# Inequality, Social Mobility and Convergence: Patterns across the Indian States[†]

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**Abstract**

Inequality and social mobility in India are longstanding social issues. We document patterns of absolute inequality, relative inequality and social mobility for India as a whole as well as for Indian states grouped by level of development. We augment the analysis of inequality and mobility with an assessment of the degree to which the states are diverging in these respects. The analysis uses easy to understand indexes constructed using selected percentiles and percentile ratios of household consumption expenditures from the National Sample Surveys for 1983 to 2011-12. As a check on the percentile based indexes, we compare them to results based on the Gini coefficient, a measure of relative inequality that makes use of all parts of the distribution of consumption, and to patterns revealed by the Ray-Genicot index of social mobility that also uses the entire distribution. Application of the percentile based indexes as well as the more comprehensive indexes reveals three distinct subperiods in the history of major Indian states, over two of which inequality worsens while social mobility improves. Contrasts among the three subperiods and across the states identified in our analysis may prove useful to scholars who want to study connections between inequality, social mobility, growth and redistributive policy across the Indian states.

**Key words**: Absolute and relative inequality, social mobility, percentile-based indexes, Gini coefficient, Ray-Genicot upward mobility index, absolute divergence, Gini decomposition, household consumption expenditure survey, Indian states, Bimarou vs. Non-Bimarou states
**JEL codes**: D31, D63, R12

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## 1. Introduction

Inequality and social mobility in India are longstanding social issues. In this paper, we document patterns of absolute inequality, relative inequality and social mobility for India as a whole as well as for Indian states grouped by level of development. The analysis makes use of indexes that are constructed from selected percentiles drawn from the top and bottom of the distributions of household consumption expenditure. We augment the analysis of inequality and social mobility with an assessment of the degree to which the states are diverging in these respects over time. The data are derived from periodic Indian National Sample Surveys of household consumption expenditure for 1983 to 2011-12. Our use of distributions of household consumption expenditure rather than of income is a choice we address in the paper.

The measurement of inequality using indexes based on selected percentiles of a distribution instead of, or in addition to, indexes that utilize the entire distribution has a long history going back at least to the work of Kuznets (1955). Following Quah (2020) in his study of cross-country income inequality, we measure absolute inequality $Q$ as the difference in average real household consumption expenditure between the top 10% and the bottom 50% of households in an Indian state or group of states. Relative inequality $q$ is defined as the ratio of $Q$ to the average consumption expenditure of the bottom 50% of the distribution: $q$ is unit free and, like $Q$, rises algebraically as inequality in consumption expenditure worsens.[1]

These specific percentile-based indexes can be used by individuals and policy makers to identify broad trends in inequality in a manner that is easy to describe and to personally relate to. This ease of interpretation stands in contrast to that of the Gini coefficient, a well-used measure of relative inequality that makes use of all parts of a distribution.[2] It is hard to relate the level of, or changes in, a Gini coefficient to the position of particular individuals. Nonetheless, we compute and compare the patterns revealed by the Gini with those based on the simpler measure of relative inequality $q$ as a way of assessing the performance of both of these indexes.

However measured, growing or stagnant overall inequality when social mobility of the poorest among us is improving will be assessed differently than a situation in which their social mobility is declining. To measure social mobility, we again follow Quah and define it as the rate of increase of average consumption expenditure of the bottom 50% of households, $m$.[3] As a matter of logic, growth in consumption of the poorest half of the distribution may develop quite differently than inequality in the entire distribution. For example, both absolute inequality $Q$ and social mobility $m$ may rise at the same time. Using per capita national income data for 60 countries, Quah shows that in fact, absolute inequality is often a misleading indicator of the social mobility of those at the bottom of the income distribution.[4] Using distributions of household consumption expenditure rather than of income, we

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[1] On the comparative advantage of relative versus absolute measures of inequality, see Milanovic (2016, 27-29).

[2] Like $q$, the Gini coefficient is a measure of relative inequality since it is based on a Lorenz curve plotting cumulative shares of consumption expenditure (in the present paper) against cumulative population shares. This curve does not change when expenditure by every household changes in the same proportion even though absolute differences in expenditure do then change. For extended analysis of the Gini, see Yitzhaki and Schechtman (2012).

[3] Social mobility can also be assessed in an intergenerational context, as in Hout (2015), Chetty et al. (2014) or Asher et al. (2024). We do not do so here. Like most concepts in distributional analysis in economics, social mobility too is a multifaceted concept. See Genicot et al. (2025) for an overview of different measures of mobility and their application in developing countries.

[4] For example, he uses data for 1980 to 2014 from the U.S., France and China to show that while absolute inequality has risen in all three countries, China has experienced strong upward mobility, France moderate upward mobility, and the U.S. downward mobility.

consider whether this is also the case for India as a whole and for Indian states grouped by level of development. It turns out that the relationship in this respect between inequality and mobility is not straightforward, varying in an interesting manner across distinct subperiods of Indian economic and public redistributive history.

As a way of assessing the reliability of the patterns of social mobility revealed by the percentile based measure *m*, and analogously to our use of the Gini, we also compute a more complex index of social mobility recently proposed by Ray and Genicot (2023, p. 3063). Like the Gini, this index is harder to interpret from the standpoint of an individual in the distribution because it too makes use of all parts of the distributions of consumption expenditure.

After studying the percentile-based indexes using household consumption data for India as well as for states grouped by level of development, and comparing the patterns revealed by these indexes to the those based on corresponding Gini coefficients and Ray-Genicot indexes of social mobility, the analysis moves to an assessment of the extent to which the Indian states are diverging or converging with respect to *Q*, *q* and *m*. It is well-known that per capita incomes across the Indian states are diverging – see, for example, Lamba and Subramanian (2020, 15). We consider whether the distributions of *Q*, *q* and *m* are also diverging using Barro and Sala-i-Martin's (1992) convergence tests, and we (again) compare this analysis to one based on the Gini by making use of a decomposition of the Gini into within state, between state and overlapping components due to Pyatt (1976) and Shorrocks (1984).

We proceed in the following way. Section two discusses our use of real household consumption expenditure instead of pre- or post-fisc income as the basis for distributional analysis. Inequality and social mobility for India and for states grouped according to the Bimarou/Non-Bimarou, or less developed/more developed classification often used in analysis of the Indian economy, are presented in section three.[5] Convergence tests for *Q*, *q* and *m* and the Pyatt-Shorrocks decomposition of the Gini are presented in section four, and section five concludes. While individual states are not analyzed in the main text, inequality and mobility measures for each of the 14 states in our sample are reported in an Appendix.

## 2. Income versus consumption and the measurement of household consumption

It is desirable to use both the income and the expenditure of individuals and groups to study inequality as Attanasio and Pistaferri (2016) and others have pointed out. For example, such a joint analysis could shed light on the implications for inequality of consumption smoothing by individuals in the face of economic shocks. In the absence of income data by household across the Indian states, however, we employ real household consumption expenditure. These data, described more fully below, are based on repeated surveys of nominal household expenditure and on appropriately chosen price indexes.

A case can be made that real consumption expenditure is more representative than is current income of household choice based on expected permanent income, and that for this reason it is better than current income as a measure of contemporary economic well-being (Norris and Pendakur, 2015). In practice, however, this argument is not decisive. Problems arise in measuring the part of real consumption that is supported by unrecorded and non-monetary transfers. Accounting for home production, especially for lower income people, is difficult, and there are variations in prices and hence

[5] Many studies have used this classification for grouping Indian states including, for example, Prakash et al. (2019) and Winer et al. (2021).

in real consumption across commodities to be dealt with (Deaton and Ghosh, 2000; Ravallion, 2000).[6] We proceed with use of consumption expenditure data because it is a sensible, if imperfect, measure of welfare and because of its availability as a distribution over individuals on a state-by-state basis.

To measure nominal household expenditure, we use monthly household consumption expenditure data collected by the National Sample Survey Office (NSSO) of the Ministry of Statistics and Program Implementation through periodic, nationally representative surveys. We employ the entire large sample household consumption expenditure data collected in 'thick' or 'quinquennial' National Sample Survey (NSS) rounds to estimate the indices of inequality and mobility for India as a whole. However, we restrict the state level analysis to 14 major Indian states: the larger sample sizes of these states produce more reliable percentile inequality and mobility estimates, thus increasing their comparability across states.[7] The analysis begins in 1983 since household consumption expenditure information is available for public use only since the 38th survey in that year. Our analysis ends with the last large sample household consumption expenditure survey available for public use, the 68th round in 2011-12.[8]

There is a household survey that was conducted in 2017-18. However, citing quality issues, that data was not made public by the authorities.[9] In the absence of comparable consumption survey data for years past 2011-12, one might be tempted to extend the survey data using household consumption expenditure information reported in the recent Periodic Labour Force Surveys (PLFS). However, the PLFS is primarily designed to collect employment and labour related information and its household consumption expenditure information is not comparable with the earlier household surveys (Jajoria and Jatav, 2020). We do not use the PLFS data in this paper.

Household consumption expenditure is expressed in real terms using prices in 1983 as the base year. Each nominal monthly per capita household consumption expenditure data point in each state is deflated using the state level Consumer Price Index for Agricultural Laborers, CPIAL, in the rural areas, and the Consumer Price Index for Industrial Workers, CPIIW, in urban areas. (The level of inflation varies widely across the Indian states, and within a state between rural and urban areas.) This converts each survey observation into a measure of monthly real per capita household consumption expenditure in 1983 prices, which we label *Monthly Per capita Consumption Expenditure,* or *MPCE*.[10] The figures reported in the figures and tables are based on yearly averages of the monthly series.

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[6] We also note that Ravallion (2000) shows that consumption expenditure reported by households seems to be increasingly falling short of National Accounts, private consumption expenditure estimates. Recently Roy and Weide (2022) have found that the consumption Gini in India underestimates inequality in income.

[7] The 14 major states are: Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. Three new states - Jharkhand, Chhattisgarh and Uttarakhand - carved out of Bihar, Madhya Pradesh and Uttar Pradesh respectively in 2000 - are included as parts of the original states.

[8] Between 1983 and 2011-12 seven large sample consumption surveys were carried out: the 38th round in 1983, 43rd in 1987-88, 50th in 1993-94, 55th in 1999-2000, 61st in 2004-05, 66th in 2009-10 and 68th in 2011-12. Except the 55th round, all surveys use a uniform recall period of 30 days for all consumption items. A mixed-recall period, with a longer (one year) reference period for some durable non-food items, was used in the 55th round. This makes the 55th round's consumption expenditures incompatible with the other rounds. Deaton (2003) and Datt et al. (2020) discuss the incompatibility issues in detail. We therefore exclude the 55th round from our analysis in this paper.

[9] Press release by the Ministry of Statistics & Program Implementation, Government of India: https://pib.gov.in/Pressreleaseshare.aspx?PRID=1591792

[10] Before aggregating households at the state level and estimating the inequality and mobility measures for the country as a whole, we adjusted the expenditure figures for price changes, with base-year 1983 = 100. As expected, while the

The inequality and mobility indexes are calculated using yearly average *MPCE* at two levels: first for India as a whole, and then for the 14 larger states containing over 90% of the Indian population over the period of this study, which are divided into two groups employing the well-used Bimarou/Non-Bimarou classification. The term Bimarou is formed from the initials of the five most under-developed Indian states: (BI)Bihar, (MA)Madhya Pradesh, (R)Rajasthan, (O)Odisha and (U)Uttar Pradesh. The remaining nine major states form the group of Non-Bimarou or more developed states. Real per capita income across members of the two groups of states differs by as much as 5 to 1 depending on the year and pair of states compared.

For the analysis of India as a whole, we use all households surveyed in a consumption round. For the state level analysis, we focus on two groups of the 14 larger individual states. The inequality and mobility measures for the Bimarou and Non-Bimarou groups are weighted averages of state by state indexes using weights calculated from the share of a state's surveyed households in the national pooled sample.[11]

## 3. Inequality and social mobility

### *3.1 Absolute inequality*

Absolute inequality $Q$ for all states and for the Bimarou and Non-Bimarou groups are presented in the left-hand side of panels (a) to (c) in Figure 1. To be clear, for India as a whole at a point in time, $Q$ is computed as the difference between average *MPCE* for the top 10% of households in the distribution and the average *MPCE* for the bottom 50% of households. For the Bimarou and Non-Bimarou groups, $Q$ is computed using the appropriate subgrouping of the 14 major states in the manner described above.

Panel (d) of the figure graphs the average *MPCE*s of the poorest half and of the richest decile separately; these prove useful in exposing the source of patterns in $Q$. For now, we set aside the discussion of the plots of $q$ and the Gini on the right-hand side of the panels in the figure.

[Figure 1 and Table 1 here]

It is clear from the left side of panel (a) in the figure that for India as a whole, $Q$ has increased since 1983, with period-specific variations in the rate of its increase. $Q$ increased sharply at the beginning and at the end of our sample period, between 1983 and 1987-88 and then again between 2004-05 and 2011-12. In between these dates, it rose at a more modest rate.

Absolute inequality for the states grouped by level of development is shown in panels (b) and (c). The general pattern of $Q$ for the Non-Bimarou states on left-hand side of panel (c) is similar to that for India as a whole; as we shall see this similarity carries over to the patterns of $q$ and $m$ as well.[12] However, the Bimarou states are different in two respects: (i) $Q$ is lower in the Bimarou states than in the more developed places for each date; and (ii) $Q$ in the Bimarou states actually declines in the middle part of our sample, from 1987-88 until 2004-05.

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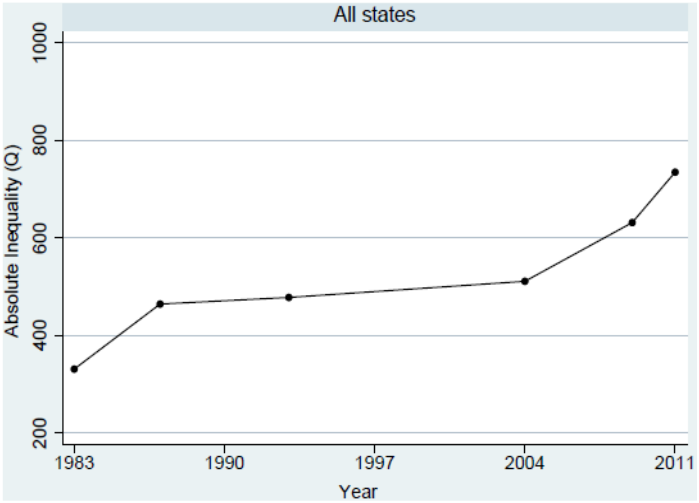
price adjusted absolute inequality and mobility estimates are significantly different from the unadjusted estimates, the relative inequality estimates remain roughly the same.

[11] In our experience, these weighted average estimates are similar to the measures constructed from the pooled samples of Bimarou and Non-Bimarou states.

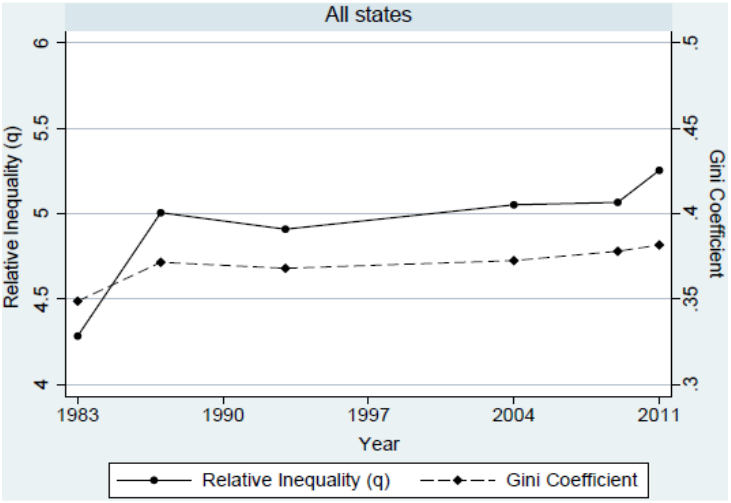
[12] Division of the 9 Non-Bimarou states into two groups - 4 high-income states (Gujarat, Haryana, Maharashtra and Punjab) and 5 middle-income states (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and West Bengal) - produces similar results (not graphed here).

The graphs in panel (d) of Figure 1 plot average *MPCEs* of the poorest half and of the richest decile of households in Bimarou and Non-Bimarou states: the left-hand graph shows data for the Bimarou states and the right-hand graph shows them for the Non-Bimarou states. It appears from this panel that the evolution of *Q* in the two groups of states is largely determined by changes in the expenditure of the richest decile since expenditure levels of the poorer half of households show relatively little variation over time. One should note, however, that the figures in Table 1 underlying the graphs in panel (d) tell a more nuanced story. Table 1(b) records substantial change in the average *MPCE* of the bottom 50% in both groups of states over the first part (1983 to 1987-88), and the last part (2004-05 to 2011-12) of our sample, as well as considerable change in these subperiods for the top decile. We shall see later that social mobility also undergoes substantial change in these early and late subperiods.

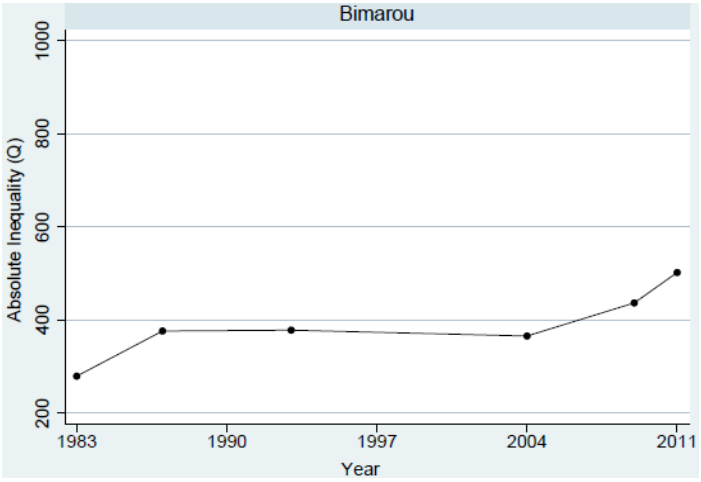
**Figure 1**
**Absolute and relative inequality in All, Bimarou and Non-Bimarou states, 1983 to 2011-12**



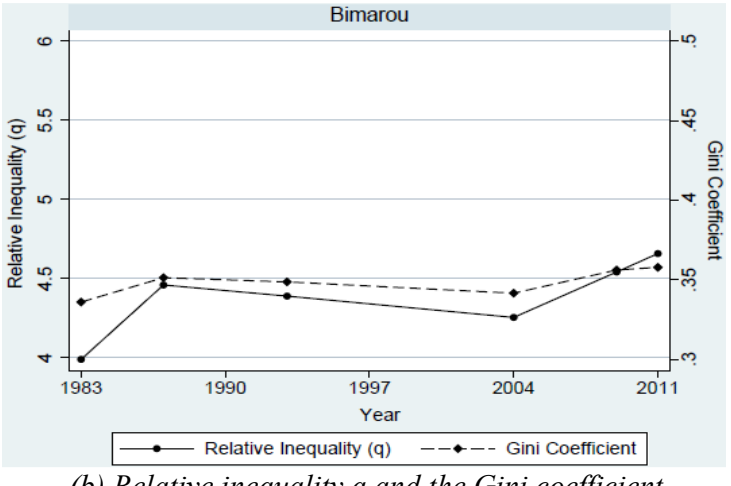

*(a) Absolute inequality Q*




*(a) Relative inequality q and the Gini coefficient*

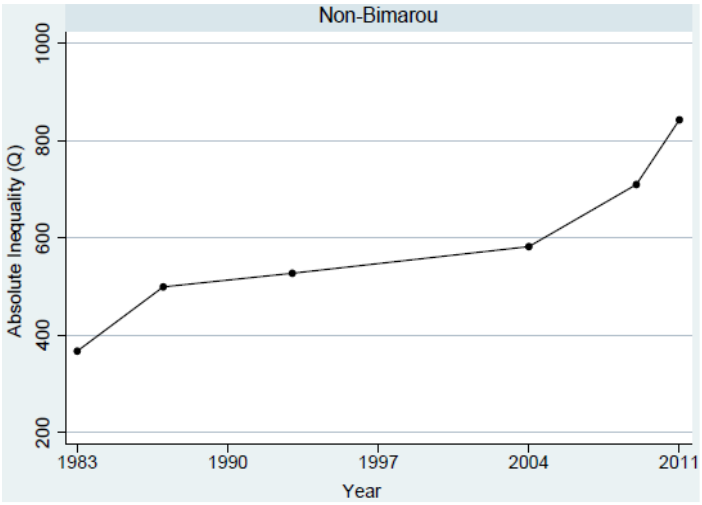



*(b) Absolute inequality Q*

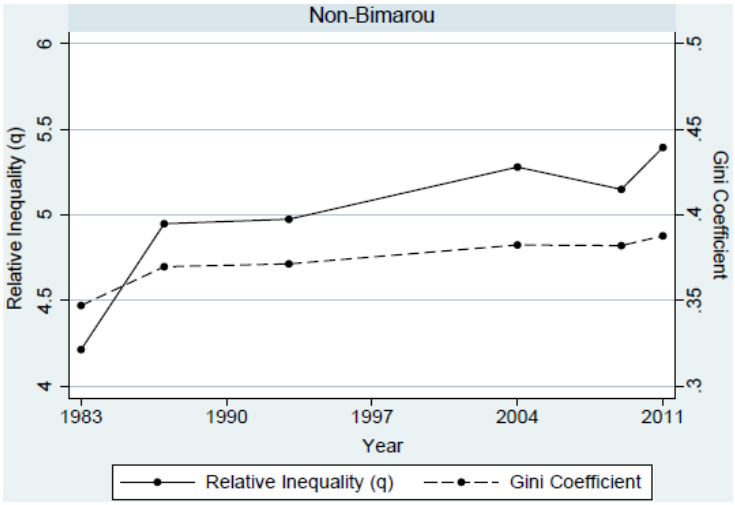



*(b) Relative inequality q and the Gini coefficient*

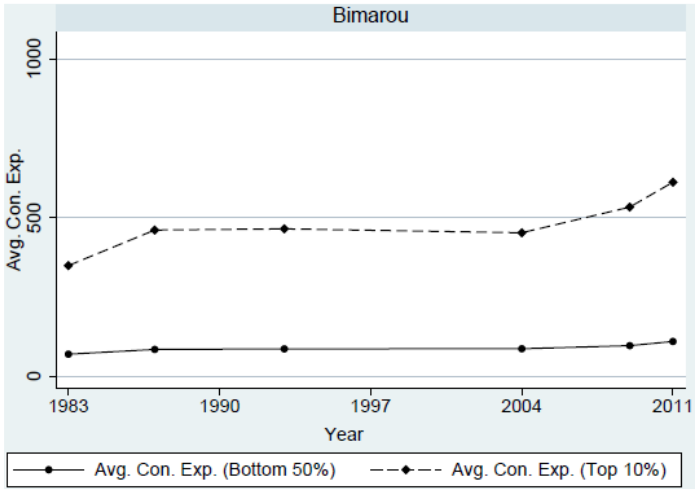
Figure 1 continued



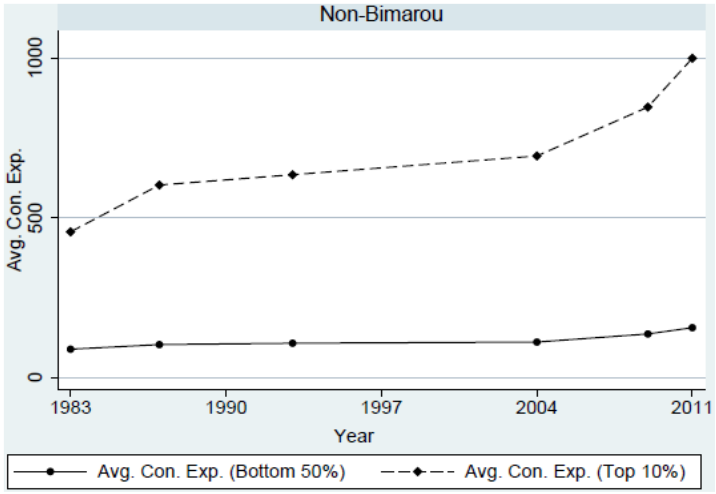

*(c) Absolute inequality Q*




*(c) Relative inequality q and the Gini coefficient*




*(d) MPCEs of poorest half and richest decile*




*(d) MPCEs of poorest half and richest decile*

*Note*: All figures are based on real household monthly per capita consumption expenditures (*MPCE*) from large sample household consumption surveys. The 'all state' figures are based on the *MPCE* data of the all India sample. The Bimarou state grouping includes the five less developed states - Bihar, Madhya Pradesh, Odisha, Rajasthan and Uttar Pradesh - while the Non-Bimarou grouping is based on the remaining nine more developed states - Andhra Pradesh, Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Punjab, Tamil Nadu and West Bengal.
*Source*: Authors' estimates combining large sample household consumption surveys of 1983 (38th round), 1987-88 (43rd round), 1993-94 (50th round), 2004-05 (61st round), 2009-10 (66th round) and 2011-12 (68th round).

**Table 1**
**Average *MPCE* of the top 10% and the bottom 50%.**
**Bimarou, Non-Bimarou and All States**

**Table 1(a): Average *MPCE* of the top 10%**

| State | 1983 | 1987-88 | 1993-94 | 2004-05 | 2009-10 | 2011-12 |
|---|---|---|---|---|---|---|
| Bimarou | 348.64 | 460.62 | 464.32 | 452.03 | 532.96 | 611.45 |
| Non-Bimarou | 455.65 | 602.22 | 634.51 | 693.02 | 846.15 | 998.85 |
| All States | 407.84 | 557.08 | 574.81 | 610.98 | 752.48 | 872.13 |
| Non-Bimarou/ Bimarou ratio | 1.31 | 1.31 | 1.37 | 1.53 | 1.59 | 1.63 |

*Source*: Same as Figure 1.

**Table 1(b): Average *MPCE* of the bottom 50%**

| State | 1983 | 1987-88 | 1993-94 | 2004-05 | 2009-10 | 2011-12 |
|---|---|---|---|---|---|---|
| Bimarou | 69.53 | 84.46 | 86.33 | 86.63 | 96.42 | 109.53 |
| Non-Bimarou | 88.47 | 102.91 | 107.19 | 110.87 | 136.19 | 155.84 |
| All States | 77.05 | 92.80 | 96.97 | 100.05 | 121.08 | 137.31 |
| Non-Bimarou/ Bimarou ratio | 1.27 | 1.22 | 1.24 | 1.28 | 1.41 | 1.42 |

*Source*: Same as Figure 1.

### *3.2 Relative inequality*

We recall that relative inequality $q$ is defined as the ratio of $Q$ to the average *MPCE* of the bottom 50% of the distribution. Palma (2011) uses a similar index to study relative inequality in an international setting - the ratio of the incomes of the richest 10% and the poorest 40% - which when calculated using average *MPCE* for all Indian states produces almost the same results as we report for $q$.[13]

The patterns of $q$ over the sample period are shown in the right-hand graphs of panels (a) to (c) of Figure 1. These panels also show corresponding Gini coefficients which, as indexes of relative inequality, can meaningfully be compared to $q$. Values of $q$ are on the left side vertical axes with those for the Gini on the right side.

In the top right-hand graph of $q$, for all states together, we see that after an initial sharp increase up to the value based on the 1987-88 survey, $q$ remains more or less constant until the survey before the last one in 2011-12, at which time its size jumps up again. $q$ for the Bimarou states shown on panel (b) also jumps upwards from 1983 to 1987-88. But then it *declines* until 2004-05 after which it again increases sharply. This pattern is similar to the evolution of $Q$ in the Bimarou states, which also declines somewhat between 1987-88 and 2004-05. For the Non-Bimarou states, $q$ has a pattern like that for all states except that there is a peak in $q$ at 2004-05 not seen in the all states case, after which $q$ declines for several years and then jumps upwards. In all cases, $q$ ends up at a level higher than at the beginning of our sample.

Although our focus in this paper is on measurement, it is hard to avoid thinking about why the patterns of $q$ and $Q$ differ between the two groups of states. We offer the following thoughts on this matter. The

[13] The correlation between the Palma ratio and $q$ when both are calculated using *MPCE* data for all states is 0.998.

differences revealed in Figure 1 might be at least partly attributed to the asymmetric effects of economic liberalization across the two groups of states. Though economic liberalization after 1990 launched the Indian economy on a higher growth trajectory, not all states experienced growth at the same time. The more developed states with better infrastructure, institutions and complementary state-specific reforms such as flexible labour laws benefited the most and experienced higher growth early on, while the underdeveloped states experienced higher growth later. (Here we are relying in part on Kotwal et al. (2011)). This narrative suggests inequality due to faster growth should be observed to rise in the Bimarou states *after* it rises in richer states, a timing that does appear in panels (b) and (c) of Figure 1 which show inequality falling in the Bimarou states until the mid-2000s while it was rising in the Non-Bimarou states, and then rising in the Bimarou states afterwards.

A second possibility, one which is intertwined with asymmetric growth thus complicating the singling out of the effect of each, is government redistribution to offset the consequences of growth for inequality. Such policy actions are likely to be more important in determining patterns of inequality in the poorest states. The declining sections of the graphs of $Q$ and $q$ between the early 1990s and 2004-05 recorded in panel (b) for the Bimarou states provides some corroborating evidence that redistributive policy did actually reduce inequality over this period, and possibly beyond.[14] We shall return to the role of redistributive policy in our discussion of social mobility.

### *3.2.1 Comparing q and the Gini*

It is useful to compare the patterns revealed by the percentile-based index of relative inequality $q$ with those revealed by the Gini, a more complicated index of relative inequality that makes use of all parts of the underlying distribution. The dotted lines on the right-hand side of panels (a), (b) and (c) of Figure 1 show the Gini for all states and the Bimarou and Non-Bimarou groups of states respectively. Because the Gini has been so well studied, we need not write out its form here.

It is not as easy to assess the Gini visually as it is to assess patterns of $q$, in part due to differences in scale, a problem easily remedied by enlarging the graphs on your screen. Even after enlargement, though, we see that the Gini varies over a relatively smaller range.[15] Subramanian and Jayaraj (2015) offer a similar observation when comparing the Gini to other indexes applied to study inequality in rural versus urban areas for India as a whole. Relatively more variation in $q$ is to be expected for two reasons. First, it relies on the ends of the distribution while the Gini is more sensitive to changes in the middle (Gastwirth, 2017). Second, Palma (2011) shows that changes in income inequality in many nations tend to occur in the tails, an observation that likely extends to the evolution of consumption expenditure in groups of Indian states.

Looking past the smaller variation in the Gini, we can compare the two indexes in terms of their trends and turning points. On these grounds, which are often relied upon when comparing two time series, we see that both indexes generally have the same pattern in these respects in all state groupings. The obvious exception is the levelling off of the Gini in the Bimarou states (in panel b) at the end of our sample period in contrast to a continued increase in $q$.

[14] On poverty reduction in Indian in the 1990s, see Deaton and Dreze (2002).

[15] For all states, the coefficient of variation of $q$ (0.07) is higher than that of the Gini (0.03), and standard deviation of $q$ (0.34) is much higher than that for the Gini (0.01). A similar pattern is found for the Bimarou and Non-Bimarou groups.

### *3.3 Social mobility measured using household consumption expenditure*

As a summary so far, we can say that absolute inequality $Q$ and relative inequality $q$ have both increased over the period we study. It is also clear that the evolution of inequality is different depending on the level of development of the states we are investigating. Both $Q$ and $q$ are consistently higher in the richer, Non-Bimarou group of states than in the Bimarou group. Moreover, while in both groups inequality increases more sharply at the beginning and end of our sample period than in its middle (between the late 1980s and the mid 2000s), both $q$ and $Q$ decline modestly in the Bimarou states in this middle period while continuing to increase in the more developed states. Finally, comparison of $q$ with the Gini shows that while visually graphs of the latter do not as easily reveal what happened at the ends of the distributions of household expenditure, on closer inspection we see that the Gini exhibits similar trends and turning points (with the exception noted earlier).

The evidence recorded in Figure 1 and Table 1 does not reveal what happened to the social mobility of the poorest half of households *m* which, we recall, is defined as the annualized growth rate between adjacent survey dates of average *MPCE*s for the poorest half of households.[16] $m$ is graphed in Figure 2 and its values are tabulated in Table 2(a) along with annual growth rates of consumption expenditure for the top 10% of households in part (b) of the table.

As a check on the use of the percentile based index *m,* the Ray-Genicot (2023) index of upward social mobility $\mu_\alpha$ that relies on all parts of the distribution of consumption expenditure is also graphed in Figure 2 and tabulated in Table 2(c) for the same state groupings. (Individual state values of this index are presented in the Appendix). Since this index may not be familiar to some readers, we describe its form here in some detail.

Using sequential NSSO rounds of real *MPCE* decile data, the Ray-Genicot (2023, eq. 20, p. 3063) panel independent index of upward mobility measure $\mu_\alpha$ is defined as:

$$\mu_\alpha(\boldsymbol{y}[s,t]) = \frac{1}{t-s} * \ln\left[\frac{\sum_{i=1}^{I} n_i(t) y_i^{-\alpha}(t)}{\sum_{i=1}^{I} n_i(s) y_i^{-\alpha}(s)}\right]^{-\frac{1}{\alpha}}, \text{ for } \alpha > 0, \qquad (1)$$

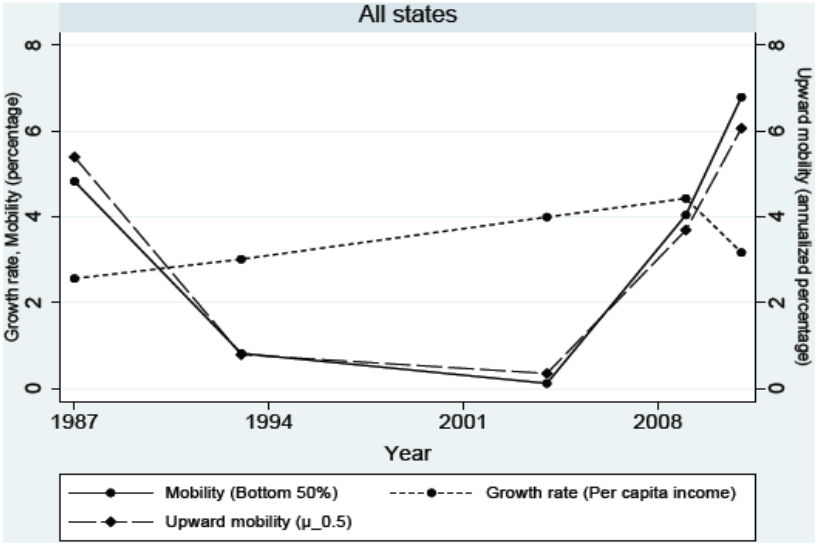
where $n_i$ is the share of the population with an average *MPCE* of $y_i$ in successive surveys at times $t > s$, and $\alpha$ is a parameter expressing the pro-poorness of the index. Since the surveys are done periodically and the number of years between surveys varies over the sample period, an annualized index is created by dividing by the number of years $(t - s)$ between two consecutive surveys. We use decile data, so the population shares are all equal to $1/10$, and we follow Ray and Genicot in setting $\alpha = 0.5$ for our baseline estimates.[17] Since variation in the value of $\alpha$ does not alter the pattern of results reported in the text, these variations are not presented in the paper.

[Figure 2 and Table 2 here]

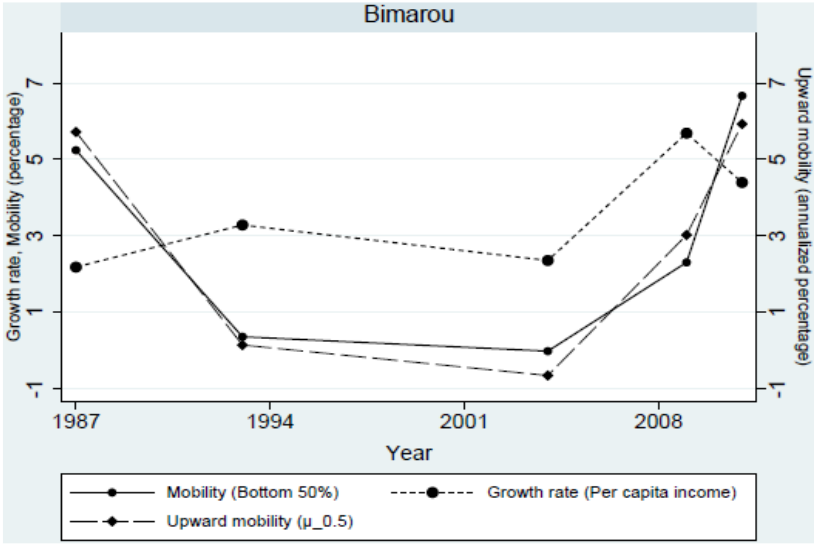
[16] To convert the growth rate of average MPCEs between two consecutive surveys to an annualized growth rate, it is divided by the number of years between two surveys.

[17] A pro-poor factor $\alpha = 0.5$ doubles the weight in the index of someone earning \$40000 relative to someone earning \$160000 (Ray-Genicot, 2023, fn. 19).

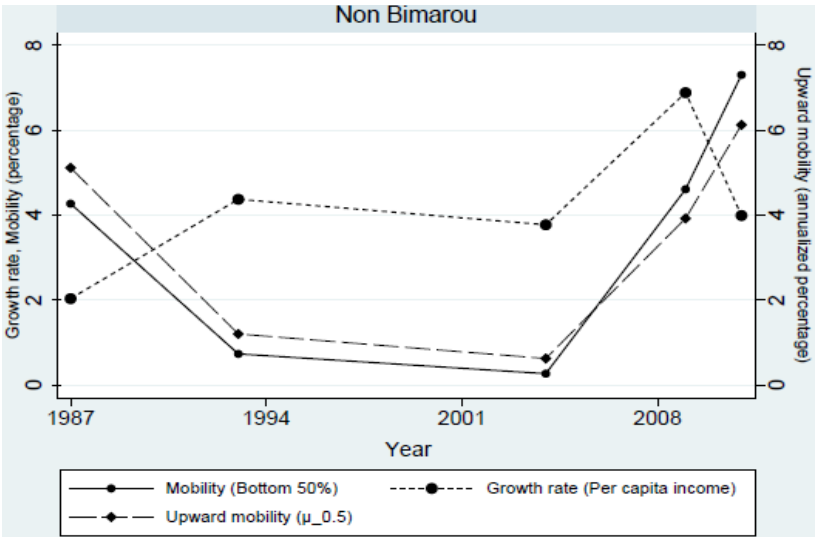
**Figure 2**
**Annualized rate of change of average *MPCE* for poorest 50% (*m*), the Ray-Genicot upward mobility index ($\mu_{0.5}$), and annual growth of real per capita income.**
**All states, Bimarou and Non-Bimarou states, 1983 to 2011-12**




(a) All states




(b) Bimarou states




(c) Non-Bimarou states

*Source*: See Figure 1. Real per capita income figures are from the Central Statistics Office, Government of India.

**Table 2**
**Annualized rate of change of average *MPCE* of the bottom 50% (*m*) and the top 10% of households, and the Ray-Genicot index of social mobility ($\mu_{0.5}$).**
**Bimarou, Non-Bimarou and All States**

**Table 2(a): Annualized rate of change of average *MPCE* of the bottom 50% of households, *m***

| State | 1983 to 1987-88 | 1987-88 to 1993-94 | 1993-94 to 2004-05 | 2004-05 to 2009-10 | 2009-10 to 2011-12 |
|---|---|---|---|---|---|
| Bimarou | 5.24 | 0.35 | 0.03 | 2.30 | 6.67 |
| Non-Bimarou | 4.27 | 0.73 | 0.27 | 4.61 | 7.30 |
| All states | 4.83 | 0.82 | 0.12 | 4.04 | 6.79 |

*Source*: Same as Figure 1.

**Table 2(b): Annualized rate of change of average *MPCE* of the top 10% of households**

| State | 1983 to 1987-88 | 1987-88 to 1993-94 | 1993-94 to 2004-05 | 2004-05 to 2009-10 | 2009-10 to 2011-12 |
|---|---|---|---|---|---|
| Bimarou | 7.71 | 0.31 | -0.30 | 3.78 | 7.31 |
| Non-Bimarou | 8.34 | 0.87 | 0.78 | 4.11 | 9.77 |
| All states | 8.67 | 0.75 | 0.26 | 4.28 | 8.36 |

*Source*: Same as Figure 1.

**Table 2(c): Annualized rate of upward mobility of average *MPCE* of households, $\mu_{0.5}$**

| State | 1983 to 1987-88 | 1987-88 to 1993-94 | 1993-94 to 2004-05 | 2004-05 to 2009-10 | 2009-10 to 2011-12 |
|---|---|---|---|---|---|
| Bimarou | 5.72 | 0.13 | -0.67 | 3.02 | 5.93 |
| Non-Bimarou | 5.12 | 1.20 | 0.63 | 3.92 | 6.13 |
| All states | 5.39 | 0.79 | 0.35 | 3.69 | 6.06 |

*Source*: Same as Figure 1.

Figure 2 and (perhaps more clearly) Table 2 reveal three distinct periods of social mobility $m$ in all state groupings similar in their timing to the three subperiods identified in the evolution of $Q$ and $q$: an initial period up to 1987-88 during which mobility is positive and relatively high; a period of stagnating or slowly deteriorating mobility between the late 1980s and the mid 2000s; and a period of strong positive mobility afterwards. The Ray-Genicot upward mobility index $\mu_{0.5}$ has the same U-shaped pattern.

Two additional facts about social mobility stand out in Table 2. First, we see from Tables 2(a) and 2(c) that apart from the initial observation, $m$ and $\mu_{0.5}$ are both then consistently higher in the more developed Non-Bimarou states than in the Bimarou states. Second, while consumption growth rates for the top 10% of households in all states in the last row of Table 2(b) are almost always higher than that of the poorest half (for all states) shown in Table 2(a), the U-shaped pattern of growth rates arises in both panels, an observation that parallels the national pattern reported by Subramanian and Jayaraj (2015) for households in urban as opposed to rural areas.)

It is interesting to compare the results in Figure 2 and Tables 2(a) and 2(c) with those of Chancel and Piketty (2019) concerning income inequality. Combining data for 1951 to 2015 from three sources - household consumption surveys, tax tabulations released by the Income Tax Department, and national accounts - and applying the Distributional National Accounts Methodology proposed by Alvaredo et al. (2016), Chancel and Piketty compute a percentile income distribution at the national level for India. In their Figure 1(a), p. S34, they present the annual per capita real income growth for the entire and for the bottom 50% of the Indian population. What interests us is the pattern in their figure of the poorest half's income growth from 1980 to 2015, a period that is roughly comparable to that covered by the expenditure surveys we use. While they found that average per capita real income growth of the bottom 50% over the 1980 to 2015 period was positive, at 1.9%, they also observed a decline in income growth from the subperiod 1980-89 to 1990-99, and then a period of rising income growth from subperiod 1990-99 to 2000-15. So it appears that both income and consumption growth for the poorest 50% of population evolved in more or less the same way over the period we study regardless of the level of development of the states considered.

The U-shaped pattern of $m$ (and $\mu_{0.5}$) in Figure 2, when combined with the patterns of $Q$ and $q$ in Figure 1, point to both a challenge and an opportunity for those who are interested in studying the consequences for inequality and social mobility of economic growth and public redistribution. The sharp increase in social mobility in all state groupings until the late 1980s, which also coincides with worsening absolute and relative inequality (see again Figure 1), occurs in an era in which the Indian economy was liberalized economically and slowly began to break away from the low 'Hindu rate of growth' of the post-Independence years.[18] We also see from Figure 2 and Table 2 that between the late 1980s and the mid-2000s mobility then stagnated while, from Figure 1 and Table 1, it is clear that in this middle period relative inequality worsened in Non-Bimarou states and improved somewhat in Bimarou states. This is a second distinct pattern concerning the relationship between relative inequality $q$ and social mobility $m$.

[18] Kotwal et al. (2011) discuss these developments. In the 1980s and 1990s the real per capita GDP growth of India was between 3% and 4%, increasing to more than 5% after 2000. Here we are referring to the real per capita GDP growth rate estimates provided by the Central Statistics Office (CSO), under the Ministry of Statistics and Program Implementation. The United Nations growth numbers for India used by Chancel and Piketty (2019) are somewhat different.

Low and relatively stable values of *m* between the mid-1990s and 2004-05 which arose alongside higher rates of economic growth (compared to pre-1990 levels) and stagnating (or slightly decreasing) levels of inequality in the Bimarou states suggests that the benefits of growth were not reaching the lower income groups. It is reasonable to think that this experience played some role in the decision of the government at the center to introduce several redistributive welfare schemes to spread the benefits of economic growth more widely, the possible impact of which on inequality in the Bimarou states we briefly pointed to earlier.

Until the early 2000s, social security protection in India was largely limited to the formal sector of the economy. This left almost the entire unorganized sector, constituting more than 90% of the workforce, outside of social security protections. The world's largest workfare program, the Mahatma Gandhi National Rural Employment Guarantee (MGNREGA) Act, was introduced by the central government in August of 2005. Under this act, any rural adult resident seeking work must be employed on local public works at the minimum wage within 15 days of the date of application. A rural household is entitled to 100 days of work per year which may be shared by different adults of the same household. Initially implemented in 200 of the poorest districts of the country, MGNREGA was extended to the entire country by 2008. Millions of rural poor households have benefited from this scheme (Dreze and Khera, 2017). Other welfare and social security schemes targeted at poorer households, such as Midday meals, Integrated Child Development Services and elderly social security pensions, have also been introduced since the early 2000s.[19]

The impact of these schemes along with those previously in existence is likely to have been at least partly behind the high growth rates of household *MPCE* after 2004 shown in Figure 2, especially in the Bimarou states. It should also be noted that over the period after 2004-05 when economic growth was generally high by Indian standards (see panel a of Figure 2), both absolute and relative inequality increased sharply. Thus, like the first subperiod (before the late 1980s), we can say that the period after the mid-2000s provides evidence of a third distinct subperiod in the evolution of *Q, q* and *m* during which inequality worsened while consumption mobility of the poorest half increased. In thinking about the evolution of inequality and mobility through three subperiods, we should recall Quah's observation that social mobility may develop differently than inequality, and that our assessment of an episode in which *m* is improving while inequality is worsening will likely be different than it would be if both inequality and mobility were declining.

The fact that the evolution of *Q, q* and *m* in the Indian states can be divided into three distinct subperiods, with additional variation that depends on the level of development of the group of states considered, suggests that this history may be a useful source of data for further study of the relationships between inequality, social mobility, growth and redistributive policy across the Indian states.

## 4. Convergence or divergence?

We pointed in the Introduction to evidence from several statistical studies such as Lamba and Subramanian (2020, p. 15) that per capita incomes across the Indian states are diverging.[20] In this section we investigate divergence in inequality and social mobility as measured by *Q, q* and *m.* For

[19] Drèze and Khera (2017) provide a more detailed analysis of these programs.

[20] See also Nagaraj et al. (1998), Rao et al. (1999), Sachs et al. (2002), Singh et al. (2003), Nayyar (2008), Dash (2014) and Cherodian and Thirlwall (2015). While almost all studies confirm per capita incomes are diverging absolutely, the evidence on conditional convergence is mixed as indicated in the survey of this literature by Cherodian and Thirlwall (2015).

completeness, and as an analogue to studies that consider divergence in state per capita incomes, we also study divergence in average state *MPCEs*.

Initially we adopt Barro and Sala-i-Martin's (1992) approach to convergence testing. Then we (again) compare the results of this analysis to one based on the Gini, making use of the decomposition of the Gini due to Pyatt (1976) and Shorrocks (1984) into within state, between state and overlapping components.[21]

### *4.1 Divergence or convergence in Q, q and m*

As a test of unconditional convergence or divergence in *Q*, *q, m* and *MPCE*, we use an ordinary least squares pooled regression based on the 14 major Indian states for the period from 1983 to 2011-12. This regression is of the form:

$$\left(\frac{1}{T}\right) log\left(\frac{H_{it}}{H_{io}}\right) = \alpha + \beta\ log(H_{io}) + \varepsilon_{it}, \text{ for all states } i \text{ and for } t = 0, 1, 2 \ldots T, \qquad (2)$$

where the left side is the annualized growth rate of index or variable *H* in state $i$ over the sample period, $log(H_{io})$ is the logarithm of $H$ in state $i$ in the initial period, and $\varepsilon_i$ is an error term. If there is unconditional divergence across the 14 states in the measure under consideration, $\beta$ in equation (2) will be positive and statistically significant indicating that states with higher values of the initial observation are associated with greater positive changes over the sample period. In this event we shall refer to the result as 'strong'. If the coefficient is insignificant, we shall refer to the result as 'weak'. Analogously for a negative coefficient indicating unconditional convergence of the measure under consideration. Tests for conditional divergence or convergence are considered later.

It should be noted that estimation of (2) does not reveal whether the time patterns of the state-specific values of an index are becoming more or less alike. Equation (2) tests only for the direction of the change over the sample period of each of the measures considered. In this respect, estimation of (2) is less informative than decomposition of the Gini which follows later.

The results of the regressions are presented in Table 3. Results with and without Kerala included are provided since this state is an outlier in most cases. The corresponding graphs of the regressions with Kerala included are provided in Figure 3 following the table, where the exceptional nature of Kerala is evident.

[Table 3 and Figure 3 here]

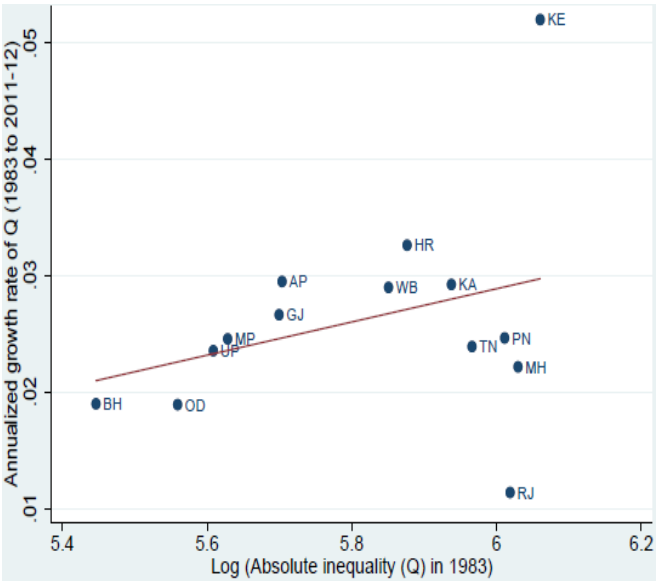
[21] See also Pyatt et al (1980) and Shorrocks (1982).

**Table 3**
**Tests for unconditional divergence or convergence in *Q*, *q*, *m* and *MPCE* across 14 major states, 1983 to 2011-12**

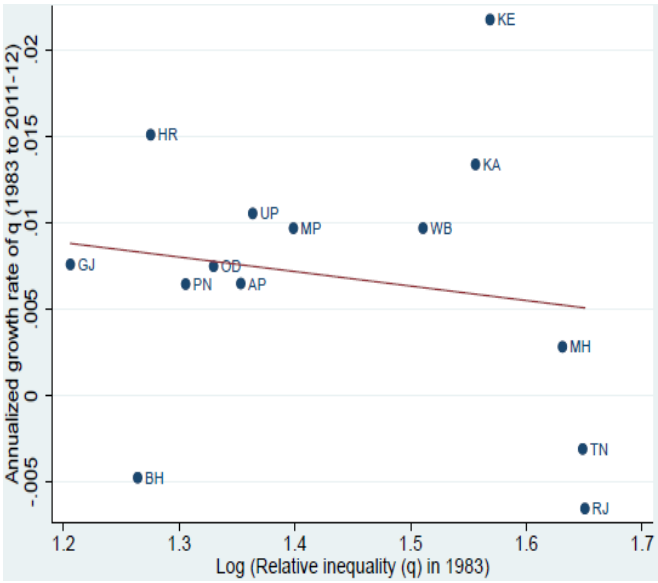
| | $\beta$ | Conclusion |
|---|---|---|
| Absolute inequality *Q* | 0.014<br>(0.014) | Weak divergence |
| excluding Kerala | 0.002<br>(0.009) | Weak divergence |
| Relative inequality *q* | -0.008<br>(0.016) | Weak convergence |
| excluding Kerala | -0.016<br>(0.013) | Weak convergence |
| Social mobility *m* | 0.006**<br>(0.003) | Strong divergence |
| excluding Kerala | 0.006**<br>(0.003) | Strong divergence |
| Average *MPCE* | 0.013<br>(0.011) | Weak divergence |
| excluding Kerala | 0.004<br>(0.006) | Weak divergence |

*Note:* The equation estimated is (2). Only the $\beta$ coefficients of regressions are reported in the table. Robust standard errors in brackets. * (**) [***] signifies significance at 10% (5%) and [1%]

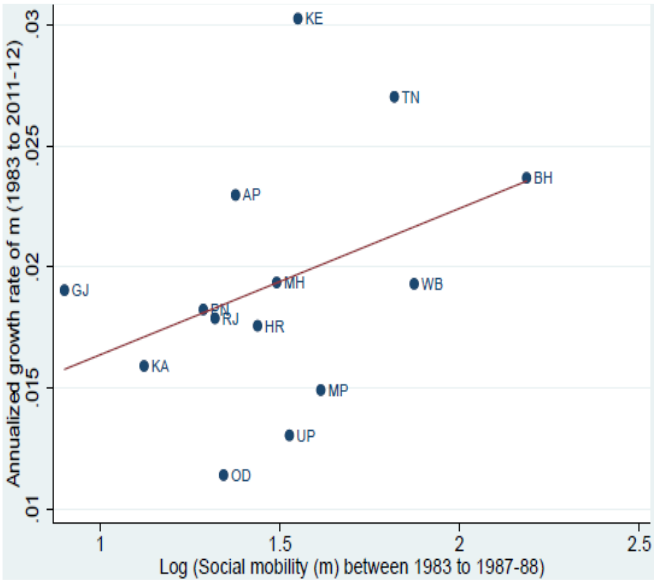
**Figure 3**
**Convergence and Divergence in Rates of Change in *Q*, *q*, *m* and average *MPCE***
**14 major Indian states, 1983 to 2011-12**



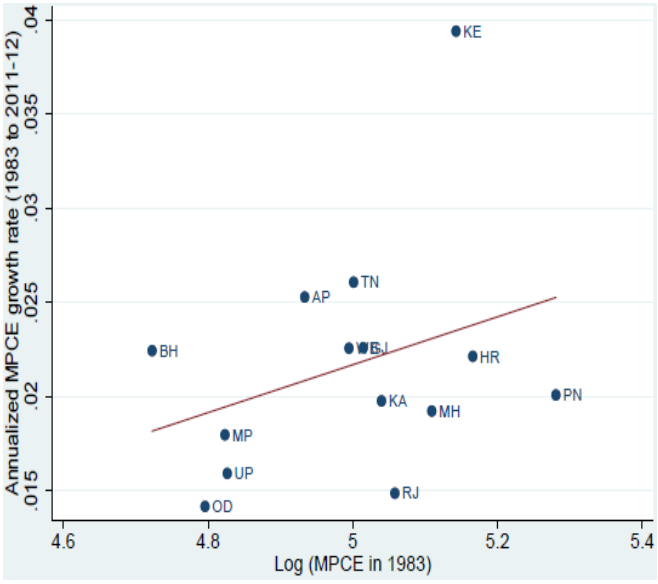

(a) Absolute inequality (*Q*)




(b) Relative inequality (*q)*




(c) Social mobility (*m*)




(d) Consumption expenditure (*MPCE*)

*Note*: In the above figures Indian states are abbreviated as: Andhra Pradesh (AP), Bihar (BH), Gujarat (GJ), Haryana (HR), Karnataka (KA), Kerala (KE), Madhya Pradesh (MP), Maharashtra (MH), Odisha (OD), Punjab (PN), Rajasthan (RJ), Tamil Nadu (TN), Uttar Pradesh (UP) and West Bengal (WB).
*Source*: Same as Figure 1.

The results in Table 3 indicate that only for *m* there is 'strong' evidence, in this case of divergence. Even average *MPCE*, which is a consumption expenditure analogue to real per capita income, exhibits only weak divergence over the sample period. Further testing (not shown here) that considers separately each of the two groups of states indicates that the statistically significant result for *m* in the sample of 14 states stems from what is happening in the Bimarou group. Why there is evidence of divergence only in the social mobility of the bottom 50% of households, why this appears to depend on what happened in the Bimarou states, and why there is no significant evidence of divergence or convergence in *Q, q* and average *MPCE* are issues that remain to be studied.

It is interesting to note that the absence of significant divergence in *MPCE* appears to contradict evidence cited earlier that per capita incomes across the states are diverging. In this respect, we recall (see fn. 6) that Ravallion (2000) has shown that consumption expenditure estimated using surveys has been falling short of private consumption expenditure as estimated in the National Accounts. This difference could be the source of somewhat lower variation in survey-based household consumption expenditure across states compared to variation in per capita incomes. It might also lie behind the result of Roy and Weide (2022) who find that a consumption Gini underestimates income inequality.

Finally, before turning to the analysis of convergence based on the Gini, we note that tests for conditional convergence (not reported here) which include various socioeconomic and demographic variables, including the literacy rate, size of the public sector and population growth, led to the same conclusions as are recorded in the third column of Table 3.

### *4.2 Studying divergence using a regionally decomposed Gini*

Pyatt and Shorrocks have shown how the Gini coefficient can be formally decomposed into three components: within-state inequality, between-state inequality, and an overlapping component. We rely on their work in this section. As is now common in the literature (see, for example, Milanovic (2002)) we shall interpret the within-state component as measuring interpersonal inequality in *MPCE* within individual states, the between-state component as measuring inequality in mean *MPCE* across the states, and the third or overlapping component as measuring the degree of homogeneity of distributions of *MPCE* across the states. A *decrease* in the share of the overlapping component indicates that the household consumption expenditure distributions of individual states are becoming *less similar*, in the sense that the expenditure levels of individuals are becoming more dependent on where they live.

The Pyatt-Shorrocks decomposition of the Gini coefficient provides an alternative way of looking at divergence of the distributions of household consumption expenditure across Indian states than is provided by estimation of equation (2). It may be better in the sense that the decomposition considers all parts of the distribution compared to estimation of equation (2) which is concerned with the direction of change in average values, and because we can compute a decomposition for each expenditure survey in the sequence from 1983 to 2011-12. The decomposition is reported in Tables (4a), (4b) and (4c) for all states and for the Bimarou and Non-Bimarou groups respectively.

Is there any systematic relationship between the Gini decomposition and the approach to unconditional convergence that lies behind estimation of equation (2)? Presumably there is a mathematical relationship between that equation and the Pyatt-Shorrocks decomposition if we assume the process of divergence or convergence is exactly that given by this equation. But we do not have such a result at hand. In its absence, we can say that it seems sensible to expect the between-state inequality of means component will tend to increase over the sample period since we found that there is (weak) evidence of unconditional divergence in average *MPCEs* across the states.

If the decomposition of the Gini shows that there is increasing between-state inequality - and we shall see that it does - this may have implications for another type of convergence associated with the theory behind equation (2). Sigma (σ)-convergence, as opposed to unconditional or β-convergence, refers to the evolution over time of the dispersion of household consumption expenditure across the states. If the between-state component of the Gini decomposition is increasing, this means that absolute differences between state-specific means of *MPCE* are widening over the sample period as a whole. This is likely to lead to an increase in the dispersion of the means as measured using the variance of the logs of average *MPCE*, that is to σ-divergence, though this does not necessarily have to occur. What actually happens is reported in the last rows of each of the panels of Table 4.

[Table 4 here]

From the table we see that the contribution of the overlapping component to the decomposition of the Gini is the largest of the three. It declines over time for all states and for the Bimarou group, though unlike the test for convergence based on (2), we cannot attach a measure of statistical significance to these or changes in other components. The decline in size of the overlapping component indicates that expenditure distributions across the states became less similar over time.

The next largest component in the decomposition is that between states. It more or less doubles over the sample period for all groups of states, indicating that inequality across the states of mean consumption expenditure is growing. Thus, as the consumption distributions of the states became less similar, differences in average household consumption between the states also increased. And from the bottom rows in the panels we also see that the variance of log (average *MPCE*) for the 14 states grew more or less continuously over time, indicating σ-divergence.

Finally, we note that the within-state component is the smallest of the three. It remains about the same over time indicating little change in within-state inequality. This result appears to be at odds with the substantial variation in social mobility revealed in Figure 2, though we should recall that the calculation of *m* depends only on the lower half of the distributions of *MPCE* while the Gini uses all parts of them.

We now turn to the results for the Bimarou and Non-Bimarou groups in Tables 4(b) and 4(c). Since these are groups of similar states with respect to their level of development, the contribution of the between-state component to overall inequality is less - in fact about half - of what it is for the sample of all states. Within-state inequality constitutes about a quarter of overall inequality in the five Bimarou states, and only about 13% of it in the nine Non-Bimarou states. This is also to be expected since the within-state component tends to increase and the between-state component to decrease as the number of states decreases.

The contribution of the overlapping component to total inequality varies between 50% and 62% among the Bimarou states, and between 62% and 74% among the Non-Bimarou states. This suggests that household consumption expenditure distributions of the Bimarou states are less homogenous than are those of the Non-Bimarou states. In other words, it appears that the location of a household in a specific Bimarou state has a larger impact on its level of consumption expenditure than does the location of an individual in one or another Non-Bimarou state. Perhaps this reflects the fact uncovered by Rasul and Sharma (2014) and others that the economic performance of Bihar and Uttar Pradesh has lagged behind the other Bimarou states. Finally we note that the size of within-state component remains about the same over time for both Bimarou and Non-Bimarou groups.

**Table 4(a)**
**Decomposition of the Gini for *MPCE*, all states 1983 to 2011-12**

| Component of Gini decomposition | Decomposed *MPCE* Gini coefficients | | | | | | Component-wise contribution to total (%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1983** | **1987-88** | **1993-94** | **2004-05** | **2009-10** | **2011-12** | **1983** | **1987-88** | **1993-94** | **2004-05** | **2009-10** | **2011-12** |
| Within-states | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 8.59 | 8.33 | 8.85 | 8.29 | 8.18 | 8.19 |
| Between-states | 0.07 | 0.07 | 0.09 | 0.12 | 0.14 | 0.14 | 22.32 | 19.44 | 23.24 | 29.32 | 35.35 | 35.6 |
| Overlapping | 0.25 | 0.26 | 0.23 | 0.24 | 0.23 | 0.23 | 69.09 | 72.22 | 67.91 | 62.39 | 56.47 | 56.21 |
| Overall Gini | 0.35 | 0.36 | 0.35 | 0.39 | 0.40 | 0.40 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Sample variance | 0.020 | 0.025 | 0.029 | 0.050 | 0.067 | 0.074 | – | – | – | – | – | – |

*Source*: Same as for Figure 1. Sample variance $\sigma_t^2$ is based on log (average MPCE): $\sigma_t^2 = \frac{1}{N}\sum_{i=1}^{N}[log(average\ MPCE_{it}) - \mu_t]^2$, where $N$ is the number of states and $\mu_t$ is the mean of $log(average\ MPCE_{it})$ over all of the states at each point in time.

**Table 4(b)**
**Decomposition of the Gini for *MPCE*, Bimarou states 1983 to 2011-12**

| Component of Gini decomposition | Decomposed *MPCE* Gini coefficients | | | | | | Component-wise contribution to total (%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1983** | **1987-88** | **1993-94** | **2004-05** | **2009-10** | **2011-12** | **1983** | **1987-88** | **1993-94** | **2004-05** | **2009-10** | **2011-12** |
| Within-states | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 24.87 | 25.5 | 25.45 | 25.44 | 25.83 | 25.08 |
| Between-states | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.08 | 12.73 | 16.94 | 19.96 | 22.77 | 24.36 | 24.8 |
| Overlapping | 0.19 | 0.18 | 0.16 | 0.17 | 0.16 | 0.17 | 62.40 | 57.6 | 54.59 | 51.79 | 49.81 | 50.12 |
| Overall Gini | 0.31 | 0.31 | 0.30 | 0.32 | 0.32 | 0.33 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Sample variance | 0.006 | 0.006 | 0.008 | 0.009 | 0.011 | 0.016 | – | – | – | – | – | – |

*Source*: Same as for Figure 1.

**Table 4(c)**
**Decomposition of the Gini for, Non-Bimarou states 1983 to 2011-12**

| Component of Gini decomposition | Decomposed *MPCE* Gini coefficients | | | | | | Component-wise contribution to total (%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1983** | **1987-88** | **1993-94** | **2004-05** | **2009-10** | **2011-12** | **1983** | **1987-88** | **1993-94** | **2004-05** | **2009-10** | **2011-12** |
| Within-states | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 12.92 | 12.92 | 13.13 | 12.95 | 12.78 | 12.69 |
| Between-states | 0.04 | 0.05 | 0.05 | 0.07 | 0.09 | 0.08 | 13.15 | 14.7 | 15.76 | 18.35 | 24.76 | 20.03 |
| Overlapping | 0.25 | 0.25 | 0.24 | 0.27 | 0.24 | 0.25 | 73.94 | 72.37 | 71.11 | 68.7 | 62.46 | 67.28 |
| Overall Gini | 0.33 | 0.34 | 0.33 | 0.39 | 0.38 | 0.38 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Sample variance | 0.009 | 0.012 | 0.012 | 0.026 | 0.040 | 0.041 | – | – | – | – | – | – |

*Source*: Same as for Figure 1.

## 5. Conclusions

We present and discuss patterns of absolute inequality *Q,* relative inequality *q,* and social mobility *m* for India as a whole and across Indian states grouped by level of development. The analysis makes use of percentile based indexes calculated from periodic surveys of household consumption expenditure conducted periodically from 1983 to 2011-12. These indexes are easy to visually inspect and to interpret in terms of where one might personally stand in the distribution. To better assess the performance of the percentile based indexes, we compare *q* to the patterns revealed by the better known Gini coefficient of relative inequality that makes use of all parts of the distribution of consumption expenditure.

The percentile based indexes *Q* and *q* reveal three distinct subperiods in the evolution of absolute and relative inequality in India as a whole over the sample period: (i) a short, early subperiod ending before 1990 during which both *Q* and *q* increased quickly; (ii) a longer mid-sample subperiod ending in the mid-2000s when both indexes are relatively unchanged; and (iii) a third subperiod, after 2004-05, during which *Q* and *q* again increased relatively quickly. A grouping of states by level of development shows that *Q* and *q* are generally higher in the more developed (Non-Bimarou) states, and that in the less developed (Bimarou) states both indexes actually decline to some extent in the middle subperiod while continuing to increase elsewhere.

As for comparison with the Gini, it turns out that *Q*, *q* and the Gini reveal more or less the same patterns over time in terms of trends and turning points. The percentile-based measures are, however, easier to inspect and to interpret, a distinct advantage from a public policy perspective.

Situations in which overall inequality is moving one way while the well-being of the poorest part of the distribution moves in another will be judged differently than if inequality and social mobility move together, as Quah (2020) emphasizes. We investigate social mobility of the poorest as measured by the rate of increase of average consumption expenditure of the bottom 50% of households, *m.* As a check on the patterns revealed by this percentile based index, we compare it to the Ray-Genicot index of upward mobility $\mu_{0.5}$ that, like the Gini, makes use of all parts of the distribution.

The percentile based mobility index, *m,* reveals three distinct subperiods coinciding with those identified earlier, both for India as a whole and for the Bimarou and Non-Bimarou state groups. While in the first subperiod (from the beginning of our sample in 1983 until the late 1980s) and third subperiod (from the mid-2000s to the end of our sample in 2011-12) social mobility *m* is relatively large and positive while inequality measured by *Q* or *q* increases, in the middle subperiod (from the late 1980s until the mid-2000s) *m* is positive but relatively quite low in both groups of states compared to its level in the earlier and later periods. Use of the more complex index of mobility proposed by Ray and Genicot (2023), $\mu_{0.5}$, leads to the same observation.

The analysis concludes with investigation of the convergence of *Q, q,* and *m* using the Barro and Sala-i-Martin methodology, followed by use of the Pyatt-Shorrocks decomposition of the Gini to explore convergence with respect to the distributions of consumption expenditure as a whole. Barro-Sala-i-Martin tests show significant results only for *m*, in this case indicating absolute divergence of social mobility across the states over our sample period as a whole. The decomposition of the Gini into within, between and overlapping components for each year indicates that the between-state component is increasing over time and that the overlapping component is declining. The first result indicates that differences in mean consumption across the states is increasing, that is, that on average the states are diverging in this respect over the sample period. The decline in overlap indicates that consumption

expenditure distributions in each group of states are becoming less similar in the sense that household expenditure is becoming more dependent on where people live.

We expect these results to be of interest both substantively, in terms of the patterns of inequality and social mobility they reveal, as well as methodologically because of the use of, and comparison between, the percentile based indexes and the Gini and Ray-Genicot indexes that use the entire distribution. Contrasting movements in inequality and social mobility over the three subperiods identified in our analysis may be of interest to scholars who want to study connections between inequality, social mobility, economic growth and public redistribution across the Indian states.

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# Appendix: State by State Results

**Table A1: Average MPCE of bottom 50% ***

| State | 1983 | 1987-88 | 1993-94 | 2004-05 | 2009-10 | 2011-12 |
|---|---|---|---|---|---|---|
| Andhra Pradesh | 77.56 | 89.84 | 93.81 | 95.03 | 127.09 | 147.56 |
| Bihar | 65.57 | 88.90 | 81.12 | 90.61 | 99.17 | 127.25 |
| Gujarat | 89.50 | 98.31 | 112.75 | 111.19 | 132.94 | 152.52 |
| Haryana | 99.57 | 116.34 | 108.91 | 120.57 | 142.78 | 162.84 |
| Karnataka | 79.90 | 89.72 | 90.97 | 89.89 | 105.92 | 124.73 |
| Kerala | 89.29 | 106.11 | 117.72 | 136.47 | 197.82 | 208.34 |
| Madhya Pradesh | 68.73 | 82.52 | 84.09 | 82.42 | 98.30 | 104.34 |
| Maharashtra | 81.36 | 95.81 | 100.52 | 97.93 | 124.86 | 139.89 |
| Orissa | 68.74 | 79.27 | 81.03 | 74.43 | 87.27 | 94.58 |
| Punjab | 110.55 | 126.56 | 134.09 | 137.08 | 151.24 | 184.22 |
| Rajasthan | 78.95 | 90.78 | 101.63 | 99.34 | 111.52 | 130.24 |
| Tamil Nadu | 74.92 | 93.37 | 102.13 | 106.01 | 129.86 | 159.69 |
| Uttar Pradesh | 69.72 | 82.53 | 87.44 | 86.40 | 91.20 | 100.44 |
| West Bengal | 76.76 | 96.74 | 107.07 | 107.22 | 129.02 | 131.77 |

* MPCE = monthly real per capita household consumption expenditure in 1983 prices

**Table A2: Average MPCE of top 10% ***

| State | 1983 | 1987-88 | 1993-94 | 2004-05 | 2009-10 | 2011-12 |
|---|---|---|---|---|---|---|
| Andhra Pradesh | 377.48 | 575.28 | 565.50 | 584.78 | 765.27 | 832.73 |
| Bihar | 297.48 | 378.08 | 385.85 | 354.57 | 485.87 | 522.04 |
| Gujarat | 388.17 | 478.84 | 607.16 | 622.55 | 768.40 | 782.39 |
| Haryana | 456.06 | 557.23 | 550.15 | 671.44 | 779.08 | 1051.65 |
| Karnataka | 458.90 | 566.56 | 567.88 | 565.88 | 612.03 | 984.40 |
| Kerala | 517.78 | 689.67 | 820.39 | 1074.98 | 1803.98 | 2046.71 |
| Madhya Pradesh | 346.92 | 546.03 | 526.77 | 488.04 | 561.69 | 657.92 |
| Maharashtra | 496.89 | 716.26 | 757.02 | 734.55 | 877.46 | 913.07 |
| Orissa | 328.33 | 411.59 | 463.14 | 421.88 | 517.68 | 535.63 |
| Punjab | 518.49 | 618.20 | 686.30 | 794.97 | 861.70 | 997.91 |
| Rajasthan | 489.99 | 562.28 | 493.91 | 480.07 | 603.45 | 695.55 |
| Tamil Nadu | 464.86 | 644.30 | 691.43 | 732.64 | 717.03 | 921.55 |
| Uttar Pradesh | 342.45 | 437.79 | 467.55 | 483.60 | 516.33 | 627.93 |
| West Bengal | 424.21 | 599.54 | 601.60 | 613.99 | 811.78 | 914.36 |

* MPCE = monthly real per capita household consumption expenditure in 1983 prices

**Figure A1: Average MPCE of Bottom 50% and Top 10% by State**

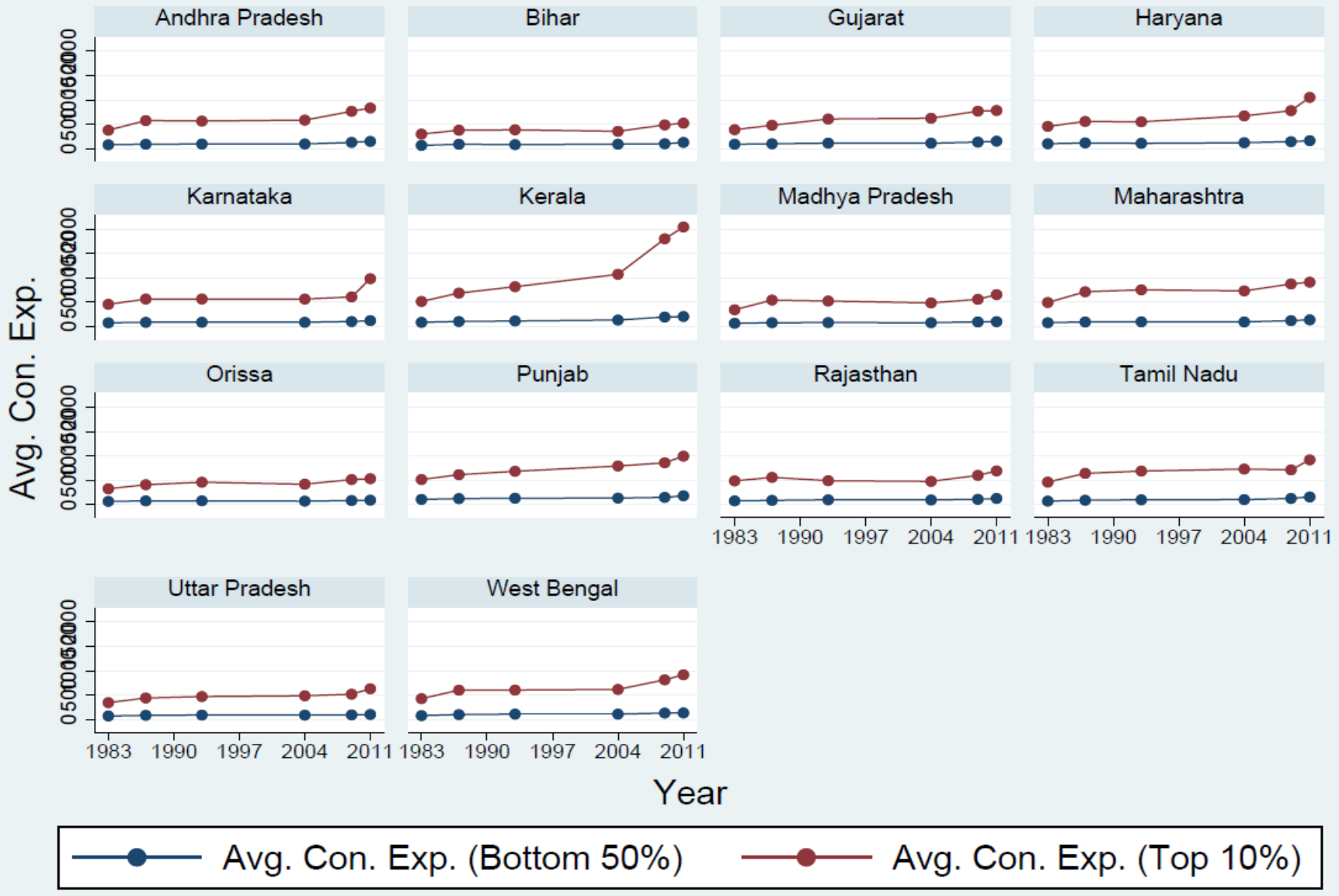

**Figure A2: Average MPCE of Bottom 50% by State**

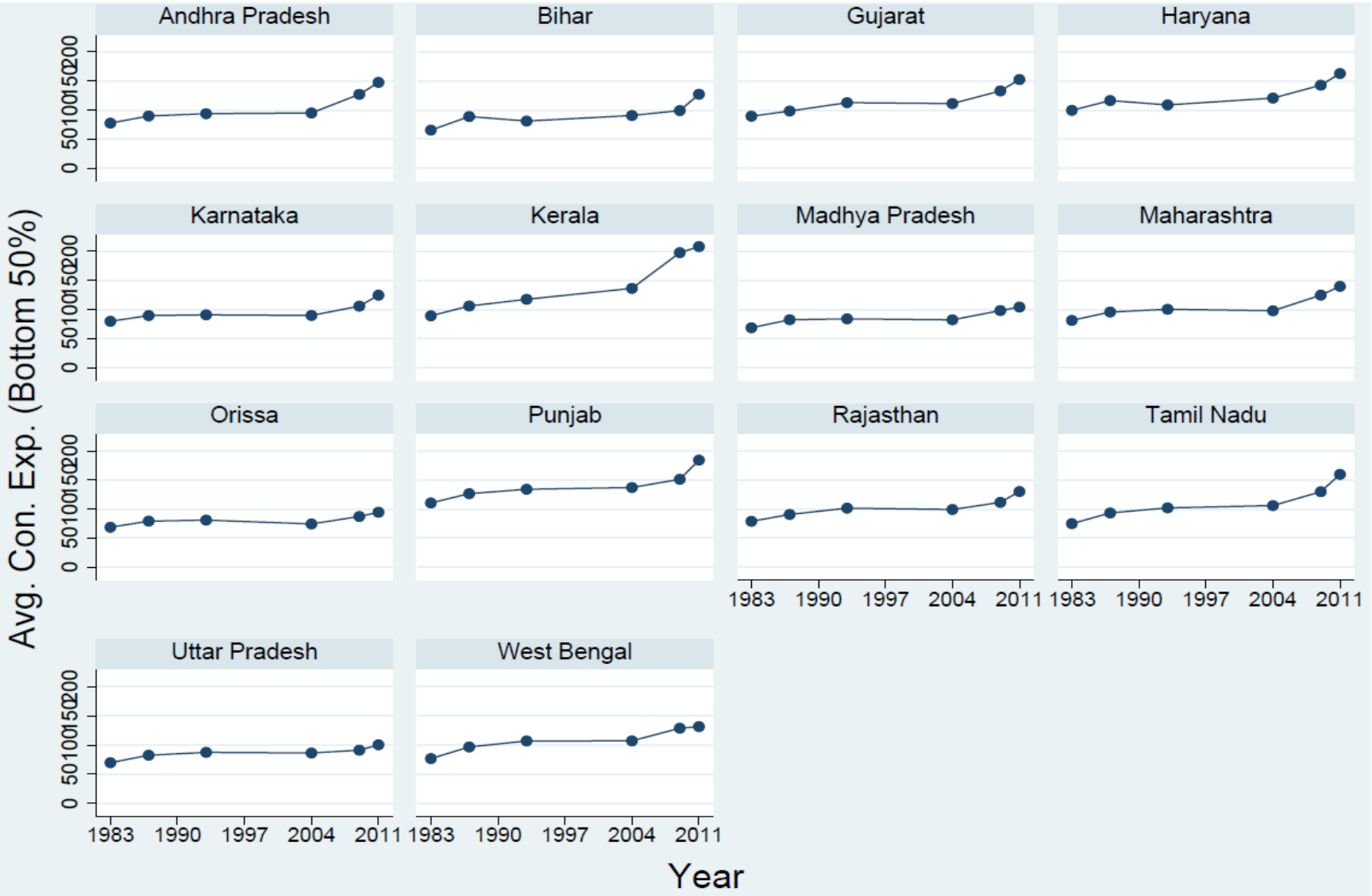

**Table A3: Absolute Inequality by State (*Q*)**

| State | 1983 | 1987-88 | 1993-94 | 2004-05 | 2009-10 | 2011-12 |
|---|---|---|---|---|---|---|
| Andhra Pradesh | 299.92 | 485.45 | 471.69 | 489.75 | 638.19 | 685.17 |
| Bihar | 231.91 | 289.18 | 304.73 | 263.96 | 386.70 | 394.79 |
| Gujarat | 298.67 | 380.53 | 494.41 | 511.36 | 635.46 | 629.87 |
| Haryana | 356.49 | 440.89 | 441.24 | 550.88 | 636.31 | 888.80 |
| Karnataka | 379.00 | 476.84 | 476.91 | 475.99 | 506.11 | 859.68 |
| Kerala | 428.49 | 583.56 | 702.68 | 938.51 | 1606.15 | 1838.37 |
| Madhya Pradesh | 278.19 | 463.51 | 442.68 | 405.62 | 463.39 | 553.58 |
| Maharashtra | 415.54 | 620.45 | 656.50 | 636.62 | 752.61 | 773.18 |
| Orissa | 259.59 | 332.32 | 382.11 | 347.45 | 430.40 | 441.05 |
| Punjab | 407.95 | 491.64 | 552.21 | 657.90 | 710.45 | 813.69 |
| Rajasthan | 411.04 | 471.50 | 392.28 | 380.72 | 491.93 | 565.31 |
| Tamil Nadu | 389.94 | 550.93 | 589.30 | 626.63 | 587.17 | 761.86 |
| Uttar Pradesh | 272.73 | 355.26 | 380.11 | 397.20 | 425.13 | 527.49 |
| West Bengal | 347.45 | 502.80 | 494.53 | 506.77 | 682.77 | 782.59 |

Note: Absolute Inequality (Q) is the difference in average MPCE of top 10% and bottom 50%

**Figure A3: Absolute Inequality by State (Q)**

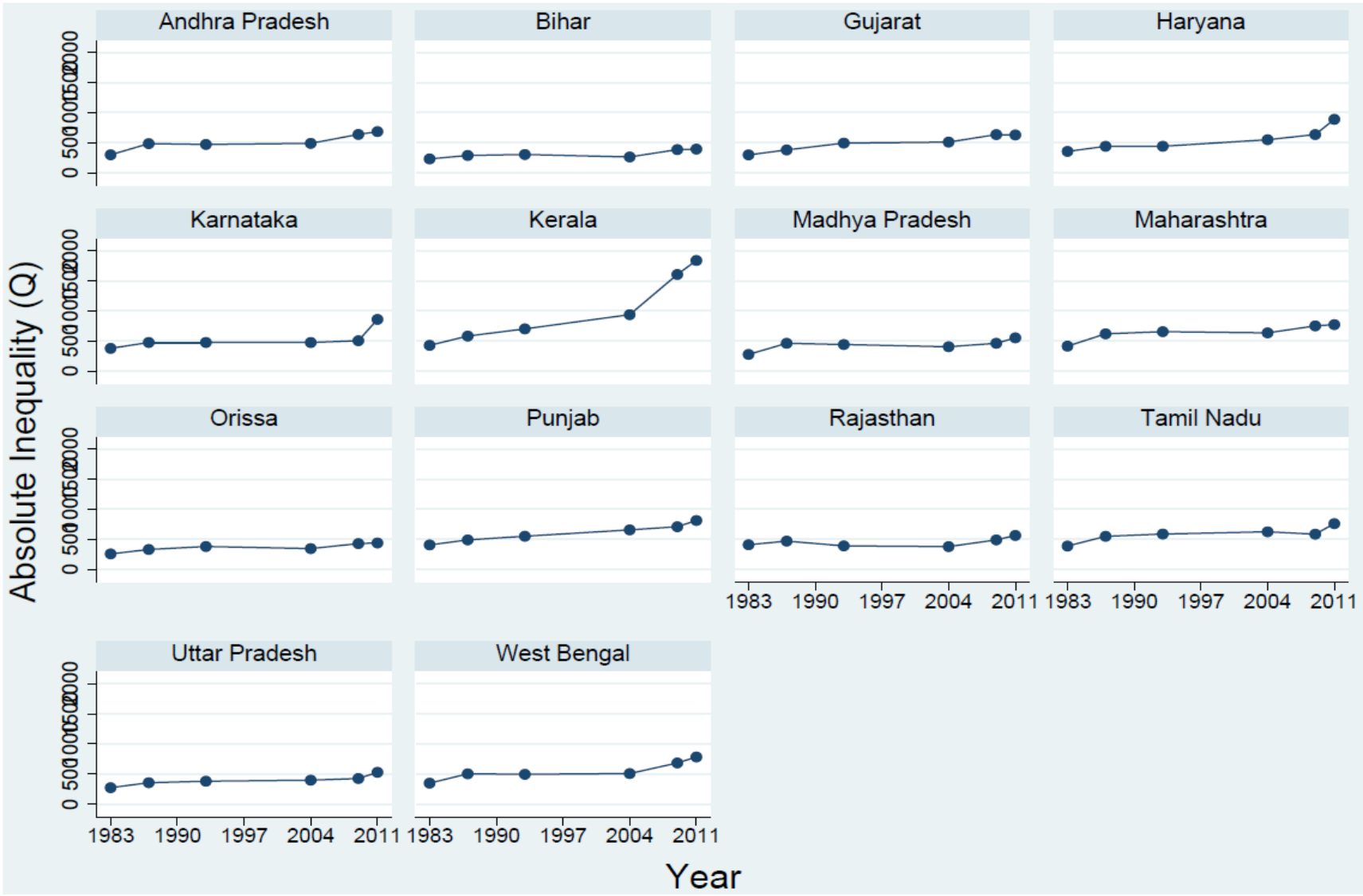

**Table A4: Relative Inequality by State (*q*)**

| State | 1983 | 1987-88 | 1993-94 | 2004-05 | 2009-10 | 2011-12 |
|---|---|---|---|---|---|---|
| Andhra Pradesh | 3.87 | 5.40 | 5.03 | 5.15 | 5.02 | 4.64 |
| Bihar | 3.54 | 3.25 | 3.76 | 2.91 | 3.90 | 3.10 |
| Gujarat | 3.34 | 3.87 | 4.38 | 4.60 | 4.78 | 4.13 |
| Haryana | 3.58 | 3.79 | 4.05 | 4.57 | 4.46 | 5.46 |
| Karnataka | 4.74 | 5.32 | 5.24 | 5.30 | 4.78 | 6.89 |
| Kerala | 4.80 | 5.50 | 5.97 | 6.88 | 8.12 | 8.82 |
| Madhya Pradesh | 4.05 | 5.62 | 5.26 | 4.92 | 4.71 | 5.31 |
| Maharashtra | 5.11 | 6.48 | 6.53 | 6.50 | 6.03 | 5.53 |
| Orissa | 3.78 | 4.19 | 4.72 | 4.67 | 4.93 | 4.66 |
| Punjab | 3.69 | 3.88 | 4.12 | 4.80 | 4.70 | 4.42 |
| Rajasthan | 5.21 | 5.19 | 3.86 | 3.83 | 4.41 | 4.34 |
| Tamil Nadu | 5.20 | 5.90 | 5.77 | 5.91 | 4.52 | 4.77 |
| Uttar Pradesh | 3.91 | 4.30 | 4.35 | 4.60 | 4.66 | 5.25 |
| West Bengal | 4.53 | 5.20 | 4.62 | 4.73 | 5.29 | 5.94 |

Note: Relative Inequality (q) is the difference in average MPCE of top 10% and bottom 50% divided by average MPCE of bottom 50%

**Figure A4: Relative Inequality by State (*q*)**

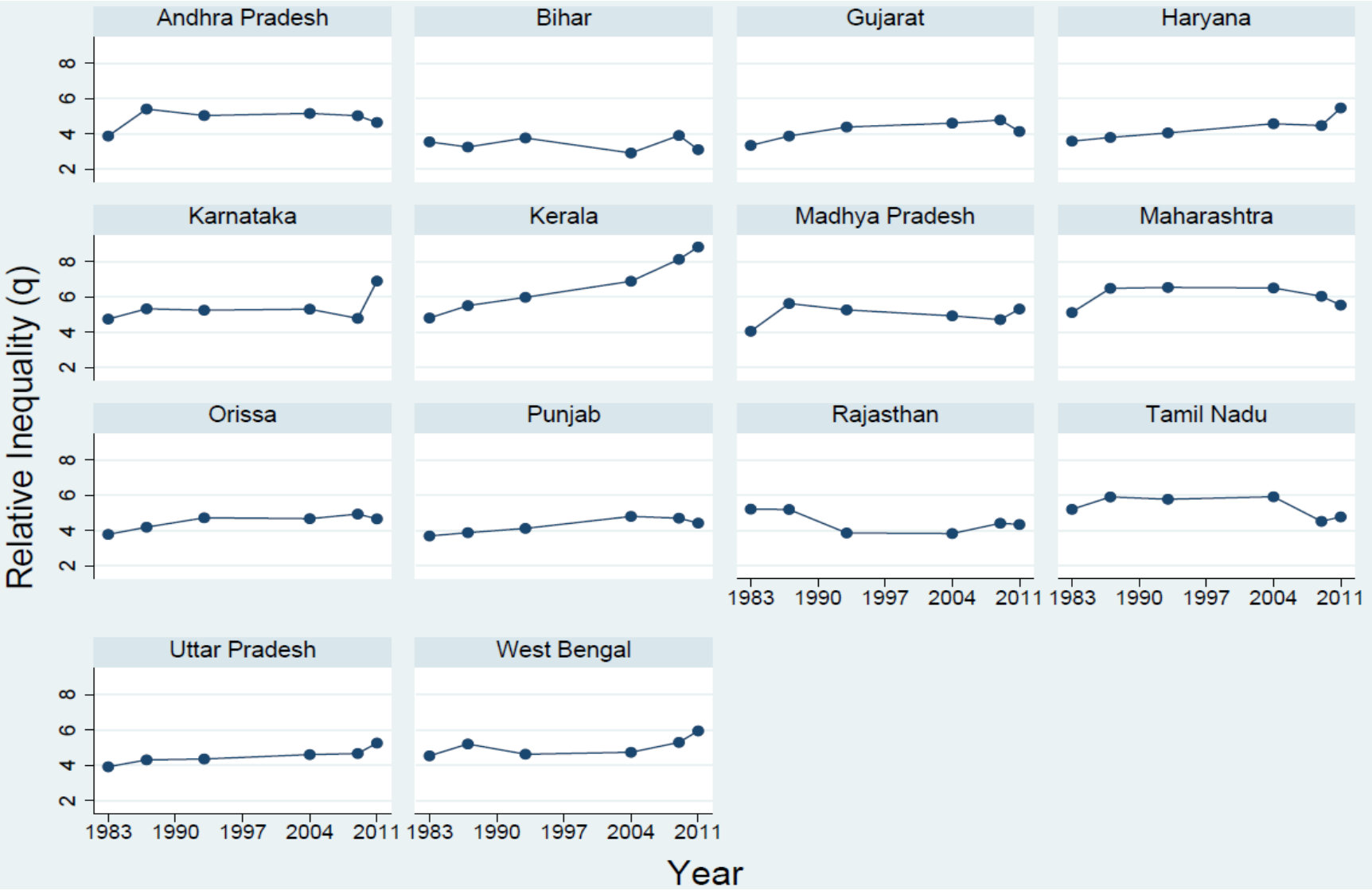

**Table A5: Social Mobility in Consumption between Surveys by State (*m*)**

| State | 1983 to 1987-88 | 1987-88 to 1993-94 | 1993-94 to 2004-05 | 2004-05 to 2009-10 | 2009-10 to 2011-12 |
|---|---|---|---|---|---|
| Andhra Pradesh | 3.96 | 0.74 | 0.12 | 6.75 | 8.05 |
| Bihar | 8.90 | -1.46 | 1.06 | 1.89 | 14.16 |
| Gujarat | 2.46 | 2.45 | -0.13 | 3.91 | 7.37 |
| Haryana | 4.21 | -1.06 | 0.97 | 3.68 | 7.03 |
| Karnataka | 3.07 | 0.23 | -0.11 | 3.57 | 8.88 |
| Kerala | 4.71 | 1.82 | 1.45 | 8.99 | 2.66 |
| Madhya Pradesh | 5.02 | 0.32 | -0.18 | 3.85 | 3.07 |
| Maharashtra | 4.44 | 0.82 | -0.23 | 5.50 | 6.02 |
| Orissa | 3.83 | 0.37 | -0.74 | 3.45 | 4.19 |
| Punjab | 3.62 | 0.99 | 0.20 | 2.07 | 10.90 |
| Rajasthan | 3.74 | 1.99 | -0.20 | 2.45 | 8.40 |
| Tamil Nadu | 6.16 | 1.56 | 0.35 | 4.50 | 11.49 |
| Uttar Pradesh | 4.60 | 0.99 | -0.11 | 1.11 | 5.06 |
| West Bengal | 6.51 | 1.78 | 0.01 | 4.07 | 1.07 |

Note: Social mobility is the compound annual growth rate of average MPCE of bottom 50%

**Figure A5: Social Mobility in Consumption between Surveys by State (*m*)**

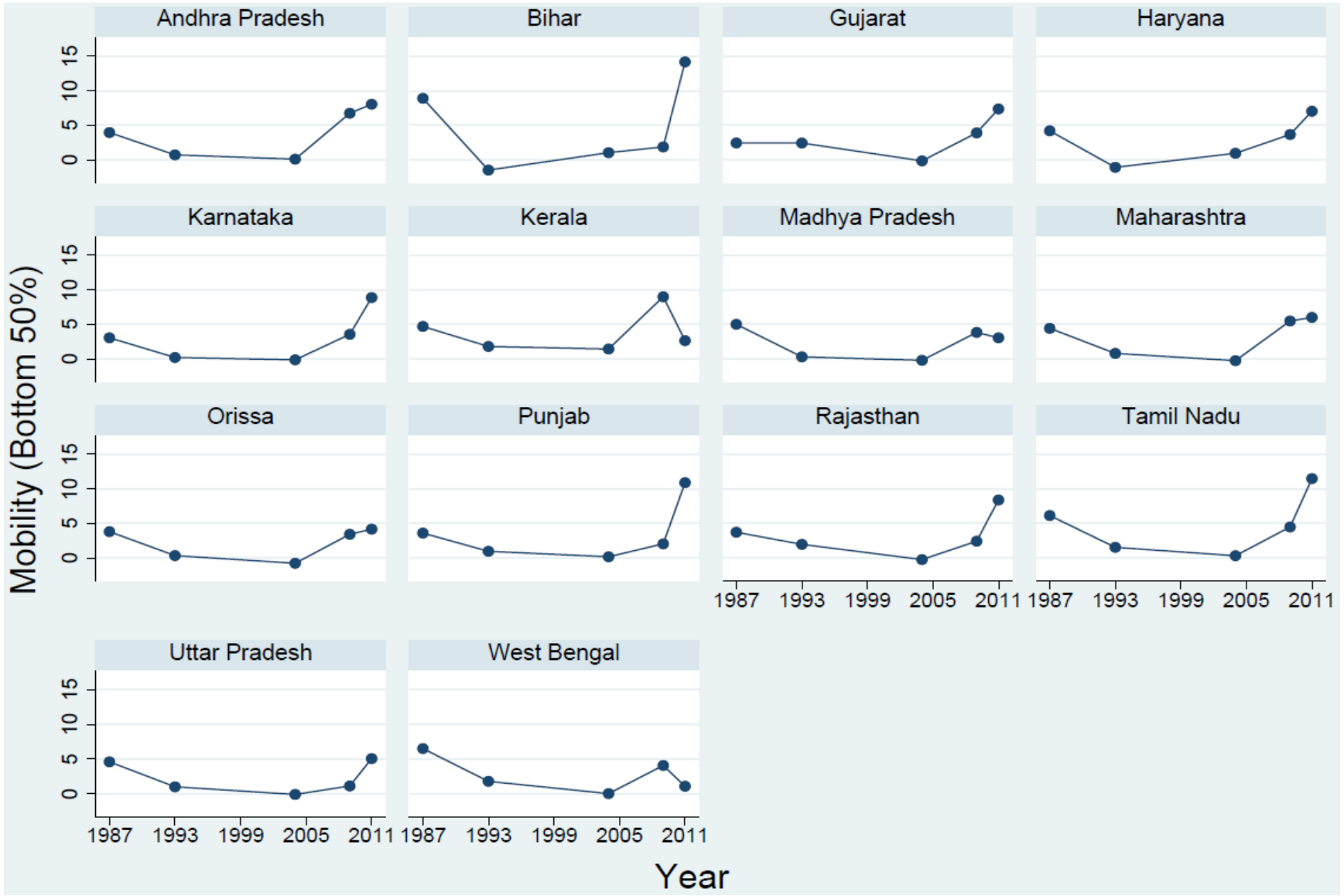

**Table A6: Upward Mobility in Consumption between Surveys by State ($\mu_{0.5}$)**

| State | 1983 to 1987-88 | 1987-88 to 1993-94 | 1993-94 to 2004-05 | 2004-05 to 2009-10 | 2009-10 to 2011-12 |
|---|---|---|---|---|---|
| Andhra Pradesh | 4.56 | 0.65 | 0.45 | 5.79 | 6.00 |
| Bihar | 7.78 | -1.79 | 0.09 | 3.81 | 5.62 |
| Gujarat | 3.30 | 2.26 | 0.73 | 3.28 | 5.03 |
| Haryana | 3.91 | -0.76 | 0.90 | 3.23 | 8.39 |
| Karnataka | 3.50 | 0.28 | 1.07 | 2.23 | 14.71 |
| Kerala | 5.01 | 1.73 | 2.42 | 3.96 | 3.85 |
| Madhya Pradesh | 5.01 | 0.56 | -0.15 | 3.44 | 5.68 |
| Maharashtra | 4.78 | 1.16 | 0.50 | 3.48 | 2.56 |
| Orissa | 4.21 | 0.32 | -0.92 | 3.88 | 4.10 |
| Punjab | 3.83 | 0.95 | -0.65 | 3.26 | 7.57 |
| Rajasthan | 7.55 | 1.23 | -0.93 | 3.28 | 8.31 |
| Tamil Nadu | 8.11 | 1.54 | 0.77 | 2.83 | 7.32 |
| Uttar Pradesh | 5.02 | 0.64 | -1.32 | 1.83 | 5.67 |
| West Bengal | 6.37 | 1.70 | -0.55 | 5.77 | 5.03 |

Note: Upward mobility is $\mu_{0.5}$ defined in equation (1) in the text

**Figure A6: Upward Mobility in Consumption between Surveys by State ($\mu_{0.5}$)**