Southern Economic Journal 2006, 72(3), 720–729

Defining Poverty Lines As a Fraction of Central Tendency

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We show under lognormality that when the Gini coefficient is stable over time, defining the poverty line as a fraction of a central tendency of the living standard distribution restricts the evolution of the poverty measures to stability. That is, poverty does not change if the Gini coefficient does not change. Moreover, when the Gini coefficient slightly changes, most of the poverty change can be considered a change in inequality. The consequences of using different poverty lines are then analyzed. Thus, important features in studies of poverty change based on these lines may result from methodological choices, rather than from economic mechanisms.

JEL Classification: I32, O15, D31

1. Introduction

For many years the relative notions of poverty have been important. These notions account for the evolution of perceptions of basic needs evolving in society (Sen 1983; Foster 1998). Being poor among a population of poor people can be considered very differently from being poor in a wealthy environment. This concern is often met by updating the poverty line across time in relation to the distribution of living standards. In these conditions, are the evolution patterns of poverty measures a real economic phenomena or only hidden consequences of methodological choices?[1] This paper addresses this question.

The literature on poverty lines is extensive and varied (van Praag, Goedhart, and Kapteyn 1978; Hagenaars and van Praag 1985; Callan and Nolan 1991; Citro and Michael 1995; Short 1998; Ravallion 1998; Madden 2000). In particular, fractions of the median or the mean of the living standard distribution have been used to update poverty lines, notably for dynamic poverty analyses by national and international administrations (Fuchs 1969; Plotnick and Skidmore 1975; Fiegehen, Lansley, and Smith 1977; O'Higgins and Jenkins 1990; Central Statistical Authority 1997; Chambaz and Maurin 1998; Oxley 1998; Stewart 1998. See Zheng 2001 for other references). An example of a major country where administrations use a fraction of the median of income as a component of

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This research was carried out during my visit to the Department of Agricultural Economics at the University of California at Berkeley. I am grateful to the British Academy and to the International Research Committee of the University of Nottingham for their financial support. I would like to thank the participants of a seminar in Nottingham University. I am also grateful for the financial support by Spanish Ministry of Sciences and Technology, project BEC2002-03097, and by the Instituto Valenciano de Investigaciones Economicas. The usual disclaimers apply.

Received January 2004; accepted May 2005.

[1] Smeeding (1979) and Browning (1979) discuss other methodological issues affecting measurement of inequality and poverty.

poverty threshold is the United Kingdom (Oxley 1998). The United States will probably use this approach in the future as it is recommended in Citro and Michael (1995).[2]

Other updating procedures exist, such as poverty lines anchored on the mean living standard of households whose living standards are close to the desired poverty line (Ravallion 1998), or poverty lines relying on subjective perceptions of poverty by individuals (van Praag, Goedhart, and Kapteyn 1978; Hagenaars and van Praag 1985; Pradhan and Ravallion 1998). This paper does not cover these procedures.

An index of poverty is a real valued function P, which, given a poverty line z, associates to each income profile $y \in R^n_+$, a value $P(y, z)$ indicating its associated level of poverty. For example, using a household consumption survey, an estimation of a poverty measure provides an indicator of the amount of poverty in the country. The results can be used to guide economic and social policies. We consider in this paper a large class of poverty measures under lognormality of the living standard distribution. This class covers all the poverty measures used in applied work. However, we also stress two major poverty measures for which we have explicit parametric results: (i) the Watts measure (Watts 1968; Zheng 1993), one of the most popular axiomatically sound poverty measures; and (ii) the head-count index, which is the most used poverty measure.

The aim of the paper is to show that using a fraction of a central tendency as the poverty line restricts the evolution of poverty statistics to be stable when the inequality is stable. This situation may occur in particular for proportional taxation, uniform value-added tax (VAT), and fixed-rate sharecropping arrangements. Therefore, for null or low levels of inequality changes—the usual case—using such popular updating procedures leads to confusing the evolution of poverty over years with the evolution of inequality described by using the Gini coefficient. This is important for policy because this procedure is frequently implemented in poverty studies, which generates pictures of limited changes in poverty. Browning (1989) shows that it is crucial for government policy to distinguish inequality and poverty. While helping the truly needed is favored, extending that role to permit redistribution is often counterproductive. Section 2 describes the properties of poverty measures when poverty lines are updated by a fraction of central tendency. The consequences of using different relative poverty lines are also compared. Section 3 concludes our research.

2. Poverty Lines and Poverty Change

Setting

The results are largely based on the assumption of lognormality of the distribution of living standards. The lognormal approximation has often been used in applied analysis of living standards (Slesnick 1993; Alaiz and Victoria-Feser 1996).[3] Although it has sometimes been found statistically

[2] In Citro and Michael (1995), page 5: "We propose that the poverty-level budget for the reference family start with a dollar amount for the sum of three broad categories of basic goods and sevices—food, clothing, and shelter (including utilities). The amount should be determined from actual Consumer Expenditure Survey (CEX) data as a percentage of median expenditure on food, clothing, and shelter by two-adult/two-child families." In Betson, Citro, and Michael (2000), nine alternative thresholds are proposed and calculated for poverty measurement in the U.S. Official Statistics in 1992. Among them are (i) one-half average expenditures of four-person consumer units and (ii) one-half median after-tax income of four-person families. Since these are official recommendations, they should be at least partly followed in the future.

[3] Atchison and Brown (1957) and Cowell (1993) indicate that the lognormality is often found appropriate for populations of workers in specific sectors.

consistent with income data (e.g., van Praag, Hagenaars, and van Eck 1983), other distribution models for living standards or incomes may be statistically closer to the data. Using U.S. data, Cramer (1980) finds the lognormal distribution is no longer dominated by other distribution models if measurement errors are incorporated.

What is wanted in this paper is (i) to obtain simplifications in calculus while simultaneously considering the three major central tendencies of a distribution (mean, median, and mode); and (ii) to simultaneously obtain a simple parametric expression of the Watts measure, the head-count index, and the Gini coefficient of inequality. This is generally not possible with nonlognormal distributions. Then, the goodness-of-fit of the distribution model is of rather secondary interest. The lognormal model is used as a simple way of illustrating a general argument that could be extended to more flexible specifications of the income distribution. In this paper, a more statistically adequate distribution model would not allow us to present the point more clearly. However, much of the qualitative intuition of the results should work with other usual income distributions.

The variance of the logarithms, denoted σ^2, is a well-known inequality measure, not always consistent with the Lorenz ordering (Foster and Ok 1999). This is not the case under lognormality. Then, under lognormality, the Gini coefficient is

$$G = 2\Phi(\sigma/\sqrt{2}) - 1, \tag{1}$$

where Φ is the cumulative distribution function (cdf) of the standard normal law and the Theil coefficient is $\sigma/2$. σ corresponds one-to-one with the Gini coefficient and Theil coefficient. This paper only mentions one of these inequality measures in the qualitative statements.

When updating the poverty line, by defining it as a fraction of the median (mean or mode), measured aggregate poverty is conserved under lognormality when σ is constant. Let us recall that the median of a lognormal distribution LN(m, σ^2) is e^m, the mode is $e^{m-\sigma^2}$, and the mean is $e^{m+\sigma^2/2}$. Then, for example, a poverty line defined as a fraction of the median has a formula: $z = Ke^m$, with K a given number between 0 and 1. In practice, parameters m and σ are not perfectly known, but are estimated instead. To avoid mixing too many questions, we do not discuss estimation errors in this paper. However, there are sampling confidence intervals for poverty indicators in the application. And now, in the theoretical part, it can be assumed that m and σ are known.

The first part starts with a very general class of additive poverty measures of the form

$$P = \int_0^z k(y, z)\, d\mu(y), \tag{2}$$

where y is the income variable, μ is the cdf of LN(m, σ^2), and z is the poverty line. P can be rewritten after a change in the variable

$$P = \int_{-\infty}^{Z \equiv \frac{\ln z - m}{\sigma}} k(e^{\sigma t+m}, e^{\sigma Z+m})\phi(t)\, dt, \tag{3}$$

where ϕ is the pdf of the standard normal law. Therefore, P only depends on parameters $Z(\equiv (\ln z - m)/\sigma)$, σ, and m. Note that the level of m cannot be described as merely the scale of the incomes. In particular, when m rises with a given σ, the variance of the incomes also rises. Now, if the poverty measure can be written as

$$P = \int_0^z k\left(\frac{y}{z}\right) d\mu(y), \tag{4}$$

which is always the case for measures employed in applied work, then it is apparent that it does not depend on m, the location parameter, once Z and σ are given. Indeed

$$P = \int_{-\infty}^{Z} k\left(\frac{e^{\sigma t+m}}{e^{\sigma Z+m}}\right)\phi(t)\ dt = \int_{-\infty}^{Z} k[e^{\sigma(t-Z)}]\phi(t)\ dt \tag{5}$$

can be rewritten as

$$F\left(\frac{\ln z - m}{\sigma}, \sigma\right), \tag{6}$$

a parameterized form of most poverty measures used in practice. Therefore, for all poverty lines that Z does not depend on m, the considered poverty measures also do not depend on m. These poverty lines are presented in the next subsection.

Results with Constant Gini Coefficient

The previous discussion leads to a consideration of the general class of poverty measures that can be written as $F((\ln z - m)/\sigma, \sigma)$ under lognormality.

The variations of the Gini coefficient have often been observed as small. A case where the Gini does not change is of a proportional taxation. In this case, each person pays a fixed proportion $0 \leq t < 1$ of his or her income y, leaving him or her with $(1 - t)y$. Clearly in this situation the Lorenz curve and, therefore, the Gini coefficient remain fixed. Naturally, poverty when measured with a fixed poverty line becomes worse by a proportional taxation. Some nonpoor people cross the poverty threshold downward, and those with low incomes who remain poor fall, raising the severity in poverty.

Proportional taxation has always been attractive to fiscal administrations because of its simplicity. Historically, some have also defended proportional taxation on the grounds of social justice. Thus, John Stuart Mill's formula of the "ability to pay" doctrine in the 19th century calls for a proportional tax on income above subsistence (see Musgrave 1985, p. 18). When subsistence needs are small, one obtains what boils down to a proportional income tax. Besides, that was the format of Pitt's proportional income tax of 3% in 1840.

Actual tax systems are very complicated at the present moment, combining elementary taxes that may be progressive, proportional, or regressive. However, it is unlikely the whole tax system will be exactly proportional, but individual taxes of interest may be. For example, medieval populations of poor peasants in many European countries were subject to a fixed proportion of the peasant's crop income. Meanwhile, recommendations for VAT often favor a unique tax rate for all goods in order to eliminate the distorting effect of the tax on relative prices. In that case, if consumption is used as a base for the definition of individual living standards, a uniform VAT would not change the income Lorenz curve or associated inequality measures that are scale invariant. Also, if one is interested in a population of nontenant peasants subject to a fixed share-cropping rate, the impact of a change in the share-cropping arrangement on poverty can be studied by assuming unchanged inequality measured by the Gini coefficient. Indeed, all crop incomes are affected proportionally, and one can assume there is no other important income.

It has often been observed that σ and other inequality measures vary less than usual poverty measures between years. For example, the estimates in Datt and Ravallion (1992) for India and Brazil in the 1980s show a smaller temporal relative variation for the Gini coefficient than the head-count index. Then, in a first approximation and in many contexts, G may change slightly when compared with changes in poverty measures. When G is considered fixed, we obtain the following results.

PROPOSITION 1. Under lognormality when the Gini coefficient of inequality is constant, using a fraction of the median (mean or mode) of the income distribution to update the poverty line as the distribution varies yields a fixed estimate of poverty measured by any poverty measure of the form $P = \int_0^z k(y/z)d\mu(y)$, where μ is the cdf of LN(m, σ^2) and z is the poverty line. This is also the case for all poverty measures that can be parametrically written as $F((\ln z - m)/\sigma, \sigma)$ and F is differentiable.

PROOF. If a poverty measure of the form $F((\ln z{-}m/\sigma), \sigma) = F(Z, \sigma)$ with $Z \equiv (\ln z{-}m)/\sigma$, then

$$dF = \frac{\partial F}{\partial Z}dZ + \frac{\partial F}{\partial \sigma}d\sigma \qquad \text{and} \qquad dZ = \frac{1}{z\sigma}dz - \frac{1}{\sigma}dm - \frac{\ln z - m}{\sigma^2}d\sigma. \tag{7}$$

This results as

$$dF = \frac{1}{\sigma}\frac{\partial F}{\partial Z}\left(\frac{dz}{z} - dm\right) + \left(\frac{\partial F}{\partial \sigma} - \frac{\partial F}{\partial Z}\frac{\ln z - m}{\sigma^2}\right)d\sigma. \tag{8}$$

Therefore, if σ is constant, $dF = 0$ is equivalent to $dz/z - dm = 0$. One exception exists in the case where $\partial F/\partial Z = 0$, which is generically negligible. By integrating the formulas, one obtains $z = K(\sigma)e^m$, where $K(\sigma)$ is a function of σ only.

Under lognormality, if $K(\sigma) = 1/p$ with $0 < p < 1$, then $z = e^m/p$ is the p^{th} fraction of the median. If $K(\sigma) = e^{\sigma^2/2}/p$, then $z = e^{m + \sigma^2/2}/p$ is the pth fraction of the mean. If $K(\sigma) = e^{-\sigma^2}/p$, then $z = e^{m - \sigma^2}/p$ is the pth fraction of the mode. *QED*.

It is easy to check that with the chosen relative poverty lines, all poverty measures of the parametric form $F((\ln z - m)/\sigma, \sigma)$ are scale invariant (i.e., they are not changed by multiplying all incomes by the same positive factor). Note that these measures do not cover all of the scale-invariant measures. The latter ones can be written as $K(m, \sigma, \ln z)$ and must satisfy $(\partial K/\partial m) + (\partial K/\partial \ln z) = 0$. The fact that the measures $F((\ln z - m)/\sigma, \sigma)$ do not change when incomes arbitrarily change, even if the Gini coefficient is kept constant, is more surprising. The scale change of all incomes would result in unchanged poverty as soon as the poverty line is proportionally updated. The particular result of interest is that the same invariance applies for any changes in incomes that leave a summary measure of inequality unchanged, provided income is lognormal. This is the specific shape of the relative poverty line that exactly offsets the effect of change in m for poverty measurement.[4]

In the strict conditions of Proposition 1, or when G slightly changes, the consequence of using fractions of central tendencies as simplified updating rules for the poverty line is plain. Such methods restrict one to obtain only stable measures of poverty evolution, at least under lognormality, and by extension for income distributions not too far from the lognormality hypothesis. This may have damaging implications for poverty policies if alternative and better poverty lines show different poverty evolution, such as soaring poverty. In such a situation, crucial interventions to alleviate a living standard crisis may not be carried out because the used poverty indicators are faulty. We now turn to the cases where the changes in σ are small instead of being strictly nullified.

Results with Gini Nonconstant

When σ slightly changes across periods, as often observed in the data at country level, the proof of Proposition 1 indicates that most of the change in poverty can be considered proportional to a change in inequality, as measured by the variance of logarithms. As shown, at the first order we have with the above relative poverty lines

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[4] It is wrong to believe that fixing σ is enough to fix everything except the scale of incomes. For example, the variance of incomes is equal to $e^{2m+\sigma^2}(e\sigma^2 - 1)$ and still varies with m even when σ is fixed. Moreover, the population of the poor also vaires with the level of m.

$$dF = \left[\frac{\partial F}{\partial \sigma} - \frac{\partial F}{\partial Z}\left(\frac{\ln z - m}{\sigma}\right)\right] d\sigma = A d\sigma, \qquad (9)$$

where A is the value of the term in parentheses. Then, when inequality changes moderately and under the approximation of lognormality, poverty measures that can be written as $P = \int_0^z k(y/z)d\mu(y)$ mostly reflect this change, rather than that which can be specific in poverty evolution.

It is possible to refine the analysis by distinguishing different relative poverty lines. Under lognormality one can define the relative poverty lines by denoting $z = e^{m+\alpha\sigma^2}/p$ with $\alpha = 0$ when the median is used as the central tendency, $\alpha = 1/2$ for the mean, and $\alpha = -1$ for the mode. Then, $\ln z = -\ln p + m + \alpha\sigma^2$. As the proof shows, the results of Proposition 1 are also valid for any poverty line of the form $K(\sigma)e^m$, although we do not develop cases that have not been used in practice. One can learn by examining how the poverty measures vary with the values of σ and p, for example in the next proposition.

Proposition 2. For all poverty measures of the parametric type $F(Z, \sigma)$ differentiable, where $Z = (\ln z - m)/\sigma$ and z is the poverty line, and where m and σ^2 are the parameters of the lognormal income distribution [therefore in particular of the form $P = \int_0^z k(y/z)d\mu(y)$, where μ is the cdf of $LN(m, \sigma^2)$], we obtain the following with the relative poverty line $z = e^{m+\alpha\sigma 2}/p$:

$$dF = \left[\frac{\partial F}{\partial Z}\left(\frac{\ln p}{\sigma^2} + \alpha\right) + \frac{\partial F}{\partial \sigma}\right] d\sigma - \frac{1}{p\sigma}\frac{\partial F}{\partial Z} dp. \qquad (10)$$

Proof. The results are obtained from direct differential calculus, noting that $Z = -\ln p/\sigma + \alpha\sigma$, $\partial Z/\partial p = -1/\sigma p$, $\partial Z/\partial \sigma = \ln p/\sigma^2 + \alpha$. The determination in the signs of the coefficients of differential terms of dF is straightforward as soon as one notices that $\ln p/\sigma^2 + \alpha \geq 0$ for $p \geq 1$ and the mean or median are used as the central tendency. *QED*.

The sign of dF shows that poverty rises or falls with a change in σ. The term in dp in dF is interesting in order to understand the impact of choosing different fractions of a central tendency for defining the poverty line. These results characterize the evolution of measured poverty as the consequence of a methodological choice, rather than an autonomous economic phenomenon. Naturally, one must be cautious with such interpretations because differences in these parameters for the compared situations are not necessarily small, although the differential of F provides insight on typical variations. One expects that the poverty measure is an increasing function of Z that increases with the poverty line ($\partial F/\partial Z \geq 0$). The assumption that $\partial F/\partial \sigma \geq 0$ may seem plausible, at least for poverty measures giving a large importance to poverty severity, because the inequality among the poor that contributes to this severity is part of global inequality.

The first term on the right-hand side of the dF equation describes the poverty change that accompanies the change in income distribution and is proportional to the change in inequality measured by σ. The sign of the coefficient of $d\sigma$ is generally ambiguous, although it can be argued as positive in most situations, which corresponds to $\partial F/\partial Z \geq 0$, $\partial F/\partial \sigma \geq 0$, $p > 1$, and $\alpha = 0$, or $\alpha = 1/2$ (i.e., the median or mean are used as a central tendency for the relative poverty line). We denote from now the latter conditions on p and α: "usual values of p and α." Then, in these conditions the poverty measure varies in the same direction as the inequality measure. The second term on the right-hand side of the dF equation describes the first-order differences in the measured poverty changes when measured with different poverty lines, here characterized by different fractions of the central tendency. Assuming $\partial F/\partial Z \geq 0$, the lower the poverty line is (the higher p is), the less the absolute poverty changes. This is consistent with smaller values of the poverty measure when the population of the poor is smaller. The same result holds true for finite variations of p.

Note that selecting one given central tendency (the mean, median, or mode) is equivalent to fixing the median as the used central tendency and choosing an adjusted level of the fraction parameter p. Indeed, there exists p' and p'' such that $(1/p)e^{m-\sigma^2} = (1/p')e^m$ and $(1/p)e^{m+\sigma^2/2} = (1/p'')e^m$. This justifies that the terms in $d\alpha$ are not developed in the study of the differential of F. Nevertheless, one can recall that the mode may differ from the median and mean in that with the usual fractions defining the poverty line, the sign of the coefficients of $d\sigma$ in dF can be negative. The next part describes more explicit results based on the head-count index and the Watts measure.

The Head-Count Index and the Watts Poverty Measure

The head-count index, the most popular poverty indicator, is the proportion of poor people in the whole population,

$$P_0 \equiv \int_0^z d\mu(y), \tag{11}$$

where μ is the cdf of living standards y, and z is the poverty line. The Watts poverty measure is defined as

$$W = \int_0^z -\ln(y/z)d\mu(y). \tag{12}$$

The Watts measure satisfies the focus, monotonicity, transfer, and transfer sensitivity axioms. It is also continuous and subgroup consistent. For the focus axiom, the poverty index $P(y, z)$ is independent of the income distribution above z. For monotonicity, $P(y, z)$ is increasing if one poor person experiences a decrease in income. For transfer, $P(y, z)$ increases if income is transferred from a poor person to someone richer. For transfer-sensitivity, the increase in $P(y, z)$ in the previous transfer axiom is inversely related to the income level of the donator. For subgroup consistency, if an income distribution is partitioned in two subgroups y' and y'', then an increase in $P(y'', z)$, with $P(y', z)$ constant, increases $P(y, z)$. Because of its axiomatic properties, it is often a better representation of poverty than other used poverty indicators. If the living standard y follows a lognormal distribution in that $\ln(y) \sim N(m, \sigma^2)$, then the Watts poverty measure is equal to $W = (\ln z - m)\Phi((\ln z - m)/\sigma) + \sigma\phi((\ln z - m)/\sigma)$, where ϕ and Φ are, respectively, the probability distribution function (pdf) and cdf of the standard normal distribution (Muller 2001). The formula for the head-count index under lognormality is $P_0 = \Phi((\ln z - m)/\sigma)$. Using Proposition 2 and by noting that $\partial P_0/\partial Z = \phi(Z)$; $\partial W/\partial Z = \sigma\Phi(Z) + \sigma Z\phi(Z) + \sigma\phi'(Z) = \sigma\Phi(Z)$; $\partial P_0/\partial\sigma = \partial P_0/\partial\sigma = 0$; and $\partial W/\partial\sigma = Z\Phi(Z) + \phi(Z)$, we obtain

$$dP_0 = \left(\frac{\ln p}{\sigma^2} + \alpha\right)\phi(Z)d\sigma - \frac{1}{\sigma p}\phi(Z)dp, \tag{13}$$

and

$$dW = [2\alpha\sigma\Phi(Z) + \phi(Z)]d\sigma - \frac{1}{p}\Phi(Z)dp. \tag{14}$$

A few differences in the variations of P_0 and W become evident with the formula. Some of the first-order variations of the Watts measure appear proportionally to the proportion of poor people in the population, $\Phi(Z)$, whereas that is never the case for the head-count index for which all of the first-order variation terms are proportional to $\phi(Z)$. Examining the calculus shows that the components proportional to $\phi(Z)$ in the formula of dW can identify the variations stemming from a change in the population of the poor, whereas the component proportional to $\Phi(Z)$ can identify those coming from the change in poverty severity. Second, divisions by σ occur for terms in the differentials of P_0, but not for that of W. The meaning of all of these differences may be unclear, but they suggest that the variation profiles of the two measures are not strongly related.

However, there are also important similarities between the variations of both measures. At the first order of the approximation, for the usual values of p and α, the poverty evolution related to changes in the income distribution (with σ) goes in the same direction as P_0 and W. In both cases the coefficient of $d\sigma$ in dF is positive, which indicates that poverty measured by both indicators increases with inequality at the first order. Meanwhile, for poverty line z below the median of the income distribution, the choice of the fraction for defining the poverty line similarly affects both measures because the coefficients of dp in dF have the same negative sign for both measures.

Other possible parametric approaches depend less on the lognormality assumption but deliver less tractable formulae. For example, Datt and Ravallion (1992) derive parametric formulae for Foster-Greer-Thorbecke poverty indices P_0, P_1, and P_2 under the assumptions of parameterized Lorenz curves of types Beta and Generalized Quadratic. However, these are only implicit formulae and the poverty measures must be extrapolated using roots of complicated equations. In such a case, an explicit analysis of the variations using these measures is ruled out. Meanwhile, the parameters intervening in these Lorenz curves are not easily interpreted and cannot be assimilated to inequality measures. Therefore, we chose not to follow this approach, but rather relied on an approximate lognormal representation that can be seen as a further simplification.

3. Conclusion

Are the evolution patterns of poverty measures a real economic phenomena, or are they only hidden consequences of methodological choices? This paper analyzes the consequences of updating poverty lines by using fractions of central tendencies of the living standard distribution. It is shown for general poverty measures that under lognormal approximation and if the Gini coefficient of inequality does not change very much, the measured evolution of poverty is restricted to be stable with these updating rules. This situation may occur particularly when studying proportional taxation, uniform VAT, and fixed-rate sharecropping arrangements, as well as for usual situations when the Gini coefficient changes moderately. In these cases, most of the changes in poverty can be considered as a change in inequality, rather than as a specific poverty phenomenon. Finally, we discussed the consequences of using different relative poverty lines or different poverty indicators. An illustration based on U.S. data confirms the theoretical results and shows the impact caused by the choice of a particular poverty line. This choice determines many features of the apparent evolution of poverty.

Therefore, using the considered relative poverty lines restricts what one could expect from studying the evolution of poverty. Other notions of poverty lines may allow clearer separation of poverty changes and small inequality changes. Furthermore, past studies of poverty change that employed these methods could be re-examined with different updating procedures for the poverty line.

The different types of poverty line updating used in the literature each have their advantages and disadvantages, and it is not always clear what is the best approach (see the surveys by Callan and Nolan [1991] and Ravallion [1998]). In particular, it is not clear if the absence of sensitivity of the poverty line to inequality is a systematically desirable property. Indeed, "absolute poverty lines" that are not updated and do not depend on inequality have their weaknesses. They do not account for the evolution of individual expectations in society, whereas many economists think that updating is desirable.

Some changes in the income distribution are likely to be simultaneously associated to changes in poverty and inequality. However, not all changes in inequality will lead to changes in poverty, as opposed to what happens with the considered relative poverty lines. What is needed is knowing what type of change in inequality should impact the poverty line. For example, this could be investigated through psychological experiments.

In conclusion, we devote a few words to the importance of the lognormality assumption. On one side, it is hard to believe that the bulk of our story linking poverty and inequality with relative poverty lines is not captured by the general shape of the lognormal distributions. Qualitatively, one expects to obtain similar results with other distributions. On the other side, it would be interesting to know what restrictions the lognormality assumption brings.

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