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ANALYZING AND COMPARING THE IMPACT OF ALTERNATIVE CONCEPTS OF RESOURCES IN DISTRIBUTIONAL STUDIES: GREECE, 2004/5

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ABSTRACT

The usual practice in empirical distributional studies is to use either disposable income or consumption expenditure as a proxy for welfare. Essentially, both variables are used as approximations of the unobserved "permanent income" of the population members. This paper exploits the information in the Greek Household Budget Survey of 2004/5 and constructs an indicator of "permanent income" using a latent variable approach. The distributions of disposable income, consumption expenditure and permanent income are compared regarding their level and structure of inequality and poverty. Both inequality and poverty appear to be substantially lower using the distribution of permanent income instead of either the distribution of disposable income or the distribution of consumption expenditure, while differences are also evident when decomposition analysis of inequality and poverty is employed using appropriate indices.

Keywords: permanent income, inequality, poverty, welfare level

JEL Classifications: D31, I31

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1. Introduction

A common problem encountered in many empirical distributional studies is that of the selection of an appropriate distribution. Usually, when economists and other social scientists analyse inequality and poverty, they are ultimately interested in inequality in the distribution of welfare. However, welfare is not directly observable and hence, for the purposes of empirical studies, a reasonably close approximation to it has to be used instead. Standard microeconomic theory suggests that, other things being equal, an individual's welfare level is determined in the short-run by his/her levels of consumption and leisure and in the long-run by his/her level of "life-cycle" or "permanent" income. These notions of welfare are closely related to the concepts of "full income" and "earnings capacity" developed by Becker (1965) and Garfinkel and Haveman (1977). Reliable estimates of permanent income at the individual level can be obtained from long series of panel data. Very few such data sets exist in a small number of countries.

Regarding short-term concepts of welfare, since there are enormous difficulties in evaluating leisure in monetary terms, most empirical studies use current consumption or current income as welfare indicators. Each variable has its merits from a theoretical point of view. Current consumption is usually considered a better approximation to life-cycle income than current income, because individuals and households tend to save and dissave in different periods of their life-cycles in an attempt to smooth their consumption and, thus, maximise their utility (assuming that utility is a positive but diminishing function of consumption). On the other hand, the use of current income has some advantages, since it can be considered as a better indicator of the ability of an individual or a household to achieve a particular welfare level [Sen (1992), Chaudhuri and Ravallion (1994)]. In practice, the data on consumption and income that are available for empirical studies in most countries usually come from Household Budget and Income Surveys and they are far from ideal.[1] Apart from being influenced by life-cycle factors, in most such surveys the relevant data are collected using extensively recall questions and are subject to large

1. Note also that the data collected in such surveys concern consumption expenditures - not consumption. Although the two variables are closely related, they are not identical, the former being a “noisy” approximation of the latter (from a statistical point of view).

margins of error. As a result, in many instances the recorded level of correlation between income and consumption is relatively low and a considerable proportion of the population who are classified as poor according to one welfare indicator appear close to the top of the distribution according to the other indicator. This finding may have disturbing implications for the design of policies aimed to alleviate poverty and/or reduce inequality, if the recorded levels of inequality and poverty as well as the composition of the poor or the structure of inequality are influenced by the welfare indicator used. Therefore, it is interesting to explore the possibility of constructing a composite welfare indicator for households using existing information about both their current incomes and consumption expenditures. This is the aim of the present paper and examples are provided using the data of the most recent Greek Household Budget Survey of 2004/05.

The remainder of the paper is organised as follows. The next section discusses briefly the data used, while the third section presents a methodology for the construction of an approximate "composite welfare indicator" for individuals. The fourth section is devoted to the analysis of inequality and poverty in Greece using alternative concepts of resources, while the final section concludes the paper and provides a discussion of its main findings.

2. The data

The paper uses the micro-data of the 2004/04 Greek Household Budget Survey that was carried out by the National Statistical Service of Greece. The survey covers all the non-institutional households in the country and its sampling fraction is about 2/1000 (around 6,600 households or 17,900 individuals). It contains detailed information about consumption expenditures (actual and imputed), incomes after taxes, social security contributions and transfer payments, socio-economic characteristics of the households and their members as well as information on a number of housing amenities and consumer durables owned by the household. In order to approximate welfare as close as possible, the concepts of both current consumption expenditure and current income include, apart from actual consumption expenditures and net incomes, the value of

consumption of income-in-kind evaluated at market prices. A number of adjustments were made to the data before they were used for the purposes of the paper. A few households were removed from the sample because the information they provided was considered to be extremely unreliable and the sample was re-weighted in order to reflect more accurately the entire population using weights derived from the 2001 population census. Further, all consumption expenditure and income figures were expressed in constant mid-2004 prices in order to remove the impact of inflation (4.0% from the beginning to the end of the survey). Finally, the value of cars purchased during the period of the survey was subtracted from the concept of consumption expenditure and replaced by the value of imputed car services, estimated using hedonic regression techniques, for all the households which owned cars. The latter estimates were also added to the concept of income as an imputed item.

The unit of analysis is the household member and the corresponding distributions were normalised using the so called "modified OECD scales" [Hagenaars et al (1994)] which assign a weight of one to the household head, a weight of 0.5 to each of the remaining adults in the household and a weight of 0.3 to each child (person aged up to 13) in the household. Nevertheless, since the unit of information collection in the Household Budget Survey was the household, for the purposes of the derivation of the composite welfare indicator in the next section the unit of analysis is the household.[2]

3. Alternative concepts of resources: a descriptive comparison

In this study we use the three alternative concepts of resources that usually are used in distributional studies which are: disposable income (no imputed items, DI), consumption expenditure (with imputed items, CE) and full income from private sources (DI with imputed items, FI). Using the previous welfare indicators we propose and

2. The empirical results of the next section are almost identical if the unit of analysis is the household member rather than the household (results available from the authors on request).

construct a fourth composite one named "permanent income" (PI) which is described in next section.

A first casual inspection of the distributions of equivalent consumption expenditure and equivalent full income per capita reveals that they are relatively similar in terms of decile shares and inequality indices albeit – as anticipated in a country with widespread self-employment such as Greece – the former distribution is less unequal than the latter. For example, the share of the bottom (top) decile of the distribution of consumption expenditure is 3.8% (22.2%) while that of the bottom (top) decile of the full income distribution is 3.5% (23.2%), the corresponding Gini indices being 0.278 and 0.293, respectively. Final, the exclusion of income in kind and other imputed items from the definition of income make the distribution DI more unequal (Gini: 0.319) comparing CE and FI distributions.

However, a closer inspection of the data reveals that the two variables are not as closely related as one could anticipate. The Spearman rank (Pearson) correlation coefficient for CE and FI is 0.687 (0.617).[3] This is evident in Table 1 where the households are ranked from the least well-off to the most well-off, in quintiles according to their equivalent consumption expenditure and equivalent full income and then cross-tabulated. Only 41.9% of them remain in the same quintile when moving from one distribution to the other, while almost a fifth of the sample (19.1%) moves by three or more quintiles.[4] There are even households who belong to the top quintile of one distribution and the bottom quintile of the other (Tables 3). Hence, at least one of the two distributions cannot be considered as a good approximation of the unobservable

3. The corresponding coefficients between actual consumption expenditure (excluding in-kind expenditures) and net monetary income – that is, the variables most frequently used in similar studies – is substantially lower, 0.627 (0.621).

4. The relatively low degree of correlation between the ranks of the members of the population in the distributions of consumption expenditure and income is not a peculiarly Greek phenomenon. See, for example, similar evidence for the U.K. and Spain cited in McGregor and Borooah (1992) and Mercader-Prats (1998), respectively. Similar evidence but in a slightly different framework can be found in Anand and Harris (1994) for Sri Lanka and Hagenaars et al (1994) for twelve member-states of the European Union, Krueger and Perri (2006) and Meyer and Sullivan (2003) for U.S.

distribution of "welfare". Smaller correlation and greater differences we could find comparing CE and DI distributions.

Part of the previous discrepancies should be attributed to genuine life-cycle factors, while another part should be attributed to the short interview period of the survey and the extensive use of recall questions, or even deliberate under-reporting. The latter factors are likely to add a lot of "artificial" variation to the estimates of both consumption expenditure and income. Under these circumstances it is worth-trying to construct a less "noisy" welfare indicator.

Table 1. Cross-tabulation of households ranked according to alternative concepts of resources (% of the total population)

CE x FI		Quintile of the distribution of FI				
		1	2	3	4	5
Quintile of the distribution of CE	1	11.0	5.3	2.7	.8	.2
	2	5.0	6.6	4.8	2.6	.9
	3	2.6	4.5	5.7	5.1	2.2
	4	1.2	2.6	4.6	6.7	4.8
	5	.2	1.0	2.2	4.8	11.9

CE x DI		Quintile of the distribution of DI				
		1	2	3	4	5
Quintile of the distribution of CE	1	9.5	6.1	2.9	1.3	.2
	2	5.1	5.7	5.0	3.2	1.0
	3	3.2	4.1	5.4	4.7	2.6
	4	1.7	2.8	4.4	6.1	5.0
	5	.5	1.3	2.3	4.7	11.3

4. The composite welfare indicator

Following Abul Naga (1994), Abul Naga and Burgess (1997) and Mercader-Prats (1998), let X be the vector of available welfare indicators $[x_1, x_2, ..., x_k]'$, such as current income, consumption expenditure, etc. Further, assume that these indicators are related to the "true" composite welfare indicator, y_p, ("permanent income" in their terminology), in the following way

$$X = by_p + U \tag{1}$$

where $b = [b_1, b_2, ..., b_k]'$, and $U = [u_1, u_2, ..., u_k]'$ is the vector of residual error terms. (1) is a factor analysis model where y_p is not observable. A number of techniques can be used for the estimation of such models (method of moments, factor analysis, principal component analysis, etc). The choice of estimation technique depends on the number of welfare indicators available (k), as well as the number of additional assumptions that the researcher is willing to make.[5] Once the structural parameters of the system have been estimated and in order to extract information about y_p, additional assumptions have to be made about the joint distribution of X and y_p.

In this paper we assume that $y_p \sim N(\mu_p, \sigma_p^2)$ and $U \sim N(0, \Omega)$. In this case, from the properties of the normal distribution (1) implies that $X \sim N(b\mu_p, bb'\sigma_p^2 + \Omega)$. Following Greene (1993, p. 76), the conditional distribution of y_p given the vector X, $f(y_p|X)$, will be

$$y_p|X \sim N[\mu_p + \Sigma_{y_pX}\,\Sigma_{XX}^{-1}(X - b\mu_p), \quad \Sigma_{y_py_p} - \Sigma_{y_pX}\,\Sigma_{XX}^{-1}\,\Sigma_{Xy_p}] \tag{2}$$

where Σ is the $[(k+1)\times(k+1)]$ covariance matrix of $y_p, x_1, x_2, ..., x_k$, which can be broken down into the sub-matrices: $\Sigma_{y_py_p} = \text{cov}(y_p, y_p) = \sigma_p^2$, Σ_{y_pX}, Σ_{Xy_p} which are the $(1\times k)$ and $(k\times 1)$ covariance matrices of y_p with $x_1, x_2, ..., x_k$, and Σ_{XX} which is the $(k\times k)$ matrix of covariances of $x_1, x_2, ..., x_k$.

Then, the best (minimum mean square error) predictor of the composite welfare indictor is defined as

$$E(y_p|X) = \mu_p + \Sigma_{y_pX}\,\Sigma_{XX}^{-1}(X - b\mu_p) \tag{3}$$

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5. As Greene (1993) points out, if $k > 3$, the model is over-identified and its estimation using the method of moments requires the imposition of additional assumptions (structure). Nevertheless, the advantage of the method of moments is that the estimated parameters are consistent and independent of the type of distribution of the welfare indicators X.

that is, the composite welfare indictor of each household is a linear function of all the available welfare indicators X of the household in question.[6] The weights assigned to the various welfare indicators are determined by the degree of covariance of these indicators both with y_p and between themselves.

In order to derive the composite welfare indictor from our data, we assume that for every household in the sample the logarithms of their disposable income, Y, and consumption expenditure on non-durable goods,[7] C, are related to the logarithm of their Y_p in the following way

$$Y = Y_p + Y_t \tag{4}$$

$$C = B + Y_p + C_t \tag{5}$$

where Y_t and C_t are, respectively, the residual income and the error term of the consumption function. Both variables are used in logarithmic form since, using appropriate tests (x^2, Kolmogorov-Smirnov) it was found that consumption expenditure is approximately lognormally distributed, whereas in the case of disposable income the assumption of lognormality was only marginally rejected at the 1% level of significance. For Y_t and C_t it is assumed that they have zero means and, further, that they are uncorrelated both with each other and with Y_p,

$$\text{cov}(Y_p, Y_t) = \text{cov}(Y_p, C_t) = \text{cov}(Y_t, C_t) = 0 \tag{6}$$

The first two assumptions are pretty innocuous, but this is not necessarily the case for the third $\text{cov}(Y_t, C_t) = 0$, although this assumption is frequently made in macroeconomic studies. It implies that unanticipated changes in the current disposable income of a household affect its current consumption only through their effect on the

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6. Bartholomew (1984) demonstrates that such an index can be constructed if the distribution of at least $k-1$ of the X indicators belongs to the family of exponential distributions (normal, gamma, Poisson, etc.).

7. Using total consumption expenditure instead of consumption expenditure on non-durable goods affects the results reported below only marginally.

composite welfare indicator ("permanent income" in macroeconomics). Furthermore, since income in-kind is included only in the concept of consumption expenditure and not in disposable income, it is likely that some common measurement error is not introduced to these variables due to income in-kind. Therefore, we avoid the two residual terms being correlated by construction. Hence, it was decided to stick to the assumption that $\text{cov}(Y_t, C_t) = 0$.

Taking (6) into account, the sample moments of (4) and (5) are

$$\text{var}(Y) = \sigma_P^2 + u_Y \tag{7}$$

$$\text{var}(C) = \sigma_P^2 + u_C \tag{8}$$

$$\text{cov}(Y, C) = \sigma_P^2 \tag{9}$$

The system of these three equations can be identified and, hence, we can estimate the three unknown variances of the composite welfare indicator, σ_P^2, residual income, u_Y, and residual consumption, u_C. Estimates of the corresponding parameters are provided in Table 2. As anticipated, the proportional contribution of residual income to the variance of disposable income (50.3%) is higher than the proportional contribution of residual consumption to the variance of consumption expenditure on non-durable goods (22.7%).

In our case the general model (1) as specified in equations (4) and (5), gives the following expression for (3)

$$E(y_P \mid X) = \mu_Y + \frac{\sigma_P^2}{(\sigma_P^2 + u_Y)(\sigma_P^2 + u_C) - (\sigma_P^2)^2}[u_C(Y - \mu_Y) + u_Y(C - \mu_C)] \tag{10},$$

that is, the composite welfare indicator of a particular household is equal to the mean of the disposable income of the entire population plus the weighted sum of the deviations of disposable income and consumption expenditure on non-durables of the household from the corresponding sample means. The weights depend positively on the variance of the residual terms of the opposite variable; in other words, the "noisier" one variable is, the

higher the weight assigned to the other variable. Finally, substituting the estimated values of the parameters σ_P^2, u_Y, and u_C from Table 2 in equation (10) we obtain the following

$$E(Y_P|Y,C)=1.075+0.183Y+0.632C \qquad (11)$$

As anticipated, the composite welfare indicator is found to be more closely related to the less "noisy" consumption expenditure and, therefore, its estimate is determined to a larger extent by this variable than by disposable income.[8]

Table 2. Permanent and transitory components of the variances of the logarithms of disposable income and consumption expenditure (on non-durables)

WELFARE INDICATOR	VARIANCE		
	Total	Permanent component	Transitory component
Disposable income	0.384	0.191	0.193
Contribution (%)	100.0	49.7	50.3
Consumption expenditure	0.247	0.191	0.056
Contribution (%)	100.0	77.3	22.7

8. Dimelis et al (1997) derive transitory components of disposable income and consumption expenditure on non-durable goods by applying the Hodrick and Prescott (1997) filter to National Accounts data for the period 1960-94. If this macroeconomic estimate of $\mathrm{cov}(Y_t, C_t)$, 0.000809, is used instead of $\mathrm{cov}(Y_t, C_t) = 0$ and (10) is modified accordingly (see Mercader-Prats (1998)), (11) changes very marginally and the value of the Gini index declines from 0.234 to 0.233. Even assuming that the value of $\mathrm{cov}(Y_t, C_t)$ is twelve times higher than the above macroeconomic estimate, measured inequality is affected only very modestly (the Gini index changes by less than 5%).

How does the new distribution compare with the distributions of income (DI, FI) and consumption expenditure (CE)? An answer to this question is provided in Table 3 and Graph 1. Table 3 provides decile shares and estimates of six widely used inequality and poverty indices for the distributions of equivalent disposable income, equivalent consumption expenditure, equivalent full income and the composite welfare indicator per capita ("permanent income", PI). Graph 1 reports the corresponding Lorenz curves. The new distribution appears to be far more equal than the other distributions and the Lorenz curve of the distribution of the composite welfare indicator clearly dominates the Lorenz curves of the other distributions. Depending on the index and the distribution, the estimates of the inequality indices decline between 20% and 45% when moving to the last column of Table 3. Since the most important differences between the distribution of the composite welfare indicator and the other distributions concern the shares of the top and bottom deciles, the largest proportional declines in inequality are recorded by those indices which are relatively more sensitive to changes in the tails of the distribution rather than the Gini index which is relatively more sensitive to changes around the median (Cowell (1995)).

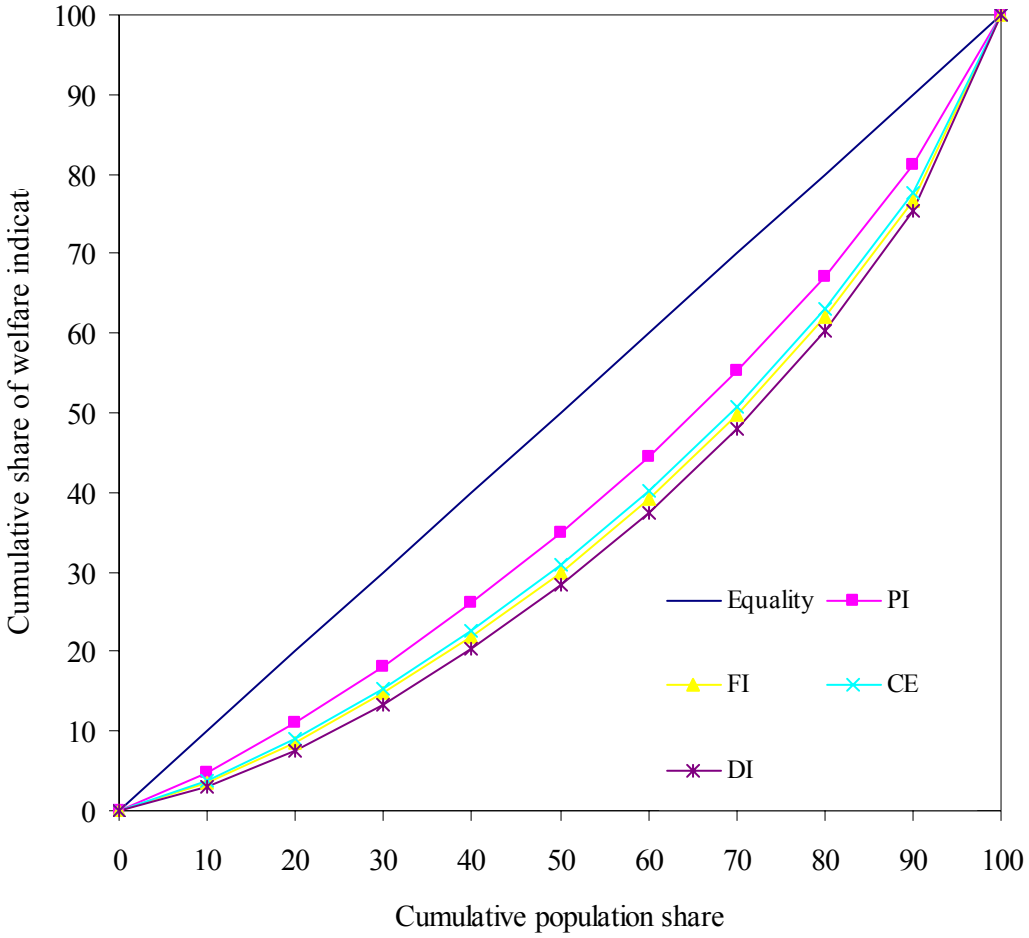
Further, these indices suggest that inequality and poverty is lower in the distribution of consumption than in the distribution of full income, while the inclusion of imputed items in these two distributions makes them more equal compared to the distribution of disposable income. In fact, the Lorenz curves reported in Graph 1 do not intersect and, thus, provide a complete ranking of the distributions under examination.

Finally, the composite welfare indicator appears to be more correlated with consumption expenditure (Spearman rank correlation coefficient: 0.962) than the other two distributions of disposable (0.773) and full income (0.821, see Table 4).

Table 3. Deciles' shares, inequality and poverty indices for alternative concepts of resources

	Distribution of			
	DI	CE	FI	PI
Decile				
1 (bottom)	2.9	3.8	3.5	4.5
2	4.6	5.2	5.1	6.2
3	5.8	6.3	6.1	7.1
4	7.0	7.3	7.1	7.9
5	8.0	8.2	8.1	8.8
6	9.1	9.3	9.3	9.7
7	10.6	10.6	10.6	10.7
8	12.3	12.3	12.2	12.0
9	15.1	14.8	14.7	13.9
10(top)	24.6	22.2	23.2	19.3
Inequality and poverty indices				
Gini	0.319	0.278	0.293	0.168
Atkinson (e=0.5)	0.083	0.062	0.069	0.038
2nd Theil (Mean Logarithmic Deviation)	0.175	0.125	0.142	0.076
Poverty rate (FGT0)	19.6	15.1	15.6	9.0
Normalised Pov. Gap (FGT1)	5.2	2.9	3.6	1.3
FGT2	2.2	0.9	1.3	0.3

Graph 1. Lorenz curves for alternative concepts of resources



Is the new variable able to predict the relative welfare position households better than the existing variables? An attempt to provide an answer to these questions is provided in Tables 4. As noted in section 2, the Household Budget Survey contains information on a number of housing amenities and consumer durable goods of each household. For the purposes of Table 4 three new indices are constructed. The first index (INDEX1) exploits the information on housing amenities available in the Household Budget Survey. For each household the value of the index is the average score on seven items, the weights of the items being the proportion of the population living in households with such amenities. These amenities and the corresponding proportion of the population living in households with such items (in parentheses) are: dwelling with bath

or shower (98.8%), dwelling with running water (99.5%), separate kitchen inside the dwelling (99.3%), dwelling with telephone (96.1%), WC inside the dwelling (95.5%), at least 40 square meters available per equivalent adult in the household (59.8%) and second (holiday) home (20.7%). The second index (INDEX2) is the counterpart of INDEX1 for consumer durable goods. The following nine items were selected: refrigerator (99.4%), electric cooker (88.0%), vacuum cleaner (82.5%), colour TV (99.3%), video (51.4%), hi-fi (69.2%), washing machine (93.8%), dishwasher (33.0%) and car (78.4%). Since the cost of obtaining these items varies considerably across items and information on the average cost per item exists in the Household Budget Survey, it was decided to construct a third index (INDEX3) reflecting the average monetary value of the corresponding stock of durable goods for each household.[9]

Once the scores for every household according to each of the three indices were calculated, the population was ordered from the member with the lowest to the member with the highest score according to each index and the corresponding ranks were estimated. The Spearman rank correlation coefficients of each of these indices and the three monetary indicators are reported in Table 6. In all cases the correlation of the ranks of the households according to their composite welfare indicator with the ranks according to any of the three indices are substantially higher than the corresponding correlation coefficients of the ranks of the other monetary indicators (DI, FI, CE) with the ranks of these indices. The estimate of the Spearman rank correlation coefficient between the composite welfare indicator PI and INDEX1 is 0.464 against estimates of 0.343-0.440 in the case of the other monetary welfare indicators, while the corresponding estimates are 0.559 against 0.443-0.538 in the case of INDEX2 and 0.580 against 0.458-0.560 in the

9. It should be stressed that, for a number of reasons, these indices should not be considered as better indicators of the standard of living than the monetary indicators and they are used here for illustrative purposes only. The fact that in the Household Budget Survey there is no information about tastes, poses limitations on the examination of the role of tastes versus resource constraints as determinants of the availability of various housing amenities and consumer durables (for example a household may have the ability to buy a car but have decided not to do so). Further, there is no information about the quality of the stock of durable goods available to each household, thus, possibly blurring the differences in the living standards of various households (for example, better-off households are likely to have more expensive cars than less well-off households). For an extensive discussion of the construction of non-monetary welfare indicators, see Callan et al (1996 , ch. 6).

case of INDEX3. Given the non-monetary welfare indicator (INDEX1, INDEX2 or INDEX3), the differences between the rank correlation coefficient of the composite welfare indicator and the rank correlation coefficient of disposable income or consumption expenditure are statistically significant at any conventional level of significance.

Table 4. Spearman rank (Pearson simple, in parenthesis) correlation coefficients of alternative welfare indicators

	DI	CE	FI	PI	INDEX1	INDEX2	INDEX3
DI	1						
CE	0.618 (0.617)	1					
FI	0.959 (0.973)	0.687 (0.686)	1				
PI	0.773 (0.767)	0.962 (0.960)	0.821 (0.817)	1			
INDEX1	0.343 (0.278)	0.440 (0.352)	0.430 (0.334)	0.464 (0.383)	1		
INDEX2	0.443 (0.345)	0.538 (0.430)	0.456 (0.358)	0.559 (0.467)	0.256 (0.343)	1	
INDEX3	0.458 (0.315)	0.560 (0.394)	0.473 (0.329)	0.580 (0.427)	0.257 (0.211)	0.969 (0.779)	1

All values are significant at the 0.01 level (2-tailed).

Finally, the results of Table 4 seem to suggest that the composite welfare indicator is able to depict better the relative welfare position of the household than the other monetary indicators of welfare employed in the paper. It is likely that the differences between the three monetary welfare indicators reported in Table 4 would have been substantially larger if we were using the "noisier" disposable income and consumption

expenditure data of the Household Budget Survey without the adjustments reported in section 2.[10]

5. Structure of inequality and poverty

As noted earlier, the level of inequality recorded by the distribution of the composite welfare indicator is substantially lower than the levels recorded by the distributions of disposable income and consumption expenditure. The next question to be investigated is whether the structures of inequality and poverty as accounted using the distribution of the composite welfare indicator differ in significant ways from the corresponding structures as accounted by the other monetary welfare indicators available in the Household Budget Survey. In order to examine the structure of inequality we rely on the mean logarithmic deviation, N

$$N = \frac{1}{n}\sum_{i=1}^{n} \ln\left(\frac{\mu}{y_i}\right) \tag{12}$$

where n is the size of the population, y_i the welfare indicator of person i (income, consumption expenditure or the composite indicator) and μ the mean of the distribution of this indicator. N is strictly additively decomposable. Thus, if the population is grouped into J mutually exclusive and exhaustive groups, N can be written in the following way that allows the quantification of the contributions of disparities "within" and "between" population groups to aggregate inequality [Anand (1983, Appendix C)]

$$N = \sum_{j=1}^{J}\left(\frac{n_j}{n}\right)N_j + \sum_{j=1}^{J}\left(\frac{n_j}{n}\right)\ln\left(\frac{\mu}{\mu_j}\right) \tag{13}$$

where the subscripts j denote the values of the corresponding variables in group j. The first component in the right hand side of (13) is the contribution of disparities "within groups" to aggregate inequality – that is, the level of inequality that would have been

10. It should be noted that the practice of using the original (unadjusted) data of Income from Budget Surveys is very common in empirical distributional studies.

recorded if the mean of each group's welfare indicator became equal to the aggregate mean by equiproportionate changes in the welfare indicators of the households of the group – while the second term is the "between groups" component of inequality – that is, the level of inequality that would have been recorded if the welfare indicators of the households of each group became equal to the group mean but differences between group means remained intact.

For the purposes of our analysis, the population is grouped into mutually exclusive and exhaustive groups using four alternative criteria: region of residence, locality, household type, socio-economic group and educational level of the household head. Further, multi-variate decomposition of inequality by population sub-groups is attempted by combining these factors. The proportionate contributions of "between groups" disparities to aggregate inequality according to each of the four welfare indicators for each grouping of the population are presented in Table 5.[11]

The results of Table 5 suggest that the structure of inequality is not affected dramatically by the distribution used. In most population groupings, the "between groups" component of inequality is higher when the distribution of the composite welfare indicator is used. This is most profound in the case of the contribution of the "between-educational-groups" component. As the evidence of Table 5 partly shows, the increase in the proportional contribution of "between-groups" disparities when the distribution of the composite welfare indicator is used instead of the other distributions occurs despite the fact that in the distribution of the composite welfare indicator the differences in the group means are not as large as in the distributions of either disposable income or consumption expenditure. The increase in the relative importance of the "between groups" component should be attributed to the fact that our formulation of the composite welfare indicator mitigates extreme values of disposable income or consumption expenditure and, thus, influences the level of inequality within particular groups substantially more than it affects the relationship between the group means and, hence, the "between groups"

[11] Ceteris paribus, the larger the number of groups and the more homogeneous the groups, the higher the proportion of aggregate inequality that is attributed to "between-groups" disparities.

component of inequality. In other words, even though both "between groups" and "within groups" inequalities decline in absolute terms when we move from the distribution of full income, disposable income or consumption expenditure to the distribution of the composite welfare indicator, the disparities "within groups" decline more significantly.[12]

From a substantive point of view, the estimates of Table 5 confirm earlier results that inequality in Greece emanates primarily from disparities "within" rather than "between" population groups [Tsakloglou (1993, 1997), Tsakloglou and Mitrakos (2006), Mitrakos and Tsakloglou (1997, 2000)]. Only when the population is grouped – into just five groups – according to the educational level of the household head, can a substantial proportion of aggregate inequality (almost 1/4) be attributed to disparities "between groups".

12. Using bootstrap techniques it can be shown that, although relatively small, the proportional contributions of "between groups" disparities to aggregate inequality are statistically significantly higher when the distribution of the composite welfare indicator is used instead of the distribution of disposable income, full income or consumption expenditure, when the population is grouped according to region, locality, socio-economic group of household head, educational level of household head and, particularly, in the multi-variate decomposition of inequality.

Table 5. Inequality decomposition using alternative concepts of resources

Grouping factor	Number of groups	% of aggregate inequality attributable to differences "between groups"			
		DI	CE	FI	PI
Region	13	4.3	6.2	5.0	6.6
Size of Locality	3	5.1	6.8	5.2	7.3
Household Type	9	6.1	7.0	4.7	6.8
Socio-economic group of household head	11	11.8	15.8	12.7	16.6
Educational level of household head	5	17.2	21.1	18.1	23.3
Multi-variate decomposition	420	27.2	29.4	27.6	32.5

For the purposes of the examination of the structure of poverty under alternative concepts of resources we employ the additively decomposable index of Foster, Greer and Thorbecke (1984), F

$$F = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{z - x_i}{z}\right)^{a} \qquad (14)$$

where z is the poverty line, while x_i represents the "truncated distribution" of the corresponding variable; x_i is equal to y_i when the household falls below the poverty line and equal to z when the household lies above it. α is a "poverty aversion" parameter whose value, in line with most empirical studies in the field, is set at $\alpha = 2$, at which the index has a number of desirable properties (focus, monotonicity, transfer sensitivity). When the population is grouped into J mutually exclusive and exhaustive groups, F can be written in the following way that allows the quantification of the contribution of particular population groups to aggregate poverty

$$F=\sum_{j=1}^{J}\frac{n_j}{n}F_j \qquad (15).$$

In line with Eurostat practice and several studies of poverty in the European Union, we set the poverty line at 60% of the median of the corresponding distribution. Since the composite welfare indicator is far more equally distributed than either income (full or disposable) or consumption expenditure, the resulting poverty rates using this type of poverty line differ considerably across distributions: 9.0% in the case of the composite welfare indicator against 19.6% in the case of disposable income, 15.1% in the case of consumption expenditure, and 15.6% in the case of full income (Table 3).

Table 6 reports the population shares, the mean equivalent disposable income, consumption expenditure, full income and composite indicator, as well as the relative poverty risk of different population groups. Some of these groups were found to be high-poverty-risk in earlier studies [Tsakloglou (1990), Tsakloglou and Panopoulou (1998), Tsakloglou and Mitrakos (2006)]: members of rural households, persons aged over 64 living alone, childless couples with at least one member aged over 64, members of households headed by farmers, members of households headed by unemployed persons, members of households headed by pensioners and members of households headed by persons who did not complete primary education.

As noted above, in almost all occasions, the mean composite welfare indicators of the high-poverty-risk groups (see rows in italic and bold format of Table 7) are closer to the national average than their mean disposable incomes, consumption expenditures or full incomes. Nevertheless, in all but two cases, when the contributions of these groups to aggregate poverty are considerably higher when we use as welfare indicator the composite welfare indicator instead of disposable income, consumption expenditure or full income. Moreover, further analysis indicate that residence in rural areas, working in agriculture and having low educational qualifications increase significantly the probability of falling below the poverty line. The poverty risk for these population groups is higher according to the new composite indicator of permanent income. At the other end, irrespective of the distribution used, the probability of poverty declines significantly as a result of high educational qualifications, particular occupational characteristics of the

household head (employer, non-manual employee or professional self-employed) and, to a lesser extent, residence in big cities.

Table 7.Relative poverty risk according to alternative concepts of resources

Characteristic of household or household head	Population share	Mean equivalent (Greece: 100.0)				Relative poverty risk Foster, Greer and Thorbecke index ($\alpha = 2$, Greece: 100.0)			
		DI	CE	FI	PI	DI	CE	FI	PI
Household type									
One person aged below 65	3.4	107.3	119.2	109.4	111.9	95.6	64.1	101.8	67.9
One person aged 65 or more	***4.2***	***69.9***	***77.2***	***81.4***	***83.0***	***195.5***	***210.9***	***162.7***	***179.6***
Childless couple (both below 65)	5.8	127.4	118.6	127.5	117.2	69.3	55.1	52.0	52.7
Childless couple (at least one person above 65)	***10.5***	***76.5***	***79.8***	***83.1***	***84.5***	***177.4***	***188.4***	***148.8***	***177.8***
Couple with one child below 18	8.6	120.3	123.1	116.6	116.5	60.5	40.4	71.5	45.3
Couple with two children below 18	15.6	101.3	111.1	101.0	106.1	88.5	49.4	90.7	52.4
Couple with three or more children below 18	5.9	86.0	96.4	85.5	93.7	134.5	82.1	151.3	118.1
Mono-parental household	1.2	74.3	107.4	78.2	97.1	176.2	71.8	178.5	132.1
Other household types	44.7	102.5	95.0	100.5	97.7	82.1	109.6	88.4	106.6
Locality									
Cities with population over 10.000	66.8	108.5	108.4	107.9	106.9	73.6	73.8	76.1	69.1
Semi-urban areas (population 2.000 - 10.000)	12.8	91.2	91.3	90.7	92.5	114.6	96.3	108.6	88.3
Rural areas (population below 2.000)	***20.4***	***77.6***	***78.0***	***79.8***	***82.1***	***177.4***	***188.3***	***173.0***	***208.5***
Socio-economic group of household head									
Employer in non-agriculture	5.8	142.3	140.3	137.7	130.4	55.4	6.9	57.4	11.8
Professional self-employed in non- agriculture	1.2	184.5	176.2	178.8	160.5	9.9	5.5	14.5	0.0
Non-professional self-employed in non-agriculture	10.0	92.5	98.8	93.3	97.2	135.0	62.3	117.9	85.3
Farmer or agricultural worker	***6.9***	***84.4***	***79.4***	***84.5***	***83.4***	***182.8***	***179.1***	***177.4***	***230.8***
Manual employee in non-agriculture (private sector)	14.1	83.0	84.2	79.3	85.6	97.8	133.8	135.1	132.9
Non-manual employee in non- agriculture (private sector)	9.1	122.6	125.7	120.7	119.4	50.9	33.6	48.9	35.2
Manual employee in non-agriculture (public sector)	4.1	99.7	96.3	96.3	97.3	45.0	87.1	56.5	41.7

Characteristic of household or household head	Population share	Mean equivalent (Greece: 100.0)				Relative poverty risk Foster, Greer and Thorbecke index ($\alpha = 2$, Greece: 100.0)			
		DI	CE	FI	PI	DI	CE	FI	PI
Non-manual employee in non- agriculture (public sector)	11.5	129.0	127.7	126.1	123.1	7.7	20.7	11.1	10.0
Unemployed	***2.3***	***69.9***	***79.2***	***70.6***	***81.2***	***170.3***	***120.0***	***201.8***	***143.3***
Pensioner	***27.9***	***90.4***	***87.6***	***94.2***	***92.2***	***125.9***	***150.2***	***112.4***	***141.2***
Other	7.1	82.0	86.8	86.5	89.2	145.6	119.1	132.0	104.3
Educational level of household head									
Tertiary education completed	16.9	151.1	145.2	147.9	137.5	17.3	22.7	19.4	12.0
Upper secondary education completed	30.5	103.7	106.2	103.4	104.5	73.0	54.7	77.6	51.9
Lower secondary education completed	13.0	89.0	90.9	88.4	92.0	107.0	103.4	119.7	118.5
Primary education completed	***29.9***	***83.2***	***82.8***	***84.3***	***86.3***	***136.4***	***138.5***	***129.5***	***144.4***
Primary education not completed	***9.6***	***65.2***	***66.6***	***69.6***	***73.0***	***208.8***	***255.8***	***194.7***	***244.5***
GREECE	100	100	100	100	100	100	100	100	100

6. Conclusions

The great majority of empirical distributional studies utilise cross-sectional data on disposable income or, to a lesser extent, consumption expenditure from Household Income and Budget Surveys. For a number of reasons, in many cases these variables exhibit a lot of artificially high variation. In addition, due to life-cycle factors, in many surveys containing information on both variables, they do not exhibit a particularly high degree of correlation. As a result, at least one, and possibly both, might not be considered as very reliable indicators of individual welfare and their use for the design of policies aimed to alleviate poverty, or reduce inequality, may be problematic. The problem is likely to be particularly serious in many developing countries with high levels of poverty where such surveys are conducted at irregular intervals, usually many years apart from one another. In these cases errors in the identification of the truly high-poverty-risk groups may have serious consequences in terms of human suffering.

The present paper presented a simple methodology that can be easily replicated in other data sets, for extracting information about a more stable welfare indicator of the population members under assumptions that cannot be considered particularly restrictive. The resulting indicator utilises the information of all the available monetary welfare indicators, with the corresponding weights determined endogenously and being inversely related to the degree of "noisiness" of each monetary welfare indicator.

Then, an application was provided using the data of a Greek Household Budget Survey for 2004/05. The distribution of the composite welfare indicator was found to exhibit substantially lower inequality than the distributions of disposable income, full income or consumption expenditure. Moreover, the composite welfare indicator was found to be more closely correlated than the other three monetary welfare indicators to a number of non-monetary welfare indicators that were constructed using the information available in the Household Budget Survey. The structure of inequality, as accounted by all welfare indicators, does not differ substantially across distributions, although in the distribution of the composite welfare indicator differences "between groups" were found to account for a higher proportion of aggregate inequality than in the distributions of disposable income, full income and consumption expenditure. Moreover, the contributions of a number of high-poverty-risk groups to aggregate poverty were found

to be larger using the distribution of the composite welfare indicator than either of the other distributions. Naturally, these findings are likely to have implications for the design of policies aimed to reduce aggregate inequality and, particularly, for the purposes of targeting efficiently the limited resources available for poverty alleviation.[13]

13. From a different point of view, these findings provide some support to the argument that anti-poverty policies should be targeted towards people that experience deprivation in terms of both income and consumption [see, for example, Nolan and Whelan (1996)]. About the three quarter of those who fall below the poverty line according to both current income and consumption expenditure as classified as poor by the composite welfare indicator, although the remaining one quarter do not.

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