods. Note also the difference from the earlier crossing (of 1983 and 1993-94), viz. that it is occurring at a much lower level. When we compare data for 1993-94 and 2009-10, as shown in figure 1b, we see that the RB curve for 2009-10 lies everywhere above the same for 1993-94 indicating that polarization has increased since the reforms.

Overall, the analysis using RB curves supports the conclusion derived from examining Wolfson and Compromise indices - polarization has increased in the period since 1993-94, although it has not been monotonic - we have already discussed some likely reasons for the non-monotonicity, i.e., the findings from the most recent period.

As discussed above, at the all-India level, the trends in polarization are similar to those of inequality, although there are some differences. To shed further light on this, we take a disaggregated view. Table 3 presents the Wolfson and Gini indices for the major Indian states in 1993-94, 2004-05 and 2009-10. As we can observe, there are differences in the trends for polarization and inequality in these three periods: e.g. in 1993-94, Bihar has a

lower Gini, but a slightly higher Wolfson index as compared to Jammu & Kashmir; Orissa has a higher Gini, but a lower Wolfson index compared to Rajasthan. In 2004-05, Jammu & Kashmir has a lower Gini, but a higher Wolfson index compared to Rajasthan (the comparison of Orissa and Uttar Pradesh is similar). In 2009-10, Karnataka has a lower Gini, but higher Wolfson index compared to Kerala. The time trends for Gini and Wolfson index are also different for some states, e.g. the Gini for Jammu and Kashmir decreased during the period 1993-4 to 2004-05 and then increased during the period 2004-05 to 2009-10, whereas the Wolfson index increased initially and then decreased; the Gini for Rajasthan increased during the period 1993-94 to 2004-05, and then decreased during 2004-05 to 2009-10, whereas the Wolfson index initially decreased and then increased; the Gini for Uttar Pradesh increased during the period 1993-94 to 2004-05, and then decreased during the period 2009-10, whereas the Wolfson index has been decreasing since 1993-94.

Insert Table 3 here

An interesting issue, and one that has been highlighted in the literature (Yitzhaki 2010) as needing additional research, is the relationship between growth and polarization.[34] In figure 2, we present a scatter plot of the growth rates in various states (in terms of real per-capita Net State Domestic Product) and the rate of change in polarization. Since the NSDP data is not available for the year 2009-10, we focus only on the years 1993-94 and 2004-05 (i.e. we leave out the year 2009-10) for computation of growth rates. This data is also presented in table 3 - the correlation coefficient between these two rates is 0.29. As we can observe, there is a modest, but positive relationship – states that have higher growth rates have also experienced higher increases in polarization. This is some evidence that the growth process in India has gone along with increased polarization, although we would advise

[34] On a related note, for a discussion of the relationship between deprivation and growth, see Wodon and Yitzhaki (2009).

caution in interpreting this as a causal linkage. When we do a similar exercise with inequality (i.e. Gini), the results are similar in the sense that growth is associated with increased inequality, but the correlation is stronger (0.32).

Insert Figure 2 here

The literature on India has not computed and used absolute inequality measures, except in the case of wealth (Jayadev et al. 2007a), so we will be brief about absolute polarization and its comparison with absolute inequality (and hence do not report our computations of absolute indices in Table 1). When we compare the changes in absolute inequality (as measured by the absolute Gini) and polarization as measured by absolute indices (Wolfson or compromise bipolarization), we observe a steady increase. The absolute Ginis in 1983, 1993-94, 2004-05 and 2009-10 are 40.53, 105.85, 248.43 and 428.72, respectively; the corresponding values for the absolute Wolfson index (obtained by multiplying the relative Wolfson index (P^W) and the median) are 25.78, 66.01, 143.40 and 241.40, respectively.

When we move from bipolarization to polarization based upon an arbitrary number of groups, we will focus upon the index proposed by Duclos et al. (2004). The index is given in Table 1 for rural, urban and all-India levels for the four periods. Although there are minor differences, the broad picture that we get is similar to that from bipolarization indices. Given the possibility of several indices, the issues that one has to confront when we move to an arbitrary number of groups (which we discussed earlier, in the literature survey) and the sharp and insightful results that we have obtained from bipolarization, we are much more comfortable with our results on bipolarization. However, we reiterate that the trends from both notions of polarization are roughly similar.

Coming now to multi-dimensional polarization, there are several cleavages in the Indian society (like in many other societies) and therefore there are several dimensions on

which disparities could manifest themselves. We have analyzed some of the important dimensions and the results are reported in Table 4. We have measured multidimensional polarization using the Zhang-Kanbur index and computed it for two commonly used measures of the single-parameter entropy family, viz. log-mean deviation and Theil. Since a figure may be better in understanding the findings, we have also summarized the results in figure 3.

Insert Table 4 and Figure 3 here

One dimension that would naturally occur to any observer of India is caste. Caste is of course a complex phenomenon that continues to attract tremendous amount of interest among various social scientists even today.[35] The NSS data allows us to do very little justice to this complex notion. Having said this, we can compare the Scheduled Castes (SC), Scheduled Tribes (ST) and others. The SCs and STs are historically disadvantaged groups, and broadly speaking, we can consider them to occupy the lower rungs of the Indian caste system. These are the only caste groups that are enumerated in 1983 and 1993-94. In 2004-05 and 2009-10, the Other Backward Classes (OBCs) are also enumerated. OBCs are disadvantaged groups which are considered to be upwardly mobile (particularly in rural areas) and are broadly speaking, better off than SCs and STs. Looking at Table 4, we can observe that, whether we use the log-mean deviation or Theil to compute the Zhang-Kanbur index, in rural India, there is a decline in polarization during the period 1983 to 1993-94, whereas an increase during the period 1993-94 to 2004-05 and then a decrease during the period 2004-05 to 2009-10. In urban India (again, whether we use log mean deviation or Theil), we see an increase in polarization during the periods 1983 to 1993-94 and 1993-94 to 2004-05, but a decrease during the period 2004-05 to 2009-10. As a result, at the all-India level, polarization increases

[35] For sophisticated analyses of caste, see Gupta (1993) and Chatterjee (1993).

during the periods 1983 to 1993-94 and 1993-94 to 2004-05, but decreases during the period 2004-05 to 2009-10.

In making the above observations, we have to keep in mind the fact that in the surveys in 2004-05 and 2009-10, four caste groups have been enumerated (SC, ST, OBC and others), whereas in the other years, only three (SC, ST and others) were enumerated. We have recalculated the polarization index, by combining the OBCs with the others and this is also reported in table 4 and shown in figure 3. As we can see, the basic story remains, even after the recalculation. However, polarization in 2004-05 and 2009-10 (and hence the rate of increase in polarization from 1993-94 and 1993-94 to 2009-10) is not as sharp as it was in the previous case (i.e. where the OBCs were separately enumerated). On the face of it, this seems puzzling, and therefore needs an explanation. Why would the same population display higher polarization when it is divided into four groups (SC, ST, OBC, and non-SC/ST/OBC) as compared to when it is divided into three groups (SC, ST, and non-SC/ST)? To see the reason, note that since the OBCs and non-SC/ST/OBCs are fundamentally different, when we combine them, the group so formed would be more unequal than each of its constituents (i.e. the OBCs and the non-SC/ST/OBCs). However, the shares of population and shares of expenditure of the new group would be equal to the sum of the shares of its constituents. As a result, the within component of inequality would rise and the between component of inequality would fall (since the total inequality has to remain the same), leading to a fall in polarization. While this is a somewhat technical explanation, essentially what is happening is that combining these two disparate groups results in a "more fuzzy" group, thereby bringing down the total identification and alienation (in the language of Esteban and Ray (1994) and Duclos et al. (2004)). The fall in polarization would of course imply that the rate of increase in polarization during 1994-2005 is lower with four caste groups as compared to the same with three groups.

Another divide on which considerable interest exists in the Indian context is the rural-urban one. Several studies (e.g. Mishra and Reddy 2009; Vakulabharanam et al. 2010; Vakulabharanam and Motiram 2011) have pointed out both increasing agrarian distress since late 1990s and increasing rural-urban disparities. A much remarked upon manifestation of agrarian distress is the phenomenon of suicides of thousands of farmers in various regions of India since the late 1990s (Mishra and Reddy 2009). When we look at rural-urban polarization, we can observe that it has been rising trend since the 1980's, and stands at a very high value of 25.57% (18.52%) using the log mean deviation (Theil) in 2009-10. It may not be a coincidence that among the various cleavages that we examine, the rural-urban one is characterized by the most polarization. Given the substantial amount of evidence that has accumulated, we believe that rural-urban disparity is the starkest among the various disparities that exist in India today. From figure 3 (i.e. by comparing the various slopes), we can also observe that rural-urban polarization has shown the fastest increase since the 1980s although it has increased it a slower rate in the most recent period, i.e. during 2004-05 to 2009-10.

Given the concern expressed among both academics and policymakers that disparities among various geographical regions are increasing and that some states are being left behind (e.g. Dreze and Sen 2002), we examine polarization among various Indian states. As we can observe, the polarization has been increasing steadily since the 1980s. We also divided the country into five regions (North, East, West, South and North East) and looked at changes in polarization. As we can observe, there has been a steady increase in polarization since the 1980s. The idea that is really driving this concern for regional disparity is that those states that are already relatively poor would see their position worsening. In India, much literature exists on the so-called BIMARU states (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh), which have been found to lag behind other states on several development

indicators. We therefore explored the polarization between the BIMARU states and other states. As we can observe, this has been increasing since the 1980s. However, the period from 1983 to 1993-94 has seen a slight increase, whereas the period 1993-94 to 2009-10 has seen a much sharper increase.

5. Discussion and Conclusions

There are two audiences that this paper has been addressed to. First is the audience that is interested in the Indian growth process – has this process been inclusive, or has it worsened pre-existing cleavages? Our main message to this audience is that the growth process in India since the 1990s has been associated with an increase in polarization. This is true whether we are looking at bipolarization, or polarization with an arbitrary number of groups, or at polarization in a multidimensional sense – on the lines of caste, sector (rural-urban), state or region. Since the inequality trends are broadly similar at the all-India level (more on the comparison between inequality and polarization below), we believe that this says something about this growth process – irrespective of the different measures and different concepts/axioms that one is using, as long as one focuses on consumption expenditure (which is widely used, including as a proxy for income), one finds that the growth process has been associated with widening disparities. Also, given the limitations of data (undersampling, underreporting etc., that we discussed earlier) the degree of polarization that we find is in all likelihood an underestimate. Moreover, the increases in polarization are also likely to be larger than what we have found, given that opportunities for wealth/income accumulation are much higher today.[36] However, the most recent comparison (2004-05 and 2009-10) has yielded different results, e.g. rural polarization has fallen and urban polarization

[36] One indication of this is that the number of Indian super rich (billionaires) has been increasing in recent years – from 49 to 55 during 2010-11. During the same period, their wealth increased from $222.1 to $246.5 billion (Karmali (2011), which is based upon the list in *Forbes* magazine).

has increased modestly. This is likely due to the implementation of the MNREGA scheme in rural areas and the slowdown of growth (partly due to the worldwide recession) which has adversely affected the incomes of the richer groups.

Given that the idea of polarization is motivated by its connection with conflict, should we be concerned about the existing level of conflict in India, and that conflict would increase in the future? How do we link the evidence on polarization in India to potential conflict, or measures of conflict, or actual instances of conflict? These are difficult questions to answer, and are beyond the scope of this paper - much more research needs to be done on this front, including conceptualization and measurement of the extent of conflict. There are many sources of conflict in India (e.g. income/wealth, caste, region, religion etc.) and these may interact with one another in a complex manner. So, we can only offer sketchy and speculative remarks. Having said this, we would like to point out that anecdotal evidence exists to suggest high and increasing level of conflict on the geographical/spatial dimension – among regions within a state, between richer and poorer states and between rural-urban areas. In a way, our findings on multidimensional polarization are consistent with this.[37] Sharp increases in bipolarization in certain states that have witnessed enormous violence and conflict (e.g. Gujarat, which in 2002, saw one of the worst instances of religious conflict in post-independence India) are also unsurprising from this perspective. It is also possible that the

[37] Since the 1990s, movements for regional autonomy/statehood (e.g. in Andhra Pradesh), inter-state conflict over resources like water (e.g. between Tamil Nadu and Karnataka), conflicts within and between states over migrants (e.g. Maharashtra and Bihar) have seen renewed vigor. The Naxalite movement spanning several states, which is dominant today in regions that are rich in mineral resources (e.g. Chhatisgarh) where the interests of the indigenous groups are pitted against those of others, has also seen a resurgence.

extent and patterns of accumulation and consumption[38] by the Indian elite may contribute to tensions in the future.[39]

The second audience that this paper is addressed to is one that is interested in polarization and inequality. We have presented patterns of polarization from a concrete and interesting context. In comparing polarization and inequality, we have found mixed results – while the trends at an all-India level are similar for inequality and polarization, the magnitudes of changes and the disaggregated trends are different between these two. The linkages to growth are also different. Overall, we believe that our results highlight the importance of studying polarization and the need for more empirical studies that will help tease out how inequality and polarization play out in particular contexts.

[38] See Jayadev et al. (2007a) on wealth accumulation and Vakulabharanam et al. (2010) on consumption of various classes.

[39] See for example the controversy and discussions surrounding *Antilia,* the 27-floor house built by the wealthiest person in India (Mukesh Ambani) in the affluent part (South) of Mumbai. This is one of the most expensive personal residences in the world and according to one recent report consumes as much as five lakh litres of water per month (Deshpande 2011). The connection to the situation described in Kurosawa's film (quoted at the beginning) is inescapable.

Acknowledgements

We thank Satya Chakravarty, Jean-Yves Duclos, Sanjay Reddy and S. Subramanian for a discussion of some of the key ideas. For comments on a previous version, we also thank Lars Osberg, Ajit Sinha, Vamsi Vakulabharanam, Thomas Weisskopf and participants at the seminar in the department of economics at the University of Bologna and the Fourth Meeting of the Society for Economic Inequality (ECINEQ) in Catania, Italy.

References

Amiel, Y. and F.A. Cowell "Measurement of Income Inequality: Experimental Test by Questionnaire," *Journal of Public Economics*, **47**: 3-26, (1992)

Aristotle *The Politics*, T. Saunders (ed.), London: Penguin Books (1962)

Balakrishnan, P. *Economic Growth in India: History and Prospect*, New Delhi: Oxford University Press, (2010)

Balakrishnan, P. (ed.) *Economic Reforms and Growth in India: Essays from the Economic and Political Weekly*, New Delhi: Orient Black Swan Press (2011)

Bery, S. and K. Singh "India's Growth Experience," in W. Tseng and D. Cowen (eds.) *India's and China's Recent Experience with Reform and Growth*, London: Palgrave Macmillan, pp. 23-58 (2007)

Bhagwati, J.N. "Indian Reforms: Yesterday and Today," *The 3rd Prof. Hiren Mukherjee Memorial Annual Parliamentary Lecture*, downloaded from http://www.columbia.edu/~jb38/papers/pdf/Lok-Sabha-speech-FINAL-EXPANDED-Deceber-14.pdf, on Jun 1, 2011 (2010)

Bourdieu, P. "The Space of Points of View," in Pierre Bourdieu et al. (ed.) *The Weight of the World: Social Suffering in Contemporary Society*, Cambridge, UK: Polity Press (1999)

Chakravarty, S.R. *Inequality, Polarization and Poverty: Advances in Distributional Analysis.* New York: Springer (2009)

Chakravarty, S.R. and A. Majumdar "Inequality, Polarization and Welfare: Theory and Applications," *Australian Economic Papers*, **40**, pp. 1-13 (2001)

Chatterjee, P. *The Nation and its Fragments*, Minneapolis: University of Minnesota Press (1993)

Cowell, F.A. "Measurement of Inequality", Discussion Paper No. DARP/36, Suntory and Toyota Centres for Economics and Related Disciplines, London School of Economics and Political Science, downloaded from http://sticerd.lse.ac.uk/dps/darp/darp36.pdf on August 2, 2011 (1998)

Deaton, A. and J. Dreze "Poverty and Inequality in India: A Reexamination," *Economic and Political Weekly*, **37**, pp. 3729-3748 (2002)

Deshpande, V. "Mukesh Ambani's house gets 5 lakh litres of water a month," *The Hindu,* 24/04/11 (2011)

Dreze, J. and A.K. Sen *India: Development and Participation*. New Delhi: Oxford University Press (2002)

Duclos, J. Y., Esteban, J. M., and D. Ray "Polarization: Concepts, Measurement, Estimation," *Econometrica*, **72**, pp. 1737-1772 (2004)

Easterly, W. "The Middle Class Consensus and Economic Development," *Journal of Economic Growth*, **6**, pp. 317-35 (2002)

Economic Times "IMF lowers India's growth projections to 7% as global recovery stalls," January 24, 2012 (2012)

Esteban, J.M. and D. Ray "On the Measurement of Polarization," *Econometrica*, **62**, pp. 819-851 (1994)

Esteban, J.M. and D. Ray "Comparing Polarization Measures," downloaded from http://www.nyu.edu/econ/user/debraj/Papers/EstRayChapter.pdf on April 20, 2011 (2010)

Fernandes, L. *The New Indian Middle Class: Democratic Politics in an Era of Economic Reform*, Minneapolis: University of Minnesota Press (2006)

Foster, J. E. and M. C. Wolfson "Polarization and the Decline of the Middle Class: Canada and the US," Working Paper no. **31**, *Oxford Poverty & Human Development Initiative* (1992)

Giddens, A. "The Growth of the New Middle Classes," in A. Vidich (ed.) *The New Middle Class: Life-Styles, Status Claims and Political Orientations*. London: Macmillan (1995)

Gupta, D. (ed.) *Social Stratification*, New Delhi: Oxford University Press (1993)

Himanshu "Recent Trends in Poverty and Inequality: Some Preliminary Results," *Economic and Political Weekly*, **42**, pp. 497-508 (2007)

Jayadev, A, S. Motiram, and V. Vakulabharanam "Patterns of Wealth Disparities in India During the Era of Liberalization," *Economic and Political Weekly,* **42**, 2007, pp. 3853-63 (2007a)

Jayadev, A, S. Motiram, and V. Vakulabharanam "Imagined Problems in Computing Wealth Inequalities," *Economic and Political Weekly*, **42**, pp. 69-71 (2007b)

Jayadev, A. and S. Reddy "Inequalities between Groups: Theory and Empirics," *World Development*, **39**, pp. 159-173 (2011)

Karmali, N. "The World's Billionaires 2011: The India story," downloaded from http://blogs.forbes.com/naazneenkarmali/2011/03/10/the-worlds-billionaires-2011the-india-story/ on Aug 5, 2011 (2011)

Khera, R. (ed.) *The Battle for Employment Guarantee*, New Delhi: Oxford University Press (2011)

Krishna, P. and G. Setupathy "Trade and Inequality in India," Paper presented at the Columbia–NCAER Conference on Trade, Poverty, Inequality and Democracy, New Delhi, March 31-April 1, 2011 (2011)

Kurosawa, A. *Tengoku to jigoku ("High and Low")*, a film produced by Kurosawa Production Co., Japan (1963)

Marx , K. and F. Engels *Manifesto of the Communist Party*, in R. Tucker (ed.) *The Marx Engels Reader*, New York: W.W. Norton [1848] (1978)

Marx , K. *Capital: A Critique of Political Economy Vol. 1*, London: Penguin Classics [1867] (1977)

Mas-Colell, A., M. Whinston and J. Green *Microeconomic Theory*, New York: Oxford University Press (1995)

McCloskey, D. *Bourgeois Dignity: Why Economics Can't Explain the Modern World*, Chicago: University of Chicago Press (2011)

Merriam Webster Online *Dictionary and Thesaurus*, http://www.merriam-webster.com/dictionary/polarization, accessed on Apr 27, 2011 (2011)

Mishra, S. and D.N. Reddy (ed.) *Agrarian Crisis in India*, New Delhi: Oxford University Press (2009)

Montalvo, J. and M. Reynal-Querol. "Ethnic Polarization, Potential Conflict and Civil War," *American Economic Review*, 95, pp. 796-816 (2005)

Nagaraj, R. "Indian Economy Since the 1980s: Virtuous Growth or Polarization?," *Economic and Political Weekly*, **35**, pp. 2831-2839 (2000)

NSSO (National Sample Survey Organization) *Level and Pattern of Consumer Expenditure, 2004-05*, Report No. **508**, Ministry of Statistics, Planning and Implementation, New Delhi (2007)

NSSO (National Sample Survey Organization) *NSS Reports of Various Rounds*, http://mospi.gov.in/nsso_4aug2008/web/nsso/reports.htm accessed on August 20, 2011 (2011)

Nayyar, D. "Economic Growth in Independent India: Lumbering Elephant or Running Tiger?", *Economic and Political Weekly*, **41**, pp. 1451-1458 (2006)

Panagariya, A. *India: The Emerging Giant.* New York: Oxford University Press (2008)

Reddy, S. and A. Jayadev "Inequalities and Identities," Working Paper, Social Science Research Network, downloaded from http://ssrn.com/abstract=1162275 on March 25, 2011 (2009)

Rodriguez, J. and R. Salas "Extended Bipolarization and Inequality Measures," *Research on Economic Inequality*, **9**, pp. 69-83 (2003)

Sarkar, S. and B.S. Mehta "Income Inequality in India: Pre- and Post-Reform Periods," *Economic and Political Weekly,* **45**, pp. 45-55 (2010)

Sen, A. and Himanshu "Poverty and Inequality in India-I," *Economic and Political Weekly*, **39**, pp. 4247-4263 (2004a)

Sen, A. and Himanshu "Poverty and Inequality in India – Growing Disparities in the 1990s", *Economic and Political Weekly*, **39**, pp. 4361-4375 (2004b)

Shorrocks, A. and G. Wan "Spatial Decomposition of Inequality," *Journal of Economic Geography*, **5**, pp. 59-81 (2005)

Subramanian, S. "Inequality Comparisons Across Variable Populations," *Contemporary Issues and Ideas in Social Sciences*, June 2006 (2006)

Vakulabharanam, V., W. Zhon, and X. Jinjun "Does Class Count? Class Structure and Worsening Inequality in China and India," Paper presented at the 31st General Conference of The International Association for Research in Income and Wealth, St. Gallen, Switzerland (2010)

Vakulabharanam, V. and S. Motiram "Political Economy of Agrarian Distress in India Since the 1990s," in S. Ruparelia, S. Reddy, J. Harriss and S. Corbridge (eds.) *Understanding India's New Political Economy: A Great Transformation?* London: Routledge (2011)

Vidich, A. (ed.) *The New Middle Class: Life-Styles, Status Claims and Political Orientations*. London: Macmillan (1995)

Wang, Y. Q. and K. Y. Tsui "Polarization Orderings and New Class of Polarization Indices," *Journal of Public Economic Theory*, **2**, pp. 349-363 (2000)

Wodon, Q. and S. Yitzhaki "Does Growth lead to Deprivation," Mimeo, The World Bank (2009)

Wolfson, M. C. "When Inequalities Diverge," *The American Economic Review*, pp. 353-358 (1994)

Yitzhaki, S. "Is There Room for Polarization?," *The Review of Income and Wealth*, **56,** pp. 7-22.

Zhang, X and Kanbur, R. "What Difference Do Polarization Measures Make: An Application to China" *Journal of Development Studies*, pp. 85-98 (2001)

Tables and Figures

Table 1: Polarization Indices for Monthly Per-Capita Expenditure

	Mean/ Median	L(0.5)[a]	Gini	Wolfson (P^W)	Compromise Bipolarization[b]	DER[c]
Rural						
1983	1.196	0.295	0.309	0.241	0.326	0.204
1993-94	1.187	0.310	0.286	0.222	0.298	0.197
2004-05	1.226	0.302	0.305	0.227	0.307	0.206
2009-10	1.213	0.304	0.300	0.223	0.302	0.204
Urban						
1983	1.272	0.273	0.342	0.283	0.376	0.220
1993-94	1.277	0.273	0.344	0.284	0.377	0.223
2004-05	1.328	0.252	0.376	0.317	0.420	0.237
2009-10	1.366	0.244	0.393	0.326	0.432	0.245
All India						
1983	1.235	0.283	0.330	0.259	0.349	0.213
1993-94	1.258	0.287	0.326	0.255	0.341	0.215
2004-05	1.347	0.266	0.363	0.283	0.375	0.234
2009-10	1.364	0.263	0.370	0.284	0.377	0.236

Source: Authors' computation from NSS data. For a description of these indices and formulae, see section 2.

Notes:

a. Lorenz ordinate for 50 percent – share of expenditure held by the poorer half.

b. Computed for $\varepsilon=0.3$

c. Duclos, Esteban and Ray index (Duclos et al. 2004). Computed using the STATA module DASP (Distribution Analysis Stata Package) for $\alpha=0.5$ with the fast option for kernel density estimation. In the interests of space, we are not reporting the standard errors, lower and upper bounds. But, these are available upon request

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Table 2: Data for the Relative Bipolarization Curves

j/k	*RB(x,j/k)*			
	1983	1993-94	2004-05	2009-10
0%	100.0%	100.0%	100.0%	100.0%
5%	11.7%	11.0%	11.2%	11.2%
10%	9.1%	8.7%	8.9%	8.8%
15%	7.0%	6.7%	6.9%	6.7%
20%	5.2%	4.9%	5.1%	5.0%
25%	3.6%	3.5%	3.6%	3.5%
30%	2.3%	2.3%	2.3%	2.3%
35%	1.3%	1.3%	1.3%	1.3%
40%	0.6%	0.6%	0.6%	0.6%
45%	0.2%	0.2%	0.2%	0.2%
50%	0.0%	0.0%	0.0%	0.0%
55%	0.2%	0.2%	0.2%	0.2%
60%	0.6%	0.6%	0.7%	0.7%
65%	1.5%	1.5%	1.6%	1.7%
70%	2.8%	2.8%	3.1%	3.2%
75%	4.7%	4.7%	5.2%	5.3%
80%	7.2%	7.2%	8.0%	8.2%
85%	10.6%	10.6%	12.0%	12.3%
90%	15.3%	15.4%	17.6%	17.9%
95%	22.2%	22.4%	26.2%	26.4%

Source: Authors' Computation from NSS Data

Note: For details of the computation, see section 2.

Table 3: State-Level Inequality and Polarization Indices

State	Growth[a]	Gini			Wolfson (P^W)			ΔW^b
	%	1993-94	2004-05	2009-10	1993-94	2004-05	2009-10	%
Andhra Pradesh	4.75	0.312	0.345	0.364	0.240	0.258	0.267	0.66
Assam	1.48	0.216	0.240	0.283	0.159	0.176	0.209	0.94
Bihar	2.29	0.253	0.259	0.273	0.197	0.191	0.205	-0.30
Gujarat	5.07	0.279	0.334	0.343	0.215	0.284	0.283	2.87
Haryana	3.90	0.311	0.355	0.339	0.254	0.266	0.277	0.42
Himachal Pradesh	5.01	0.325	0.328	0.336	0.233	0.238	0.258	0.18
Jammu & Kashmir	1.93	0.270	0.260	0.266	0.195	0.230	0.193	1.61
Karnataka	5.29	0.309	0.361	0.350	0.252	0.276	0.301	0.88
Kerala	4.76	0.316	0.393	0.473	0.235	0.305	0.297	2.70
Madhya Pradesh	2.07	0.315	0.357	0.351	0.243	0.256	0.280	0.51
Maharashtra	3.54	0.376	0.393	0.409	0.319	0.335	0.316	0.46
Orissa	3.54	0.282	0.324	0.326	0.214	0.254	0.232	1.70
Punjab	2.54	0.285	0.351	0.339	0.226	0.268	0.263	1.70
Rajasthan	4.33	0.280	0.303	0.300	0.223	0.205	0.207	-0.71
Tamil Nadu	4.15	0.344	0.379	0.342	0.261	0.299	0.290	1.31
Uttar Pradesh	1.91	0.302	0.327	0.322	0.276	0.243	0.240	-1.08
West Bengal	5.58	0.308	0.353	0.338	0.227	0.258	0.235	1.26

Source: Authors' Computation from NSS Data. Growth rates computed based upon the data available from the EPW Research Foundation.

Notes:

a. Average annual (compound) growth rate for per-capita Net State Domestic Product. Three new states Chattisgarh, Jharkhand and Uttarakhand were created after 1993-94 by separating them from Madhya Pradesh, Bihar and Uttar Pradesh, respectively. In the series provided by the EPW Research foundation, in both periods, data for these newer states is given separately from the states that they were earlier part of. So, we included these new states in their "parent" states (i.e. Madhya Pradesh, Bihar and Uttar Pradesh) and computed for both periods the per-capita NSDP and its growth.

b. Average annual (not compounded) percentage change in the Wolfson index.

Table 4: Multidimensional Polarization

Subgroups	Log Mean Deviation				Theil			
	W	B	T	B/W (%)	W	B	T	B/W (%)
1. Castes								
Rural								
1983	0.147	0.007	0.154	5.016	0.177	0.007	0.184	3.967
1993-94	0.131	0.006	0.137	4.693	0.165	0.006	0.171	3.591
2004-05 (I)	0.144	0.012	0.156	8.288	0.194	0.012	0.206	6.134
2004-05 (II)	0.147	0.008	0.156	5.696	0.198	0.008	0.206	4.060
2009-10 (I)	0.142	0.010	0.152	6.946	0.199	0.010	0.209	4.995
2009-10 (II)	0.145	0.007	0.152	4.495	0.203	0.006	0.209	3.113
Urban								
1983	0.184	0.004	0.189	2.428	0.211	0.004	0.215	1.985
1993-94	0.189	0.007	0.195	3.623	0.233	0.006	0.239	2.715
2004-05 (I)	0.207	0.026	0.233	12.355	0.258	0.025	0.283	9.796
2004-05 (II)	0.223	0.010	0.233	4.274	0.275	0.009	0.283	3.189
2009-10 (I)	0.232	0.026	0.258	11.257	0.322	0.026	0.348	8.036
2009-10 (II)	0.249	0.009	0.258	3.662	0.340	0.008	0.348	2.447
All India								
1983	0.166	0.009	0.176	5.631	0.199	0.009	0.207	4.424
1993-94	0.165	0.010	0.175	6.359	0.210	0.010	0.220	4.705
2004-05 (I)	0.189	0.028	0.217	14.771	0.252	0.028	0.281	11.193
2004-05 (II)	0.202	0.015	0.217	7.311	0.267	0.014	0.281	5.142
2009-10 (I)	0.199	0.027	0.227	13.677	0.289	0.028	0.317	9.690
2009-10 (II)	0.213	0.014	0.227	6.438	0.304	0.013	0.317	4.245
2. Rural/Urban								
1983	0.162	0.013	0.176	8.302	0.193	0.014	0.207	7.402
1993-94	0.151	0.024	0.175	15.768	0.195	0.025	0.220	13.077
2004-05	0.175	0.042	0.217	23.690	0.236	0.045	0.281	19.010
2009-10	0.181	0.046	0.227	25.568	0.267	0.049	0.317	18.521
3. State								
1983	0.164	0.011	0.176	6.781	0.196	0.012	0.207	6.003
1993-94	0.157	0.018	0.175	11.605	0.200	0.020	0.220	9.974
2004-05	0.189	0.028	0.217	14.541	0.252	0.028	0.281	11.198
2009-10	0.192	0.034	0.227	17.906	0.281	0.036	0.317	12.733
4. Region								
1983	0.173	0.003	0.176	1.762	0.205	0.003	0.207	1.462
1993-94	0.170	0.005	0.175	2.794	0.216	0.005	0.220	2.132
2004-05	0.209	0.008	0.217	4.003	0.273	0.008	0.281	2.967
2009-10	0.211	0.015	0.227	7.194	0.302	0.015	0.317	4.885
5. BIMARU								
1983	0.171	0.004	0.176	2.570	0.203	0.004	0.207	2.131
1993-94	0.170	0.005	0.175	2.740	0.183	0.005	0.188	2.601

2004-05	0.206	0.011	0.217	5.413	0.270	0.011	0.281	4.028
2009-10	0.212	0.015	0.227	7.072	0.302	0.015	0.317	4.815

Source: Authors' Computations based upon NSS data.

Notes:

a. W: Within component; B: Between Component; T: Total; B/W: Between/Within

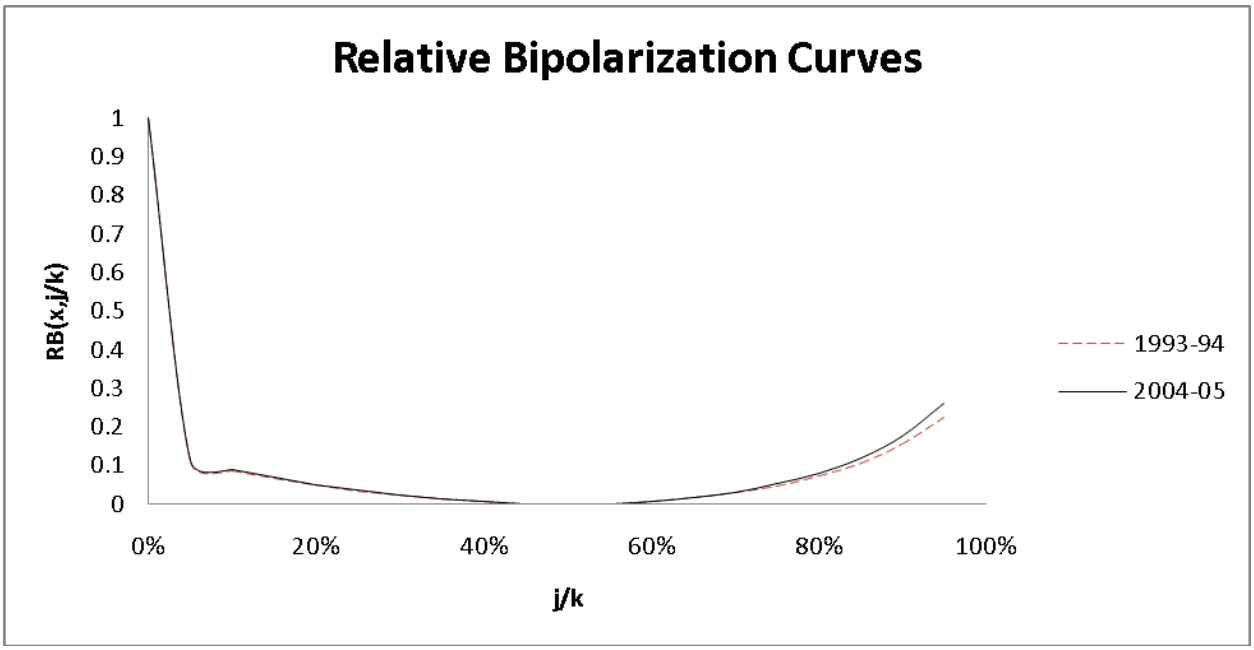
b. For caste decomposition, 2004-05 (I) and (II) (and 2009 (I) and (II)) refer to when the OBC are separately included, and when they are added to "Others", respectively.

c. See note (b) for table 3 above. We have used the same procedure in the state level decomposition, i.e. in 2004-05 and 2009-10, we have taken the newer states and combined them with their parent states.

d. Regions: North, South, East, West and North East. North includes Jammu & Kashmir, Himachal Pradesh, Punjab, Uttarkhand, Haryana, Uttar Pradesh, Chattisgarh, Madhya Pradesh, Delhi, and Chandigarh. South includes Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Andaman, Lakshadweep, Pondicherry. East includes Bihar, West Bengal, Jharkhand, and Orissa. West includes Rajasthan, Gujarat, Maharashtra, Goa, Daman-Diu, and Dadra. North East includes Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, Assam.

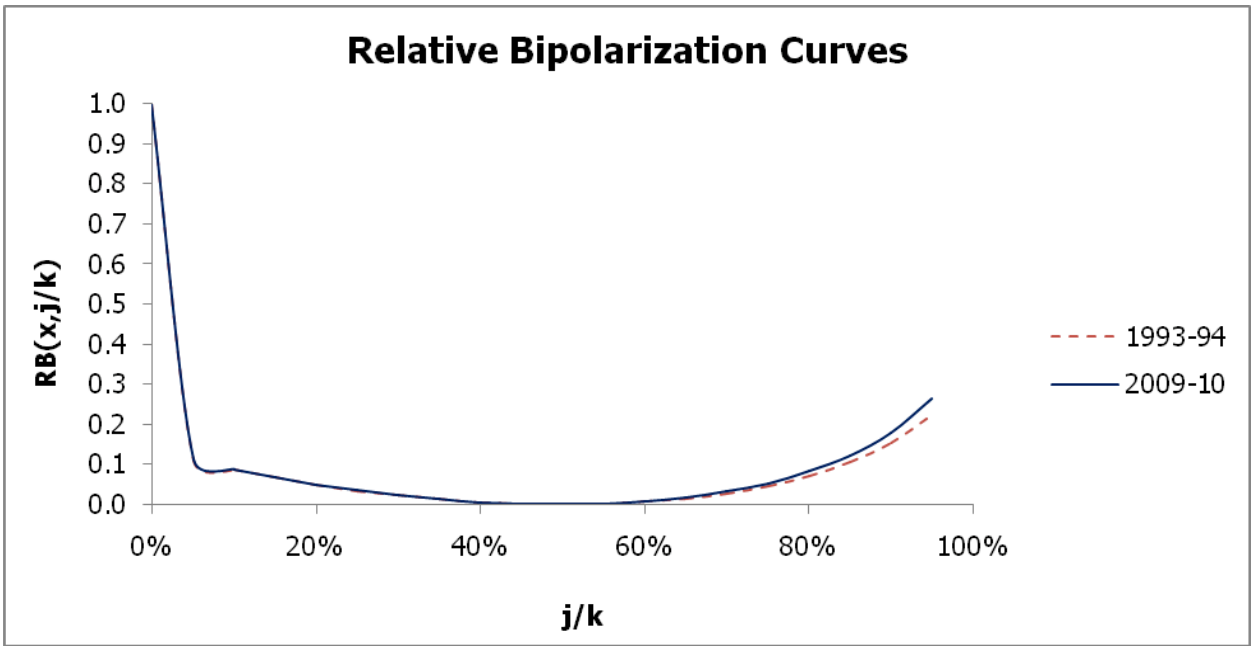
e. BIMARU: Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh. For this decomposition too, in 2004-05, we have combined the newer states with their parents.

Figure 1a: Relative Bipolarization Curves for 1993-94 and 2004-05



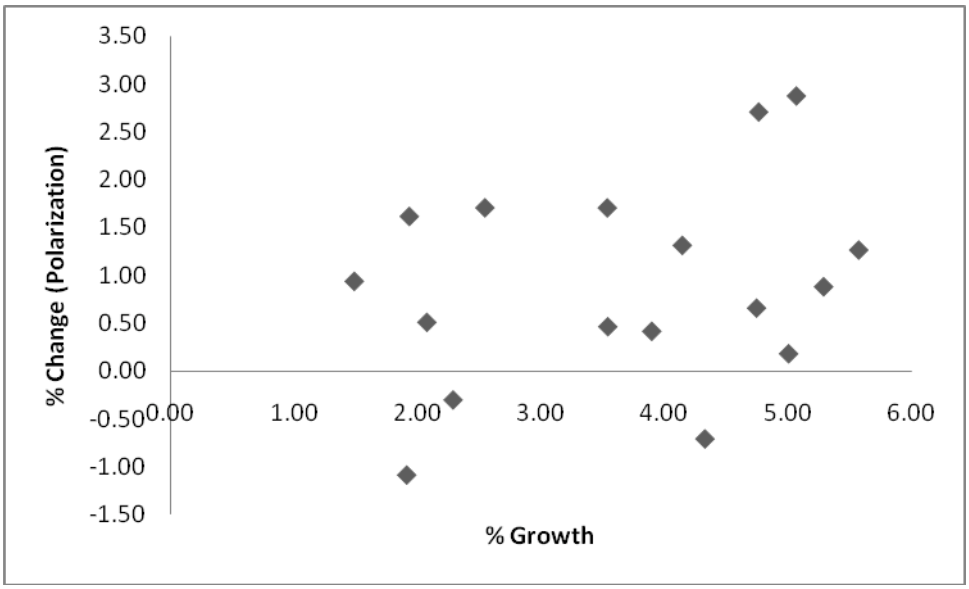
Note: For the data that is used to construct these curves, see table 2.

Figure 1b: Relative Bipolarization Curves for 1993-94 and 2009-10



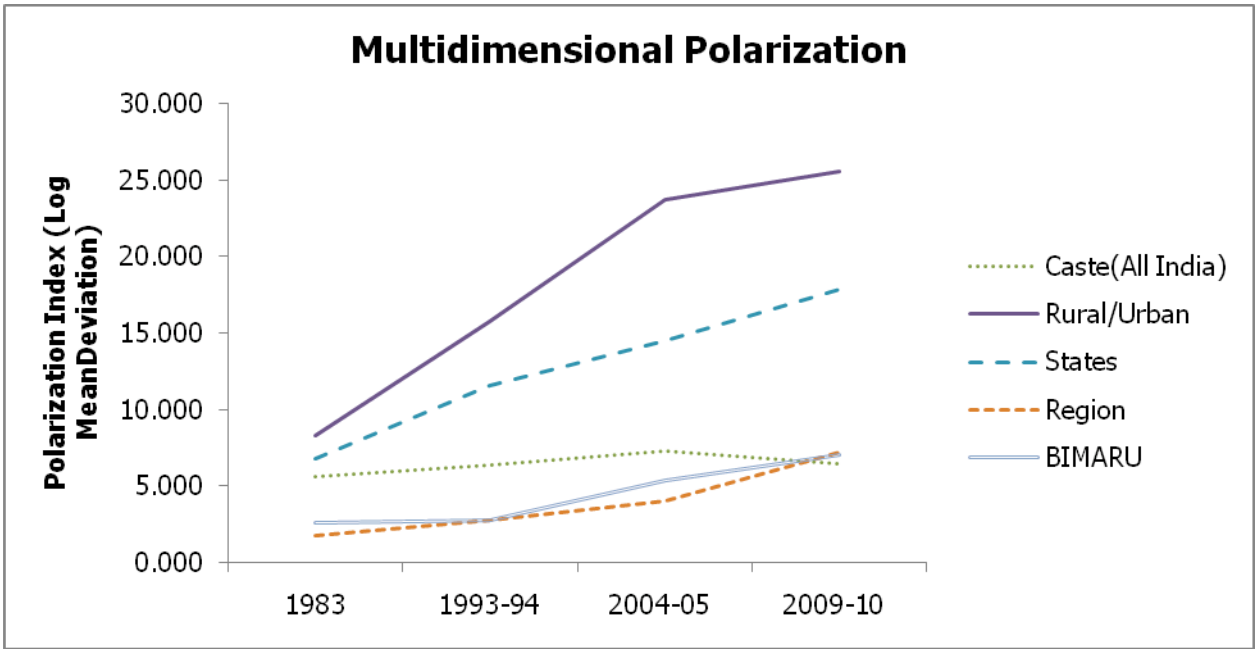
Note: For the data that is used to construct these curves, see table 2.

Figure 2: Relationship between State Level Growth and Change in Polarization



Note: See table 3 for a description of the growth rates and changes in polarization.

Figure 3: Multidimensional Polarization for 1983 to 2009-10



Note: For data used to construct the above figure, see Table 4 (Log-Mean deviation values).

For caste, for 2004-05 and 2009-10, we have used values from scheme II.