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Abstract

We analyze polarization in India roughly in the past two and half decades using consumption expenditure data. We show that polarization has increased sharply since the 1990s, reversing the earlier trend. On multidimensional polarization, we show that several pre-existing cleavages (caste, rural-urban, state, region) have accentuated. Overall, our results suggest that the high growth that India has been witnessing in recent years and the pro-market reforms initiated since 1990s have been associated with widening disparities. Comparing polarization and inequality, we find similarities, but also some differences. Our results therefore underscore the importance of studying polarization as distinct from traditional inequality.

Keywords:

Polarization; Inequality; Growth in India

JEL Code:

D31; D63

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

Among economists working on inequality, particularly on its implications for conflict, one issue that has received considerable attention in recent times is "polarization." In this paper, we explore this issue by focusing on the Indian context. This paper attempts to both elucidate the concept of polarization by using the Indian example, and to deepen our understanding of the transformation that India has been going through roughly in the past two and half decades.

Why focus on polarization? There are different notions of polarization in the literature and we will discuss these nuances below. A broad definition of polarization is that it is the "appearance (or disappearance) of groups in a distribution" (Chakravarty 2009, p. 105). Several authors have argued that polarization is intimately connected with conflict.[1] In fact, as we discuss below, ideas of polarization are quite old and in their conception, they embody connections with conflict. The idea that a highly unequal or polarized society may be prone to conflict has been known for sometime now to social scientists and other thinkers (as is reflected in the quote above from Kurosawa's film). As we show below, the axiomatic foundations of polarization are different from those of traditional notions of inequality (e.g. the Lorenz curve). However, this in itself does not mean much – axioms in social sciences are never taken literally as axioms, but rather as assumptions about the real

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[1] See Chakravarty (2009; Ch 4) and Esteban and Ray (1994; 2010) and the references therein.

world.[2] The relevant question then is, are the axioms of polarization more "realistic"? Do they correspond with subjective notions that individuals or groups hold? We do not have anything to say on this front, since we lack evidence from the Indian context.[3] Not to deny the relevance of the above questions, but irrespective of differences in axiomatic foundations, the importance (particularly on the empirical front) 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, and has therefore captured the imagination of many social scientists, philosophers and intelligent lay people around the world.[4] Considerable literature has justifiably accumulated on India's growth

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[2] 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) talk about "rationality axioms"?

[3] Wolfson (1994) presents evidence to argue that people do hold beliefs that justify the use of the notion of "bipolarization" (which we discuss below).

[4] 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."

process.[5] 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 others (e.g. Sarkar and Mehta 2010; Vakulabharanam et al. 2010; Himanshu 2007; Himanshu and Sen 2004 a,b; Nagaraj 2000), who argue that inequality has worsened. Surely, some of this disagreement has to do with different sources of data, different ways of measuring inequality, and even different ways of thinking about inequality. While we cannot resolve this debate by providing definitive answers, we do think that our focus on polarization may provide a different/newer perspective.

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[5] See Sen (2007) for the various perspectives in the debate on Indian growth. Also see Balakrishnan (2010) and the references therein.

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."[6] 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 National Sample Survey (NSS) data on monthly consumption expenditure for the years 1983, 1993-94, and 2004-5, to investigate changes in polarization. A description of this data and our methodology is presented below, but at this juncture, it is worth pointing out that the choice of these years will allow us to map changes roughly a decade before and after the reforms. A broad summary of our findings is as follows: we find that polarization has sharply increased in India since the 1990s (i.e. since the adoption of reforms). When it comes to "unidimensional" polarization, this is a reversal from the previous trend (i.e. during 1983-94). Looking at multidimensional polarization, cleavages on several fronts (caste, state, region) have been accentuated since the 1990s. 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

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

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 to understand 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.[7] 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).[8] 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. the *petty bourgeoisie*) and its fragility - given the likelihood that in the process of capitalist development, people belonging to this class

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[7] 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).

[8] "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). Also see Easterly (2002) for a cross-country analysis that shows the benefits of a larger middle class for development.

could join the ranks of the proletariat.[9] 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.[10] Given the richness of Marx's insights and the multiple interpretations that one can drawn from his work, this is a rather simplistic description,[11] but it will suffice given our purpose, viz. showing that the idea of polarization had antecedents in classical thinking.

Foster and Wolfson (1992) and Wolfson (1994) demonstrate the main principles/axioms that characterize the process of polarization[12] 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

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[9] "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).

[10] "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).

[11] 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.

[12] 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..

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. 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.[13] Formally, the polarization index derived by Wolfson (1992) is:

$$\frac{\mu}{m} \left(\frac{1}{2} - L(0.5) - \frac{G}{2} \right)$$

where 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. 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.[14]

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[13] 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).

[14] 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.

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 Majumder 2001; Rodriguez and Salas 2003). For our purposes, it is important to consider the "compromise" 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:

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

As earlier, m denotes the median, n is the size of the total population, and $(x_1, x_2, ..., x_n)$ 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

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).

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 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:

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

$\hat{k}$ 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

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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.[15] 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[16] 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:

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

$K>0$ 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 is 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 groups. This index is as given below:

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[15] Note that in bipolarization, we are concerned with the poor, the middle and the rich.
[16] In the sense that an individual by him/her self would contribute only marginally.

$$\int\limits_{0}^{\infty}\int\limits_{0}^{\infty}(f(y'))^{1+\alpha}f(y)|y-y'|dydy'$$

Here f is the income density function 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.[17] 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 is 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 the results below.

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, region etc.) and polarization is measured by looking at

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

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.

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 a 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). 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).[18]

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[18] Jayadev and Reddy (2009, 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 multidimensional polarization, their notion of polarization is quite different from the one prevailing in the literature, that we have discussed above.

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.

3. Description of the Data and Methodology

As mentioned above, the data that we use is from the National Sample Surveys on monthly consumption expenditure for the years 1983 (38th round), 1993-94 (50th round) and 2004-5 (61st round). The data from these rounds is comparable, and we therefore do not need to worry about the incomparability issue that had plagued some earlier studies (e.g. see Sen and Himanshu 2004 a,b; Himanshu 2007). These are large nationally representative surveys that are widely used by researchers working on India. 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 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, since 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). While interpreting the results below, these limitations have to be kept in mind.

We focus on polarization and inequality of *nominal* expenditure. Some may argue that what we should be looking at is *real* expenditure. This would not be an issue for most measures that we use (which are relative) if there was only one index to deflate nominal values to their real equivalents. However, this is not the case – India has a lot of socio-economic and regional variation – ideally, one would need different indices for different regions, for people employed in different occupations, and for people belonging to different classes. Despite this, we use nominal values for the following reasons. First, the different indices that we could use (e.g. the Consumer Price Indices for various states) are not without their own problems, which maybe one reason why many of the studies on Indian inequality (see references cited in the introduction, but also Deaton and Dreze 2002) have focused exclusively on inequality in nominal consumption expenditure. Second, to the extent that we would like to compare trends in inequality to those of polarization, the nominal-real distinction is not that important, in so far as we are consistent. Finally, in making inter-personal or inter-group comparisons, do people look at nominal incomes/expenditures/wealth or real values? The answer to this question is not clear to us, particularly in the Indian context – there may be an equally valid case for looking at nominal values.[19]

4. Analysis and Results[20]

Table 1 presents some polarization indices at the rural, urban, and all-India levels for the years 1983-84, 1993-94 and 2004-05. As we can see, for rural India, the Wolfson index falls during 1983-1993, but then rises sharply during 1994-2005

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[19] As is standard in the literature on India (see the above mentioned references, but also some studies on poverty, e.g. Deaton and Dreze 2002), we do not use an explicit equivalence scale.
[20] The programs and data used for this analysis will be kept at the following URL in due course of time: http://www.igidr.ac.in/~sripad/data_and_programs.htm

(although in 2004-05, it still remains below the level in 1983). For urban India, it remains virtually the same during 1983-1993, but then shows a pronounced rise during 1994-2005. At the all-India level, the index shows a slight downward trend in 1983-1993 and a substantial upward trend during 1994-2005. The compromise bipolarization index shows a similar trend as the Wolfson index. 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 during 1983-1993 and sharp increase during 1994-2005. However, the polarization indices are falling more rapidly during 1983-1993: 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.[21] During 1994-2005, the rates of increase in the polarization indices is somewhat 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 11.6%, 23.9%, 10.7% and 10.1%, respectively.

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 the ratio of the mean to the median, the share of consumption held by the poorer half of the population (i.e. the Lorenz ordinate at 50%) and the Gini. At the all-India level, the share of the expenditure held by the poorer half of the population, which showed a minor rise during the period

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[21] 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.

1983-1993 (by less than a percentage point) fell in a pronounced manner during the period 1994-2005 (by more than two percentage points). The ratio of the mean to the median, which was rising moderately in the period 1983-1994 (by about two percentage points) rose sharply during the period 1994-2005 (by about nine 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.

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 2004-5, if we look at the people below or at the median (i.e. the poorer 50%), about 89% of them live in rural areas; about 80% belong to disadvantaged groups[22] (Scheduled Caste (SC), Scheduled Tribe (ST) or Other Backward Classes (OBC) with about 37% SC or ST and about 43% 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 2004-05 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, the poorer half largely comprises of (about 65%) SCs and OBCs[23] and those in low-

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[22] We discuss these caste groups in detail below, in the context of multidimensional polarization.
[23] 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.

skilled/low-paying occupations, with those involved in "elementary occupations" (e.g. street vendors, garbage collectors, domestic helpers) being the highest (28%), followed by clerks (19%) and plant and machine operators and assemblers (10%).[24]

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 three periods. The data used to construct the curves are shown Table 2 and the RB curves for 1993-94 and 2004-05 are shown in figure 1. What can we say based upon these? The RB curves for the years 1983 and 1993-94 look very close to each other (which is the reason why we do not present the RB curve for 1983 in figure 1). 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. However, given that the difference is small (i.e. the curves lie close to each other), we do not want to overemphasize it. 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 can be seen from figure 1. As we discussed above, this implies that polarization is higher in the latter period 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

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[24] 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.

polarization has increased during 1994-2005. 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 80th 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.

Insert Table 2 and Figure 1 here

From the above, we can see that at the all-India level, the trends in polarization are similar to those of inequality. 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 and 2004-05. As we can observe, there are differences in the trends for polarization and inequality in both the periods: e.g. in 1993-94, Bihar has a lower Gini, but a higher Wolfson index as compared to Jammu & Kashmir (also compare Rajasthan and Orissa). In 2004-05, Jammu & Kashmir has a lower Gini, but a higher Wolfson compared to Rajasthan (also compare Orissa and Uttar Pradesh).

Insert Table 3 here

An interesting issue that we can explore is the relationship between growth and polarization. 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. 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 caution in interpreting this as a causal linkage. When we do a similar exercise with inequality

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(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 inequality in India has not really explored the case of absolute inequality, except in the case of wealth (Jayadev et al. 2007a), so we do not want to say much about it (and hence do not report our computations 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 1983-84, 1993-94 and 2004-05 are 40.53, 105.85, and 248.43, respectively; the corresponding values for the Wolfson index are 6.44, 16.50, and 35.85, 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 three periods. Although there are minor differences, the broad picture that we get is similar to that from bipolarization indices – essentially, polarization was stable during 1983-93, but rose sharply during 1994-2005. 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 unambiguous result 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 these dimensions and the results are reported in Table 4.

Insert Table 4 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.[25] The NSS data allows us to do very little justice to this complex notion. Having said this, we can definitely 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 1983-84 and 1993-94. In 2004-05, 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. We use the Zhang-Kanbur index to investigate polarization among caste groups. 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 1983-1993, but an increase – in fact, a substantially sharp one during 1994-2005. In urban India (again irrespective of log mean deviation or Theil), we see an increase in polarization during both 1983-1993 and 1994-2005, but the increase during the latter period is rather sharp. As a result, at the all-India level, polarization increases slightly during 1983-1993, but substantially during 1994-2005. In making the above observations, we have to keep in mind the fact that in the survey in 2004-05, four caste groups have been enumerated (SC, ST, OBC and others), whereas in the other years, only three (SC, ST and others) were

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

enumerated. We have recalculated the polarization index, by combining the OBCs with the others and this is also reported in Table 4. As we can see, the basic story of decreasing polarization during 1983-1993 and increasing polarization during 1994-2005 remains, even after the recalculation. However, polarization in 2004-05 (and hence the rate of increase in polarization in 1994-2005) is not as sharp as 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, both in the Indian and Chinese contexts is the rural-urban one. In the Indian context, several studies (e.g. Mishra and Reddy 2009; Vakulabharanam et al. 2010; Vakulabharanam and Motiram

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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 since the 1980's, and stands at a very high value of 23.69% (19.01%) using the log mean deviation (Theil). 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.

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 1983-1993 has seen a slight increase, whereas the period 1994-2005 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 polarizing, i.e. it has been associated with an increase in polarization. This is true whether we are looking at bipolarization, 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. Broadly speaking, this is somewhat different from a picture that one would get if one focuses on inequality: although the all-India trends are the same, the magnitudes of the changes and the within-country patterns are both different. This says something about the 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.

Given that many studies of polarization (including this one) are motivated by implications for conflict, should we be concerned that conflict would increase in India? This is a difficult question to answer - much more research needs to be done on this front, but the patterns of accumulation and consumption (e.g. see Jayadev et al. 2007a; Vakulabharanam et al. 2010) by the Indian elite may contribute to tensions in the near future.[26]

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[26] 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.

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 polarization and the need for more empirical studies that will help tease out how inequality and polarization play out in particular contexts.

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Tables and Figures

Table 1: Polarization Indices

	Mean/Median	L(0.5)[a]	Gini	Wolfson	Compromise Bipolarization[b]	DER[c]
Rural						
1983	1.196	0.295	0.309	0.060	0.326	0.204
1993-94	1.187	0.310	0.286	0.055	0.298	0.197
2004-05	1.226	0.302	0.305	0.057	0.307	0.206
Urban						
1983	1.272	0.273	0.342	0.071	0.376	0.220
1993-94	1.277	0.273	0.344	0.071	0.377	0.223
2004-05	1.328	0.252	0.376	0.079	0.420	0.237
All India						
1983	1.235	0.283	0.330	0.065	0.349	0.213
1993-94	1.258	0.287	0.326	0.064	0.341	0.215
2004-05	1.347	0.266	0.363	0.071	0.375	0.234

Source: Authors' computation from NSS data.

Notes:

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

b. Computed for ε=0.3

c. Duclos-Esteban-Ray (2004) index. Computed using the STATA module DASP (Distribution Analysis Stata Package) for α=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	2005-06
0%	1	1	1
5%	0.1167	0.1101	0.1125
10%	0.0913	0.0867	0.0888
15%	0.0699	0.0665	0.0685
20%	0.0516	0.0494	0.0509
25%	0.0362	0.0347	0.0358
30%	0.0235	0.0226	0.0234
35%	0.0134	0.0129	0.0134
40%	0.0061	0.0059	0.0061
45%	0.0016	0.0015	0.0016
50%	0	0	0
55%	0.0016	0.0016	0.0017
60%	0.0065	0.0064	0.0070
65%	0.0152	0.0152	0.0164
70%	0.0283	0.0283	0.0310
75%	0.0469	0.0468	0.0517
80%	0.0720	0.0720	0.0805
85%	0.1058	0.1063	0.1201
90%	0.1527	0.1538	0.1764
95%	0.2223	0.2243	0.2617

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		ΔW[b]
	%	1993-94	2004-05	1993-94	2004-05	%
Andhra Pradesh	4.75	0.312	0.345	0.060	0.064	0.66
Assam	1.48	0.216	0.240	0.040	0.044	0.94
Bihar	2.29	0.253	0.259	0.049	0.048	-0.30
Gujarat	5.07	0.279	0.334	0.054	0.071	2.87
Haryana	3.90	0.311	0.355	0.064	0.066	0.42
Himachal Pradesh	5.01	0.325	0.328	0.058	0.059	0.18
Jammu & Kashmir	1.93	0.270	0.260	0.049	0.057	1.61
Karnataka	5.29	0.309	0.361	0.063	0.069	0.88
Kerala	4.76	0.316	0.393	0.059	0.076	2.70
Madhya Pradesh	2.07	0.315	0.357	0.061	0.064	0.51
Maharashtra	3.54	0.376	0.393	0.080	0.084	0.46
Orissa	3.54	0.282	0.324	0.053	0.063	1.70
Punjab	2.54	0.285	0.351	0.056	0.067	1.70
Rajasthan	4.33	0.280	0.303	0.056	0.051	-0.71
Tamil Nadu	4.15	0.344	0.379	0.065	0.075	1.31
Uttar Pradesh	1.91	0.302	0.327	0.069	0.061	-1.08
West Bengal	5.58	0.308	0.353	0.057	0.065	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 M.D.				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
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
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
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
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
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
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

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) 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 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 1: Relative Bipolarization Curves for 1993-94 and 2004-05
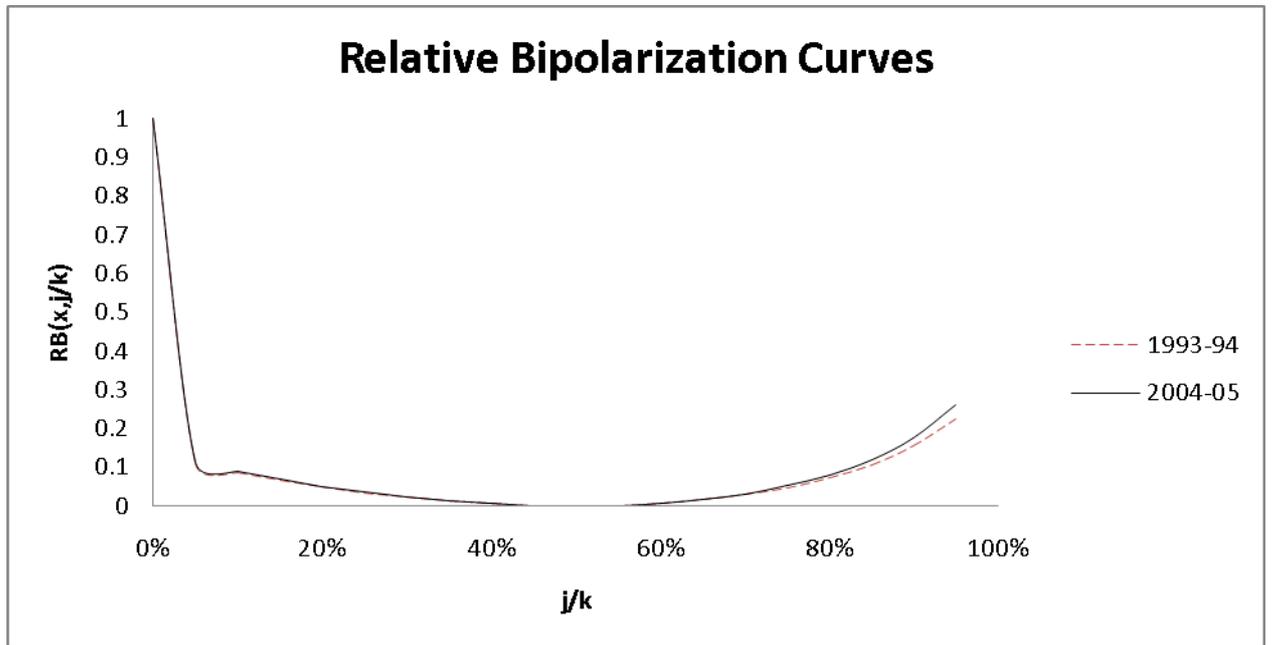
Note: For the data that is used to construct these curves, see table 2

Figure 2: Relationship Between Growth and Change in Polarization
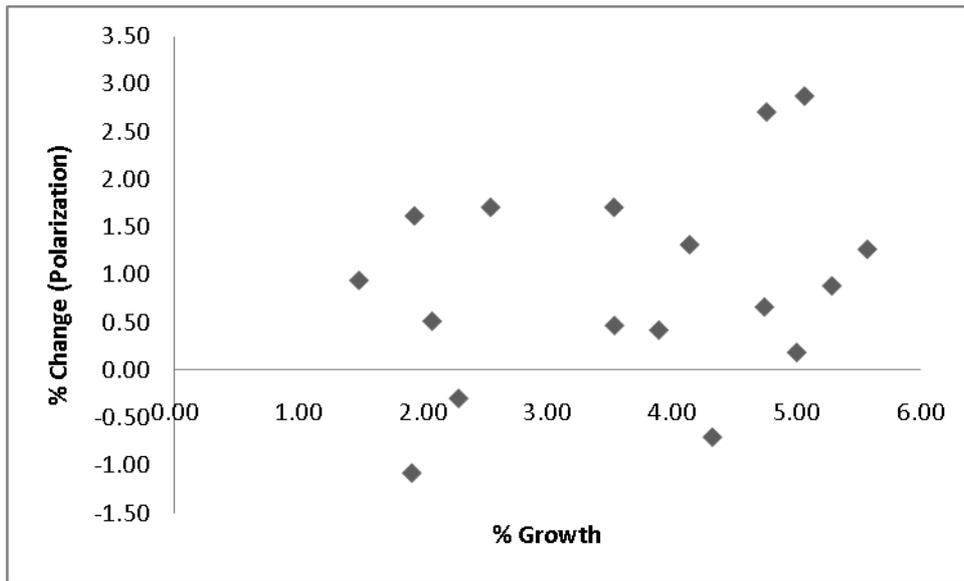
Note:

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