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Estimation and analysis of the nature and extent of inequality in the distribution of consumer expenditure in Indian states

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Abstract

Inequalities in the distribution of income or expenditure or wealth are negative indicators of development of a country or of a region. Though per capita income is considered as the main indicator of development, such inequalities are needed to be measured to have a proper assessment of development. In India, except some special surveys by National Council for Applied Economic Research (NCAER), data on the distribution of income or wealth are not available, and the data on the distribution of consumer expenditure collected and compiled by the National Sample Survey Organisation (NSSO) are used as the proxy. Gini coefficient/index is most popularly used as a relative/index measure of inequality, though it is not considered as a fully reasonable measure of inequality. As a result, other measures like Lorenz curve, Theil's entropy measure, Atkinson's measure, standard deviation of logarithms, etc. have also parallel use. The main problem in the Gini coefficient/index actually lies in the debate between an absolute and a relative measure of inequality. There are other problems also. However, different measures tend to give different pictures on inequality comparison. If one measure shows that inequality in India in a particular year has fallen in comparison to a previous year, it may be possible to find another measure that shows that inequality has actually increased. Under these circumstances, any researcher in this field tends to choose any one of the available measures, which he feels the best, and to make the desired comparisons. In this respect, the Gini coefficient/index has been most popular because it seems most convenient, though not most convincing, to use. This study tries to use both the relative and absolute Gini measures of inequality simultaneously and to derive a general, centrist or intermediate or overall impression about the nature and trend of inequality in the distribution of consumer expenditure in different states of India in the period from 1983 to 2012.

Keywords: Estimation, analysis, nature, extent, inequality, distribution, consumer expenditure

Introduction

The phrase 'inequality in the distribution of income' (or wealth or such valued things) is very commonly used in economics and other social sciences. The term 'inequality' in the phrase 'inequality in the distribution of income' means the absence of equality or deviation from equality in the distribution of income among the persons/households of a community or of a geographical region or so. The term 'distribution' in the phrase 'inequality in the distribution of income' has normally a meaning opposite to 'addition' so that when a total income $n\mu$ is distributed among n persons in the form (y_1, y_2, \dots, y_n) , we have $\sum_{i=1}^n y_i = n\mu$, where μ is the mean (arithmetic mean) income. Another assumption we normally make in the measurement of inequality in the distribution of income is that the inequality measure is additive. It implies that income of any person has an inequality implication or has a contribution to inequality and all these contributions are added to arrive at the final measure of inequality. It is not necessary that it must be additive, it may be multiplicative or so. But to us the additive form of inequality function is most convincing. Actually, it is based on an additively separable social welfare function. Throughout our discussion below we shall take this additivity assumption.

Some conventional measures of Inequality

Measures of inequality that are conventionally used or discussed in the literature are the Lorenz curve (Lorenz, 1905) [17], Dalton measure (Dalton, 1920) [6], Gini coefficient or Lorenz ratio (Gini, 1912/1921) [10, 11], standard deviation, variance, coefficient of variation,

squared coefficient of variation, relative mean deviation, standard deviation of logarithms, Theil entropy measure (Theil, 1967) ^[26], Atkinson measure (Atkinson, 1970) ^[1], Sen measure (Sen, 1973) ^[24], Kakwani measure (Kakwani, 1980) ^[13], mean logarithmic deviation (Theil, 1972) ^[27], extended Gini indices (Chakraborty, 1988) ^[4], generalised Gini index (Weymark, 1981) ^[28], etc. Of these measures, Lorenz curve (Lorenz 1905) ^[17] and Gini coefficient (Gini 1912/1921) ^[10] are oldest and most popular. National Sample Survey Organisation (NSSO) of India, which collects household data on consumer expenditure, based on which inequality for the Indian economy is calculated over time and across states, itself uses these two measures of inequality in their reports. Lorenz curve being a graphical measure is not fully convenient for inequality comparison and so Gini coefficient has the widest use. It is a relative/index measure. It has an absolute counterpart which is neither proposed by Gini himself nor used by many practitioners. In the present paper we shall take up this popular relative/index measure of inequality, shall explain its several properties and shall use it, along with its absolute counterpart for measuring inequality in India and its major states for the period 1983 to 2011-12. The basic objective of this paper is to have a centrist (neither leftist nor rightist) view of inequality in the major states of India in the referred period by the simultaneous use of absolute and relative measures of inequality. We have chosen Gini measure for the purpose because of its widest use. The same exercise can be done for other measures also.

Three categories of reasonableness criteria

The reasonableness criteria that are frequently referred in the literature of inequality measurement are mainly of three categories. These criteria are related to several types of changes in income (which is being distributed) and population (among whom income is distributed) and corresponding changes in inequality that seem reasonable under the assumptions made.

In the first category we have several invariance or independence criteria, namely, (i) invariance under permutation or the symmetry criterion, (ii) invariance under equal addition/subtraction of income criterion, (iii) invariance under proportionate addition/subtraction of income or invariance under scalar multiplication of income or the mean independence criterion, and (iv) invariance under proportionate addition/subtraction of population or population replication criterion. The mean independence criterion arises from the assumption that human beings are more interested in the relative measures of inequality, probably because of their convenience in comparison, and not in the absolute measures. The invariance under population replication criterion is based on the assumption that majority of the human beings feel that when a population with a particular type and extent of inequality is duplicated (or replicated) the inequality of the combined population remains unchanged as there is no inter-group inequality between the two (or more) populations.

In the second category we have the income transfer criteria, namely (v) the Pigou-Dalton income transfer criterion that states that a regressive transfer from a poor person to a rich (or less poor) person raises inequality, and (vi) the diminishing income transfer criterion that states that a regressive transfer between two relatively rich persons raises inequality by a smaller amount than that between two

relatively poor persons. Criterion-(v) is based on the assumption that social welfare is a concave function of income. Criterion-(vi) is based on the fact that a regressive transfer between two relatively rich persons raises inequality in the distribution of welfare by a smaller amount than that between two relatively poor persons. These criteria are developed mainly by Pigou (1912) ^[22] and Dalton (1920) ^[6]. In the third category we have basically two types of decomposition criteria: one is (vii) decomposition into population sub-groups and the other is (viii) decomposition into different types of income. The first criterion states that, if a population consists of two or more sub-groups, then inequality of the whole population should be decomposed into intra-group inequalities and inter-group inequalities of the sub-groups. The second criterion states that, if income of any person consists of two or more types of income (for example, wage and non-wage income), then inequality of the combined income should be decomposed into intra-type inequalities and inter-type inequalities of different types of income. In addition to these three types of reasonableness criteria an inequality measure is expected to satisfy the (ix) normalisation criterion that states that the measure should be equal to zero when all individuals have equal income and the index measure should reach a value one when all income is enjoyed by a single individual. In some modified form these and some other criteria are put as axioms by Atkinson (1970) ^[1], Sen (1973) ^[24] and Kolm (1976) ^[14] and a number of axiomatic measures are developed.

Some basic problems in inequality measurement

All the above criteria may seem reasonable when viewed individually, but an inequality measure may not satisfy all of them simultaneously. For example, if an inequality measure satisfies invariance under equal addition of income criterion, then it cannot satisfy invariance under proportionate addition of income criterion.

Actually, there are different types of inequality and different criteria are related to those different types. Invariance under equal addition of income criterion is actually relevant for absolute measures of inequality and invariance under proportionate addition of income criterion is relevant for relative measures of inequality. On the other hand, invariance under population replication criterion is relevant for both absolute and relative measures, but is not relevant for index measures.

In the literature of inequality measurement, three main types of inequality measures are referred and discussed. There are other types and other measures also. These three types of measures are: Absolute Measures, Relative Measures and Index Measures. Of these three types of measures, relative measures are most frequently discussed.

A relative measure of inequality in the distribution of income is independent of proportionate change in income, is unit free and its lower limit is generally normalised at zero. An index measure of inequality is also a relative measure whose upper limit is also normalised preferably at one. On the other hand, an absolute measure of inequality in the distribution of income is independent of equal amount change in income and is not unit free. However, its lower limit is also generally normalised at zero.

In the judgement about the use of an absolute measure or a relative measure or an index measure, or all three measures, we are guided not only by reasonableness mentioned above but also by convenience and justice as will be discussed below.

Relative versus Absolute Measures – Convenience versus Justice

An absolute measure of inequality has an absolute unit of measurement (normally same as the unit of measurement of income). A relative measure of inequality is normally measured relative to mean income and is unit free. It is something like coefficient of variation (CV) and is more convenient (not necessarily more appropriate as will be explained shortly) for inequality comparison. An absolute measure of inequality is not unit free and so inequality comparison across countries using different units of measuring income or over time in the same country with inflationary conditions becomes inconvenient (but not impossible and probably more rational as explained below). At the same time, it is felt by a group of people that proportionate additions to incomes keep relative positions of the individuals unchanged and thereby inequality unchanged. It is actually relative inequality, and not absolute inequality, that remains unchanged. With proportionate additions to incomes, absolute inequality increases. On the other hand, when income levels of all individuals increase by equal amount, absolute inequality remains unchanged. But with this as mean income also increases by same amount, relative inequality falls. Thus, relative inequality remaining unchanged if absolute inequality in a region increases; inequality in that region actually increases (viewing inequality in a centrist or intermediate sense). Similarly, absolute inequality remaining unchanged if relative inequality in the region falls; inequality in that region actually falls (viewing inequality in the same centrist or intermediate sense). If this is the justice for the measurement of inequality, it should not be measured only by measures of relative inequality just for the sake of convenience.

Relative versus Index Measures – Less versus More Convenience

A relative measure of inequality is measured relative to mean income and is unit free. It is something like coefficient of variation (CV) and is more convenient than the corresponding absolute measure for inequality comparison (as stated earlier). However, it is not most convenient as the lower and upper limits of such a measure may not be fixed. To overcome this inconvenience an index measure of inequality is used which is not only unit free but also has fixed lower and upper limits, normally at zero and one. It will be explained shortly that for achieving this convenience further injustice is done in the measurement of inequality.

Some basic problems in inequality measurement reconsidered

Index measures which can also be expressed in percentage term apparently seem to be more convenient than relative measures for inequality comparison between any two regions or between any two time points for the same region. But this is true when population sizes of the two regions or two time points are not substantially different (so that the ratio between the index measure and the corresponding relative measure for the two regions or for the two time points are not substantially different) or when we use Gini type inequality measures with population of large sizes (so that the value of the relative measure tends to that of the index measure as is explained below). Thus, for inequality comparison across countries of different sizes, index

measures (unless it is of Gini type) fail to give proper justice and relative measures are more widely used.

On the other hand, relative measures, being unit free, apparently seem to be more convenient than absolute measures for inequality comparison between any two regions or between any two time points for the same region. But this is true when we feel that proportionate addition to income, and not equal addition to income, leaves inequality unchanged. But if we feel that equal addition to income, and not proportionate addition to income, leaves inequality unchanged, absolute measures, though less convenient than relative measures for inequality comparison between any two regions or between any two time points for the same region, will give more justice than relative measures.

From the point of convenience index measures are more convenient than relative measures which are more convenient than absolute measures. On the other hand, from the point of justice absolute measures give more justice than relative measures which give more justice than index measures. Relative measures are viewed in the literature as compromise measures – a compromise between absolute measures and index measures and majority of the measures of inequality mentioned at the beginning of this paper have been developed as relative measures.

Dalton who proposed the two principles of additions was himself in a dilemma in the choice between the two. The question about invariance under population replication criterion can be raised through a simple example given below. Consider a population of 100 individuals of which one receives Rs. 100.00 and other 99 individuals receive no income. It is a case of extreme inequality and the value of the index measure is 1. Now if the population is doubled, then out of 200 individuals 2 will receive the income of Rs. 100.00 each and other 198 individuals receive no income. This is not a case of extreme inequality, and the value of the index measure of inequality should be less than 1. An index measure of inequality cannot satisfy the population replication criterion.

Kolm in his famous article 'Unequal Inequalities I' [Kolm, 1976]^[15] has beautifully demonstrated a fact – In May 1968 in France, radical students triggered a student unrest which induced a workers' general strike. All this was ended by the agreements which decreed a 13% increase in all payrolls. Thus, labourers earning 80 pounds a month received 10 pounds more, whereas executives who already earned 800 pounds a month received 100 pounds more. The Radicals felt bitter and cheated; in their view, this widely increased income inequality. But this would have left unchanged the relative inequality or an inequality index.

He has added – I have found many people who feel that it is an equal absolute increase in all incomes which does not augment inequality, whereas an equi-proportional increase makes income distribution less equal or more unequal – and these were people of moderate views. When all incomes are multiplied by the same number, whereas a relative measure of inequality does not change, an absolute measure of inequality is multiplied by this number. Therefore, if we study variations of an absolute measure of inequality over time in an inflationary country, we must use real incomes, discounted for inflation; or if we make international comparisons, we must use the correct exchange rates. This need not be done if we use a relative measure of inequality. Thus, a relative measure of inequality is more convenient to

use. “Anyway, convenience could not be an alibi for endorsing injustice.”

He has been of the opinion that inequalities can be measured by both the ways and the researchers in this field have used both of them. He has tried to define a relative measure of inequality as a ‘rightist’ measure as the richer section of the community or the capitalist class or their union prefer to accept the views that inequality remains unchanged when income increases by equal proportion and inequality falls when income increases by equal amount, and an absolute measure of inequality as a ‘leftist’ measure as the poorer section of the community or the labour class or the labour union prefer to accept the views that inequality remains unchanged when income increases by equal amount and inequality increases when income increases by equal proportion.

He has observed that Dalton would have liked neither an absolute measure nor a relative measure of inequality. He has felt that a ‘centrist’ measure of inequality in between the ‘rightist’ measure and the ‘leftist’ measure or in between the relative measure and the absolute measure might suit his (Dalton’s) taste, since they satisfy both his requirements. Based on this view some statisticians prescribe an average of the absolute measure and the relative measure as a ‘centrist’ or ‘intermediate’ and correct measure (for example, Krtscha (1994) ^[16] has prescribed the product of SD and CV as the intermediate measure and Subramanian and Jayaraj (2015) ^[25] have used this measure for measuring inequality for India in the period from 1983 to 2009-10).

However, viewing relative measure of inequality as ‘rightist’ and absolute measure of inequality as ‘leftist’ is not completely true, because when income falls, the richer section of the community or the capitalist class or their union prefer to accept the views that inequality remains unchanged when income falls by equal amount and inequality falls when income falls by equal proportion, or they prefer to accept an absolute measure in comparison to a relative measure, and the poorer section of the community or the labour class or the labour union prefers to accept the views that inequality remains unchanged when income falls by equal proportion and inequality increases when income falls by equal amount. Moreover, averaging absolute and relative measures is not very meaningful because the former is unit dependent and the latter is unit free.

What is the way out?

Then what is the proper way to measure inequality? Probably the proper way to measure inequality is to measure both absolute and relative inequality – however convenient the measure of relative inequality is or however inconvenient the measure of absolute inequality is. Only then we shall be able to have a ‘centrist’ or ‘intermediate’ or correct view. For the convenience of comparison, we may also have to have an index measure of inequality, but this should not be the only measure. “Anyway, convenience could not be an alibi for endorsing injustice.”

Gini measures – in absolute, relative or index forms – are based on a particular type of welfare function. Gini index is equal to Lorenz ratio. Thus, Lorenz measures – in the form of the Lorenz curve or in the form of Lorenz ratio – are also based on the same type of welfare function. Therefore, we shall call these measures as those in the Lorenz-Gini family. Other measures prescribed in the literature outside this family are based on other types of welfare function.

The Gini measures

From the conventional notion of inequality, it follows that a simple, positive, absolute and objective measure of inequality of income (or of such valued things) may be given by the average of absolute (or modulus) deviations of all incomes from all other incomes. Symbolically, if $Y_1, Y_2, Y_3, \dots, Y_n$ are incomes of n individuals (in non-decreasing order), the first absolute measure of inequality (AMI_1) given in the average terms according to the above definition runs as

$$AMI_1 = \frac{\sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|}{n^2}.$$

This expression implies that the inequality measure is directly dependent on all possible mutual and absolute deviations with equal weights. This equal weighting principle creates some problems which we shall discuss later. This measure takes the minimum value at 0 when all incomes are equal or when there is no inequality and it takes the maximum value $\frac{2(n-1)\mu}{n}$ when the total income is enjoyed by one individual. This maximum value is directly dependent on both population size and mean income. This measure is independent of equal additions to incomes, independent of population replication and satisfies the Pigou-Dalton income transfer criterion. Automatically, proportionate additions to incomes raise the value of this measure, or the measure does not become mean invariant. This measure is some sort of per capita inequality.

To make the measure mean invariant or to have a relative measure of inequality in the Gini family we divide the above expression simply by μ to have.

$$RMI_1 = \frac{\sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|}{n^2 \mu}.$$

This measure takes the minimum value at 0 when all incomes are equal or when there is no inequality and it takes the maximum value $\frac{2(n-1)}{n}$ when all income is enjoyed by one individual. This maximum value is directly dependent on population size but is independent of mean income. This measure is unit free and is independent of proportionate additions to incomes, independent of population replication and satisfies the Pigou-Dalton income transfer criterion. Automatically, equal additions to incomes reduce the value of this measure. This measure is some sort of per capita and per unit of mean income inequality. Being unit free this measure can be conveniently used for inequality comparison. But if human beings feel that invariance of inequality from equal additions to incomes is the justice and invariance from proportionate additions to incomes is an injustice, this relative measure of inequality, however convenient, cannot be used. Anyway, convenience could not be an alibi for endorsing injustice.

Even if human beings feel that invariance of inequality from proportionate additions to incomes is the justice, the above mentioned relative measure of inequality cannot be fully convenient. It is partly convenient because it is unit free; it is partly inconvenient because its upper bound is not constant and is dependent on population size. We are calling it the second type of inconvenience faced in inequality measurement. Thus, for example, suppose in one region with $n=100$ the upper bound of the measure of relative inequality is 1.98 and the actual relative inequality is also

1.98 indicating a situation of extreme inequality, and in another region with $n=1000$ the upper bound of the same measure of inequality is 1.998 but the actual value at 1.997996 indicating a situation of less than extreme inequality. Here even if both of them are unit free, it is not possible to say just by comparing 1.98 with 1.997996 that inequality in the first region is less than that in the second. An index measure of inequality measures relative inequality relative to maximum possible inequality and eliminates this problem.

The index measure of inequality in any family of additive measures is obtained either by dividing the absolute measure by its maximum value or by dividing the relative measure by its maximum value. In the Gini family when

$\frac{\sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|}{n^2}$ is divided by $\frac{2(n-1)\mu}{n}$, or when $\frac{\sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|}{n^2 \mu}$ is

divided by $\frac{2(n-1)}{n}$ we have $\frac{\sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|}{2n(n-1)\mu}$ and this is the

famous Gini coefficient/index we all use for inequality calculation. An index measure of inequality obtained in this way is also a unit free measure. It helps comparing inequality relative to mean income. It also helps comparing inequality relative to maximum possible inequality and so it is most convenient for inequality comparison. It has fixed lower and upper bounds at 0 and 1 respectively and the extent of inequality can be easily expressed in percentage terms. However, it is not necessary that the two bounds must be set at 0 and 1. They can well be set at 'a' and 'b' ($a < b$). A measure developed by Chakraborty in his 'Extended Gini indices' [Chakraborty, 1988]^[4] has bounds at 0 and 2. If this measure is applied for more than one region or country or time the property of meaningful comparability is not violated.

However, this inequality index fails to satisfy the population replication criterion. Actually, the value of any index measure of inequality always falls with population replication. For the Gini measure this happens because to have the index measure of inequality in this family, the expression n^2 in the denominator of RMI_1 is replaced by $n(n-1)$, actually by $2n(n-1)$. Many statisticians, economists or social scientists in general, and even many common people are in favour of the index measure. They find their logic from situations like the following (also mentioned earlier). Consider a population of 100 individuals of which one receives Rs. 100.00 and other 99 individuals receive no income. It is a case of extreme inequality and the value of the index measure is 1. Now if the population is doubled, then out of 200 individuals 2 will receive the income of Rs. 100.00 each and other 198 individuals receive no income. This is not a case of extreme inequality, and the value of inequality measure should be less than 1. This is exactly what happens in case of the index measure of inequality mentioned above.

If we are fully convinced with the reasonableness criterion given in an index measure we should also be convinced of the unreasonableness of the population replication criterion mentioned above and then we can also modify the absolute measure of inequality mentioned above by replacing the expression n^2 in the denominator of AMI_1 by $n(n-1)$ or by $2n(n-1)$. Dalton, who has proposed the invariance from the population replication criterion, was also in a dilemma – he was not fully convinced with his own logic given in favour of population replication. Gini probably was convinced of the invariance from the population replication criterion, because Gini developed the inequality measure as

$\frac{\sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|}{2n^2 \mu}$ and not as $\frac{\sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|}{2n(n-1)\mu}$. Probably Lorenz

was also convinced of the invariance from the population replication criterion because he has tried to define inequality in terms of proportions of population. The reasonableness in the invariance from the population replication criterion can be explained with the help of the same example mentioned above. When in the population of 100 individuals one receives Rs. 100.00 and other 99 individuals receive no income the value of relative inequality as obtained from the original Gini formula is 0.99. This is the value of extreme inequality, because with 100 individuals and with the income of Rs. 100.00 inequality cannot be raised further. Now as the population is doubled, then out of 200 individuals 2 will receive the income of Rs. 100.00 each and other 198 individuals receive no income and the value of relative inequality as obtained from the original Gini formula remains unchanged at 0.99. This happens because with population replication inequality (relative inequality) does not change, but the scope for raising inequality further increases from the transfer of the income of Rs. 100.00 of one of the two individuals to the other. After this transfer the value of relative inequality as obtained from the original Gini formula increases to 0.995. This measure of inequality is not an index measure of inequality, but a relative measure of inequality and its upper bound is not fixed. With this measure of inequality we have to face the second type of inconvenience in inequality comparison mentioned earlier. However, this measure tends to an index measure as the population becomes large.

Then what type of inequality do we actually want to have? Probably all three types – absolute, relative and index in the order they are given. This is for the reason that absolute inequality contains maximum information regarding inequality and so it is most appropriate for inequality comparison but at the same time it is least convenient for the purpose. On the other hand, inequality indices, that can be expressed in percentage terms also, are most convenient for inequality comparisons, but fail to capture some information contained in absolute inequality measures. Some references on this point of measurement of inequality from the existing literature can throw some light.

Sometimes the absolute measure of inequality and the relative measure of inequality give the opposite trends. J. P. Mackenbach (2015)^[18] argues that such opposing trends for relative and absolute inequalities in health are quite common in European countries. A. Yukiko (2010)^[29] argues that neither absolute nor relative inequality measure alone properly reflect our conception of inequality. F. Azpitarte and O. Alonso-Villar (2012)^[2] provide an empirical illustration of pattern of inequality using Australian income data for the period 2001–2008. The results suggest that despite the reduction of relative inequality, inequality increased for most centrist value judgments. C. Del Rio and J. Ruiz-Castillo (2001)^[8] provide an empirical work in the case of Spain for the period 1980-81 to 1990-91 in this regard. They argue that in the relative Lorenz sense, the 1990-91 household expenditures distribution in Spain dominates the 1980-81 distribution, but the latter dominates the former in the absolute Lorenz sense. K. Bosmans, K. Decancq and A. Decoster (2011)^[3] compare absolute, relative and intermediate views on the evolution of global inequality between 1980 and 2009. They argue that according to the relative view, inequality remains invariant

after a uniform proportional change of all incomes whereas the absolute view requires invariance to a uniform change of all incomes with the same amount. C. Masseria and S.Allin (2008) [20] argue that single measure of inequality that captures all dimensions of health improvement and inequality does not exist; therefore, it is advisable to apply different measures to best understand and compare inequalities over time or across population subgroups and countries.

Inequality in the Distribution of Consumer Expenditure in the States of India

In this section we shall present one after another the estimates of absolute and relative/index measures of inequality in the distribution of consumer expenditure with the help of measures in the Gini family for fifteen major states of India and also for all India separately for rural and urban sectors for seven large sample surveys conducted by the NSSO during the period 1983 to 2011-12. When Gini measures are applied for India and its major states, the distinction between relative and index measures becomes irrelevant because of large population.

Estimates of inequality for India and its states are obtained from the NSSO data and the NSSO itself gives those estimates separately for rural and urban sectors with the help of Lorenz curves and Gini coefficients and different economists use those estimates in their analysis. As Gini coefficient/index solely fails to give a complete idea about inequality other measures like the Krtscha measure (Krtscha (1994) [16] is used by Subramanian and Jayaraj (2015) [25] as an intermediate measure, Theil’s entropy measure and squared coefficient of variation are used by Chakraborty and Kundu (2016) [5] for the purpose of decomposition of inequality between different sub-groups. Krtscha measure being the product of an absolute measure of inequality

(given by SD) and a relative measure of inequality (given by CV), succeeds to give a centrist view of inequality, succeeds to satisfy some reasonableness criteria of measures of inequality, but fails to satisfy some others and are not used in general. Many authors use the estimates provided by the NSSO for explaining the trends and patterns of inequality in the rural and urban sectors of the states of India and many of them have their own estimates on the basis of the NSSO data. Deaton and Dreze (2002) [7] have estimated inequality for India and its states for the years 1993-94 and 1999-00 by using (i) difference of log AM and log GM and (ii) variance of log values and have observed that inequality in India has increased in this period. Have shown that inequality measured by Gini coefficient has an adverse effect on poverty in the period from 1983 to 2004-05. Sen and Himanshu (2004) [23] have shown that inequality, measured by Gini index, in rural and urban India has sharply increased in the 1990s. Majumdar, Sarkar and Meheta (2017) [19] have used both the Gini index and the general entropy measure to examine the pattern of change in inequality in India in the pre-reform and the post-reform period. In the present paper we shall use two normal measures (absolute and relative/index measures of inequality in the Gini family) side by side to have a centrist view of the nature of inequality in the states of India.

We shall start our analysis with Gini index as it is used most popularly. Table-1 presents the values of Gini Index for rural households of 15 major states of India in comparison to all India for 7 large sample surveys during the period 1983 to 2011-12. Given the fact that rural populations in these states are large so that these values of Gini Index can be alternatively interpreted as those of relative measure of inequality that satisfy the population replication criterion. A number of striking features are observed from the table.

Table 1: Relative Inequality (Gini Index) in Rural Areas of Major States in comparison to All India during 1983 to 2011-12

Rural	Relative Inequality (Gini Index)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	0.292 (11)	0.301 (11)	0.285 (11)	0.235 (6)	0.290 (11)	0.278 (11)	0.282 (8)
ASSAM	0.192 (1)	0.222 (1)	0.176 (1)	0.201 (1)	0.195 (1)	0.244 (5)	0.221 (1)
BIHAR	0.255 (3)	0.264 (4)	0.222 (2)	0.207 (2)	0.205 (2)	0.225 (1)	0.232 (2)
GUJARAT	0.252 (2)	0.233 (2)	0.236 (3)	0.234 (5)	0.269 (6)	0.254 (6)	0.282 (9)
HARYANA	0.279 (5)	0.281 (7)	0.3007 (13)	0.239 (8)	0.321 (14)	0.301 (14)	0.271 (7)
KARNATAKA	0.299 (12)	0.292(9)	0.266 (8)	0.241 (9)	0.262 (4)	0.234 (3)	0.321 (14)
KERALA	0.330 (14)	0.323 (14)	0.288 (12)	0.270 (14)	0.341 (15)	0.417 (15)	0.429 (15)
MADHYA PRADESH	0.292 (10)	0.290 (8)	0.277 (9)	0.242 (10)	0.266 (5)	0.292 (13)	0.283 (10)
MAHARASHTRA	0.283 (7)	0.331(15)	0.302 (14)	0.258 (13)	0.307 (12)	0.268 (10)	0.292 (11)
ORISSA	0.266 (4)	0.267 (5)	0.243 (4)	0.244 (11)	0.282 (9)	0.261 (7)	0.255 (4)
PUNJAB	0.279 (5)	0.295 (10)	0.265 (7)	0.239 (7)	0.279 (8)	0.289 (12)	0.301 (13)
RAJASTHAN	0.340 (15)	0.311 (12)	0.260 (6)	0.209 (3)	0.245 (3)	0.225 (1)	0.257 (5)
TAMIL NADU	0.324 (13)	0.323 (13)	0.307 (15)	0.279 (15)	0.316 (13)	0.264 (9)	0.297 (12)
UTTAR PRADESH	0.290 (9)	0.279 (6)	0.278 (10)	0.246 (12)	0.287 (10)	0.263 (8)	0.265 (6)
WEST BENGAL	0.284 (8)	0.252 (3)	0.251 (5)	0.224 (4)	0.269 (7)	0.238 (4)	0.251 (3)
All India	0.297	0.298	0.282	0.260	0.300	0.291	0.307

Note: Figures in the parentheses indicate ranks

Source: NSS Reports of different Rounds

1. Inequality is observed to be lowest (highlighted by deep green shades) for Assam in all but one rounds of the surveys.
2. It is observed to be highest (highlighted by red shades) for Rajasthan in 1983, for Maharashtra in 1987-88 and 1993-94, for Tamil Nadu in 1999-00 and for Kerala in last three rounds.

3. It is greater than all India figure (highlighted by red or pink shades) only for four states in 1983 (viz., Karnataka, Kerala, Rajasthan and Tamil Nadu), only for five states in 1987-88 and in 1993-94, only for two states in 1999-00, only for four states in 2004-05, only for three states in 2009-10 and only for two states in 2011-12 (viz., Karnataka and Kerala). It is less than all India figure (highlighted by deep or light green shades) for all other states.
4. Kerala is the only state where inequality is observed to be greater than all India figures for all seven rounds of survey.
5. For seven states (viz., Assam, Bihar, Gujrat, Orissa, Punjab, Uttar Pradesh and West Bengal) inequality is observed to be less than all India figures for all seven rounds.

Of these five features the third feature seems most striking. All India figure is observed not to lie in the middle of all the states but is observed to lie well above the middle. One reason behind this feature may lie in the fact that a number of minor states are not included in the analysis. But as inequalities in those minor states are not expected and are not observed to be greater than all India figures, the reason seems not very strong. A second reason behind this feature may lie also in the fact that inequality in all India is not simply the average of the intra-state inequalities but also contains inter-state inequality. Therefore, the all India figure may lie above the middle if the inter-state inequality in MPCE is significantly greater than inter-state inequality in intra-state inequalities. To examine this possibility, average MPCE figures are presented in table-2.

Table 2: Average MPCE (in Rs. at 2009-10 Prices) in Rural Areas of Major States in comparison to All India during 1983 to 2011-12

Rural	MPCE in Rs. at 2009-10 prices						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	651.47 (7)	747.34 (7)	760.77 (7)	759.43 (11)	884.77 (7)	1020.14 (4)	1287.75 (4)
ASSAM	637.92 (8)	716.86 (9)	680.16 (12)	713.42 (12)	820.74 (10)	863.47 (9)	876.05 (13)
BIHAR	529.25 (15)	637.38 (14)	575.26 (15)	644.73 (14)	630.25 (14)	681.03 (15)	844.10 (14)
GUJARAT	692.80 (5)	752.33 (5)	799.30 (5)	923.03 (4)	900.69 (5)	994.92 (7)	1226.79 (6)
HARYANA	962.64 (1)	1001.83 (2)	1014.57 (3)	1196.01 (3)	1303.83 (2)	1393.59 (3)	1580.73 (3)
KARNATAKA	659.60 (6)	696.00 (11)	709.86 (11)	835.89 (7)	768.28 (12)	806.54 (12)	1175.59 (9)
KERALA	819.70 (3)	986.94 (3)	1028.80 (2)	1281.94 (1)	1530.87 (1)	1850.68 (1)	2108.11 (1)
MADHYA PRADESH	567.47 (13)	662.40 (13)	664.09 (13)	672.19 (13)	663.42 (13)	796.59 (13)	877.52 (12)
MAHARASHTRA	623.47 (10)	750.37 (6)	718.51 (10)	831.69 (8)	857.89 (8)	1010.93 (5)	1204.15 (7)
ORISSA	557.48 (14)	595.10 (15)	579.21 (14)	624.76 (15)	602.72 (15)	682.80 (14)	739.32 (15)
PUNJAB	962.64 (1)	1142.35 (1)	1141.03 (1)	1243.62 (2)	1279.44 (3)	1479.80 (2)	1744.02 (2)
RAJASTHAN	716.96 (4)	829.99 (4)	849.55 (4)	918.93 (5)	892.74 (6)	1004.48 (6)	1203.22 (8)
TAMIL NADU	633.58 (9)	720.08 (8)	773.74 (6)	860.65 (6)	909.88 (4)	968.44 (8)	1263.92 (5)
UTTAR PRADESH	589.88 (11)	693.85 (12)	721.95 (9)	781.23 (9)	804.80 (11)	828.67 (11)	879.23 (11)
WEST BENGAL	589.88 (11)	699.45 (10)	734.63 (8)	761.42 (10)	849.35 (9)	855.10 (10)	960.17 (10)
All India	634.82	737.86	741.54	813.92	844.32	927.70	1074.20

Note: Figures in the parentheses indicate ranks

Source: NSS Reports of different Rounds

It shows that though inter-state inequality in MPCE is greater than inter-state inequality in intra-state inequality indices, the difference is not that significant to raise all India figures to such high levels. To find out the true reason behind this feature, absolute inequalities (given by absolute Gini and measured in Rs. at 2009-10 prices) are presented in table-3. It shows that in 1983 inequality was highest in Kerala, and not in Rajasthan, followed by Punjab, Haryana and then Rajasthan. Inequalities in seven states are above the all India figure. Other three states are Tamil Nadu, Karnataka and Andhra Pradesh. If we compare this situation of 1983 with that for Gini index we find that three states, viz., Punjab, Haryana and Andhra Pradesh have absolute inequalities greater than all India figure though their relative inequalities are less than corresponding all India figure. Almost similar picture is observed for other six survey rounds. Actually, the positive correlation between MPCE and intra-state absolute inequality is so strong (r -square =

0.88 for pooled data) that absolute inequality when deflated by mean expenditure to arrive at Gini index, the correlation between MPCE and intra-state inequality index falls drastically to 0.22. Automatically, in 1983, for the states like Punjab, Haryana and Andhra Pradesh with high absolute inequality as well as high mean expenditure, relative inequality tends to underestimate actual inequality. On the other hand, for the states with low absolute inequality as well as low mean expenditure, relative inequality tends neither to underestimate nor to overestimate actual inequality.

At this juncture one can correctly counter-argue that in 1983, for the states like Punjab, Haryana and Andhra Pradesh with high mean expenditure, absolute inequality tends to overestimate actual inequality; whereas for the states with low mean expenditure, absolute inequality tends neither to underestimate nor to overestimate actual inequality.

Table 3: Absolute Inequality (Absolute Gini measured in Rs. at 2009-10 Prices) in Rural Areas of Major States in comparison to All India during 1983 to 2011-12

Rural	Absolute Inequality (Absolute Gini in Rs. at 2009-10 prices)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	190.36 (9)	225.31 (9)	217.13 (10)	178.75 (6)	256.40 (10)	283.60 (12)	362.58 (10)
ASSAM	122.56 (1)	159.08 (2)	119.40 (1)	143.41 (2)	160.03 (2)	210.69 (5)	193.62 (2)
BIHAR	135.12 (2)	168.15 (3)	153.28 (3)	133.15 (1)	128.90 (1)	153.23 (1)	195.74 (3)
GUJARAT	174.71 (7)	175.51 (4)	188.28 (6)	215.68 (11)	242.03 (9)	252.71 (9)	345.99 (8)
HARYANA	268.93 (13)	281.20 (13)	305.04 (15)	285.81 (13)	419.15 (14)	419.47 (13)	427.76 (13)
KARNATAKA	197.22 (10)	203.24 (8)	189.15 (7)	201.75 (9)	201.17 (5)	188.73 (3)	377.33 (12)
KERALA	270.70 (15)	318.53 (14)	296.43 (13)	346.23 (15)	522.47 (15)	771.73 (15)	904.13 (15)
MADHYA PRADESH	165.78 (4)	191.84 (6)	184.16 (4)	162.53 (4)	176.34 (4)	232.60 (8)	247.95 (6)
MAHARASHTRA	176.50 (8)	248.12 (11)	217.10 (9)	214.76 (10)	263.72 (11)	9270.93 (11)	351.85 (9)
ORISSA	148.29 (3)	158.99 (1)	140.79 (2)	152.25 (3)	169.85 (3)	178.21 (2)	188.62 (1)
PUNJAB	268.93 (13)	336.99 (15)	301.83 (14)	296.90 (14)	356.96 (13)	427.66 (14)	525.16 (14)
RAJASTHAN	243.49 (12)	258.53 (12)	220.81 (11)	191.82 (7)	218.88 (6)	226.01 (7)	309.44 (7)
TAMIL NADU	205.29 (11)	232.26 (10)	237.52 (12)	240.36 (12)	287.21 (12)	255.67 (10)	375.60 (11)
UTTAR PRADESH	171.31 (6)	193.76 (7)	200.70 (8)	192.08 (8)	230.59 (8)	217.94 (6)	233.22 (4)
WEST BENGAL	167.56 (5)	176.00 (5)	184.47 (5)	170.56 (5)	228.81 (7)	203.51 (4)	241.02 (5)
All India	188.30	220.08	209.35	211.49	253.37	269.96	329.30

Note: Figures in the parentheses indicate ranks

Source: NSS Reports of different Rounds

Thus, to make a meaningful inter-state comparison of actual inequality either we have to look for a centrist or intermediate measure of inequality in between the absolute and the relative/index measures in the Gini family, or in the absence of such a measure we have to analyse the results of both absolute and relative/index measures. This point becomes more relevant when we try to make an inter-temporal comparison.

Values of Gini Index presented in table-1 are reproduced in table-4 with an intension of inter-temporal comparison. In this table a fall in relative inequality / inequality index in any state in a survey round over the previous round is highlighted by deep green, light green or yellow shades. On the other hand, an increase in relative inequality / inequality index in any state in a survey round over the previous round is highlighted by red, violet or blue shades. It is observed from the table that the movements are quite non-uniform for all the states and for all the rounds. For example, in Andhra Pradesh inequality is observed to increase in 1987-88 over 1983, it is observed to fall in next two rounds, but is observed to increase again in the next round (2004-05); it is observed to fall again in 2009-10 and finally in 2011-12 it is

observed to increase once again. On the other hand, for the state like Karnataka, inequality is observed to fall continuously for first three rounds, it is observed to increase in the next round (2004-05); it is observed to fall again in 2009-10 and finally in 2011-12 it is observed to increase once again.

These falls and increases in relative inequalities are shown vis-a-vis falls and increases in MPCE (shown in table-5) and also falls and increases in absolute inequality (shown in table-6). In table-5, an increase in average MPCE over previous round is highlighted by light green shades and a fall is highlighted by pink or red shades (red shade is used for highlighting substantial falls). It is observed from the table that only in 12 out of 96 cases there are falls in average MPCE over previous rounds. It is also observed that for states of Haryana, Kerala, Tamil Nadu, Uttar Pradesh and West Bengal and also for All India average MPCE has increased continuously over different rounds. To distinguish these 12 cases from other 84 cases in table-4, light green, violet and blue shades are used against deep green, yellow and red shades. The implications of these distinctions along with the observations from table-6 will be explained shortly.

Table 4: Relative Inequality (Gini Index) in Rural Areas of Major States and All India during 1983 to 2011-12

Rural	Relative Inequality (Gini Index)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	0.292	0.301	0.285	0.235	0.290	0.278	0.282
ASSAM	0.192	0.222	0.176	0.201	0.195	0.244	0.221
BIHAR	0.255	0.264	0.222	0.207	0.205	0.225	0.232
GUJARAT	0.252	0.233	0.236	0.234	0.269	0.254	0.282
HARYANA	0.279	0.281	0.3007	0.239	0.321	0.301	0.271
KARNATAKA	0.299	0.292	0.266	0.241	0.262	0.234	0.321
KERALA	0.330	0.323	0.288	0.270	0.341	0.417	0.429
MADHYA PRADESH	0.292	0.290	0.277	0.242	0.266	0.292	0.283
MAHARASHTRA	0.283	0.331	0.302	0.258	0.307	0.268	0.292
ORISSA	0.266	0.267	0.243	0.244	0.282	0.261	0.255
PUNJAB	0.279	0.295	0.265	0.239	0.279	0.289	0.301
RAJASTHAN	0.340	0.311	0.260	0.209	0.245	0.225	0.257
TAMIL NADU	0.324	0.323	0.307	0.279	0.316	0.264	0.297
UTTAR PRADESH	0.290	0.279	0.278	0.246	0.287	0.263	0.265
WEST BENGAL	0.284	0.252	0.251	0.224	0.269	0.238	0.251
ALL INDIA	0.297	0.298	0.282	0.260	0.300	0.291	0.307

Source: NSS Reports of different Rounds

In table-6, a fall in Absolute Inequality (Absolute Gini in Rs. at 2009-10 prices) over previous round is highlighted by deep or light green shades (light green shade is used for highlighting fall in absolute inequality along with a fall in average MPCE) and an increase is highlighted by pink or violet shades (violet shade is used for highlighting increase in absolute inequality along with a fall in average MPCE). It is observed from the table that only in 27 out of 96 cases there are falls in absolute inequality over previous rounds. It is also observed that in all rounds, except 1987-88, change in absolute inequality over previous round shows mixed results. When this distinction of these 27 cases from remaining 69 cases are considered along with those in table-4, the implications of six colour shades used in table-4 becomes clear.

First consider the cases of table-4 highlighted by deep green, yellow and red shades. These cases (84 out of 96 cases) are associated with increase in average MPCE over previous rounds. When average MPCE in any state increases in any round over the previous round, MPCE of different households may change in different ways and we have following three types of cases. (i) MPCE of rich households may increase on the average in a larger proportion than poor households leading to an increase in relative inequality

(highlighted by red shades in table-4) as well as an increase in absolute inequality (highlighted by pink shades in table-6). We have 38 out of 84 such cases. (ii) MPCE of rich households may increase on the average in a smaller proportion than poor households, but by a larger amount than poor households leading to a fall in relative inequality (highlighted by yellow shades in table-4) but an increase in absolute inequality (highlighted by pink shades in table-6). We have 27 out of 84 such cases. (iii) MPCE of rich households may increase on the average in a smaller proportion as well as by a smaller amount than poor households leading to a fall in both relative inequality (highlighted by deep green shades in table-4) and absolute inequality (highlighted by light green shades in table-6). We have 19 out of 84 such cases. Cases of type-(iii) are better than those of type-(ii) and cases of type-(ii) are better than those of type-(i) when the objective of any society is to reduce inequality. Note that in a situation of increasing average MPCE, if relative inequality increases, absolute inequality also increases. There cannot be any such case in which relative inequality increases but absolute inequality falls. But there are cases in which relative inequality falls but absolute inequality increases (cases of type-(ii)).

Table 5: Average MPCE (in Rs. at 2009-10 Prices) in Rural Areas of Major States and All India during 1983 to 2011-12

Rural	MPCE in Rs. at 2009-10 prices						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	651.47	747.34	760.77	759.43	884.77	1020.14	1287.75
ASSAM	637.92	716.86	680.16	713.42	820.74	863.47	876.05
BIHAR	529.25	637.38	575.26	644.73	630.25	681.03	844.10
GUJARAT	692.80	752.33	799.30	923.03	900.69	994.92	1226.79
HARYANA	962.64	1001.83	1014.57	1196.01	1303.83	1393.59	1580.73
KARNATAKA	659.60	696.00	709.86	835.89	768.28	806.54	1175.59
KERALA	819.70	986.94	1028.80	1281.94	1530.87	1850.68	2108.11
MADHYA PRADESH	567.47	662.40	664.09	672.19	663.42	796.59	877.52
MAHARASHTRA	623.47	750.37	718.51	831.69	857.89	1010.93	1204.15
ORISSA	557.48	595.10	579.21	624.76	602.72	682.80	739.32
PUNJAB	962.64	1142.35	1141.03	1243.62	1279.44	1479.80	1744.02
RAJASTHAN	716.96	829.99	849.55	918.93	892.74	1004.48	1203.22
TAMIL NADU	633.58	720.08	773.74	860.65	909.88	968.44	1263.92
UTTAR PRADESH	589.88	693.85	721.95	781.23	804.80	828.67	879.23
WEST BENGAL	589.88	699.45	734.63	761.42	849.35	855.10	960.17
ALL INDIA	634.82	737.86	741.54	813.92	844.32	927.70	1074.20

Source: NSS Reports of different Rounds

Now consider the cases of table-4 highlighted by light green, violet and blue shades. These cases (12 out of 96 cases) are associated with fall in average MPCE over previous rounds. When average MPCE in any state falls in any round over the previous round, MPCE of different households may change in different ways to have following three more types of cases. (iv) MPCE of rich households may fall on the average in a larger proportion than poor households leading to a fall in relative inequality (highlighted by light green shades in table-4) as well as a fall in absolute inequality (highlighted by light green shades in table-6). We have 7 such cases out of 12 cases. (v) MPCE of rich households may fall on the average in a smaller proportion than poor households, but by a larger amount than poor households leading to an increase in relative inequality (highlighted by blue shades in table-4) but a fall

in absolute inequality (highlighted by light green shades in table-6). We have 1 out of 12 such cases. (vi) MPCE of rich households may fall on the average in a smaller proportion as well as by a smaller amount than poor households leading to an increase in both relative inequality (highlighted by violet shades in table-4) and absolute inequality (highlighted by violet shades in table-6). We have 4 out of 12 such cases. Cases of type-(iv) are better than those of type-(v) and cases of type-(v) are better than those of type-(vi) when the objective of any society is to reduce inequality. Note that in a situation of falling average MPCE, if relative inequality falls, absolute inequality also falls. In the situation of falling average MPCE, there cannot be any such case in which relative inequality falls but absolute inequality increases, but there are cases in which relative inequality increases but absolute inequality falls (cases of type-(v)).

Table 6: Absolute Inequality (Absolute Gini in Rs. at 2009-10 Prices) in Rural Areas of Major States and All India during 1983 to 2011-12

Rural	Absolute Inequality (Absolute Gini in Rs. at 2009-10 prices)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	190.36	225.31	217.13	178.75	256.40	283.60	362.58
ASSAM	122.56	159.08	119.40	143.41	160.03	210.69	193.62
BIHAR	135.12	168.15	153.28	133.15	128.90	153.23	195.74
GUJARAT	174.71	175.51	188.28	215.68	242.03	252.71	345.99
HARYANA	268.93	281.20	305.04	285.81	419.15	419.47	427.76
KARNATAKA	197.22	203.24	189.15	201.75	201.17	188.73	377.33
KERALA	270.70	318.53	296.43	346.23	522.47	771.73	904.13
MADHYA PRADESH	165.78	191.84	184.16	162.53	176.34	232.60	247.95
MAHARASHTRA	176.50	248.12	217.10	214.76	263.72	270.93	351.85
ORISSA	148.29	158.99	140.79	152.25	169.85	178.21	188.62
PUNJAB	268.93	336.99	301.83	296.90	356.96	427.66	525.16
RAJASTHAN	243.49	258.53	220.81	191.82	218.88	226.01	309.44
TAMIL NADU	205.29	232.26	237.52	240.36	287.21	255.67	375.60
UTTAR PRADESH	171.31	193.76	200.70	192.08	230.59	217.94	233.22
WEST BENGAL	167.56	176.00	184.47	170.56	228.81	203.51	241.02
ALL INDIA	188.30	220.08	209.35	211.49	253.37	269.96	329.30

Source: NSS Reports of different Rounds

Thus, in cases of type-(iii) and type-(iv) both relative and absolute inequalities measured in the Lorenz-Gini family are found to fall in the rural areas of major states of India and all India. The total number of such cases is 26 out of 96. For these cases we can unambiguously say that inequality has decreased. These cases were attained mainly in the years 1993-94 and 1999-00, and partly in the year 2009-10. Of these two cases, cases of type-(iii) are better than those of type-(iv) because in the former type cases falling inequality is accompanied with increasing MPCE and in the latter type cases falling inequality is accompanied with falling MPCE. On the other hand, in cases of type-(i) and type-(vi) both relative and absolute inequalities measured in the Lorenz-Gini family are found to increase in the rural areas of major states of India and all India. The total number of such cases is 42 out of 96. For these cases we can unambiguously say that inequality has increased. These cases are found mainly in the years 1987-88, 2004-05 and 2011-12, and partly in the year 2009-10. Of these two cases, cases of type-(vi) are worse than those of type-(i) because in the former type cases increasing inequality is accompanied with falling MPCE

and in the latter type cases increasing inequality is accompanied with increasing MPCE.

In remaining 28 cases we have mixed results of fall in relative inequality but increase in absolute inequality (in 27 out of 28 cases associated with increase in average MPCE) or of increase in relative inequality but fall in absolute inequality (in 1 out of 28 cases associated with fall in average MPCE). For these cases we cannot unambiguously say about increment or decrement of inequality.

Now let us have a look into the nature of inequality of the Lorenz-Gini type in the urban areas of 15 major states of India and all India. Table-7 presents the values of Gini Index for urban households of 15 major states of India in comparison to all India for 7 large sample surveys during the period 1983 to 2011-12. Like rural sector, in urban sector also the populations in these states are so large that these values of Gini Index can be alternatively interpreted as those of relative measure of inequality that satisfy the population replication criterion. A number of striking features similar to those found in rural sectors are also observed from the table.

Table 7: Relative Inequality (Gini Index) in Urban Areas of Major States in comparison to All India during 1983 to 2011-12

Urban	Relative Inequality (Gini Index)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	0.306 (7)	0.361 (14)	0.320 (10)	0.313 (7)	0.370 (11)	0.382 (11)	0.336 (6)
ASSAM	0.238 (1)	0.337 (9)	0.287 (3)	0.309 (6)	0.320 (2)	0.324 (1)	0.351 (7)
BIHAR	0.298 (5)	0.297 (3)	0.310 (7)	0.319 (9)	0.330 (3)	0.332 (4)	0.297 (2)
GUJARAT	0.264 (2)	0.285 (2)	0.290 (5)	0.286 (2)	0.310 (1)	0.324 (1)	0.290 (1)
HARYANA	0.321 (10)	0.298 (5)	0.280 (1)	0.287 (3)	0.360 (7)	0.360 (6)	0.401 (10)
KARNATAKA	0.330 (13)	0.297 (5)	0.320 (10)	0.323 (11)	0.360 (7)	0.334 (5)	0.445 (15)
KERALA	0.371 (15)	0.387 (15)	0.340 (14)	0.321 (10)	0.400 (15)	0.498 (15)	0.436 (14)
MADHYA PRADESH	0.290 (3)	0.331 (8)	0.330 (12)	0.315 (8)	0.390 (14)	0.364 (8)	0.407 (12)
MAHARASHTRA	0.329 (12)	0.352 (11)	0.350 (15)	0.348 (14)	0.370 (11)	0.410 (14)	0.366 (9)
ORISSA	0.294 (4)	0.324 (6)	0.300 (6)	0.290 (5)	0.350 (4)	0.389 (13)	0.358 (8)
PUNJAB	0.321 (10)	0.278 (1)	0.280 (1)	0.288 (4)	0.390 (14)	0.372 (9)	0.333 (3)
RAJASTHAN	0.301 (6)	0.346 (10)	0.290 (5)	0.282 (1)	0.370 (11)	0.378 (10)	0.333 (4)
TAMIL NADU	0.347 (14)	0.354 (13)	0.340 (14)	0.381 (15)	0.360 (7)	0.332 (4)	0.334 (5)
UTTAR PRADESH	0.312 (8)	0.329 (7)	0.320 (10)	0.328 (12)	0.370 (11)	0.361 (7)	0.423 (13)
WEST BENGAL	0.328 (11)	0.353 (12)	0.330 (12)	0.341 (13)	0.380 (12)	0.384 (12)	0.406 (11)
All India	0.325	0.352	0.340	0.342	0.371	0.381	0.385

Note: Figures in the parentheses indicate ranks

Source: NSS Reports of different Rounds

For urban sector the value of relative inequality given by Gini Index is greater than that for rural sector in almost all the states and for almost all the years. Only for Madhya Pradesh and Rajasthan in 1983, for Punjab in 1987-88 and for Haryana in 1993-94 the value of relative inequality in urban sector is less than that for rural sector. These are highlighted by horizontal shades as well as bold digits in table-7. Like rural sector, for urban sector also the all India figure lie well above the middle of 15 major states' figures. In 1993-94 only one state's (Maharashtra) figure lies above the all India figure. To examine whether inter-state

inequality in MPCE is significantly greater than inter-state inequality in intra-state inequalities for giving an explanation to the above feature, the average MPCE figures for the urban sectors are presented in table-8.

It shows that for urban sector also, though inter-state inequality in MPCE is greater than inter-state inequality in intra-state inequality indices, the difference is not that significant to raise all India figures to such high levels. To find out the true reason behind this feature, absolute inequalities (given by absolute Gini and measured in Rs. at 2009-10 prices) are presented in table-9.

Table 8: Average MPCE (in Rs. at 2009-10 Prices) in Urban Areas of Major States in comparison to All India during 1983 to 2011-12.

Urban	Average MPCE in Rs. at 2009-10 prices						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	1043.96 (11)	1166.88 (11)	1197.03 (11)	1364.53 (11)	1478.89 (10)	1982.23 (4)	2098.47 (6)
ASSAM	1047.57 (10)	1366.33 (3)	1344.53 (6)	1436.15 (9)	1536.15 (8)	1540.27 (11)	1699.53 (11)
BIHAR	942.27 (14)	944.94 (15)	1033.11 (15)	1058.42 (15)	1010.95 (15)	1092.33 (15)	1181.57 (15)
GUJARAT	1112.87 (8)	1217.74 (8)	1329.12 (7)	1572.97 (7)	1619.22 (6)	1859.01 (6)	1994.41 (9)
HARYANA	1259.72 (1)	1275.72 (5)	1386.89 (5)	1608.96 (4)	1658.64 (4)	1898.18 (5)	2729.04 (1)
KARNATAKA	1131.30 (6)	1124.70 (13)	1238.28 (10)	1607.04 (5)	1500.17 (9)	1716.38 (8)	2468.01 (3)
KERALA	1199.59 (4)	1349.00 (4)	1446.28 (3)	1645.19 (3)	1874.31 (2)	2663.45 (1)	2571.66 (2)
MADHYA PRADESH	985.40 (13)	1195.76 (10)	1194.15 (12)	1223.48 (12)	1312.10 (12)	1469.35 (12)	1650.32 (12)
MAHARASHTRA	1253.94 (3)	1418.24 (1)	1550.42 (1)	1717.01 (1)	1667.24 (3)	2231.98 (2)	2273.99 (4)
ORISSA	1027.76 (12)	1137.69 (12)	1178.00 (13)	1091.05 (14)	1099.58 (14)	1425.41 (13)	1481.80 (14)
PUNJAB	1259.72 (1)	1367.90 (2)	1494.61 (2)	1585.57 (6)	1925.42 (1)	1992.68 (3)	2207.08 (5)
RAJASTHAN	1087.77 (9)	1205.34 (9)	1242.94 (9)	1403.85 (10)	1399.71 (11)	1669.50 (10)	1849.83 (10)
TAMIL NADU	1113.75 (7)	1260.67 (7)	1282.62 (8)	1714.01 (2)	1567.60 (7)	1678.69 (9)	1996.44 (8)
UTTAR PRADESH	921.53 (15)	1099.94 (14)	1138.29 (14)	1217.78 (13)	1244.40 (13)	1364.99 (14)	1585.31 (13)
WEST BENGAL	1155.99 (5)	1262.20 (6)	1387.68 (4)	1528.71 (8)	1631.43 (5)	1735.66 (7)	2049.85 (7)
All India	1115.72	1266.45	1340.42	1508.13	1527.98	1785.81	2012.62

Note: Figures in the parentheses indicate ranks

Source: NSS Reports of different Rounds

Table 9: Absolute Inequality (Absolute Gini measured in Rs. at 2009-10 Prices) in Urban Areas of Major States in comparison to All India during 1983 to 2011-12.

Urban	Absolute Inequality (Absolute Gini in Rs. at 2009-10 prices)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	319.14 (7)	421.24 (10)	383.05 (5)	426.57 (6)	547.19 (9)	757.21 (13)	704.24 (9)
ASSAM	249.54 (1)	460.03 (13)	385.88 (7)	443.43 (7)	491.57 (4)	499.05 (3)	595.66 (4)
BIHAR	280.61 (2)	280.35 (1)	320.26 (1)	337.56 (2)	333.61 (1)	362.65 (1)	350.52 (1)
GUJARAT	293.68 (5)	347.48 (3)	385.44 (6)	450.58 (8)	501.96 (5)	602.32 (8)	578.88 (3)
HARYANA	404.95 (13)	378.63 (6)	388.33 (8)	461.02 (10)	597.11 (11)	683.34 (11)	1093.53 (13)
KARNATAKA	373.34 (9)	333.80 (2)	396.25 (10)	518.49 (11)	540.06 (8)	573.27 (7)	1098.23 (14)
KERALA	444.87 (15)	521.69 (15)	491.74 (14)	528.59 (13)	749.72 (14)	1326.40 (15)	1122.21 (15)
MADHYA PRADESH	286.04 (3)	395.40 (8)	394.07 (9)	385.74 (3)	511.71 (6)	534.84 (4)	671.79 (8)
MAHARASHTRA	412.87 (14)	498.60 (14)	542.65 (15)	596.96 (14)	616.88 (12)	915.11 (14)	832.68 (12)
ORISSA	302.34 (6)	368.12 (5)	353.40 (2)	316.40 (1)	384.85 (2)	554.48 (5)	529.80 (2)
PUNJAB	404.95 (13)	380.22 (7)	418.49 (11)	456.93 (9)	750.91 (15)	741.28 (12)	734.78 (10)
RAJASTHAN	327.04 (8)	416.73 (9)	360.45 (3)	395.75 (4)	517.89 (7)	631.07 (9)	616.29 (5)
TAMIL NADU	386.07 (11)	445.86 (11)	436.09 (12)	652.46 (15)	564.34 (10)	557.33 (6)	666.88 (6)
UTTAR PRADESH	287.15 (4)	361.42 (4)	364.25 (4)	399.52 (5)	460.43 (3)	492.76 (2)	670.05 (7)
WEST BENGAL	378.86 (10)	446.05 (12)	457.93 (13)	521.65 (12)	619.94 (13)	666.49 (10)	832.05 (11)
All india	362.99	446.16	455.74	515.92	566.88	680.39	774.46

Note: Figures in the parentheses indicate ranks

Source: NSS Reports of different Rounds

It shows that now a larger number of states lie above the all India figure. But as argued earlier, as relative inequality tends to underestimate actual inequality and absolute inequality tends to overestimate it, especially for the rich states, therefore, to make a meaningful inter-state comparison of actual inequality either we have to look for a centrist or intermediate measure of inequality in between the absolute and the relative/index measures, or in the absence of such a measure we have to analyse the results of both

absolute and relative/index measures. This point becomes more relevant when we try to make an inter-temporal comparison.

Values of Gini Index presented in table-7 are reproduced in table-10 with an intension of inter-temporal comparison. In this table a fall in relative inequality / inequality index in any state in a survey round over the previous round is highlighted by deep green, light green or yellow shades. On the other hand, an increase in relative inequality / inequality

index in any state in a survey round over the previous round is highlighted by red, violet or blue shades.

Table 10: Relative Inequality (Gini Index) in Urban Areas of Major States and All India during 1983 to 2011-12

Urban	Relative Inequality (Gini Index)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	0.306	0.361	0.320	0.313	0.370	0.382	0.336
ASSAM	0.238	0.337	0.287	0.309	0.320	0.324	0.350
BIHAR	0.298	0.297	0.310	0.319	0.330	0.332	0.297
GUJARAT	0.264	0.285	0.290	0.286	0.310	0.324	0.290
HARYANA	0.321	0.297	0.280	0.287	0.360	0.360	0.401
KARNATAKA	0.330	0.297	0.320	0.323	0.360	0.334	0.445
KERALA	0.371	0.387	0.340	0.321	0.400	0.498	0.436
MADHYA PRADESH	0.290	0.331	0.330	0.315	0.390	0.364	0.407
MAHARASHTRA	0.329	0.352	0.350	0.348	0.370	0.410	0.366
ORISSA	0.294	0.324	0.300	0.290	0.350	0.389	0.358
PUNJAB	0.321	0.278	0.280	0.288	0.390	0.372	0.333
RAJASTHAN	0.301	0.346	0.290	0.282	0.370	0.378	0.333
TAMIL NADU	0.347	0.354	0.340	0.381	0.360	0.332	0.334
UTTAR PRADESH	0.312	0.329	0.320	0.328	0.370	0.361	0.423
WEST BENGAL	0.328	0.353	0.330	0.341	0.380	0.384	0.406
ALL INDIA	0.325	0.352	0.340	0.342	0.371	0.381	0.385

Source: NSS Reports of different Rounds

These falls and increases in relative inequalities are shown vis-a-vis falls and increases in MPCE (shown in table-11) and also falls and increases in absolute inequality (shown in table-12). In table-11, an increase in average MPCE over previous round is highlighted by light green shades and a fall is highlighted by pink or red shades (red shade is used for highlighting substantial falls). It is observed from the table that only in 8 out of 96 cases there are falls in average MPCE over previous rounds. It is also observed that except for the states of Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra and Tamil Nadu, average MPCE has increased continuously over different rounds. To distinguish these 8 cases from other 88 cases in table-10 light green, violet and blue shades are used against deep green, yellow and red shades. The implications of these distinctions along with the observations from table-12 will be explained shortly.

In table-12, a fall in Absolute Inequality (Absolute Gini in Rs. at 2009-10 prices) over previous round is highlighted by deep or light green shades (light green shade is used for highlighting fall in absolute inequality along with a fall in average MPCE) and an increase is highlighted by pink or violet shades (violet shade is used for highlighting increase in absolute inequality along with a fall in average MPCE). It is observed from the table that only in 23 out of 96 cases there are falls in absolute inequality over previous rounds. It is also observed that in all rounds change in absolute inequality over previous round shows mixed results. When this distinction of these 23 cases from remaining 73 cases are considered along with those in table-10, the implications of six colour shades used in table-10 becomes clear.

Table 11: Average MPCE (in Rs. at 2009-10 Prices) in Urban Areas of Major States and All India during 1983 to 2011-12

Urban	Average MPCE in Rs. at 2009-10 prices						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	1043.96	1166.88	1197.03	1364.53	1478.89	1982.23	2098.47
ASSAM	1047.57	1366.33	1344.53	1436.15	1536.15	1540.27	1699.53
BIHAR	942.27	944.94	1033.11	1058.42	1010.95	1092.33	1181.57
GUJARAT	1112.87	1217.74	1329.12	1572.97	1619.22	1859.01	1994.41
HARYANA	1259.72	1275.72	1386.89	1608.96	1658.64	1898.18	2729.04
KARNATAKA	1131.30	1124.70	1238.28	1607.04	1500.17	1716.38	2468.01
KERALA	1199.59	1349.00	1446.28	1645.19	1874.31	2663.45	2571.66
MADHYA PRADESH	985.40	1195.76	1194.15	1223.48	1312.10	1469.35	1650.32
MAHARASHTRA	1253.94	1418.24	1550.42	1717.01	1667.24	2231.98	2273.99
ORISSA	1027.76	1137.69	1178.00	1091.05	1099.58	1425.41	1481.80
PUNJAB	1259.72	1367.90	1494.61	1585.57	1925.42	1992.68	2207.08
RAJASTHAN	1087.77	1205.34	1242.94	1403.85	1399.71	1669.50	1849.83
TAMIL NADU	1113.75	1260.67	1282.62	1714.01	1567.60	1678.69	1996.44
UTTAR PRADESH	921.53	1099.94	1138.29	1217.78	1244.40	1364.99	1585.31
WEST BENGAL	1155.99	1262.28	1387.68	1528.71	1631.43	1735.66	2049.85
ALL INDIA	1115.72	1266.45	1340.42	1508.13	1527.98	1785.81	2012.62

Source: NSS Reports of different Rounds

Table 12: Absolute Inequality (Absolute Gini in Rs. at 2009-10 Prices) in Urban Areas of Major States and All India during 1983 to 2011-12

Urban	Absolute Inequality (Absolute Gini at 2009-10 prices)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
ANDHRA PRADESH	319.14	421.24	383.05	426.57	547.19	757.21	704.24
ASSAM	249.54	460.03	385.88	443.43	491.57	499.05	595.66
BIHAR	280.61	280.35	320.26	337.56	333.61	362.65	350.52
GUJARAT	293.68	347.48	385.44	450.58	501.96	602.32	578.88
HARYANA	404.95	378.63	388.33	461.02	597.11	683.34	1093.53
KARNATAKA	373.34	333.80	396.25	518.49	540.06	573.27	1098.23
KERALA	444.87	521.69	491.74	528.59	749.72	1326.40	1122.21
MADHYA PRADESH	286.04	395.40	394.07	385.74	511.72	534.84	671.79
MAHARASHTRA	412.87	498.60	542.65	596.96	616.88	915.11	832.68
ORISSA	302.34	368.12	353.40	316.40	384.85	554.48	529.80
PUNJAB	404.95	380.22	418.49	456.93	750.91	741.28	734.78
RAJASTHAN	327.04	416.73	360.45	395.75	517.89	631.07	616.29
TAMIL NADU	386.07	445.86	436.09	652.46	564.34	557.33	666.88
UTTAR PRADESH	287.15	361.42	364.25	399.52	460.43	492.76	670.05
WEST BENGAL	378.86	446.05	457.93	521.65	619.94	666.49	832.05
ALL INDIA	362.99	446.16	455.74	515.92	566.88	680.39	774.46

Source: NSS Reports of different Rounds

First consider the cases of table-10 highlighted by deep green, yellow and red shades. These cases (88 out of 96 cases) are associated with increase in average MPCE over previous rounds. Of these 88 cases we find 17 cases (deep green) with fall in both relative and absolute inequality, 16 cases (yellow) with fall in relative but increase in absolute inequality and remaining 55 cases (red) with increase in both relative and absolute inequality.

Next consider the cases of table-10 highlighted by light green, blue and violet shades. These cases (8 out of 96 cases) are associated with fall in average MPCE over previous rounds. Of these 8 cases we find 5 cases (light green) with fall in both relative and absolute inequality, 1 case (blue) with increase in relative but fall in absolute inequality and remaining 2 cases (violet) with increase in both relative and absolute inequality.

Thus, in 22 cases out of 96 cases both relative and absolute inequalities measured in the Lorenz-Gini family are found to fall in the urban areas of major states of India and all India. For these cases we can unambiguously say that inequality has decreased. These cases are attained mainly in the years 1993-94 and 2011-12. Of these 22 cases, 17 cases (deep green) are better than remaining 5 cases (light green).

On the other hand, in 57 cases both relative and absolute inequalities measured in the Lorenz-Gini family are found to increase in the urban areas of major states of India and all India. For these cases we can unambiguously say that inequality has increased. These cases are found in the years other than 1993-94 and 2011-12. Of these 57 cases, 2 cases (violet) are worse than remaining 55 cases (red).

In remaining 17 cases we have mixed results. In 16 out of 17 cases which are associated with increase in average MPCE, we have fall in relative inequality but increase in absolute inequality and only in 1 out of 17 cases which is associated with fall in average MPCE we have an increase in relative inequality but fall in absolute inequality. For these cases we cannot unambiguously say about increment or decrement of inequality.

When we try to compare the situations of urban regions with those of rural regions, we observe that only in few cases two regions exhibit similar pictures. For example we have observed that in rural regions in 26 out of 96 cases both relative and absolute inequalities have decreased and these

were attained mainly in the years 1993-94 and 1999-00. The number of such cases in urban regions is 22 and these were attained mainly in the years 1993-94 and 2011-12. Of these cases only 7 cases are common to both rural and urban areas and those are observed mainly in the year 1993-94. This means that in these 7 cases the relevant states were able to reduce unambiguously both rural and urban inequality.

On the other hand, we have also observed that in rural regions in 42 out of 96 cases both relative and absolute inequalities have increased and these were observed mainly in the years 2004-05 and 2011-12 and partly in 1987-88 and 2009-10. The number of such cases in urban regions is 57 and these were observed mainly in the years 1987-88 and 2004-05 and partly in 1999-00, 2009-10 and 2011-12. Of these cases only 25 cases are common to both rural and urban areas and those are observed mainly in the years 1987-88 and 2004-05 and partly in the years 2009-10 and 2011-12. This means that in these 25 cases inequality in the relevant states has unambiguously increased in both rural and urban areas.

Concluding Observations

Gini index is a widely used measure of inequality. It is basically a relative measure of inequality. It has an absolute counterpart which was neither proposed by Gini himself nor used by many authors. As explained by Kolm, a relative measure of inequality alone cannot give a complete picture on inequality of any region; an absolute measure of inequality has also to be used. In this paper we have used both Gini index and absolute Gini for measuring inequality in the distribution of consumer expenditure in India and its fifteen major states for the period 1983 to 2011-12. Results show that in slightly more than fifty percent cases relative inequality has increased and in these cases absolute inequality has also increased, and in slightly less than fifty percent cases relative inequality has decreased but in about fifty percent of these latter fifty percent cases (i.e., about twenty five percent of total cases) absolute inequality has also decreased and in remaining fifty percent cases (i.e., the rest or about twenty five percent of total cases) though relative inequality has decreased, absolute inequality has increased. These last twenty five percent cases are associated with increased average MPCE. In these cases,

average MPCE of the richer section of the community has increased on the average by a smaller proportion than the poorer section leading to a fall in relative inequality, but average MPCE of the richer section has increased by a larger amount than the poorer section leading to an increase in absolute inequality. Thus, in these twenty five percent cases simply by looking at the values of Gini index we cannot unambiguously say that inequality in the states or in all India has decreased in the concern period.

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