Changing Pattern of Inequality in the Distribution of Consumer Expenditure in Rural West Bengal (1983 – 2012)

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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 more accurate 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 (Gini, 1912, 1921, 1936) 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 (Lorenz,1905), Dalton's measure (Dalton,1920), Theil's entropy measure (Theil, 1967), Atkinson's measure (Atkinson, 1970), Sen's measure (Sen, 1973), standard deviation of logarithms, coefficient of variation, mean logarithmic deviation (Theil, 1972), extended Gini indices (Chakraborty, 1988), Kakwani's index (Kakwani, 1980), generalised Gini index (Weymark, 1981),squared coefficient of variation, relative mean deviation, etc. have also parallel use. All these measures are either relative or index measures. Majority of them have their absolute counterparts. As explained by Kolm (1976), absolute measures of inequality have some properties different from relative/index measures and those cannot be ignored. 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 makes the desired comparisons. In this respect, the Gini coefficient/index has been most popular because it seems most convenient to use, though not most convincing. This study tries to use two types of measures of inequality, namely the Gini type and the SD-CV type, simultaneously and tries to derive a general, centrist or intermediate or overall, though sometimes apparently conflicting, impression about the changing pattern of inequality in the distribution of consumer expenditure in rural West Bengal in comparison to rural all India in the period from 1983 to 2012.

Key words: Inequality, Absolute Inequality, Relative Inequality, Inequality Index, Decomposable Inequality

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 nμ is distributed among n persons in the form (y_1, y_2, …, y_n), we have $\sum_{i=1}^{n} y_i = n\mu$, where μ is the mean (arithmetic mean) income.It is not necessary that the term 'distribution' should have a meaning opposite to 'addition', it may also have a meaning opposite to 'multiplication' or so. But to us the first meaning is most convincing and we are used to assume it. Throughout our discussion below we shall take this assumption. 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 also. Even in the class of additive measures we may have a large number of measures depending on the underlying welfare function. Inequality measures are mainly of three types: absolute, relative and index and have three different types of welfare implications. There may be other types in between these three types. Thus, it is very difficult to have a precise definition of inequality.

Relative versus Absolute Measures – Convenience versus Justice

An absolute measure of inequality has an absolute unit of measurement (related to 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 researchers 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 conventional measures of Inequality

Measures of inequality that are conventionally used or discussed in the literature are the Lorenz curve, the Dalton measure, the Gini coefficient or the Lorenz ratio, the relative mean deviation, the variance, the coefficient of variation, the standard deviation of logarithms, the Theil measure, the Atkinson measure, the Sen measure, the extended Gini coefficient, etc. Of these measures, Lorenz curve (Lorenz 1905) and Gini coefficient (Gini 1912, 1921, 1936) are oldest and most popular. The Lorenz curve being a graphical measure is not a scalar measure or not a single valued measure and is not fully convenient for inequality comparison and so the 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. But as Kolm (1976) pointed out, an absolute measure of inequality has some merits which the relative measure cannot have. In the present paper we shall take up this popular measure of inequality, shall explain its several properties and limitations, and shall use it and some others for measuring inequality in rural West Bengal vis-a-vis all India for the period 1983 to 2011-12.

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 interestedin 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) and Dalton (1920).

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), Sen (1973) and Kolm (1976) 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 all of them cannot satisfy 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. Some inequality measures fail to satisfy invariance under population replication criterion.

Actually, as mentioned above, there are different types of inequality measures and different criteria are related to those different types. In fact, three types of inequality measures are observed in the literature: they are Absolute Measures, Relative Measures and Index Measures. 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 and index measures of inequality. Invariance under population replication criterion is relevant for both absolute and relative but not index measures of inequality.

Automatically a number of questions arise at this point. Those are: Are human beings as well as the researchers in this field really interested only in the relative measure of inequality or invariance under scalar multiplication *and* not in the absolute measure of inequality, only because the former is more convenient? Are they really most interested in an index measure because that is most convenient? Are they really interested in the invariance under population replication criterion also? Are they also interested in the diminishing income transfer criterion? Is satisfaction of decomposition criteria completely necessary? Are all these criteria mutually consistent? Dalton who proposes the two principles of additions is 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.

Kolmin his famous article 'Unequal Inequalities I' [Kolm, 1976] 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 equiproportional 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 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) has used the product of SD and CV as the centrist measure of inequality. Subramanian and Jayaraj (2015) have used it for measuring inequality for rural and urban India for 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 correct, 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 of inequality in comparison to a relative measure of inequality, 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. The terms 'rightist' and 'leftist' are applicable only incase of increase in

income. Moreover, averaging absolute and relative measures or multiplying 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 all three types of inequality separately: absolute, relative and index, in the order they are mentioned. Only then we shall be able to have a 'centrist' or 'intermediate' view. For the convenience of comparison, we may have an index measure of inequality, but this should not be the only measure. "Anyway, convenience could not be an alibi for endorsing injustice."

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, …, 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 all 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] 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 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 and the researchers tend to use an index measure. For Gini measures, the relative measure tends to an index measure as the population becomes large. This leads to a new problem for Gini measures. For large population injustice created in the index measure over the relative measure cannot be observed and explained.

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 measure or even in relative inequality measure and lead to some injustice. For some classes of inequality measures this injustice becomes so acute that we may have to reject the index measure completely and may have to rely only on absolute and relative measures.

The discussion so far made is based on the first type of reasonableness criteria, i.e., on various invariance criteria. Now we shall take up the second type of reasonableness criteria, i.e., the income transfer criteria. We have already said that the Gini measures satisfy the Pigou-Dalton income transfer criterion. This is true because the expression in the numerator of the Gini measures, i.e.,$\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j|$shown earlier can be expressed as

$$\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j| = -2(n-1)y_1 - 2(n-3)y_2 - 2(n-5)y_3 - \ldots\ldots\ldots + 2(n-5)y_{n-2} + 2(n-3)y_{n-1} + 2(n-1)y_n.$$

This is just the weighted sum of the incomes; the weights are governed by the ranks of incomes. It starts from -2(n-1) for lowest income. It gradually increases with the increase in income but remains negative up to all incomes less than median income, and it becomes 0 for median income, if there exists any such person/household having the income exactly equals to the median income; otherwise, the weight will increase up to -2. Thereafter, it increases to positive values to start from +2 and reaches the maximum value of 2(n-1) for highest income. Thus, increase in the income of individual 1 (the poorest person) by one rupee reduces the

numerator of Gini measures by 2(n-1) rupees and that of individual n (the richest person) raises the numerator of the same by the same 2(n-1) rupees. This leads to a peculiar implication for Pigou-Dalton income transfer criterion. A transfer of one rupee from individual 1 (the poorest person) to individual n (the richest person) raises the numerator of Gini measures by 4(n-1) rupees or the Gini coefficient by $\frac{2(n-1)}{n^2\mu}$, or the Gini index by $\frac{2}{n\mu}$, whatever are the values of Y_1 and Y_n. Similarly a transfer of one rupee from individual n-1 (the second richest person) to individual n (the richest person) raises the numerator of Gini measures by 4 rupees or the Gini coefficient by $\frac{2}{n^2\mu}$, , or the Gini index by $\frac{2}{n(n-1)\mu}$, , whatever are the values of Y_{n-1} and Y_n .As we shall see below this should not be the property of a good measure of inequality. The above expression also shows that Gini measure is not only additive but also a linear function of income.

The numerator of the Gini measures, i.e.,$\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j|$can also be expressed as

$$\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j| = -2(n-1)(y_1-\mu) - 2(n-3)(y_2-\mu) - 2(n-5)(y_3-\mu) - \\ \dots\dots\dots + 2(n-5)(y_{n-2}-\mu) + 2(n-3)(y_{n-1}-\mu) + 2(n-1)(y_n-\mu), \text{ or as}$$

$$\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j| = -2(n-1)(y_1-M) - 2(n-3)(y_2-M) - 2(n-5)(y_3-M) - \\ \dots\dots\dots + 2(n-5)(y_{n-2}-M) + 2(n-3)(y_{n-1}-M) + 2(n-1)(y_n-M).$$

These are just the weighted sums of the deviations of incomes from their mean or median (M), the weights are as before governed by the ranks of incomes It starts from -2(n-1) for lowest income. It gradually increases with the increase in income but remains negative up to the median income, and becomes 0 for median income. Thereafter, it increases to positive values and reaches the maximum value of 2(n-1) for highest income. The numerator can also be expressed as the weighted sum of absolute deviations of incomes from their median (M) with weights all positive starting from 2(n-1) for lowest income, gradually falling to reach 0 for median income and then again increasing to reach the maximum value of 2(n-1) for highest income. The sum of the weights is approximately n^2 (it is exactly n^2if n is an even number and it is ($n^2 - 1$) if n is an odd number). Thus,

$$\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j| = 2(n-1)|y_1-M| + 2(n-3)|y_2-M| + 2(n-5)|y_3-M| + \\ \dots\dots\dots + 2(n-5)|y_{n-2}-M| + 2(n-3)|y_{n-1}-M| + 2(n-1)|y_n-M|.$$

In other words,$\frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i-y_j|}{2n^2}$, the absolute measure of inequality in the Gini family, ishalf of the weighted mean absolute deviations from the median – a measure of dispersion.

Now if the absolute deviations are taken from the mean and if the weights are replaced by the respective absolute deviations, the new measure will satisfy all the good properties of Gini measures. Moreover, it will also satisfy the property that the effect of income transfer between two persons is not only dependent on their ranks but also dependent on their values. These replacements lead us to the standard deviation as an absolute measure of inequality and coefficient of variation as a relative measure of inequality. The measure will still remain additive but not linear in income.

In the discussion about different measures of inequality, both Sen and Kolm have found that standard deviation and coefficient of variation satisfy the basic properties of absolute and relative measures of inequality respectively. Kolm has observed that these measures though satisfy the 'income transfer principle', they fail to satisfy the 'principle of diminishing income transfer'. Kolm writes: "However, their decrease for a one pound transfer to an

income smaller by a given amount is proportional to this amount and thus independent of the income levels." Kolm has not proceeded further with this family of measures because he was more interested to define a 'centrist' measure of inequality and that also in the Atkinson family.

Sen rejects these measures on three grounds one of which is their failure to satisfy the 'principle of diminishing income transfer'. The second reason is the way the deviations are taken in the formula of standard deviation and coefficient of variation. According to Sen, deviations of income from the mean are less reasonable than deviations of one income from the other. Sen observes: "There is another methodological issue. Is it best to measure the difference of each income level from the mean only, or should the comparison be carried out between every pair of incomes? The latter will capture everyone's income difference from everyone else, and not merely from the mean, which might not be anybody's income whatsoever."

The third reason lies in the squaring principle applied in the formula of standard deviation and coefficient of variation. He finds no justice in applying this principle; rather he finds that this squaring principle is making the increase in inequality from regressive transfer invariant to the levels of income of the two individuals hence dissatisfying the 'principle of diminishing income transfer'. In this connection he writes: "… the procedure of squaring the differences is a particular one. And the question may be asked: Why choose this particular formula? It is easily checked that CV does have the characteristic of attaching equal weights to transfers of income at different income levels."

However, the second reason shown by Sen is not tenable because standard deviation can also be expressed as $\sigma = \sqrt{\frac{1}{2n^2}\sum\sum(y_i - y_j)^2}$. The squaring principle in standard deviation and coefficient of variation that makes them not to satisfy the 'principle of diminishing income transfer' can be said to be unreasonable if we are convinced of the principle of diminishing income transfer but cannot be said to be more unreasonable than the measures in the Gini family. In the Gini family a regressive transfer of an amount between two poor persons with an income difference may lead to a less increment in inequality than a regressive transfer of the same amount between two rich persons with same income difference if the number of persons between the two poor persons is less than that between the two rich persons. This property makes them more unreasonable than those in the SD-CV family. The 'principle of diminishing income transfer' is put forward on the ground of diminishing marginal utility of income. Standard deviation of the logarithm of income is tried as a solution; but has not succeeded to be reasonable for other reasons. Diminishing marginal utility of income leads to a higher welfare loss from a regressive transfer of an amount between two poor persons with an income difference than a regressive transfer of the same amount between two rich persons with same income difference. If marginal utility of income diminishes at a diminishing rate, then this regressive transfer between two poor persons also leads to a larger increase in the inequality in the distribution of welfare. However, if we are interested in the measurement of inequality in the distribution of income as such and not in the implied welfare loss, nor in the implied inequality in the distribution of welfare, then even if the marginal utility of income diminishes at a decreasing rate the 'principle of diminishing income transfer' does not have any bearing on the measures of inequality in the distribution of income and then inequality measures in the SD-CV family become perfectly reasonable.

As explained by Kolm and as is seen from the formula, SD is a per person inequality measure and thus an absolute measure of inequality. CV is a per person per rupee of mean income inequality measure and so a relative measure of inequality. The upper bound of this relative measure is $\sqrt{n-1}$ and so CV has to be divided by $\sqrt{n-1}$ to have an index measure of inequality in this SD-CV family. All these three measures in this family have a particular type of welfare implication as will be explained shortly. Other measures of inequality in the moment family can be constructed by taking a third order central moment, better a third order modulus central moment of the form $(\frac{1}{n}\sum(|y_i-\mu|)^3)^{\frac{1}{3}}$, or a fourth order central moment etc. These higher order modulus central moments attach higher weights to higher incomes and are consistent with welfare functions with marginal contribution of income diminishing at increasing rates. These make inequality increasing at a higher rate for regressive transfers at higher income levels than those at lower income levels. If we want inequality increasing at a higher rate for regressive transfers at lower income levels than those at higher income levels, we can take a fractional order modulus central moment of the form $(\frac{1}{n}\sum(|y_i-\mu|)^{2-\varepsilon})^{\frac{1}{2-\varepsilon}}$, $0<\varepsilon<1$. This is a measure very close to that developed by Atkinson in the form $I_A' = 1-\left[\sum\left(\frac{y_i}{\mu}\right)^{1-\varepsilon} f(y_i)\right]^{\frac{1}{1-\varepsilon}}$.

To sum up this theoretical section, we can say that there always exists a welfare consideration in the concept and measurement of inequality in the distribution of income or wealth. An income distribution has a welfare implication on the one hand and a welfare distribution implication on the other. An income has a welfare contribution – the marginal contribution normally diminishes with increasing income. Inequality measures of the Gini family satisfy all usual properties of inequality measures. But the welfare implications of these measures are full of peculiarities and cannot be justified easily. This happens because the Gini measures are rank dependent and not value dependent. Thus, if we consider a group of 10 individuals having income of 10 rupees each, we have a situation of no inequality and the value of Gini index also becomes 0. Now if one rupee is transferred from any one individual to any other the value of Gini index jumps up to 0.02. If this process of regressive transfer is continued until we reach the situation where 8 individuals have income of 0 rupees each, the ninth individual has income of 1 rupee and the tenth individual has income of 99 rupees, the Gini index reaches the value of 0.998. Finally, when this last rupee of the ninth individual is transferred to the tenth individual to reach the situation of extreme inequality, the Gini index reaches the value of 1 implying an increment of 0.002 (just contrast this low value of 0.002 to the high value of 0.02 for the first transfer). Gini index tends to have an upward bias in inequality measurement. This peculiarity inherent in the Gini measure cannot be justified by any standard welfare function. On the other hand, if marginal welfare contribution of income diminishes but at a constant rate with increasing income or if in the name of measuring inequality in income distribution, we do not want to measure inequality in the implied welfare distribution, the implied welfare function becomes fully and only consistent with inequality measures of the SD-CV family. These inequality measures of the SD-CV family also satisfy all usual properties of inequality measures and should actually be used by all practitioners replacing the measures of the Gini family.

When we want that the inequality measure is decomposable, the Gini measures seem not at all good measures and we have to rely on other measures. The inequality measures in the SD-CV family also fail to be decomposable, though welfare consideration for these measures seem more acceptable than that for the Gini measures. The index measure of this family, namely the CV index, beautifully explain what injustice we incur if we insist on an index

measure for making inequality comparison most convenient. The injustice cannot be observed for Gini measures in our illustrations having large population size. Finally, the square measures in the SD-CV family, namely, variance and CV-square are useful both from the underlying welfare implications and from the purpose of decomposability.

Estimation and Analysis of the Nature of Inequality in the Distribution of Consumer Expenditure in Rural West Bengal vis-a-vis Rural India

In this section we shall first present 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 rural West Bengal along with rural India for seven large sample surveys conducted by the NSSO during the period 1983 to 2011-12. When Gini measures are applied for India and a large state like West Bengal, 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 pf 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 are also used by the practitioners – the Krtscha measure (Krtscha(1994)) is used by Subramanian and Jayaraj(2015), mean logarithmic deviation, Theil's entropy measure and squared coefficient of variation are used by Chakraborty and Kundu (2016). In the present paper we shall first use two usual measures (absolute and relative/index measures of inequality in the Gini family) side by side to explain the nature of inequality in the state of West Bengal in comparison to all India. In Gini measures, as incomes are rank weighted and not value weighted, the distinction between a relative measure and an index measure is small and insignificant and tends to zero as population size tends to infinity. Therefore, in the second step we shall consider SD, CV and CVI as absolute, relative and index measures of inequality and shall explain the nature of injustice we may have to incur if we insist on an index measure. In the third and final step, we shall consider variance and CV-square as measures of absolute and relative inequality which have same implications with SD and CV respectively, but at the same time they can be used for decomposing inequality into between group inequality and within group inequality. For illustration we shall make simple illustration with poor half and rich half as two groups.

Table-1 presents (in three separate panels) the values of Gini Index, average MPCE and absolute Gini for rural households of West Bengal in comparison to all India for 7 large sample surveys during the period 1983 to 2011-12. Given the fact that rural populations in the state as well as in the country as a whole are large, these values of Gini Index can be alternatively interpreted as those of relative measure of inequality that satisfy the population replication criterion also. A number of features are observed from the table.

(i) Relative inequality / inequality index in West Bengal rural is observed to be lower than all India figures in all rounds of the survey.

(ii) Average MPCE in West Bengal rural is observed to be lower than all India figures in all but one (2004-05) rounds of the survey. In 2004-05, average MPCE in West Bengal rural is slightly greater than all India figure, whereas the figure for relative inequality / inequality index in West Bengal rural in that round is substantially lower than all India figure.

Table-1: Relative Inequality, Average MPCE and Absolute Inequality in Rural West Bengal in comparison to Rural All India during 1983 to 2011-12

RURAL	Relative Inequality /Inequality Index (Gini Coefficient / Gini Index)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
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**

RURAL	Average MPCE in Rs. at 2009-10 prices						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
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**

RURAL	Absolute Inequality (Absolute Gini in Rs. at 2009-10 prices)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
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 (ordered from lowest to highest for inequality and from highest to lowest for MPCE) out of 15 major States.

Source: NSS Reports of different Rounds.

(iii) Automatically absolute inequality in West Bengal rural turns out to be lower than all India figures in all rounds of the survey.

Values of Gini Index, average MPCE and absolute Gini presented in table-1 can also be used for inter-temporal comparison. It is observed from the table that average MPCE has increased continuously for the state as well as the country. However, the movements for inequality are quite non-uniform between the state and the country. When average MPCE in any region increases in any round over the previous round, MPCE of different households may change in three following distinct ways. (i) MPCE of rich households may increase on the average in a larger proportion than poor households leading to an increase in relative inequality as well as an increase in absolute inequality. We have 2 such cases for West Bengal, in 2004-05 over 1999-00 and in 2011-12 over 2009-10 and 3 such cases for all India, in 1987-88 over 1983, in 2004-05 over 1999-00 and in 2011-12 over 2009-10. (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 but an increase in absolute inequality. We have 2 such cases for West Bengal, in 1987-88 and in 1993-94 and also 2 such cases for all India, but in 1999-00 and in 2009-10. (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 and absolute inequality. We have 2 such cases for West Bengal, in 1999-00 and in 2009-10 and only1 such case for all India, in 1993-94.As the objective of any society is to reduce inequality, cases of type-(iii) are better than those of type-(ii) and cases of type-(ii) are better than those of type-(i). In cases of type-(iii) both relative and absolute inequalities measured in the Gini family are found to decrease. On the other hand, in cases of type-(i) both relative and absolute inequalities measured in the Gini family are found to increase. Finally, in cases of type-(ii) mixed results are observed and definite conclusion regarding inequality change cannot be drawn.

Table-2 presents (in three separate panels) the values of SD (as a measure of absolute inequality), CV(as a measure of relative inequality) and CV index(as an index measure of inequality) for rural households of West Bengal in comparison to all India for 7 large sample

surveys during the period 1983 to 2011-12. It is observed from the table that both absolute and relative inequalities in West Bengal rural are observed to be lower than all India figures in all rounds of the survey. These are completely same as those obtained for Gini measures in Table-1. But when we consider the index measure, we observe that the CV index in West Bengal rural is observed to be greater than all India figures in all rounds of the survey. It is only due to the fact that a true index measure is population dependent and in the present case population for all India rural is several times of that for West Bengal rural, and this creates these fallacious results. Actually, a true index measure is not at all convenient for inequality comparison and should not be used.

Table-2: Absolute Inequality (SD),Relative Inequality (CV) and Inequality Index (CVI) in Rural West Bengal in comparison to Rural All India during 1983 to 2011-12

RURAL	Absolute Inequality (Standard Deviation (SD) at 2009-10 prices)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
WEST BENGAL	336.82 (4)	397.99 (5)	415.07 (8)	347.97 (5)	523.20 (8)	404.46 (4)	492.35 (5)
ALL INDIA	**403.75**	**491.41**	**441.22**	**428.12**	**564.85**	**551.98**	**731.89**

RURAL	Relative Inequality (Coefficient of Variation (CV))						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
WEST BENGAL	0.571 (7)	0.569 (3)	0.565 (8)	0.457 (7)	0.616 (7)	0.473 (4)	0.513 (3)
ALL INDIA	**0.636**	**0.666**	**0.595**	**0.526**	**0.669**	**0.595**	**0.681**

RURAL	Index of Inequality (CV Index (CVI)						
	1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
WEST BENGAL	0.000088 (3)	0.000084 (3)	0.000079 (4)	0.000061 (3)	0.000080 (5)	0.000061 (3)	0.000066 (3)
ALL INDIA	**0.000027**	**0.000028**	**0.000023**	**0.000020**	**0.000024**	**0.000021**	**0.000024**

Note: Figures in the parentheses indicate ranks (ordered from lowest to highest) out of 15 major States.

Source: NSS Reports of different Rounds.

Values of SD and CV presented in table-2 can also be used for inter-temporal comparison. It has already been observed from Table-1 that average MPCE has increased continuously for the state as well as the country. However, the movements for inequality measured in terms of SD and CV are quite non-uniform between the state and the country. Here also we have three distinct types of cases. (i) MPCE of rich households has increased on the average in a larger proportion than poor households leading to an increase in relative inequality as well as an increase in absolute inequality. We have 2 such cases for West Bengal, in 2004-05 over 1999-00 and in 2011-12 over 2009-10 and 3 such cases for all India, in 1987-88 over 1983, in 2004-05 over 1999-00 and in 2011-12 over 2009-10. These results are same as those for Gini measures. (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 but an increase in absolute inequality. We have 2 such cases for West Bengal, in 1987-88 and in 1993-94 but no such case for all India. (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 and absolute inequality. We have 2 such cases for West Bengal, in 1999-00 and in 2009-10 and 3 such cases for all India, in 1993-94, in 1999-00 and in 2009-10.Results of these last two types are a bit different from those in Gini measures. But as explained in the theoretical section we shall rely more on these than Gini measures. Moreover, as we shall see below, the square measures of the SD-CV type are decomposable. For this reason also, we shall rely more on these than Gini measures.

Table-3 presents the values of variance (in place of SD as a measure of absolute inequality), and CV square (in place of CV as a measure of relative inequality) for rural households of West Bengal in comparison to all India for 7 large sample surveys during the period 1983 to 2011-12. As expected, these results have same implications as those for SD and CV.

Table-3: Absolute Inequality (by Variance in place of SD) and Relative Inequality (by CV-square in place of CV) in Rural Areas of West Bengal and All India during 1983 to 2011-12

		1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
West Bengal	SD	337.01	398.75	415.39	348.45	523.20	404.11	492.36
	CV	0.571	0.569	0.565	0.457	0.616	0.473	0.513
All India	SD	**403.91**	**491.98**	**441.74**	**427.78**	**565.41**	**551.86**	**731.89**
	CV	**0.636**	**0.666**	**0.595**	**0.526**	**0.669**	**0.595**	**0.681**

		1983	1987-88	1993-94	1999-00	2004-05	2009-10	2011-12
West Bengal	Variance	113577.67	158998.01	172551.41	121418.52	273740.87	163306.57	242413.95
	CV-square	0.326	0.324	0.319	0.209	0.380	0.223	0.263
All India	Variance	**163142.71**	**242048.49**	**195133.11**	**182994.90**	**319690.85**	**304546.83**	**535664.91**
	CV-square	**0.405**	**0.444**	**0.354**	**0.276**	**0.448**	**0.354**	**0.464**

Source: NSS Reports of different Rounds.

Table-4 presents the values of variance (as a measure of absolute inequality), and CV square (as a measure of relative inequality) for rural households of West Bengal in comparison to all India for 7 large sample surveys during the period 1983 to 2011-12 decomposed into within group inequality and between group inequality where the groups are taken as poor half and rich half.

It is observed from the table that in 1983 about 50% of relative inequality of rural West Bengal was due to within group inequalities and remaining 50% was due to between group inequality. For all India rural the said percentages were about 58% and 42% respectively. But as the overall relative inequality in all India rural (0.4050) was greater than West Bengal rural (0.3258), between group inequality for all India rural (0.1703) is found to be slightly greater than West Bengal rural (0.1625) and within group inequality for all India rural (0.2347) is found to be significantly greater than West Bengal rural (0.1633). Almost similar conclusion can be drawn for absolute inequality. But as the mean income of the rich half is greater than that of the poor half, the share of within group inequality in overall absolute inequality is greater than that for relative inequality. It is 57% in comparison to 50% in West Bengal rural and 66% in comparison to 58% in all India rural.

In 1987-88, overall relative inequality in West Bengal rural decreased slightly by 0.67% in comparison to 1983. This decrease was due to decrease in between group inequality, as within group inequality increased slightly. Increase in within group inequality was due to increase in inequality within rich half (from 0.1778 to 0.2186), as inequality within poor half decreased slightly (from 0.0693 to 0.0467) in this period. In all India rural, overall relative inequality increased by 9.55%. This increase was due to increase in between group inequality, as within group inequality decreased slightly. On the other hand, in this period, overall absolute inequality in West Bengal rural increased significantly by 39.99%. This increase was partly due to increase in within group inequality and partly due to increase in between group inequality. The picture for all India rural is almost same as West Bengal Rural.

Table-4: Decomposition of Absolute Inequality (Variance) and Relative Inequality (CV-square) in Rural Areas of West Bengal and All India during 1983 to 2011-12

		1983					
		Overall		Within	Between	Within (%)	Between (%)
West Bengal	Variance	113577.67		64871.57	48706.10	57.12	42.88
	CV-square	0.3258		0.1633	0.1625	50.12	49.88
All India	Variance	163142.71		107593.64	55549.07	65.95	34.05
	CV-square	0.4050		0.2347	0.1703	57.96	42.04

		1987-88					
		Overall	% Increase	Within	Between	Within (%)	Between (%)
West Bengal	Variance	158998.01	39.99	**97845.77**	**61152.24**	61.54	38.46
	CV-square	0.3236	-0.67	0.1771	**0.1465**	54.73	45.27
All India	Variance	242048.49	48.37	**146378.35**	**95670.14**	60.47	39.53
	CV-square	0.4437	9.55	0.2283	**0.2154**	51.45	48.55

		1993-94					
		Overall	% Increase	Within	Between	Within (%)	Between (%)
West Bengal	Variance	172551.41	8.52	**115061.20**	57490.21	66.68	33.32
	CV-square	0.3192	-1.37	0.1924	**0.1268**	60.27	39.73
All India	Variance	195133.11	-19.38	**116779.26**	**78353.86**	59.85	40.15
	CV-square	0.3537	-20.29	**0.1853**	**0.1683**	52.40	47.60

		1999-00					
		Overall	% Increase	Within	Between	Within (%)	Between (%)
West Bengal	Variance	121418.52	-29.63	**65559.04**	**55859.48**	53.99	46.01
	CV-square	0.2092	-34.45	**0.1030**	**0.1062**	49.25	50.75
All India	Variance	182994.90	-6.22	**99702.80**	83292.10	54.48	45.52
	CV-square	0.2762	-21.90	**0.1337**	**0.1425**	48.40	51.60

Source: NSS Reports of different Rounds.

In 1993-94, overall absolute as well as relative inequality in all India rural decreased significantly in comparison to 1987-88. These decreases were due to decrease in within group inequality as well as between group inequality. For West Bengal rural, there were no significant changes in 1993-94 in comparison to 1987-88. Absolute inequality increased by 8.52% and that was mainly due increase in within group inequality, and relative inequality decreased by 1.37% and that was mainly due decrease in between group inequality.

In 1999-00, overall absolute as well as relative inequality in West Bengal rural decreased significantly in comparison to 1993-94. These decreases were due to decrease in within group inequality as well as between group inequality. For all India rural, absolute inequality decreased by 6.22% and that was mainly due decrease in within group inequality, and relative inequality decreased by 21.90% and that was mainly due decrease in between group inequality.

Table-4: Continued…

		1999-00					
		Overall		Within	Between	Within (%)	Between (%)
West Bengal	Variance	121418.52		65559.04	55859.48	53.99	46.01
	CV-square	0.2092		0.1030	0.1062	49.25	50.75
All India	Variance	182994.90		99702.80	83292.10	54.48	45.52
	CV-square	0.2762		0.1337	0.1425	48.40	51.60

		2004-05					
		Overall	% Increase	Within	Between	Within (%)	Between (%)
West Bengal	Variance	273740.87	125.45	**188116.85**	**85624.02**	68.72	31.28
	CV-square	0.3795	81.42	**0.2331**	**0.1464**	61.43	38.57
All India	Variance	319690.85	74.70	**207431.47**	**112259.38**	64.89	35.11
	CV-square	0.4476	62.05	**0.2510**	**0.1966**	56.07	43.93

		2009-10					
		Overall	% Increase	Within	Between	Within (%)	Between (%)
West Bengal	Variance	163306.57	-40.34	**86482.14**	**76824.43**	52.96	47.04
	CV-square	0.2233	-41.16	**0.1070**	**0.1163**	47.92	52.08
All India	Variance	304546.83	-4.74	**172533.98**	132012.84	56.65	43.35
	CV-square	0.3539	-20.94	**0.1738**	**0.1801**	49.12	50.88

		2011-12					
		Overall	% Increase	Within	Between	Within (%)	Between (%)
West Bengal	Variance	242413.95	48.44	**134573.30**	**107840.65**	55.51	44.49
	CV-square	0.2629	17.73	**0.1307**	**0.1323**	49.70	50.30
All India	Variance	535664.91	75.89	**344962.85**	**190702.06**	64.40	35.60
	CV-square	0.4642	31.19	**0.2566**	**0.2077**	55.27	44.73

Source: NSS Reports of different Rounds.

In 2004-05, overall absolute and relative inequality in West Bengal rural as well as in all India rural increased significantly in comparison to 1999-00, relatively more for West Bengal. In 2009-10, overall absolute and relative inequality in West Bengal rural as well as in all India rural decreased significantly in comparison to 2004-05, relatively more for West Bengal. Finally, in 2011-12, overall absolute and relative inequality in West Bengal rural as well as in all India rural increased significantly in comparison to 2009-10, relatively more for all India. All these results explain that both in West Bengal rural and all India rural inequalities are following paths with regular ups and downs. On the whole, absolute inequalities are increasing for both the regions; relative inequality is slightly falling for West Bengal rural and slightly increasing for all India rural. These trends are also observed in both within group inequality and between group inequality.

Concluding Remarks

It is very difficult to have a precise measure of inequality in the distribution of any distributable like income or expenditure; this is because of the fact that there exists a large class (rather classes) of inequality measures that are reasonable – some are more reasonable

than others for one set of reasonableness criteria, while some others are more reasonable than remaining others for another set of reasonableness criteria. In a situation of increasing income/expenditure, we may have a leftist measure or a rightist measure or a continuum of centrist measures in between the leftist and rightist measures (and not a single centrist measure), or even some extreme-leftist or extreme-rightist measures in any class of inequality measure. In this paper we have chosen the measures in the SD-CV class that are explained to be more reasonable than the conventionally used measures judged in terms of the welfare implications and decomposability. Our results on the nature and extent of inequality in West Bengal rural vis-à-vis all India rural are interesting and fully convincing. Further interesting and policy suggesting results could be obtained if such exercises are undertaken for combined inequality calculated by Mondal and Kayet (2018) decomposed into within group inequality and between group inequality for all India or for the major states of India when rural and urban sectors are considered as two groups.

References:

Atkinson, A.B. (1970) "On the Measurement of Inequality", *Journal of Economic Theory, 2*.

Chakraborty, S.R. (1988) "Extended Gini indices of inequality", *International Economic Review, 29(1)*.

Chakraborty, S.R. and S. Kundu (2016) "Measures of Well-being, Poverty and Deprivation: Theory and Estimates at State and District Levels in India", *Sarvekshana, 101*.

Dalton, H. (1920) "The Measurement of the Inequality of Incomes", *Economic Journal, 30.*

Gini, C. (1912) "Variabilità e mutabilità", reprinted in Pizetti, E. and T. Salvemini(eds) (1955),*Memorie di metodologicastatistica*, Rome: LibreriaEredi Virgilio Veschi.

Gini, C. (1921) "Measurement of Inequality of Incomes",*The Economic Journal, 31*.

Gini, C. (1936) "On the Measure of Concentration with Especial Reference to Income and Wealth", *Cowles Foundation Paper*.

Kakwani, N.C. (1980) *Income Inequality and Poverty: Methods of Estimation and Policy Applications*, Oxford University Press.

Kolm, S.C. (1976) "Unequal Inequalities I", *Journal of Economic Theory, 12*.

Krtscha, M. (1994) "A New Compromise Measure of Inequality" in W. Eichhorn (ed.): *Models and Measurement of Welfare and Inequality*, Heidelberg: Springer-Verlag.

Lorenz, M.O. (1905) "Methods for Measuring Concentration of Wealth"*Journal of the American Statistical Association, 9.*

Mondal, D. and A. Kayet (2018) "Trends and Patterns of Combined Inequality in India: An analysis across major States from 1983 to 2011-12", *Sarvekshana, 104*.

Pigou, A.C. (1912) *Wealth and Welfare*, Macmillan, London.

Sen, A. (1973) *On Economic Inequality*, Clarendon Press, Oxford.

Subramanian, S. and D. Jayaraj(2015) "Growth and Inequality in the Distribution of India's Consumption Expenditure: 1983 to 2009-10", *Economic and Political Weekly, 50(32)*.

Theil, H. (1967) *Economics and Information Theory*, North Holland, Amsterdam.

Theil, H. (1972) *Statistical Decomposition Analysis*, North Holland, Amsterdam.

Weymark,J.A. (1981) "Generalized Gini inequality indices", *Math Soc Sci, 1*.