IDENTIFYING LOW STANDARDS OF LIVING:
EVIDENCE FROM SPAIN

by

Magda Mercader-Prats

March 1997

Abstract

Income and expenditure levels during a given time period are the most widely used welfare indicators for the measurement of poverty. Evidence from cross-sectional survey data reveals that a non-negligible proportion of households which are considered poor according to one indicator (income or expenditure) are considered out of poverty according to the other one. This paper studies the performance of income and expenditure levels in identifying the long run poor. Factor analysis applied to Friedman's Permanent Income Hypothesis is used to both decompose these static welfare indicators into their respective permanent and transitory components and to construct a long run welfare index which combines the information about permanent income contained into these two welfare indicators. Making use of the Spanish household budget survey 1980-81 (Encuesta de Presupuestos Familiares) it is shown that while the choice between indicators (income or expenditure) should favour expenditure, the new long run welfare index is empirically superior in identifying the chronically poor than either income or expenditure alone.

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An earlier version of this paper was presented at the International Economic Association 1995 conference. My thanks go to the conference participants and to R. Abul Naga, A.B. Atkinson, F. Bourguignon, J.C. Castellar and P. Delicado for their helpful comments on the paper.
1. Introduction

Any attempt to measure poverty requires the identification of the poor (see Sen [1981]). A key element in the identification process is the indicator of welfare. At a theoretical level, the welfare index is assumed to be well defined but, in practice, views about which index should be adopted differ. In the empirical literature, income and expenditure levels in a given time period taken from cross-sectional household budget surveys, are the most widely used single broad indicators of economic resources for the measurement of poverty. Some of the attempts to measure poverty are based on income levels, whereas others tend to use expenditure levels. For example, the approach adopted by Eurostat to derive poverty ratios for each country in the European Community uses consumption expenditure data from Family Budget Surveys (see Eurostat [1990]). This is not the method used, however, in most studies of poverty in advanced countries, which typically record poverty on the basis of total income (see Table 1 in Atkinson [1990]).

The impact of the choice of indicator on both the extent and, in particular, the composition of the poor population is not always neutral. According to the Spanish survey, when half of the mean equivalent income/expenditure is adopted as relative poverty line, and the household as a unit of analysis, the degree of disagreement between these two indices of welfare is substantial: only around half of the poor population as predicted by income levels appears also to be in the low expenditure group. This large degree of disagreement between the two indicators underlines the relevance of this choice, particularly when poverty figures based on either income or expenditure are the basis for the design of anti-poverty policies.

This paper deals with the performance of income and expenditure levels in a given time period to identify the long run poor. Simple models of intertemporal consumption smoothing suggest that consumption expenditure levels are a better proxy of the long run welfare levels than current income levels. When account is taken of measurement errors of consumption or for the

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1 This relative definition is the one of the most widely used in the European context. See for instance the Eurostat Report (1990).

2 Similar evidence is derived for other countries. See for instance Mc Gregor et al. (1992), Bhundell et al. (1990) or Tsakloglou (1991).

3 Underlying our analysis of poverty measurement lies a social welfare function of the form: \( W(x_1, x_2, \ldots, x_n, G) \), where \( x_i \) is household's long run welfare level, and \( G \) is the poverty line. A household is said to be long run poor when its permanent income falls below \( G \).
Notice the implications of estimates in Table 1 for the identification of the poor. Taking a relative poverty line equal to the bottom quintil, out of 20.00 per cent of the low income households, 54.5 per cent (10.9 of the entire population) appear to be in the low expenditure group, so they appear to be unambiguously poor. The remaining 45.5 per cent (9.1 of the overall population) appear to be in the low income group but not in the low expenditure group. The normalised degree of agreement is 54.5 in Spain (53.0 per cent in the UK). Where are these 45.5 per cent of households which appear as poor according to one index ranked in terms of the other index?

Table 1
Re-ranking of households from income deciles to expenditure deciles as percentage of the total population (brackets the same percentages for the UK)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(3.1)</td>
<td>(2.9)</td>
<td>(2.0)</td>
<td>(0.8)</td>
<td>(0.4)</td>
<td>(0.3)</td>
<td>(0.2)</td>
<td>(0.1)</td>
<td>(0.1)</td>
<td>(0.0)</td>
</tr>
<tr>
<td>1</td>
<td>4.2</td>
<td>2.4</td>
<td>1.4</td>
<td>0.8</td>
<td>0.5</td>
<td>0.4</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>(2.0)</td>
<td>(1.7)</td>
<td>(1.1)</td>
<td>(0.7)</td>
<td>(0.5)</td>
<td>(0.3)</td>
<td>(0.2)</td>
<td>(0.1)</td>
<td>(0.1)</td>
<td>(0.0)</td>
</tr>
<tr>
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<td>1.7</td>
<td>1.5</td>
<td>1.3</td>
<td>1.0</td>
<td>0.7</td>
<td>0.5</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>4</td>
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<td>1.5</td>
<td>1.6</td>
<td>1.2</td>
<td>1.0</td>
<td>0.9</td>
<td>0.5</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.6</td>
<td>0.9</td>
<td>1.2</td>
<td>1.3</td>
<td>1.4</td>
<td>1.3</td>
<td>1.2</td>
<td>1.1</td>
<td>0.7</td>
<td>0.3</td>
</tr>
<tr>
<td>6</td>
<td>0.4</td>
<td>0.7</td>
<td>0.9</td>
<td>1.2</td>
<td>1.4</td>
<td>1.4</td>
<td>1.3</td>
<td>1.2</td>
<td>1.0</td>
<td>0.4</td>
</tr>
<tr>
<td>7</td>
<td>0.3</td>
<td>0.3</td>
<td>0.7</td>
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<td>1.2</td>
<td>1.5</td>
<td>1.4</td>
<td>1.5</td>
<td>1.4</td>
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</tr>
<tr>
<td>8</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.4</td>
<td>1.6</td>
<td>1.8</td>
<td>1.3</td>
</tr>
<tr>
<td>9</td>
<td>0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>0.5</td>
<td>0.6</td>
<td>0.9</td>
<td>1.2</td>
<td>1.7</td>
<td>2.1</td>
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</tr>
<tr>
<td>10</td>
<td>0.0</td>
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<td>0.2</td>
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<td>0.8</td>
<td>1.2</td>
<td>1.9</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Notice the implications of estimates in Table 1 for the identification of the poor. Taking a relative poverty line equal to the bottom quintil, out of 20.00 per cent of the low income households, 54.5 per cent (10.9 of the entire population) appear to be in the low expenditure group, so they appear to be unambiguously poor. The remaining 45.5 per cent (9.1 of the overall population) appear to be in the low income group but not in the low expenditure group. The normalised degree of agreement is 54.5 in Spain (53.0 per cent in the UK). Where are these 45.5 per cent of households which appear as poor according to one index ranked in terms of the other index?

Households at the right top corner of the matrix are those with a low level of expenditure which are ranked at the top deciles of income. 14 per cent (about 280,000 in absolute numbers) of the households ranked at the bottom quintile of expenditure, show an income level above the median income; and 2.5 per cent of them are ranked at the bottom income quintile. Symmetrically, households at the bottom left corner of the matrix are very low income levels, ranked at the top end of the expenditure distribution. Again, 14.0 per cent of households ranked at the bottom quintile of income, are ranked above the median expenditure. The degree of re-ranking from the bottom of one measure to relatively high levels of the other is, therefore, substantial and it appears to be very similar in both countries.

It seems hard to believe that a household is truly poor on the basis of index (income or expenditure) if it is ranked in the top quintile according to the other index. Measurement errors of income and consumption expenditure levels might provide a partial explanation to this observed re-ranking. For instance, recorded income and expenditure are collected in the survey over an

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5 Let $P_{11}$ be the percentage of households which are poor according both income and expenditure, as a percentage of the total population; $P_{00}$ the percentage of households which are poor according to income and non-poor according to expenditure, $P_{01}$ the percentage of households which are poor according to expenditure and non-poor according to income, and finally $P_{10}$ the percentage of population non-poor according to both indexes.

We define the index of degree of agreement (DA) between the two indices as the number of households for which there is agreement between indices; that is,

$$DA = P_{11} + P_{00} = 1 - P_{10} - P_{01}$$

or the normalized degree of agreement (NDA) when the bottom quintile is taken as the poverty line:

$$NDA = \frac{P_{11} + P_{00} - 0.6}{0.4} = \frac{1 - P_{10} - P_{01} - 0.6}{0.4}$$

Notice that the normalised degree of agreement belongs to the interval $[0, 1]$. It has a zero value when $P_{11}=0.2$ and $P_{00}=0.4$, and its value is 1 when $P_{11}=P_{00}=0$. The degree of disagreement is defined as 1 minus the degree of agreement.

Appendix 1 presents the sensitivity of the degree of agreement to several of the methodological choices that were made to construct Table 1. It shows that the degree of agreement remains fairly stable with respect to the methodological choices considered.
interview period of a week. Income refers to the received in the 12 months previous to the interview whereas annual expenditure is estimated by adding up (appropriately weighted) expenditures of different kinds. In both cases it might well be that recorded amounts are not very accurate because of a forgetting effect which might be one of the reasons to explain the presence of seasonality in recorded expenditure levels (See Pazos [1994]). Concerning recorded income levels, there is also evidence of systematic under-reporting among interest and dividend income and income from self-employment, particularly farmers (See Mercader-Prats [1995]). Other elements, further discussed in next section, contribute also to the understanding of the extent of the observed re-ranking between income and expenditure.

3. A theoretical basis for the choice of indicator

Friedman (1957)'s formulation of the Permanent Income Hypothesis is particularly useful to discuss the relative performance of income and consumption levels as a proxy of long run welfare since it relates in a direct way both household consumption and income to permanent income levels.

Under perfect certainty, if intertemporal indifference curves are assumed to be negatively sloped, convex to the origin and homothetic, income \( y \) and consumption \( c \) levels for household \( h \) can be written as:

\[
y_h = \gamma y_h^{*} \quad (1) \\
c_h = c_h^{*} = k(i, u) y_h^{*} \quad (2)
\]

for \( i = 1, \ldots, H \). Whereas the relative position of households in terms of their current income may differ with respect to their position in terms of permanent income \( y_h \) because of the transitory income component \( y_h^* \), the relative position of households in terms of consumption, corrected for needs summarized here by \( u \), equals that in terms of permanent income levels. Under certainty, consumption seems to dominate income. Notice, however, that the ratio \( k \) of consumption to permanent income could vary from consumer unit to consumer unit because of differences in the interest rate, \( i \). For instance, households facing a higher return on savings will have a greater incentive to postpone consumption than those who face a low return, it would be

\[\text{then more likely to find households in the former group among the expenditure poor than those in the latter group.} \]

Equally, differences in the rate of time preference or in the preference on bequests across households can be also expected to deviate consumption from permanent income levels.

It is commonly recognised that in practice, liquidity constraints are important, particularly among poor households. If consumption is constraint by current income, a transitory component of consumption, \( c_h^* \), will appear in equation (2). In this case, when the constraint is binding for just one period, consumption is likely to be equal to income, so that both indicators will coincide. For households which face liquidity constraints permanently, consumption is expected to be steadier than income, since households, by saving when times are relatively good in terms of income (and negative saving when times are relatively bad), fill the gap in the credit market (See Deaton [1992]). In this latter case, the relative position of households in terms of consumption is likely to be closer to the permanent income one than that it terms of income. The presence of uncertainty could be a further reason to expect the consumption ranking to diverge from that of permanent income. A simple way to consider it is suggested by Friedman who considers \( k \) to be a function of the ratio of non-human wealth to permanent income, \( w \),

\[k = k(w, i, u) \quad (3)\]

The lower \( w \), the higher the need to increase savings to cover emergencies, and the lower consumption. Other parameters such as age or social and cultural factors, could be also considered in the determination of consumer risk-aversion.

Finally, measurement errors can deviate recorded income and expenditure away from permanent income. There are errors of measurement that affect both income and consumption levels which crucially depend on the particular way data is collected. We have already mentioned the forgetting effect that rises when the interview period is too short in comparison with length of the time period over which information is required, or the systematic miss-reporting of income, particularly among capital income and income from self-employed, which appears to be a common feature in most micro-data surveys (See for instance Atkinson and Micklewright [1983]). There is also another source of deviation of recorded expenditure from consumption that can make expenditure to be an unreliable indicator of underlying consumption (See Kay et al [1984]) which relates to the problem of the timing of expenditure versus consumption and rises the question of how

\[\text{Transitory income is likely to show a specific pattern over time.}\]
expenditure on durables should be treated.

In sum, when considerations about measurement errors of consumption are combined with the fact that consumption is more subject to individual idiosyncrasies than income, the superiority of consumption over income as proxy of the household long run welfare level can no longer be taken for granted. At a theoretical level there is, therefore, room for both questioning the choice of index and considering alternative approaches to the problem of the identification of the long run poor.

4. A long run welfare index

In a recent contribution, Abul Naga (1994) proposes a multiple indicator index to the identifcation of the long run poor, i.e. a summary statistic of long run welfare, constructed by pooling the information about long run welfare content in a set of three or more welfare indicators. This is done by means of one hidden factor model. The index is the expected value of this hidden factor conditional upon the observed set of indicators. We apply similar techniques here to derive a two-indicator index based solely on income and expenditure levels, which is a particularly relevant case not covered in the mentioned work.

Assume that the proportion of permanent income devoted to permanent consumption, k in the PIH, depends only on household characteristics, such as family size and composition:

\[ k = k(u_h). \]

(4)

Assume also that differences in k across households are known, and equivalence scales are used to take account of such differences. Household equivalent income, \( Y_e \), and household equivalent consumption, \( C_e \), can be written as follows,

\[ Y_e = Y + Y_k \]

(5)

\[ C_e = K + Y + C_k. \]

(6)

for \( h = 1, \ldots, H \). As Friedman (1957) suggests we assume multiplicative rather than an additive form.

of income and consumption, so, capital letters indicate that variables are measured in logarithms. Assume also that transitory components of income and consumption are uncorrelated with one another and with the corresponding permanent components, that is

\[ \rho_{Y_t, Y} = \rho_{C_t, C} = \rho_{Y_t, C} = 0 \]

(7)

and that mean transitory components of income and consumption are zero.

Under these assumptions all parameters of the matrix of variances and covariances of the system made by equations (5) and (6),

\[ \Sigma = \begin{bmatrix} \sigma_{Y_t + Y} & \sigma_{Y_t + C} \\ \sigma_{C_t} & \sigma_{C_t + C} \end{bmatrix} \]

(8)

are identified and standard factor analysis can be applied (See for instance Johnson and Wichern [1992]).

If the question is that of choosing between income and expenditure, the indicator more correlated with permanent income should be chosen as a better proxy of permanent income, i.e. the indicator with a lower variance of the transitory component.

The long run welfare index for household \( h \) takes the following form (See Appendix 2 for details):

\[ \gamma_h = E(Y_{t, Y} + C_h) - \mu_y + \frac{\sigma_{Y_t}}{\sigma_{C_t} + \sigma_{C_t}} \left( \sigma_{C_t} + \sigma_{Y_t} \right)^{-1} \sigma_{Y_t} (Y_{h, Y} - \mu_y) + \sigma_{Y_t} (C_h - \mu_y) \]

(9)

\( h = 1, \ldots, H \). Permanent income for household \( h \) is equal to average permanent income, \( \mu_{Y_P} \), plus the weighted sum of the deviation of both household income and household expenditure with respect to their respective averages. The weights of this sum positively depend on the variance of the transitory component of the opposite variable. The larger the variance of transitory

\[ ^* \text{Notice that the non-correlation between the transitory components of income and consumption effectively rules out liquidity constraints. The non-correlation between transitory and permanent components of income might also be problematic under the presence of systematic miss-reporting among capital and self-employment income. These issues are further developed below. Notice that } C_h \text{ includes other than measurement errors, any idiosyncratic component of consumption which is independently distributed across households.} \]
income/expenditure is the greater is the weight attributed to consumption expenditure/income. In other words, the noisier income with respect to consumption expenditure, the larger is the relative weight attributed to consumption. Since the variables are expressed in logarithms, the weights correspond to the elasticities of permanent income with respect to both income and consumption expenditure. In the (C,Y) surface a given value of Y is represented by a straight line with slope $-\alpha_c/\alpha_y$.

Notice that by construction the variance of Y is lower than the variance of either Y or C\textsuperscript{10}. Similarly, the correlation coefficient between Y and both Y and C is also greater than the correlation between Y and C, i.e. the long run welfare index offers a greater degree of agreement with either income or expenditure than they do income and expenditure between them.

The validity of the index relies on two important assumptions that deserve a more deep discussion. Firstly, it imposes a non-correlation between transitory components of income and consumption, assumption which effectively rules out the presence of liquidity constraints. Under non zero correlation, it is still true that the indicator with lower variance is the one most correlated to permanent income. The weights attributed to each indicator in the construction of permanent income are in this case biased, overweighing the indicator with a lower transitory component\textsuperscript{11}. Secondly, it also imposes a non-correlation between transitory and permanent

\textsuperscript{10} The variance of Y takes the form:

$$\text{Var}(\hat{\mu}_y) = \alpha_y \left( \frac{\sigma_{\mu_y}^2}{\sigma_{\mu_y}^2} \right)$$

Notice that since the term in brackets is lower than 1, the variance of Y is lower than the variance of either C or Y.

\textsuperscript{11} Let $\alpha_{y,C}$ be the covariance between transitory components of income and consumption. The long run welfare index, for household $h$ in this case:

$$\hat{\mu}_y = \mu_y + \tau'(\sigma_y, -\alpha_y, \sigma_y, \sigma_{y,C}, \mu_0, \mu_0)$$

$h=1,...,H$

where

$$\tau' = \frac{\sigma_y}{\alpha_y}$$

$\alpha_y (\sigma_y - \sigma_{y,C}^2)^{1/2} \sigma_y \sigma_{y,C} - \sigma_y^2$.

5. An application to the Spanish data

Table 2 presents estimates of the permanent and transitory variances of income and expenditure, i.e. $\sigma_y$, $\alpha_y$ and $\sigma_{y,C}$ in equations (8), and the share of the transitory components of income and expenditure in the total respective variances (in log), making use of the same data set. Estimates are derived for different distributions using the method of moments\textsuperscript{12}.

\textsuperscript{12} Let $\sigma$ be the covariance between permanent and transitory income. The permanent income index is in this case:

$$\hat{\mu}_y = \mu_y + \tau'(\sigma_y, -\sigma, \sigma_{y,C}, \mu_0, \mu_0)$$

$h=1,...,H$

where

$$\tau' = \frac{\sigma_y}{\sigma_y}$$

$\sigma_y \sigma_{y,C} - \sigma_y^2$.

\textsuperscript{12} In just identified models, this method gives estimates which are consistent as well as best asymptotic normal.
Table 2
Transitory and permanent components of the variance of income and expenditure (in log) in %.

In italic relative weight of the transitory components on total variance

<table>
<thead>
<tr>
<th></th>
<th>$\sigma_Y$</th>
<th>$\sigma_C$</th>
<th>$\sigma_{Y_t}$</th>
<th>$\sigma_{C_t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Total income</td>
<td>53.65</td>
<td>42.37</td>
<td>27.34</td>
<td>28.31</td>
</tr>
<tr>
<td>Total expenditure</td>
<td></td>
<td></td>
<td></td>
<td>15.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(15.03)</td>
</tr>
<tr>
<td>(2) Including non money items</td>
<td>50.26</td>
<td>41.34</td>
<td>26.38</td>
<td>23.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14.96</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(14.96)</td>
</tr>
<tr>
<td>(3) Including farmers and self employed</td>
<td>50.70</td>
<td>41.77</td>
<td>26.40</td>
<td>24.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(15.37)</td>
</tr>
</tbody>
</table>

Notice that, as expected, for the three distributions considered the estimated share of the transitory component of income appears to be larger than the estimated share of the transitory component of consumption expenditure, especially when income is unadjusted from non-money items. The exclusion of households headed by farmers and self-employed does not modify in a noticeable way the estimated value of the parameters. The first conclusion is, therefore, that if one of the two indicators should be chosen as index of the welfare level in the long run, if should be expenditure rather than income, as it has been done in many of the existing national poverty studies based on this source of data (See for instance Ruiz-Castillo [1987]).

The long run welfare index takes the following form:

$$\hat{\rho}_n = 3.178 + 0.285F_n + 0.456C_n$$

The weight given to consumption expenditure is greater (almost double) than the weight attributed to income in the calculation of permanent income. Tables 3 and 4 summarise some descriptive statistics of the three welfare indices.

Table 3
Descriptive statistics of $Y$, $C$, and $Y_p$

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>CV</th>
</tr>
</thead>
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<tr>
<td>$Y$</td>
<td>12.59</td>
<td>3.45</td>
<td>16.28</td>
<td>3.63</td>
</tr>
<tr>
<td>$C$</td>
<td>12.76</td>
<td>8.32</td>
<td>15.70</td>
<td>5.04</td>
</tr>
<tr>
<td>$Y_p$</td>
<td>12.38</td>
<td>8.28</td>
<td>14.74</td>
<td>3.51</td>
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</tbody>
</table>

Table 4
Correlation matrix between $Y$, $C$ and $Y_p$

<table>
<thead>
<tr>
<th></th>
<th>$Y$</th>
<th>$C$</th>
<th>$Y_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Y$</td>
<td>1</td>
<td>0.579</td>
<td>0.841</td>
</tr>
<tr>
<td>$C$</td>
<td>0.579</td>
<td>1</td>
<td>0.928</td>
</tr>
<tr>
<td>$Y_p$</td>
<td>0.841</td>
<td>0.928</td>
<td>1</td>
</tr>
</tbody>
</table>

Permanent income inequality measured by the CV is more than 30% lower than either income or expenditure inequality. As a result of these correlation coefficients, the NDA between $Y$ and $Y_p$, and $C$ and $Y_p$ are now 70.5 and 83.2 per cent respectively.

Which households are identified as poor according to the multiple indicator index? How do they compare to those classified as poor according to either income or expenditure? Figure 1 describes these populations of poor when the bottom quintile of each index is taken as relative poverty line (poverty lines are indicated in the figure as $Y$, $C$ and $Y_p$). The following things can be noticed. Firstly, all households which appear to be poor according to both income and consumption appear also to be poor according to long run welfare index, as before, they account for 10.9 per cent of the total population. Secondly, out of the total income poor, 16.5 per cent (3.3 per cent of the total population) appear to be non-expenditure poor but poor according to the long run welfare index. Equally, out of the total expenditure poor households, 28.5 per cent (5.7 per cent of the total population) appear to be non-income-poor, but poor according to the long run welfare index. Finally, 0.1% of the population appear only poor according to the $Y_p$ index. The main effect of the index in the Spanish case is, therefore, to take out of poverty as measured by one of the two welfare indices (income or expenditure) those households in the middle and top ranges of the other index and, simultaneously, to consider as poor those households either poor with both indices, poor only with one index but with the other index not far from the poverty line, or non-
poor with either income or expenditure but with levels of both indices very close to their respective poverty lines.

Figure 1: Classification of poor according to income, expenditure and permanent income (as percentage of the total population)

In order to provide a more exact description of these poor populations, we fitted a logit model to a set of variables proxy of the household welfare level in the long run to predict the probability of being poor according to each of the three welfare indices (See Appendix 3 for a description of these variables). Estimates are presented in Table 5. Notice that all variables included are highly significant in the three equations. The comparison across equations of the estimated parameters for a given variable is illustrative. The probability of being poor when the head has no (or little) education is greater with either Y or C, whereas it is lower for high educational levels. Increasing the value of the imputed rent from owner-occupied houses reduces the probability of being poor according to Yp by more than it reduces the probability of being income or expenditure poor. This reduction is also higher when the household owns durables such as dish-washer and car. Households with a head unemployed, pensioner or non-active, have a probability of being poor according to Yp which lies between the probability they have of being poor according to income (higher) and the probability of being poor according to expenditure (lower). Finally, increases in the level of household expenditure on durables reduces the probability of being poor according to Yp by less than it reduces the probability of being poor according to expenditure and by more than it reduces the probability of being income poor. Households which are investing in durables but have a relatively low incomes level are likely to be classified as non-poor according to expenditure but appear more likely to be poor according to Yp. The long run welfare index allows us to classify them as long run poor without introducing any arbitrary choice regarding the durable goods to be excluded from total expenditure, as is commonly done. In sum, estimates presented suggest that the permanent income index does better in identifying the long run poor than either income or expenditure alone.

6. Conclusion
We have empirically shown that the choice between income and expenditure as indices of household welfare for the measure of poverty has important implications on the composition of the poor population. The lack of conclusive answer to the question as which indicator should be chosen as a proxy of the welfare level in the long run has pushed us to develop Abul Naga’s
(1994) approach. Using one hidden factor model, we have suggested both a criteria for choosing between the two indicators and an index of long run welfare which is a weighted sum of income and expenditure levels. The new index has the strength that it is derived directly from the theory of consumption; it has a very intuitive interpretation and is both easy and cheap to use. It is also measurable in a continuous scale. It relies on the assumptions of a multiplicative structure of income and consumption, and on non-correlation between transitory components of income and consumption with one another and with the corresponding permanent ones, assumptions that are not arbitrary and that can, to some extent, be checked.

Making use of the Spanish household budget survey 1980-81, we have shown that expenditure from this source turns to be superior to income as proxy of the welfare level in the long run. A description of the poor populations according to the three indices suggests that new index does better in identifying the long run poor than either income or expenditure alone.

**BIBLIOGRAPHY:**


APPENDIX 1: Sensitivity of the normalized degree of agreement (NDA) to some methodological choices

We estimate the extent of agreement between income and expenditure for both different equivalent scales and different weighting units. In particular we consider five different equivalent scales that go from \( s=0 \) when no adjustment is made by family size, to the per capita scale, \( s=1 \), where \( s \) is the scale parameter in Buhmara et al form (1988), and two different weighting units, households and individuals. Table 6 presents estimates of the NDA between income and total expenditure, and income and expenditure net of durables\(^{14}\).

Table 6
Normalised degree of agreement for different distributions
Poverty line: bottom quintile

<table>
<thead>
<tr>
<th>Counting unit/Equivalent scale</th>
<th>Total income</th>
<th>Total expenditure</th>
<th>Total income net of durable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H</td>
<td>I</td>
<td>H</td>
</tr>
<tr>
<td>( s=0 )</td>
<td>65.7</td>
<td>59.5</td>
<td>63.7</td>
</tr>
<tr>
<td>( s=0.25 )</td>
<td>59.5</td>
<td>57.0</td>
<td>59.6</td>
</tr>
<tr>
<td>( s=0.5 )</td>
<td>54.5</td>
<td>54.0</td>
<td>54.0</td>
</tr>
<tr>
<td>( s=0.75 )</td>
<td>52.2</td>
<td>54.0</td>
<td>51.5</td>
</tr>
<tr>
<td>( s=1 )</td>
<td>53.0</td>
<td>55.5</td>
<td>52.7</td>
</tr>
</tbody>
</table>

38: Households; 1: Individuals

Notice that the normalized degree of agreement is slightly larger for the two equivalence scales extremes (per capita and non-adjustment). It reaches a clear absolute maximum when no adjustment is made by family size and households are weighted equally. The exclusion of some durables from total expenditure does not imply any significant change in the NDA. Finally, we calculate the NDA excluding households headed by a self-employed or farmer, for \( s=0.5 \) and the unit of counting is the household, and it is 54.0 per cent.

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\(^{14}\)Expenditure net of durables excludes expenditure on cars, TV sets, radios, videos and other entertainment household appliances, washing machines, dish washers, fridges and similar, from total expenditure. Expenditures deducted account for around 7 per cent of total expenditure. The aim of this calculation is only illustrative of NDA change when we move from one to the other distribution of expenditure.
APPENDIX 2: Derivation of the permanent income index

Following standard factor analysis techniques, as Abul Naga (1994) does (see for instance Johnson and Wichern (1992)), we can write equations (5) and (6) in a compact form:

\[
\begin{bmatrix}
Y \\
\epsilon
\end{bmatrix} = \begin{bmatrix}
X \\
1
\end{bmatrix} \begin{bmatrix}
\mu \\
\epsilon
\end{bmatrix} + \begin{bmatrix}
Y_i \\
\epsilon_i
\end{bmatrix}
\]

or

\[X = A + \beta Y_p + U\]

Assume that \(Y_p \sim N(p, \sigma_{y_p})\) and \(U \sim N(0, \Omega)\). In this case,

\[X \sim N(A + \beta p, \beta^2 \sigma^2_p + \Omega)\]

By the properties of the multivariate normal distribution:

\[Y_p | X \sim N[p, \Sigma_{p|x}^{-1} (X - A - \beta p) \Sigma_{p|x}^{-1} \Sigma_{x|x}^{-1} Y_p]\]

where

\[
\Sigma_{p|x} = \begin{bmatrix}
\Sigma_{11} & \Sigma_{12} \\
\Sigma_{21} & \Sigma_{22}
\end{bmatrix} = \begin{bmatrix}
\sigma_p & \sigma_{p|y} \\
\sigma_{p|y} & \sigma_p \\
\sigma_{y|p} & \sigma_{y|y}
\end{bmatrix}
\]

and \(\Sigma_{11} = \sigma^2_p\)

It follows that \(E(Y_p|X)\) takes the form given by equation (9).