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TIPs FOR POVERTY ANALYSIS. THE CASE OF SPAIN, 1980-81 TO 1990-91

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In this paper, we apply the methodology developed by Jenkins and Lambert (1997) to the study of the evolution of poverty in Spain during the 1980s. The main advantage of this approach lies in the fact that it provides poverty orderings consistent with a wide subset of generalized poverty gap poverty indices, while allowing different poverty lines for each of the distributions being compared. Our contribution focuses on two aspects. (i) We study the robustness of our results to the choice of the equivalence scale. (ii) We extend to our procedures of statistical inference which are already used in the inequality literature. The main conclusion is the unambiguous fall in poverty levels, both in the population as a whole as well as in all subgroups in the partition by household size.

Keywords: Poverty dominance, equivalence scales, statistical inference

(*JEL* I32, D31)

1. Introduction

Sen (1976)'s seminal article on poverty measurement distinguished between the identification problem concerned with setting the poverty standard, and the aggregation problem of constructing a suitable overall index of poverty. Following Sen's influential recommendation that poverty mesures should incorporate Intensity and Inequality considerations as well as Incidence ones, a host of indices with these characteristics have been proposed (See Foster (1984) for a review of the literature). On the other hand, in any empirical application we have to deal

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with the problem that in heterogeneous populations households with different characteristics have different needs. This problem is usually solved by first partitioning the household population into equivalent classes from the point of view of needs; then a set of equivalence scales are used in order to make interpersonal welfare comparisons among the partition subgroups.

Notice that there are three sources of ambiguity. 1) Given the poverty line, distribution y may have less poverty than distribution x according to a poverty index P, but the opposite may be the case for some other poverty index P'. 2) Given a poverty measure, the inconclusiveness may arise if we obtain different rankings for different poverty lines. 3) Given a poverty measure, both the poverty line and the composition of the poor depend on the equivalence scales chosen[1]. Therefore, the poverty ranking of two distributions may be reversed for different sets of equivalence scales.

There are two ways of dealing with problems 1) and 2). In the first place, one can always compare two distributions according to several interesting poverty measures and alternative poverty lines. This is the approach followed in Spain by Ruiz-Huerta and Martínez (1994) (or RHM (1994) for short) using the 1980-81 and 1990-91 EPFs (*Encuestas de Presupuestos Familiares*), and by INE (1996) using also the 1973-74 EPF. The first authors computed 5 poverty measures for 12 poverty lines, while INE (1996) computed 6 poverty measures for 3 poverty lines. In the second place, recent theoretical results open up a more definite way of approaching the double source of ambiguity just described. These results seek to characterize situations in which income distributions may be unambigously ranked while nonetheless taking into account a potential diversity of judgements about the form of the aggregate poverty index and the appropriate choice of the poverty line. This line of work is best exemplified by the use of a graphical device –the "Three 'I's of Poverty" (TIP) curve– due to Jenkins and Lambert (1997), or JL (1997) for short. These authors study both the absolute case, in which there is a single poverty line for both situations under comparison, and the relative case, in which there are two different poverty lines representative of the standard of living in each of the two situations. In both cases orderings of distributions by

[1]For a recent analysis of this problem, see Lanjouw and Ravaillon (1995), and in the context of international poverty comparisons, see Burkhauser *et al.* (1996), De Vos and Zaidi (1997), and Duclos and Mercader-Prats (1999).

non-intersecting TIP curves correspond to unanimous poverty orderings according to a wide class of poverty indices which contain most of the measures actually used in applied work.

However, the only existing application of these methods (to the UK case in JL (1997)) does not deal with problem 3). Given a partition into ethically homogeneous subgroups, the quest for robustness in this direction calls for an investigation of the following two questions. i) Whether poverty is unambigously smaller in the JL sense in distribution y relative to distribution x for all subgroups of the basic partition. ii) Independently of the answer to this cuestion, in empirical applications we are usually interested in making statements for the population as a whole.[2] If we pool all households belonging to ethically heterogeneous groups by using some equivalence scales, a robust approach at the population level requires to study whether the results obtained by applying the JL methods change when we experiment with different equivalence scales.[3]

This paper, which applies the JL methods to the Spanish case, has four aims. Previous results in Del Río and Ruiz-Castillo (1996) allow us to conclude that, for all common absolute poverty lines, poverty has declined in Spain during the 1980s according to all poverty measures in a wide class which includes the poverty indices used in RHM (1994) and INE (1996). Since the standard of living in Spain differs widely in the two situations under comparison, the first aim of this paper is to investigate whether can generalized to the relative case. Furthermore, the JL methods allow us to answer the following question without using additional value judgements: by how much can we reduce the 1980-81 poverty line, maintaining constant the one corresponding to 1990-91, while preserving the unambigous poverty dominance conclusion? The second aim of the paper is to study the robustness problem 3). To make the analysis tractable, we apply the JL methods in the

[2] Assume that, as it is likely to be the empirical case, distribution y exhibits less poverty for some subgroups, while distribution x has less poverty for other subgroups in the basic partition Under the assumption that we are given a social ranking of all subgroups in the basic partition from the point of view of relative desert or increasing needs, Chambaz and Maurin (1998) have demonstrated that the Atkinson and Bourguignon (1987) dominance criteria in a utilitarian social welfare framework can be applied to the analysis of poverty when the demographic composition of society and the poverty lines differ in situations y and x.

[3] In view of note (2), it is important to point out that the JL methods do not require the assumption of a utilitarian social welfare function, or a ranking of the subgroups of the basic partition provided *a priori* to the analyst by society.

context of a model originally suggested by Buhmann *et al.* (1988) and Coulter *et al.* (1992a, 1992b), in which the only household characteristic which gives rise to differences in needs is household size. The third aim is to illustrate the advantages of the JL approach for the poverty analysis of other population partitions different from the partition by household size. For this purpose, we select the partition by Autonomous Communities.

The fourth and final aim of this paper is to improve upon previous research in two technical directions. On the one hand, JL (1997) only provide numerical comparisons of TIP curves, but it has been known for some time that such comparisosn might be affected by sampling variability. To account for that, we construct confidence intervals for the TIP curves in order to follow proper procedures of statistical inference to test for dominance, equality or non-comparability in pair-wise TIP comparisons. On the other hand, there exist different possibilities about how to approximate household welfare from the available information on income and/or household expenditures. RHM (1994) and INE (1996) use total household income or total household expenditures as reported in the EPF. Alternatively, we use a measure of current expenditures which includes several imputations and adjustments, net of the expenditures devoted to the acquisition of certain goods which are best considered as investment rather than current consumption.

The plan of the paper is as follows. Section 2 presents the TIP curve concept, as well as the theoretical results in the absolute and the relative cases. In Section 3 we take a brief look at our data, and present what we believe is a better definition of household welfare than the definitions used in previous poverty comparisons in Spain. Section 4 presents the empirical results for the subgroups of the basic partition by household size, the population as a whole and, for illustrative purposes, for the partition by Autonomous Communities. Section 5 provides some concluding comments. We use the approximations in large samples of the ordinates of the TIP curves to develop statistical inference procedures for poverty parcial orderings. In order to facilitate the reading of the text we relegate this question to a technical Appendix.

2. The Jenkins-Lambert approach

2.1 TIP curves and generalized poverty gaps poverty measures

Let there be a set of individuals $N = \{1, ..., n\}$, each of which characterized by a real number, x_i, which we will call income. *Let* $x = (x_1, ..., x_n)$ be the income distribution once incomes have been arranged in ascending order, so that $0 < x_1 \leq x_2 ... \leq x_n$; and let z be a critical economic level, known as the poverty line, which implicitly defines the set of poor people, $T(x, z) = \{i \in N : x_i < z\}$, comprising all individuals whose income does not reach this level.

Let g_x be the vector of poverty gaps associated with distribution x and the poverty line z, where for each i, $g_{xi} = max\{z - x_i, 0\}$. Many familiar poverty indices may be defined as functions of the vector g_x. For later reference, let P be the class of replication invariant, increasing and Schurr-convex functions of poverty gap vectors. In fact, many poverty indices can be expressed solely in terms of the vector of normalized poverty gaps, Γ_x, where each of its element is defined by:

$$\Gamma_{xi} = \frac{g_{xi}}{z} = \max\left\{\frac{z - x_i}{z}, 0\right\}.$$

Let Q be the class of replication invariant, increasing and Schurr-convex functions of normalized poverty gap vectors. Clearly, $Q \subseteq P$.[4]

Let q be the number of poor people. The TIP curve of poverty gaps, denoted by TIP$(g; p)$, where $0 \leq p \leq 1$, plots against p the sum of the first $100 \cdot p$ percent of g-values divided by the total number of receiving units. Thus TIP$(g; 0) = 0$ and for integer values $q, q \leq n$,

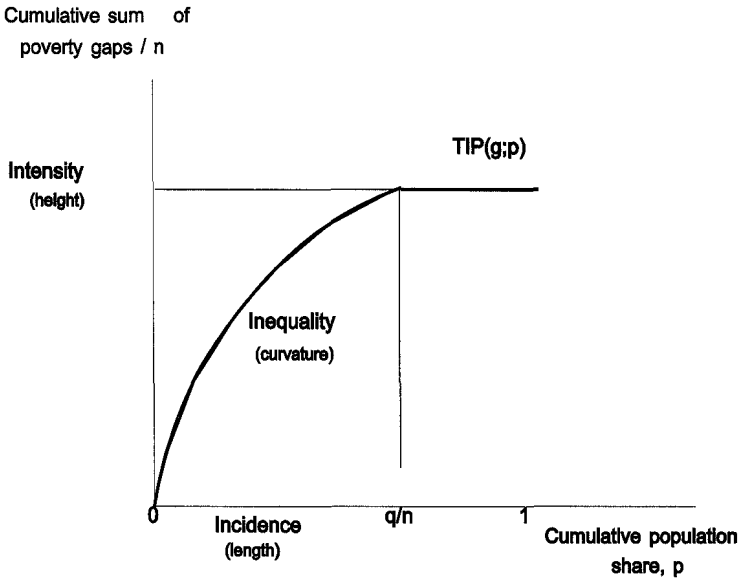
$$TIP(g; q/n) = \frac{\sum_{i=1}^{q} g_i}{n}.$$

Figure 1 from JL (1997) illustrates some of the TIP's good properties. The Incidence aspect of poverty is summarized by the length of the TIP curve's non-horizontal section. The headcount ratio is that $p = q/n$ at which the curve becomes horizontal. The Intensity is summarized by the TIP curve's height, since the vertical intercept at $p = 1$ is the aggregate poverty gap averaged across all households. The Inequality

[4] See Table 1 in JL (1998) for examples and counter-examples of well known poverty indices in the classes P and Q.

aspect is summarized by the degree of concavity of the non-horizontal section of the TIP curve. If all the households' poverty gaps were equal, this section would be a straight line with slope equal to $(z - x_i)$. The TIP curve for normalized poverty gaps, denoted TIP$(\Gamma; p)$, has the same shape properties and it shows equally well the Incidence, Intensity and Inequality dimensions of aggregate poverty.[5]

FIGURE 1
Properties of TIP curve



2.2 *Poverty dominance results*

Given two income distributions, x and y, and any two poverty lines, z_x and z_y, we may calculate the TIP curves associated with each distribution of poverty gaps, TIP_{gx} and TIP_{gy}. We say that the distribution g_x dominates in the TIP sense the distribution g_y, when the TIP_{gx} curve does not lie below the TIP_{gy} curve at any point. Thus, g_x TIP dominates g_y if TIP$(g_x) \geq$TIP(g_y) for all p. Strict TIP dominance demands that this inequality be strict for some p.

[5]In previous versions of the paper, JL (1995) labelled this TIP$(g; p)$ curve the Inversed Generalized Lorenz curve, following the terminology introduced by Jenkins (1991, 1994) who used the device for wage discrimination measurement. See JL (1997) for other uses and names of the same curve in Yitzhaki (1991), Hannah and Kay (1977) and Shorrocks (1993, 1997), as well as for the relation between the TIP$(\Gamma; p)$ and Shorrocks (1995) modified-Sen poverty index

The first result is that dominance of un-normalised poverty gaps is equivalent to a unanimous poverty ordering by all indices in P for all common poverty lines set at z or lower. Formally, given any two income distributions x and y and a common poverty line z, TIP dominance of g_x over g_y is necessary and sufficient to ensure that $P(y|z') \leq P(x|z')$ for all common poverty lines $z' \leq z$, and for all poverty indices $P \in P$. This is Theorem 1 in JL (1998). Furthermore, Theorem 2 shows that the Generalized Lorenz dominance of y over x can only occur if the distribution g_x dominates in TIP sense the distribution g_y for all common poverty lines.[6]

However, this result is not as definitive as it may seem at first glance. The common poverty line used so far provides an absolute view which does not allow for different poverty standards in the distributions being compared. But the fact that one distribution has less poverty than another for any common poverty line, does not imply that this result will be maintained for different lines. The use of different poverty lines is particularly interesting when we want to compare poverty levels in different countries or at different points in time for the same country. Fortunately, given two different poverty lines z_x and z_y, TIP dominance of normalized poverty gaps is equivalent to a unanimous poverty ordering by all indices in Q for all pairs of poverty lines $(r \cdot z_x, r \cdot z_y)$ with $r \in (0, 1]$ which keep the same relationship as the original z_x and z_y. (This is Theorem 3 in JL (1998)).

Finally, given two poverty lines z_x and z_y, whenever TIP(Γ_x, p) dominates TIP(Γ_y, p) there may be room to lower the poverty line for distribution x alone, the poorer distribution, while preserving the poverty ranking between x and y in the subclass Q. (This is Theorem 4 in JL (1998)). The interesting point is that the extent to which this may be done is revealed by the poverty gap data themselves and does not require any new value judgement. The intuition is that when the TIP curve for x lies everywhere above that for y, there is scope for lowering TIP(Γ_x, p) while mantaining non-intersecting TIP curves of normalized poverty gaps and the ordering for the subclass Q.

Thus, JL methods serve to characterize all situations where income distributions may be ordered unambiguously in terms of different choices of both poverty lines and aggregate poverty indices. Furthermore, unlike Lorenz curves in the field of inequality, TIP curves allow us to

[6] See also JL (1998) for the connection between these two theorems and the previous results in Atkinson (1987) and Foster and Shorrocks (1988a, 1988b).

express in a quantitative manner the poverty differences between the distributions under comparison.

3. Data and the definition of household welfare

3.1 Data

Our data comes from two large budget surveys, the EPFs for 1980-81 and 1990-91. They consist of 23,972 and 21,155 observations, representative of a population of approximately 10 and 11 million households, respectively, occupying residential housing in all of Spain including the northern African cities of Ceuta and Melilla. As several authors have pointed out, the use of the EPFs in studying poverty presents advantages as well as a number of disadvantages –see Mercader-Prats (1993), RHM (1994) and INE (1996). To the classic problems regarding the lack of response or the underestimation of reported income by certain segments of the population, it is necessary to add those shortcomings which are particularly relevant when dealing with poverty. We refer to the exclusion in the sample of some of the more marginal strata of the population: the homeless and people who live in accommodations not covered in the survey, i. e. residences for the aged, prisons, hospices, boarding houses, etc. The EPFs, however, are the only large and comparable micro surveys in Spain where, together with very rich and comparable data on household income and expenditures, we are provided with detailed information on the demographic, geographic and socioeconomic household characteristics. In this paper we use the EPFs, although we are aware that the results obtained should be completed with data from other sources directly involving the population not covered by them.

3.2 The definition of household welfare in real terms

There is general agreement about the desirability of identifying household welfare with some measure of permanent income or consumption. The question, of course, is how best to approximate the ideal measurement with the data on income and expenditures typically available in household budget surveys. In the case of the Spanish EPF, we should remember how different are the processes followed by the INE to estimate annual hosehold income and household expenditures –see INE (1992). Therefore, as pointed out in Ruiz-Castillo (1999), we should not be surprised about the fact that a majority of the population have

household expenditures larger than household income. The problem is that using income or expenditures to approximate the household standard of living is not an innocous decision. Mercader-Prats (1998), RHM (1994) and INE (1996) highlight how this decision conditions the results on the intensity and the composition of poverty.

Ruiz-Castillo (1999) provides *a priori* reasons to favor household expenditures over household income. The work by Sanz (1996), comparing the 1990-91 EPF with the National Accounts, indicates that there are fundamental difficulties with the measurement of both household disposable income and household expenditures, although in our opinion the defficiencies in the income side are even more serious. Using the EPF of 1980-81, Mercader-Prats (1998) shows that household expenditures provide a better proxy for long-run welfare than household income.

Both RMH (1994) and INE (1996) use total household monetary income or expenditures as reported in the public use tapes, although both study the imputations for home production and wages in kind, subsidized meals at work, and implicit rental value for non-rental housing.[7] Like Slesnick (1991, 1993), we approximate household welfare by the best possible measure of current consumption. Lacking information on leisure and public goods consumption, our starting point must be household total expenditures as an approximation to household consumption of private goods and services. The EPF has a rather wide concept of total expenditures, including expenditures on items not covered by the Consumer Price Index (like funeral articles; contributions to non-profit institutions; gambling expenditures; fines; hunting, fishing and other fees), as well as the imputations already mentioned. To avoid double counting, transfers to other households or to household members absent from home are excluded.

Recently, bulk purchases of food and drinks for home consumption have been gaining popularity among certain strata from the more urbanized population. This might not cause a major problem in 1980-81 but, concerned with the gradual extent of this practice during the 1980s, the INE collected partial but valuable information on bulk purchases for the 1990-91 EPF. However, this information is not taken into account in the estimates of annual food expenditures contained

[7]For both owner-occupied housing and the rest of the stock which is neither rented nor owned, such rental values are the estimates reported by the owner or the occupying household, respectively.

in the public use tape constructed by the Institute. Fortunately, Peña and Ruiz-Castillo (1998) have studied this issue in some detail, and have produced improved estimates of food and drinks annual expenditures using all the available information on bulk purchases. These estimates have been incorporated in our household total expenditures measure.[8]

Our experience with the 1980-81 EPF indicates that discontinuous household expenditures on some durables, whose occurrence may distort heavily the total, are best considered investment rather than consumption. These refer to current acquisitions of cars, motorcycles and other means of private transportation, as well as house repairs financed by either tenants or owner-occupiers. Life and housing insurance premiums are excluded on the same grounds. Thus, our estimate of household current consumption equals total household expenditures, net of these investment items. Ideally, the elimination of current expenditures on the acquisition of those durables should be accompanied by the inclusion of an estimate of the consumption services currently provided by these investment flows as well as by the stock of household durables acquired in the past. We can do this only for housing —without doubt the more important household durable— because the INE provides an imputed rental value.

Thus, we approximate household current consumption by a rather complete measure of current household expenditures on private goods and services, net of the expenditures for the acquisition of certain durables and other savings items.

In order to make comparisons in real terms, RHM (1994) and INE (1996) use a common inflation rate for all 1980-81 households. To take into account the possible distributional impact of changes in relative prices, we express household expenditures at constant prices of the Winter of 1991 by means of household specific statistical price indices. These have been constructed in Ruiz-Castillo *et al.* (1999), using the information on individual commodity prices contained in the official Consumer Price Index system with 1983 as the base year. These indices are statistical price indices of the Laspeyres type, which provide an upper bound to the true cost of living indices based on household preferences. For the population as a whole, Del Río and Ruiz-Castillo (1996) show that the evolution of relative prices during

[8] These estimates, together with some minor adjustments in the imputations provided in the public use tapes, are available in http://www eco.uc3m.es/epf90-91.html.

the 1980s was distributionally neutral. Hence, although our procedure to make intertemporal comparisons in real terms is conceptually more satisfactory than the one used in previous studies, we cannot expect large differences in our results on these grounds alone.

4. Poverty trends in Spain

4.1 The Basic Partition

In this paper we assume that the only characteristic which gives rise to differences in socially relevant needs is household size.[9] Thus, only the expenditures of households of the same size are directly comparable. Table 1 presents some basic statistics about the demographic composition of the population and mean household expenditures by household size. In this and the following Tables, the symbol Δ always refers to the rate of change between 1980-81 and 1990-91, in percentage terms, of the variable to the left, i.e. $\Delta = 100 \cdot (1990\text{-}91 - 1980\text{-}81)/1980\text{-}81$. All results are computed using the blowing up factors provided by the INE, which permit to convert sample statistics into population statistics.

TABLE 1
Demographic composition of the population and mean household expenditures by household size (in thousands pesetas)

Household size	Population shares (%)			Mean household expenditures		
	1980-81	1990-91	Δ in %	1980-81	1990-91	Δ in %
1 person	7 8	10.0	28.2	803	1,088	35 5
2 persons	21.1	22.3	5.7	1,346	1,679	24.7
3 persons	18 6	20 8	11.8	1,865	2,363	26 7
4 persons	23.6	25.0	5.9	2,211	2,902	31.3
5 persons	14 9	13.2	-11 4	2,394	3,051	27 4
6 persons	7.7	5.4	-29.9	2,535	3,244	28.0
7 persons	3 6	2 2	-38 9	2,799	3,273	16.9
8 or + persons	2.7	1.1	-59.3	2,988	3,675	23.0
ALL	100.0	100.0	---	1,949	2,391	22.7

Δ = Rate of change during the 1980s in percentage terms

Households of 4 or fewer persons have more weight in 1990-91 than in 1980-81, while the opposite is the case for larger households. In both years, mean household expenditures grow with household size

[9] An alternative would be to recognize that children may have lesser needs than adults. For the impact of this distinction on headcount ratios, see Duclos and Mercader-Prats (1999).

although, in most cases, at a decreasing rate. Due to limitations in the sample size, in the rest of this subsection we will only study the subgroups consisting of 1 to 7 persons.

a). The absolute case

For many people, a constant absolute common poverty line in real terms provides an adequate reference point for analysis of trends in living standards. This could be particularly justified in a situation like ours in which household specific price indices have been used to express both distributions at constant prices. Therefore, let us begin by setting a single poverty line for each subgroup in both time periods equal to 50 per cent of the 1980-81 mean household expenditures (see column 1 in Table 2). Columns 2 and 3 in Table 2 present the headcount ratio in each year, while column 4 refers to the percentage change in headcount ratios from 1980-81 to 1990-91. The last three columns of Table 2 present analogous information for the average poverty gap.

TABLE 2
The Incidence and Intensity of poverty in the absolute case in the partition by household size. The single poverty line in each subgroup (in thousands pesetas) fixed at 50 per cent of the subgroup's 1980-81 mean household expenditures

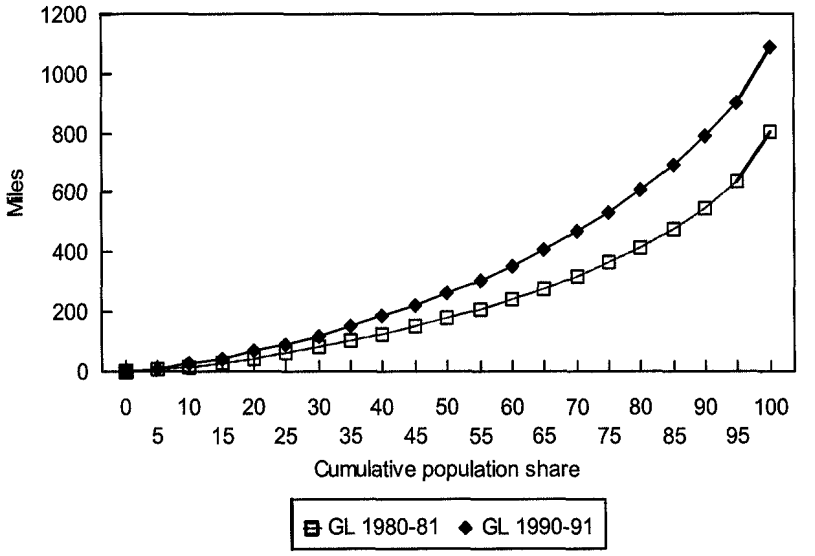
Household size	Absolute poverty lines	Headcount (%) 1980-81	1990-91	Δ in %	Average poverty gap 1980-81	1990-91	Δ in %
1 person	402	30.4	13 2	-56.6	39	15	-61.5
2 persons	673	22.3	10.2	-54 3	42	15	-64.3
3 persons	933	16.5	5.5	-66 7	40	11	-72 5
4 persons	1,105	12 1	4.3	-64.5	31	10	-67.7
5 persons	1,197	13.7	4.7	-65.7	39	12	-69.2
6 persons	1,267	12.2	4 2	-65.6	34	13	-61.8
7 persons	1,399	14.3	7.8	-45 5	51	24	-52 9

Δ = Rate of change during the 1980s in percentage terms

The first thing to notice is that, for this particular set of absolute poverty lines, both the Incidence and the Intensity of poverty (measured by the proportion of people in poverty and the average poverty gap, respectively) have decreased in Spain during this period for all household sizes. The next question, of course, is the robustness of poverty trends to the change in poverty lines and to other poverty indices sensitive to household expenditures inequality among the poor. For that purpose, we have compared the generalized Lorenz curves for each household size in 1980-81 and 1990-91. In all cases, the 1990-91 generalized Lorenz curve strictly dominates the 1980-81 one. The implication is that, for all possible common poverty lines, poverty has

diminished for all subgroups during the 1980s according to all poverty measures the class P. In Figure 2 we illustrate the case for single person households.[10]

FIGURE 2
Generalized Lorenz curves
Single person households



b). The relative case

Even if the household specific price indices we use do a good job in allowing us to make comparisons in real terms which take into account the distributional role of changes in relative prices, many people would insist that poverty inferences should be made recognizing the differences in the standard of living in the two situations.[11]

We begin the analysis of the relative case by fixing both poverty lines at 50 per cent of their own mean household expenditures for each household size. Table 3 presents the poverty lines, the headcount ratios, and the average normalized poverty gaps in the two situations, as well as the poverty change measured by the difference of headcount ratios and average normalized poverty gaps in percentage terms.

[10] Statistical details on these comparisons, as well as on all the remaining ones reported in this Section, are available upon request.

[11] JL (1998) provides an illuminating example in which one distribution has less poverty than another for all common absolute poverty lines. However, after allowing for the fact that the first distribution enjoys a higher standard of living the conclusion is reversed.

TABLE 3
The Incidence and Intensity of poverty in the relative case in the partition by household size. The single poverty line in each subgroup (in thousands pesetas) fixed at 50 per cent of the subgroup's 1980-81 mean household expenditures in 1980-81 and 1990-91

Household	Poverty lines			Headcount ratio (%)		Δ	Average normalized poverty gap		Δ
	1980-81	1990-91	90/80	1980-81	1990-91	in %	1980-81	1990-91	in %
1 person	402	544	1.3532	30.4	25.6	-15.8	0.0982	0.0785	-20.1
2 persons	673	839	1.2467	22.3	18.8	-15.7	0.0618	0 0465	-24 8
3 persons	933	1,182	1.2669	16.5	13.3	-19.4	0.0428	0 0282	-34.1
4 persons	1,105	1,451	1.3131	12.1	12.3	1.6	0.0279	0 0255	-8.6
5 persons	1,197	1,525	1.2740	13.7	11.4	-16.8	0.0325	0 0246	-24.3
6 persons	1,267	1,622	1.2802	12.2	11.6	-4.9	0.0267	0.0247	-7.5
7 persons	1,399	1,636	1 1694	14.3	13.1	-8.4	0.0363	0 0287	-20.1

Δ = Rate of change during the 1980s in percentage terms

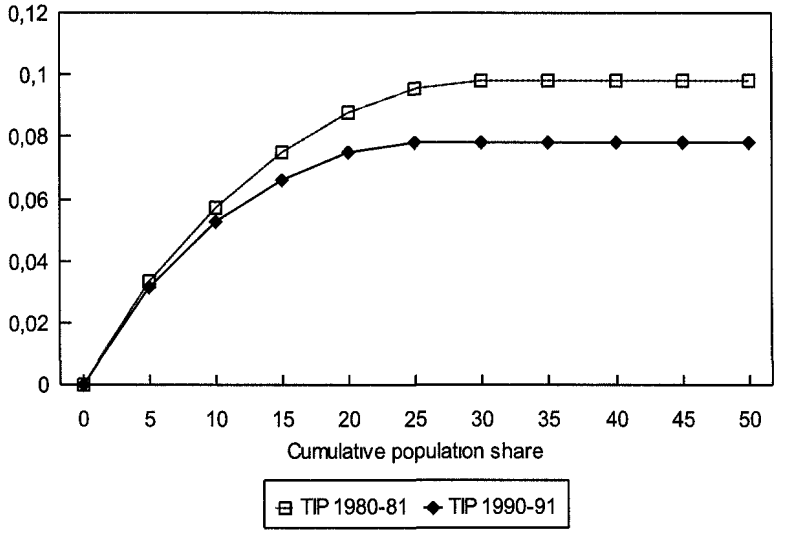
Reflecting the higher standard of living at the end of the decade, the 1990-91 poverty line is higher than the one for 1980-81 for all subgroups. Consequently, the 1990-91 headcount ratios have increased relative to the values in column 3 of Table 2. For 4 person households the headcount ratio is now slightly greater in 1990-91 than in 1980-81, while for the remaining subgroups the reduction in the poverty Incidence is smaller than what we observe in column 4 of Table 2. Similarly, the Intensity of poverty has diminished in all subgroups (column 9 of Table 3) but by a smaller percentage than what we observe in column 7 of Table 2.

Applying JL's methods, in the first place one can investigate the robustness of these patterns within the class Q of poverty measures which, in addition to the Incidence and the Intensity of poverty, reflect Inequality considerations among the poor. For that purpose, we compare the TIP curves of normalized poverty gaps in 1980-81 and 1990-91 for each subgroup. For households consisting of 1, 2, 3, and 5 persons the TIP curve of 1980-81 strictly dominates the 1990-91 one. Figure 3 illustrates the result for single person households.

The implication for any of these subgroups is that, for all pairs of poverty lines $(r \cdot z_x, r \cdot z_y)$ with $r \in (0, 1]$ which stand in the same relation as the mean household expenditures in 1980-81 and 1990-91, the 1990-91 household expenditures distribution exhibits less poverty than the 1980-81 one for all poverty indices in the class Q. For single person households, for example, this ratio of poverty lines –which reflects the different standards of living in the two situations under comparison– equals $544/402 = 1.3532$ (see column 3 of Table 3).

Thus, the result holds whenever the poverty line for 1990-91 is 35.3 per cent greater than the 1980-81 poverty line. For the remaining households –consisting of 4, 6 and 7 persons– we find that the 1980-81 TIP curve weakly dominates the 1990-91 TIP curve.[12] For four person households, for example, the implication is that whenever the poverty line for 1990-91 is 31.3 per cent greater than the 1980-81, we can only assert that the 1990-91 distribution has less or equal poverty than the 1980-81 distribution.

FIGURE 3
TIP curves of normalized poverty gaps
Single person households



In the second place, JL methods allow us to stress in a quantitative way the extent of the poverty differences between two distributions in the relative case. Looking at Figure 3, for example, one can ask the following question for single person households: maintaining the poverty line for 1990-91 at 50 per cent of its mean household expenditures (i.e., 544,000 pesetas), how far can we lower the poverty line for 1980-81 from 402,000 pesetas and still conclude that its TIP curve for normalized poverty gaps weakly dominates the 1990-91 one in a statistically significant sense? The results are summarized in Table 4. Column 1 in Table 4 reproduces the initial 1980-81 poverty line fixed at half the mean household expenditures for each subgroup. Column 2 provides the lowest value for the 1980-81 poverty line which implies the above result, while column 3 indicates which percentage of the 1980-

[12] For 7 person households, this result is possibly due to the reduced sample size of the subgroup (see Table 1).

81 mean household expenditures this value represents. The symbol * attached to a particular subgroup, serves to remind ourselves when we have only weak dominance between the TIP curves.

TABLE 4
TIP dominance in the relative case in the partition by household size

Household size	Poverty lines	Lowest poverty lines		Lowest numerical poverty lines	
	1980-81	1980-81	%Mean	1980-81	% Mean
1 person	402	337	42.0	370	46.0
2 persons	673	579	43.0	619	46.0
3 persons	933	767	41.1	823	44.1
4 persons*	1,105	1,039	47.0	1,083	49 0
5 persons	1,197	1,029	43.0	1,101	46.0
6 persons*	1,267	1,115	44.0	1,242	49 0
7 persons*	1,399	1,119	40.0	1,315	47 0

Leaving aside the case of 7 person households due to its reduced sample size, the subgroups which allow for a greater margin in reducing the 1980-81 poverty line are the single person and 3 person households. However, if we were to fix the 1980-81 poverty line for 4 person households below the 47 per cent of their mean expenditures, we would not be able to maintain the weak dominance of the 1980-81 TIP curve. This means that there would exist some poverty indices in the class Q for which poverty in 1980-81 would be less than in 1990-91.

Statistical inference procedures are decisive to reject crossings or dominance relations between TIP curves due only to sampling variability. In addition, statistical methods should lead to more precise estimates. The last two columns in Table 4 present the information on the lowest 1980-81 poverty line computed by numerical methods as in JL (1997). As expected, we observe that the statistical methods lead to larger intervals than the numerical ones; the differences oscillate from 2 to 7 percentage points.

4.2 The population as a whole

The Spanish case during the 1980s is rather exceptional: as we have seen for all household sizes, absolute and relative poverty at constant prices in 1990-91 is less or equal than in 1980-81 according to all poverty indices in a wide class. Nevertheless, it is always interesting to study the situation for the population as a whole. For this purpose, we can pool all households in a single distribution of comparable household expenditures by using some equivalence scales.

As indicated in the Introduction, in this paper we limit ourselves to a single parameter equivalence scales model first suggested by Buhmann *et al.* (1988) and Coulter *et al.* (1992a, 1992b). If we let s denote household size, then adjusted income for each household i is defined by

$$u_i(\theta) = \frac{x_i}{(s_i)^\theta}, i = 1, ..., n \text{ and } \theta \in [0, 1] .$$

When $\theta = 0$, adjusted income coincides with unadjusted household income, while if $\theta = 1$, it becomes per capita household income. Taking a single adult as the reference type, the expression s^θ can be interpreted as the number of equivalent adults in a household of size s. Thus, the greater is the equivalence elasticity θ, the smaller are the economies of scale in consumption or, in other words, the larger is the number of equivalent adults.[13]

In the absolute case, there is little to be learned: the fact established in the previous subsection that the generalized Lorenz curve for each household size in 1990-91 strictly dominates the one for 1980-81, ends the issue of the robustness of the reduction of poverty to the way we pool households of all sizes into a single household distribution. On the other hand, this fact completely explains the results in Del Río and Ruiz-Castillo (1996) for the population as a whole about the generalized Lorenz dominance of the 1990-91 household expenditures distribution over the 1980-81 one for different values of the parameter θ.[14]

In the relative case, the results of the previous subsection leave open only two questions at the population level: i) whether there is strict or weak dominance for the different θ values, and ii) the margin by which we can lower the 1980-81 poverty line and still maintain weak dominance in the TIP sense. For the sake of completeness, we include in Table 5 all relevant information about poverty lines fixed at 50

[13] Evidently, the use of this equivalence scales model involves restrictions on household preferences implying that the adjustment procedure is independent of both household utility levels and relative prices. The authors have been using this model quite extensively to study the evolution of inequality and welfare in Spain using the 1973-74, 1980-81 and 1990-91 EPFs see Ruiz-Castillo (1995, 1998), Del Río and Ruiz-Castillo (1996, 1997), and Ruiz-Castillo and Sastre (1999).

[14] Using appropriate methods of statistical inference, INE (1996) also finds that the 1990-91 distribution dominates the 1980-81 one in the generalized Lorenz sense. Applying Shorrocks (1983) results, this study concludes that social welfare has increased during the 1980s. However, it does not extract the pertinent implications for poverty trends in the case of a common absolute poverty line.

per cent of mean household expenditures, headcount ratios, average normalized poverty gaps and the lowest 1980-81 poverty lines compatible with maintaining weak dominance of the 1980-81 TIP curve of normalized poverty gaps over the 1990-91 one.

TABLE 5
The evolution of the Incidence and Intensity of poverty, as well as TIP dominance results in the relative case for the population as a whole Poverty lines in each period (in thousands pesetas) are fixed at 50 per cent of the period's mean household expenditures

	Poverty lines			Headcount ratio (%)		Δ	Average normalized poverty gap		Δ	Lowest poverty line	
	1980	1990	90/80	1980	1990	in %	1980	1990	in %	1980	% Mean
θ=0.0	974	1,196	1.2279	22 0	20.8	-5.4	0.077	0.069	-10.4	896	46 0
θ=0 2	750	934	1.2453	19.9	18.4	-7.5	0.063	0.054	-14.3	690	46.0
θ=0.4	582	737	1.2663	18.2	16.5	-9.3	0.053	0.044	-16.7	524	45.0
θ=0.7	405	525	1.2963	17.3	15.4	-11.0	0.045	0.036	-20.0	373	46.0
θ=1.0	289	383	1.3253	18.8	17.0	-9.6	0.049	0.040	-18.4	266	46.0

Δ = Rate of change during the 1980s in percentage terms

For all θ, both the Incidence and the Intensity of poverty have decreased over the 1980s. Moreover, the comparison of TIP curves of normalized poverty gaps leads us to conclude that the TIP curve for 1980-81 strictly dominates the 1990-91 one for all values of θ. In the case of $\theta = 0.4$, for example, this means that whenever the 1990-91 poverty line is fixed 26.6 per cent above the one for 1980-81, poverty in 1990-91 is less than in 1980-81 for all poverty indices in the class Q.

At first sight, these results may appear redundant relative to those obtained in RHM (1994) and INE (1996), who are unanimous in stating that absolute and relative poverty have decreased. Nevertheless, we should not overlook the following three facts. In the first place, we use what we believe is the best measure of household welfare that can be obtained from the information on household income and expenditures contained in the EPF (see Section 3). In the second place, the conclusions obtained in those other papers are only valid for a host of poverty measures and poverty lines for a few equivalence scales.[15]

[15] RHM (1994) uses the headcount ratio, the relative poverty gap, the Sen Index and two members of the Foster, Greer and Thorbecke family. In an exploratory analysis using the headcount ratio they use a dozen poverty lines, although most of the analysis is done with a single poverty line They use household income and expenditures per capita and two versions of the OCDE equivalence scales. INE (1996) uses the headcount ratio, the relative poverty gap, the Hagenaars Index and three members of the Foster, Greer and Thorbecke family. Poverty lines are fixed

Conversely, the JL methods allow us to establish these conclusions for a much wider set of poverty indices and, specially, for a far broader set of poverty lines which capture –for each value of the parameter θ– the increase in the standard of living in 1990-91 relative to 1980-81 (see column 3 in Table 5). In the third place, as we will see in a moment, the JL methods allow us to search for the lowest 1980-81 poverty line compatible with weak dominance of the 1980-81 TIP curve.

Within a given subgroup of the basic partition the poor have always the same household size. However, the composition of the poor for the population as a whole includes households of all sizes. Consequently, we expect that we cannot reduce the 1980-81 poverty line for the entire population by as much as for any individual subgroup taking separately. The results in the last two columns of Table 5 indicate that the lowest 1980-81 poverty line which ensures a poverty reduction during the 1980s for the population as a whole represents a practically fixed proportion of the mean household expenditures (46 per cent) for all θ values.[16] The order of magnitude of this interval is also robust to changes in the 1990-91 poverty line: when we fix this poverty line at 60 (or 40) per cent of the 1990-91 mean household expenditures, the lowest level at which we can set the 1980-81 poverty line is 56 (36) per cent of the 1980-81 mean.

Thus, the more general statement that we can offer for the population as a whole is that, for all values of θ and independently of whether we fix the 1990-91 poverty line at 40, 50 or 60 per cent of the 1990-91 mean household expenditures, we can set the 1980-81 poverty line at 36, 46 or 56 per cent of its own mean respectively and still conclude that poverty in 1990-91 is less or equal than poverty in 1980-81 according to all poverty indices in the class Q.

4.3 Poverty trends within Autonomous Communities

To illustrate our approach to the study of poverty trends in other partitions different from the partition by household size, we select the partition by Autonomous Communities. To simplify matters, it is convenient to choose a single value of the parameter $\theta = 0.4$. We concentrate on the more interesting of the two cases, namely, the rela-

at 25, 40 and 50 per cent of the mean household expenditures per capita.

[16] As we saw in relation to the basic partition, using numerical methods leads to a smaller interval: at the population level the poverty line can be fixed at 47 per cent of the 1980-81 mean household expenditures for all θ values.

tive case. A view of relative poverty has led us already to fix poverty lines as a function of the standard of living in the two periods under comparison. But for any partition of the population, how rich and poor subgroups do relative *to their own internal standards* may or may not coincide with how they do relative to *national standards* which, by construction, are more demanding for the poor than for the rich subgroups. Therefore, in this subsection we present two points of view which we find complementary, depending on whether poverty lines are fixed according to *their own internal standards* or to *national standards.*

Suppose we rank Autonomous Communities in terms of the poverty change in the first case. Consider one of them for which poverty decreases during the 1980s. If its mean household expenditures changes above the national mean, then we would expect that it will experience a greater poverty reduction when we fix the poverty lines using the *national standards.* On the contrary, if its mean household expenditures worsens relative to the population as a whole, the poverty reduction will be of a smaller order of magnitude or it may even vanish. Thus, the initial ranking, together with the change in mean adjusted household expenditures relative to the whole population, will allow us to understand the final ranking.

This strategy can be pursued using several poverty measures and alternative poverty lines. The TIP approach has the advantage that it provides a certain cardinal measurement of poverty change for a wide class of poverty measures and a continuum of poverty lines. Let us begin by fixing the 1990-91 poverty line for each Autonomous Community at 50 per cent of its mean adjusted household expenditures. Whenever the 1980-81 TIP curve dominates[17] the 1990-91 one, we ask by how much we can reduce the 1980-81 poverty line and still preserve the dominance relationship. In the left-hand side of Table 6, the first group of Autonomous Communities is ordered according to the amount by which this reduction is possible. Then comes Cataluña and the País Vasco for which there is a crossing between the two TIP curves. Finally, we have Extremadura and La Rioja for which the TIP curve for 1990-91 dominates the one for 1980-81, revealing that when poverty lines are fixed according to these Communities own standards, poverty has increased during the 1980s. The central part of Table 6

[17] In this subsection all comparisons are numerical because, due to the small size of certain Autonomous Communities, statistical comparisons are not possible.

presents the information on the rate of change of mean adjusted household expenditures in each Autonomous Community in relation to the overall change that, when $\theta = 0.4$, is an increase in real terms equal to 26.6 per cent. In the righ-hand side of Table 6, Autonomous Communities are ordered according to the size of the reduction in the 1980-81 or 1990-91 poverty line, but when poverty change is measured in terms of a single poverty line fixed at 50 per cent of the mean adjusted household expenditures for the population as a whole.

TABLE 6
TPI dominance in the relative case in the partition by Autonomous Communities when θ=0 4

Autonomous Communities	Lowest numerical poverty line within Community % Poverty line	Mean Household Expenditures Δ within/Δ national	Autonomous Communities	Lowest numerical national poverty line % Poverty line
Asturias*	38.6	1.22	Asturias*	36.9
Andalucía*	43 0	1.06	Castılla-M*	42 2
Navarra*	44.0	1 03	Navarra*	43.0
Baleares*	45.0	1.15	Andalucía*	43.5
Castilla-M*	46.0	1 56	Baleares*	43.6
Castilla-L*	46.0	0.94	Cataluña*	47.0
Cantabria*	47 0	0 24	Castilla-L*	47.0
C. Valenciana*	47.0	0.52	Canarıas*	47 2
Galicia*	47 1	0 74	Madrid*	48.0
Canarias*	48.0	1.17	Extremadura*	49.1
Murcia*	48.0	0 80	Galicia*	49.8
Aragón*	48.0	0.59	Murcıa*	50.0
Madrid*	48.9	1 12	C. Valenciana	crossıng
Ceuta-Melılla*	50 0	0 18	Aragón	crossing
Cataluña	crossing	1.29	Cantabria**	48.0
País Vasco	crossıng	0 75	La Rioja**	46 6
Extremadura**	49.0	1 27	País Vasco**	46.0
La Rioja**	47 6	0 90	Ceuta-Melılla**	42 8

* . The TIP curve for 1980-81 dominates the TIP curve for 1990-91
** The TIP curve for 1990-91 dominates the TIP curve for 1980-81

The results can be summarized as follows. Which Autonomous Communities did well under their own and under national standards? Asturias, Andalucía, Navarra and Balerares. Which Autonomous Communities gained positions because their improvement in real terms is, on average, greater than for the population as a whole? Cataluña and Extremadura, which come from the last two groups in the initial ranking, Castilla La Mancha and perhaps Madrid which gains 4 positions from the first to the final ranking. Which Autonomous Communities exhibit greater poverty in 1990-91 (or crossing) according to both criteria?

The País Vasco and La Rioja. Which Autonomous Communities did worse according to national standards than according to their own? The Comunidad Valenciana and Aragón, for which the poverty in the second situation becomes non-comparable, and Cantabria and Ceuta and Melilla for which the final ranking indicates that poverty increased during the 1980s.

5. Conclusions

There are a number of valuable studies on the evolution of aggregate poverty in Spain using the EPFs of 1980-81 and 1990-91. In this paper we provide a more definitive treatment of this question by applying the robust approach to the choice of the poverty line and the poverty index pioneered by JL in their analysis of the UK during the same time period. Relative to this important study, we introduce two improvements. In the first place, we adopt a robust approach to the problem posed by the demographic heterogeneity of the household population by applying the JL methods in a simple model in which the equivalence scales are assumed to depend only on household size. In the second place, we apply statistical inference procedures rather than numerical methods to poverty comparisons.

Previous studies of the Spanish case have established that for a number of poverty lines and poverty indexes, both in the absolute and the relative case aggregate poverty has decreased during the 1980s. Our results differ from the previous ones in a number of respects.

1. RHM (1994) and INE (1996) measure household welfare by total household income or total household expenditures as they appear in the public use tapes for the 1980-81 and 1990-91 EPFs. In our case, we use what we believe to be the best possible approximation to the household current consumption of private goods and services.

2. INE (1996) considers only household income and expenditures per capita, while RHM (1994), in addition, considers two more equivalence scales. We begin by comparing the aggregate poverty for each subgroup of the basic partition by household size. We establish that for all household sizes poverty in 1990-91 is less than or equal to poverty in 1980-81 for all members of a wide class of poverty measures. Taking the two extreme cases of one- and two-person households, we find that this is true for all pairs of poverty lines in which the 1990-91 one is 35.3 and 24.6 per cent greater, respectively, than the 1980-81 one.

Furthermore, maintaining the 1990-91 poverty line at 50 per cent of its mean household expenditures, we can reduce the 1980-81 poverty line for three- and four-person households down to 41 and 47 per cent of its own mean household expenditures, respectively, and still conclude that there is less or equal poverty in 1990-91 than in 1980-81.

3. For the population as a whole, the more general statement we can support is that, for all values of the parameter which represents the importance we want to give to economies of scale in consumption, and independently of whether we fix the 1990-91 poverty line at 40, 50 or 60 per cent of the 1990-91 mean household expenditures, we can set the 1980-81 poverty line at 36, 46 or 56 per cent of its own mean, respectively, and still conclude that poverty in 1990-91 is less or equal than poverty in 1980-81 according to all members in a wide class of poverty measures which are functions of normalized poverty gaps.

4. Carrying a relative view of poverty to the analysis of any population partition different from the partition by household size, we distinguish between poverty comparisons for each subgroup according to *their own living standards* and according to *national standards*. For the case of Autonomous Communities, we show that difference in rankings under these two sets of standards can be explained by taking into account the behavior of each Autonomous Community's mean household expenditures relative to the population as a whole. Of course, all poverty comparisons are made for all relative poverty lines and all poverty measures allowed by JL methods.

Appendix A1: On statistical methods

The comparison of TIP curves is a valuable device to test for the presence of robust poverty orderings. Unfortunately, as with the Lorenz curves, the TIP dominance relation provides only a partial ordering of distributions of poverty gaps. Thus, there are three possible results: dominance, equality and non-comparability. Current experience with Lorenz curves indicates that many of the crossings observed in practice are only the result of sampling variability, and do not reflect the true characteristics of the population involved (see, for instance, Bishop *et al.* (1989) and Del Río and Ruiz-Castillo (1996)). For this reason, we propose the use in this context of statistical procedures which allow for a distinction between dominance, equality and non-comparability, overcoming the shortcomings of mere numerical comparisons.

Let X be a random income variable, and let F_x be the population cumulative distribution function which is assumed continuous and twice differentiable.

A quantile of income, ζ_p, corresponding to the proportion of individuals $p(0 \leq p \leq 1)$ is implicitly defined by $F_x(\zeta_p) = p$ (on the assumption that F_x is strictly monotonic). Thus, corresponding to a set of K-abscissae, $p_1 < p_2 < ... < p_K$, we have a set of K population income quantiles $\zeta_1 < \zeta_2 < ... < \zeta_K$, and a set of K population Generalized Lorenz (GL for short) curve ordinates, $\phi(\zeta_1) < \phi(\zeta_2) < ... < \phi(\zeta_K)$, defined as

$$\phi(\zeta_k) = \int_0^{\zeta_k} x dF_x(x) = P_k \gamma_k,$$

where $\gamma_k = E(X|X \leq \zeta_k)$ is the conditional mean of incomes less than or equal to ζ_k.

Let V be the variable obtained from X by the following transformation:

$$V = \max\{(z - X), 0\},$$

where $z \in R^+$ is a fixed value. We know that, by definition, V is the variable used to construct the TIP curve. To clarify the analogies between both curves, let us define a new variable W as follows:

$$W = -V = \min\{(X - z), 0\}.$$

The density function of W, f_w, is a translation of the density function of the original variable, f_x, with the peculiarity that it is censored in $W = 0$, where the density corresponding to all values of $X \geq z$ is accumulated. Let $\zeta^* = (\zeta_1^*, ..., \zeta_K^*)$ be the vector of population quantiles for W, and let us define the corresponding GL ordinates by

$$\phi(\zeta_k^*) = \int_0^{\zeta_k^*} w dF_w(w) = p_k \gamma_k^*,$$

where $\gamma_k^* = E(W|W \leq \zeta_k^*)$. Let us consider a random sample of size n. The sample estimate of the GL ordinates are computed as

$$\widehat{\phi}(\zeta_k^*) = \sum_{i=1}^{r_k} \frac{w_i}{n} = p_k \widehat{\gamma}_k^*,$$

where $\widehat{\gamma}_k^* = \sum_{i=1}^{r_k} \frac{w_i}{r_k}$ and $r_k = [n \cdot p_k]$.

In order to perform statistical inference with the vector of GL sample ordinates, it is necessary to know the asymptotic distribution of ϕ. Beach and

Davidson (1983) show that if the population has finite mean and variance and the cumulative distribution function is strictly monotonic and twice differentiable, then the sample ordinates are asymptotically normal:

$$\sqrt{n}(\widehat{\phi} - \phi) \underline{d}\, N_k(0, \Pi).$$

Π is the covariance matrix with

$$\pi_{k,l} = p_k \left[\lambda_k^2 + (1 - p_l)(\zeta_k - \gamma_k)(\zeta_l - \gamma_l) + (\zeta_k - \gamma_k)(\gamma_l - \gamma_k)\right],$$

for $k \leq l$, where λ_k^2 is defined as the variance of X conditional on $X \leq \zeta_k$. In the empirical analysis, consistent sample estimates of λ_k^2, ζ_k y γ_k can be calculated and substituted in the previous expression.

Although W has a censored density function in the upper tail, there is no need to modify the theorem because the distribution function, F_w, is differentiable in the interval $(-\infty, 0)$. To obtain confidence intervals for the ordinates associated with each abscisa, only the behaviour of the distribution up to each abscisa is relevant. This is true since the conditional means and variances of the quantiles associated with values of $W < 0$ would exactly coincide with those belonging to a hypothetical variable W' defined (with no censoring) as, $W' = (X - z)$. Therefore, we propose using the asymptotic result in the ordinates corresponding to values of $W < 0$, and the results regarding the population mean for the ordinates including values of $W = 0$. Once the difficulties involved in working with a censored distribution are overcome, we only have to relate the GL curve of the variable W to the TIP curve of the variable V. But both curves are symmetrical, and so the application of the above results is immediate.

We are, then, in a position to use asymptotically distribution-free inference procedures developed by Bishop *et al.* (1989) and Bishop *et al.* (1994) to test the equality of GL curves. Unlike the classical tests (see Beach and Davidson (1983), Gail and Gastwirth (1978) and Gastwirth and Gail (1985)) which only provide a partition of the sample space into two regions (acceptance and rejection regions), the procedures used by these authors, based on the union-intersection principle (see Richmond (1982)), make it possible to distinguish between three differentiated regions associated with dominance, equality and noncomparability between the two curves under comparison.

In poverty measuring, only the situation of the poor needs to be taken into account. The consequence for the TIP test is that, unlike the comparison of Lorenz curves, in the overall null hypothesis we should only include the TIP ordinates corresponding to values of $W < 0$ (or $V > 0$), together with the

ordinate associated with the last quantile which allows us to test the equality of average poverty gaps. To consider all the quantiles would increase the width of the confidence intervals for the same significance level. Although the original analysis was presented in terms of a sample of i.i.d. observations, Beach and Kaliski (1986) have extended this methodology to samples which involve weighted observations. This extension is important in our case because the Spanish data come from a sample in which, in an attempt to reflect the socio-demographic structure of the country, households are weighted differently. Beach and Kaliski demonstrate that the central results are maintained, so that a suitable redefinition of the quantiles and conditional sample means and variances is the only operation we must perform in order to include the information refering to each sample observation.

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Resumen

En este trabajo utilizamos la metodología desarrollada por Jenkins y Lambert (1997) para analizar la evolución de la pobreza en España durante la década de los 80. La principal ventaja de este enfoque es que proporciona órdenes de pobreza consistentes con un amplio subconjunto de índices de pobreza del gap de pobreza generalizado, a la vez que permite la utilización de líneas de pobreza diferentes en cada una de las distribuciones que se pretenden comparar. Nuestra contribución se centra en dos aspectos. (i) Estudiamos la robustez de los resultados ante diferentes escalas de equivalencia. (ii) Extendemos a esta metodología los procedimientos de inferencia estadística ya existentes en la literatura de desigualdad. La principal conclusión es el descenso unánime de los niveles de pobreza tanto en el conjunto de la población como en todos los subgrupos de la partición por tamaño del hogar.

Palabras clave: Dominancia en pobreza, escalas de equivalencia, indiferencia estadística.

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