IDENTIFYING LOW STANDARDS OF LIVING: EVIDENCE FROM SPAIN

by

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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 cronically poor than either income or expenditure alone.

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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[1], 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[2]. 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[3]. Simple models of intertemporal consumption smoothing behaviour 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

[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), Blundell et al (1990) or Tsakloglou (1991).

[3] Underlying our analysis of poverty measurement lies a social welfare function of the form: $W(x_1,...,x_n; G)$, 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.

fact that consumption is more subject to individual idiosyncrasies than income, however, the superiority of consumption over income can no longer be taken for granted. It might be then appropriate to consider alternative approaches for the identification of the chronically poor. Abul Naga (1994) develops a multiple indicator of welfare for the identification of the long run poor. He uses factor analysis techniques to pool the information about long run welfare contained in a set of three or more indicators. Due to an identification problem, his method cannot be applied, however, when income and expenditure are the solely welfare indicators one wishes to use. In this paper a similar one-factor model is applied to break down income and consumption expenditure levels into their respective permanent and transitory components, solving the miss-identification problem by imposing a multiplicative structure of income and consumption, as suggested by Friedman (1957). This decomposition allows both to establish a criterea for chosing between income and expenditure and to derive a welfare index that combines the information about the long rung welfare contained in both income and consumption expenditure levels. The use of this index for the identification of the poor is illustrated making use of the Spanish household budget survey, *Encuesta de Presupuestos Familiares, 1980-81 (EPF)*.

The plan of the paper is as follows. After the analysis of the observed re-ranking of households at the bottom end of the income and expenditure distributions content in Section 2, Section 3 presents a theoretical guideline for the choice of index. In Section 4 we suggest an empirical method for choosing between the two indices and we construct a long run welfare index, based on income and expenditure levels. In Section 5 we present the empirical application, and, finally, in Section 6 there is the conclusion.

2. The problem: Degree of disagreement between income poor and expenditure poor

Table 1 presents the observed re-ranking decile matrix between income and expenditure, i.e. in the case of households ranked in the *nth* decile of income or expenditure, in which decile of expenditure or income are they ranked? Estimates offered are derived from the cross-sectional 1980-81 Spanish household budget survey. Households at the diagonal of the matrix are classified at the same decile according to both indices. They account for 22.4 per cent of the total population.

Table 1
Re-ranking of households from income deciles to expenditure deciles as percentage of the total population (brackets the same percentatges for the UK)[4]

expenditure=rows; income=columns

	1	2	3	4	5	6	7	8	9	10
1	4.2 (3.1)	2.4 (2.9)	1.4 (2.0)	0.8 (0.8)	0.5 (0.4)	0.4 (0.3)	0.2 (0.2)	0.1 (0.1)	0.1 (0.1)	0.0 (0.0
2	2.1 (2.0)	2.2 (2.6)	1.6 (1.7)	1.3 (1.1)	1.0 (0.7)	0.6 (0.3)	0.5 (0.3)	0.4 (0.1)	0.2 (0.2)	0.1 (0.1
3	1.4 (1.5)	1.7 (1.7)	1.7	1.5	1.3	1.0	0.7	0.5	0.3	0.1
4	0.7 (0.9)	1.2 (1.2)	1.5	1.6	1.2	1.2	1.0	0.9	0.5	0.2
5	0.6 (0.6)	0.9 (0.7)	1.2	1.3	1.4	1.3	1.2	1.1	0.7	0.3
6	0.4 (0.5)	0.7 (0.3)	0.9	1.2	1.4	1.4	1.3	1.2	1.0	0.4
7	0.3 (0.4)	0.3 (0.3)	0.7	1.0	1.2	1.5	1.4	1.5	1.4	0.7
8	0.2 (0.3)	0.3 (0.1)	0.5	0.8	1.0	1.2	1.4	1.6	1.8	1.3
9	0.2 (0.4)	0.1 (0.2)	0.3	0.5	0.6	0.9	1.2	1.7	2.1	2.4
10	0.0 (0.2)	0.1 (0.1)	0.2	0.2	0.4	0.5	0.8	1.2	1.9	4.4

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

[4] The Spanish data used come from the household budget survey, *Encuesta de Presupuestos Familiares*, 1980-81. The survey contains income and expenditure levels for more than 23,000 households representative of the more than 10 million households in Spain. The unit of analysis adopted is the household. Both household income and household expenditure are adjusted for household size and composition according to the parameter s=0.5 of the Buhmann et al (1988) form. Income includes regular income in cash, and it is net of PAYE income tax and social security contributions. Expenditure includes the market value of total purchases. Both the market value of home production, income in kind and free meals at work are imputed in both distributions. The UK estimates are taken from Mc.Gregor et al (1992).

be in the low income group but not in the low expenditure group[5]. The normalised degree of agreement is 54.5 in Spain (53.0 per cent in the UK)[6]. Where are this 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 top 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

[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_{10} 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_{00} the percentage of population non-poor according to both index.
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,

$$DA=P_{11}+P_{00}=1-P_{10}-P_{01} \quad (1)$$

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

$$NDA=\frac{P_{11}+P_{00}-0.6}{0.4}=\frac{1-P_{10}-P_{01}-0.6}{0.4} \quad (2)$$

Notice that the normalised degree of agreement belongs to the interval [0,1]. It is has a zero value when P_{11}=0.2 et P_{00}=0.4, and its value is 1 when P_{10}=P_{01}=0. The degree of disagreement is defined as 1 minus the degree of agreement.

[6] Appendix 1 presents the sensitivity of the degree of agreement to several of the methodological choices that where 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 anual 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 divident income and income from self-employement, 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:

$$y_h=y_{p_h}+y_{t_h} \qquad (1)$$

$$c_h=c_{p_h}=k(i,u_h)y_{p_h} \qquad (2)$$

for h=1,...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_p) because of the transitory income component (y_t)[7], the relative position of households in terms of consumption, corrected for needs summarized here by u, equals the 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

[7] Transitory income is likely to show a specific pattern over time.

then more likely to find households in the former group among the expenditure poor than those in the later 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_t, 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,

$$k=k(i,w_h,u_h) \qquad (3)$$

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 crutially 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 lenght 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 comon 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

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 identification 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[8].

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:

$$k_h=k(u_h). \tag{4}$$

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_h, and household equivalent consumption, C_h, can be written as follows,

$$Y_h=Y_{p_h}+Y_{t_h}, \tag{5}$$

$$C_h = K + Y_{p_h} + C_{t_h}, \tag{6}$$

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

[8] Abul Naga (1994) comments that the model cannot be identified in the two indicators case.

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[9], that is

$$\rho_{Y_p Y_t} = \rho_{C_p C_t} = \rho_{Y_t C_t} = 0 \tag{7}$$

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),

$$\Sigma = \begin{bmatrix} \sigma_{Y_p}+\sigma_{Y_t} & \sigma_{Y_p} \\ \sigma_{Y_p} & \sigma_{Y_p}+\sigma_{C_t} \end{bmatrix} \tag{8}$$

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

If the question is that of chosing 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 Apendix 2 for details):

$$\hat{Y}_{p_h}=E(Y_{p_h}/Y_h,C_h)=\mu_{Y_p}+\left[\frac{\sigma_{Y_p}}{\sigma_Y\sigma_C-\sigma^2_{Y_p}}\right][\sigma_{C_t}(Y_h-\mu_{Y_p})+\sigma_{Y_t}(C_h-K-\mu_{Y_p}) \tag{9}$$

h=1,...,H. Permanent income for household *h* is equal to average permanent income, μ_{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

[9] 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 bellow. Notice that C_t includes other than measurement errors, any ideosincratic 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 $\hat{Y}_p$ is represented by a straight line with slope $-(\sigma_{Y_t}/\sigma_{C_t})$.

Notice that by contruction the variance of $\hat{Y}_p$ is lower than the variance of either Y or C[10]. Similarly, the correlation coefficient between $\hat{Y}_p$ 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, overweighting the indicator with a lower transitory component[11]. Secondly, it also imposes a non-correlation between transitory and permanent components of income, assumption that does not allow for instance the proportion of income-underreporting to increase by income levels. Under positive correlation between permanent and transitory income, the long run welfare index will relatively overweight income[12].

It is difficult to predict which will be the exact magnitud of these biases, unless we can make assumptions about these covariances before hand. Notice that when it is the case that σ_{C_t} is lower than σ_{Y_t}, the two biases will tend to cancel out.

5. An application to the Spanish data

Table 2 presents estimates of the permanent and transitory variances of income and expenditure, i.e. σ_{Y_t}, σ_{C_t} and σ_{Y_p} 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[13].

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[10] The variance of $\hat{Y}_p$ takes the form:

$$Var(\hat{Yp})=\sigma_{Y_p}\left(\frac{\sigma_{Y_p}\sigma_{C_t}+\sigma_{Y_p}\sigma_{Y_t}}{\sigma_{Y_p}\sigma_{C_t}+\sigma_{Y_p}\sigma_{Y_t}+\sigma_{Y_t}\sigma_{C_t}}\right)$$

Notice that since the term in brackets is lower than 1, the variance of $\hat{Y}_p$ is lower than the variance of either C or Y.

[11] Let $\sigma_{Y_tC_t}$ be the covariance between transitory components of income and consumption. The long run welfare index, for household h is in this case:

$$\hat{Y}_{ph}=\mu_{Y_p}+\tau'[(\sigma_{C_t}-\sigma_{Y_tC_t})(Y_h-\mu_Y)+(\sigma_{Y_t}-\sigma_{Y_tC_t})(C_h-\mu_C)]$$

h=1,...,H

where

$$\tau'=\frac{\sigma_{Y_p}}{\sigma_{Y_p}(\sigma_{Y_t}+\sigma_{C_t}-2\sigma_{Y_tC_t})+\sigma_{Y_t}\sigma_{C_t}-\sigma^2_{Y_tC_t}}$$

[12] Let σ be the covariance between permanent and transitory income. The permanent income index is in this case:

$$\hat{Y}_{ph}=\mu_{Y_p}+\tau''[(\sigma_{C_t}+\frac{\sigma}{\sigma_{Y_p}})(Y_h-\mu_Y)+(\sigma_{Y_t}-\frac{\sigma^2}{\sigma_{Y_p}})(C_h-\mu_C)]$$

h=1,...,H

where

$$\tau''=\frac{\sigma_{Y_t}}{\sigma_Y\sigma_C-(\sigma_{Y_p}+\sigma)^2}$$

[13] 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

	σ_Y	σ_C	σ_{Y_p}	σ_{Y_t}	σ_{C_t}
(1)= Total income Total expenditure	55.65	42.37	27.34	28.31 *(50.87)*	15.03 *(35.47)*
(2)=(1)+including non money items	50.26	41.34	26.38	23.88 *(47.51)*	14.96 *(36.19)*
(3)=(1)+excluding farmers and self employed	50.70	41.77	26.40	24.30 *(47.93)*	15.37 *(36.80)*

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:

$$\hat{Y}_{p_h} = 3.178 + 0.285Y_h + 0.456C_h$$

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 $\hat{Y}_p$

	Mean	Minimum	Maximum	CV
Y	12.59	3.45	16.28	5.63
C	12.76	8.32	15.70	5.04
$\hat{Y}_p$	12.58	8.28	14.74	3.51

Table 4
Correlation matrix between Y, C and $\hat{Y}_p$

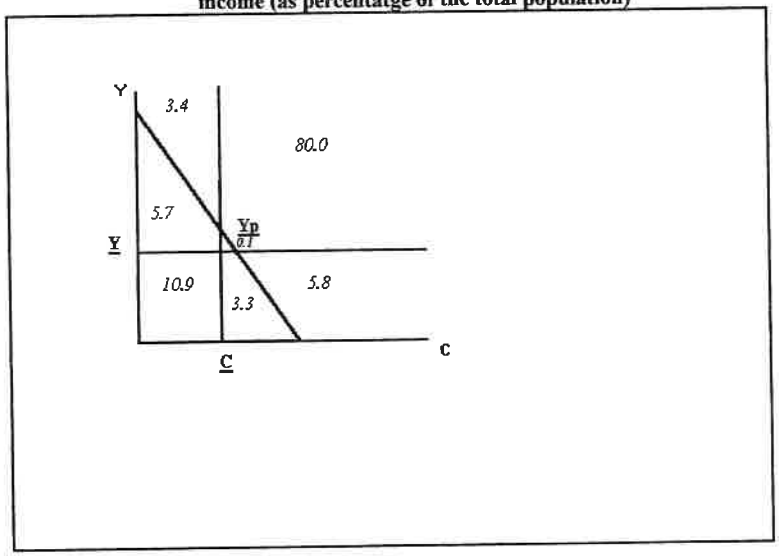
$$\begin{bmatrix} 1 & 0.579 & 0.841 \\ 0.579 & 1 & 0.928 \\ 0.841 & 0.928 & 1 \end{bmatrix} \quad (11)$$

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 $\underline{Y}$, $\underline{C}$ and $\underline{Y}_p$). 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 $\hat{Y}_p$ 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 percentatge 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 comparision across equations of the estimated parameters for a given variable is ilustrative. The probabily of being poor when the head has no (or little) education is greater with the $\hat{Y}_p$ index than 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 $\hat{Y}_p$ by more than it reduces the probability of being income or expenditure poor. This reduction is also higher when the household own durables such as dish-washer and car. Households with a head unemployed, pensioner or non-active, have a probability of being poor according to $\hat{Y}_p$ 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 $\hat{Y}_p$ 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 income level are likely to be classified as non-poor according to expenditure but appear more likely to be poor according to $\hat{Y}_p$. 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.

Table 5

Logit parameter estimates. Dependent variables: Being poor with Y, C and $\hat{Y}_p$

	Income			Expenditure			Permanent Income		
Variable	Parameter estimate	Standard Error	Wald Chi-Square	Parameter estimate	Standard Error	Wald Chi-Square	Parameter estimate	Standard Error	Wald Chi-Square
Inter	-1.2261	0.00282	189136.34	-0.4103	0.00294	19498.18	-0.7317	0.00297	60670.31
Educ1	0.8454	0.00289	85722.05	1.0833	0.00305	125772.38	1.1755	0.00306	147647.22
Educ2	0.5886	0.00199	87518.33	0.5957	0.00210	80236.00	0.7165	0.00211	115708.93
Educ4	-0.7691	0.00437	31035.59	-0.6011	0.00447	18077.56	-0.6933	0.00479	20955.16
Educ5	-1.6400	0.0100	26659.94	-1.3471	0.00934	20804.92	-1.7258	0.0117	21675.67
Imprent	-3.93E-6	1.505E-8	68109.83	-2.72E-6	1.539E-8	31234.70	-4.08E-6	1.637E-8	62291.59
TV	-0.7967	0.00296	72406.33	-0.6067	0.00328	34168.45	-0.7064	0.00340	43119.72
Dish	-0.4056	0.00897	2046.04	-0.7753	0.0113	4732.84	-0.9034	0.0130	4834.15
Car1	-0.7012	0.00219	103690.39	-1.0688	0.00242	195411.05	-1.0806	0.00244	188201.28
Car2	-0.4697	0.1070	1932.84	-1.1804	0.0188	3946.86	-1.7999	0.0253	5049.46
Unem	1.2374	0.0034	132478.02	0.5669	0.00385	21704.59	0.91.21	0.00376	58940.82
Pen	0.7860	0.00217	131697.09	0.5654	0.00224	63721.71	0.7707	0.00226	116715.98
Nact	1.2934	0.00465	77218.7	0.6435	0.00496	16822.88	1.0767	0.00496	47139.54
Hsize	0.0297	0.000538	3039.11	-0.0808	0.00059	18786.08	-0.0294	0.000584	2539.29
Dur	-3.43E-6	1.786E-8	36973.17	-0.3E-4	5.595E-8	248008.48	-0.2E-4	4.829E-8	190230.25
Predicted/ Observed			81.1%			85.9%			86.6%

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 develope 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 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 surve 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 popualtions according to the three indices suggests that new index does better in identifying the long run poor than either income or expenditure alone.

BIBLIOGRAPHY:

Abul Naga, R., (1994), 'Identifying the poor: a multiple indicator approach', *Distributional Analysis Research Programme*,STICERD, Working Paper 9, London: London School of Economics.

Atkinson, A. B. and Micklewright, J., (1983), 'On the reliability of income data in the family expenditure survey 1970-1977', *Royal Statistical Society*, vol. 164, Part 1, pp.33-61.

Atkinson, A. B., (1990), 'Comparing poverty rates internationally: Lessons from recent studies in OECD countries', *Welfare State Programme*, STICERD, Working Paper 53, London: London School of Economics..

Buhmann, B., Rainwater, L., Schmaus, G. and Smeeding, T., (1988), 'Equivalence scales, well-being, inequality, and poverty: sensitivity estimates across ten countries using the Luxembourg Income Study (LIS) data base', *Review of Income and Wealth*, vol. 34, pp. 115-142.

Blundell, R., Preston, I., (1990), 'The distinction between income and consumption in the measurement of household welfare', Institute for Fiscal Studies, Working Paper.

Chaudhuri, S. and Ravallion M., (1993), 'How well do static indicators identify the chronically poor?', *Journal of Public Economics*, vol. 53, pp.367-394.

Deaton, A., (1992), *Understanding Consumption*, Oxford University Press.

Friedman, M., (1957), *A Theory of the Consumption Function*, Princeton University Press.

Eurostat, 1990, *Inequality and Poverty in Europe (1980-1985)*, Rapid Reports, Population and Social Conditions, n 7.

Johnson, P, Webb, S, (1991), 'UK poverty statistics: A comparative study', Institue for Fiscal Studies, Commentary n 27, London.

Johnson, R.A. and Wichern, D.W. (1992), *Applied Multivariate Statistical Analysis*, Second Edition, Prentice Hall.

Kay, J.A, Keen, M.J. and Morris, C.N., (1982), 'Estimating consumption from expenditure data', *Journal of Public Economics*, vol. 23, pp.169-181.

Mc.Gregor, P. and Borooah, V.K., (1992), 'Is low spending or low income a better indicator of whether or not a household is poor: some results from the 1985 Family Expenditure Survey', *Journal of Social Policy*, January, pp.53-69.

Mercader-Prats, M., (1995), 'Peut-on mesurer la pauvreté ? Aspects conceptuels et méthodologiques de la mesure de la pauvreté. L'Espagne dans le contexte européen', PhD DELTA-EHESS, Paris.

Pazos, M. (1994), 'Variabilidad semanal de los gatos en la EPF', *Estadística Española*, Vol.36, nº 137, pp. 431-444.

Ruiz-Castillo, J., (1987), 'La medición de la pobreza y de la desigualdad en España, 1980-81', Estudios económicos, Banco de España, n 42.

Sen, A.K.(1981), *Poverty and Famines*, Oxford University Press.

Tsakloglou, P., (1991), 'A comparison of poverty estimates using expenditure and income data', working paper series, n 71, Luxembourg Income Study.

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 Buhmann 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

	Total income Total expenditure		Total income Expenditure net of durable	
Counting unit/ Equivalent Scale	H	I	H	I
s=0	65.7	59.5	63.7	58.7
s=0.25	59.5	57.0	59.0	55.7
s=0.5	54.5	54.0	54.0	53.2
s=0.75	52.2	54.0	51.5	53.2
s=1	53.0	55.5	52.7	55.5
	H: Households; I: Individuals			

Notice that the normalised 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.

[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:

$$\begin{bmatrix} Y \\ C \end{bmatrix} = \begin{bmatrix} 0 \\ K \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \end{bmatrix} Y_p + \begin{bmatrix} Y_t \\ C_t \end{bmatrix} \qquad (12)$$

or

$$X = A + \beta Y_p + U \qquad (13)$$

Assume that $Y_p \rightarrow N(\mu_{Yp}, \sigma_{Yp})$ and $U \rightarrow N(0, \Omega)$. In this case,

$$X \rightarrow N(A + \beta\mu_{Y_p}, \beta\beta'\sigma_{Y_p}^2 + \Omega) \qquad (14)$$

By the properties of the multivariate normal distribution:

$$Y_p/X \rightarrow N[\mu_{Y_p} + \Sigma_{12}\Sigma_{22}^{-1}(X - A - \beta\mu_{Y_p}); \Sigma_{11} - \Sigma_{12}\Sigma_{22}^{-1}\Sigma_{21}] \qquad (15)$$

where

$$\Sigma_{Y_pX} = \begin{bmatrix} \Sigma_{11} & \Sigma_{12} \\ \Sigma_{21} & \Sigma_{22} \end{bmatrix} = \begin{bmatrix} \sigma_{Y_p} & \sigma_{Y_p} & \sigma_{Y_p} \\ \sigma_{Y_p} & \sigma_Y & \sigma_{Y_p} \\ \sigma_{Y_p} & \sigma_{Y_p} & \sigma_C \end{bmatrix} \qquad (16)$$

and $\Sigma_{11} = \sigma_{Yp}$

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

APPENDIX 3: A description of the variables used in the Logit model

EDU1= head of the household without education

EDU2=head of the household with elementary education

EDU3=head of the household with primary education

EDU4=head of the household with secondary education

EDU5=head of the household with a university degree

IMPR= imputed rent from owner-occupied houses

TV=having Colour TV set

WASH= having dish-washer

CAR1=having one car

CAR2=having more than one car

HS= household size

EMPLOYED=head employed

UNEM= head unemployed

PEN= head pensionner

NACT=head non-active

Reference Household:

EDU3=1, EMPLOYED, TV=0, CAR1=0, CAR2=0, DISH=0.