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The distribution of full income in Greece

Abstract

Non-cash incomes from either private or public sources can have substantial effects on the distribution of economic welfare. However, standard approaches to inequality measurement either neglect them or take into account only selected non-monetary items. Using data for Greece in the mid 2000s we show that it is possible to incorporate a comprehensive list of non-monetary components into the analysis of income inequality. The results indicate that inequality declines sharply when we move from the distribution of disposable monetary income to the distribution of full income, that includes both cash and non-cash incomes. Both private and public non-cash incomes are far more equally distributed than monetary income, but the inequality-reducing effect of publicly provided in-kind services is stronger. The structure of inequality changes when non-cash incomes are included in the concept of resources, but the effects are not dramatic. Non-cash incomes appear to accrue more heavily to younger and older individuals, thus reducing differences across age groups.

Keyword: income distribution, imputed rent, in-kind public transfers

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1. Introduction

Empirical studies of economic inequality and poverty utilize distributions of proxy variables of material well-being such as income or consumption. In particular, income appears to be a straightforward concept for that purpose. Yet its precise theoretical definition and, consequently, its operationalization are quite complex. The theoretical quest of what exactly is income goes back in time. According to Fisher (1906), income is reflected on a series of perceived events or psychic experiences called enjoyment, that stem from the consumption of goods or services. In this sense, a person's income is the total flow of services yielded to her from her property, while individuals acquire goods and services that are beneficial to them by means of money. In a sense, every durable good may be considered as capital that yields income flows and the Fisherian concept of income can serve as a basis of inter-personal comparisons. But there are two shortcomings. First, the Fisherian definition focuses on actual consumption, ignoring capital accumulation. Second, it is very difficult to measure it objectively. As Haig (1921, p. 58) points out "*it is necessary for practical reasons to disregard the intangible psychological factors and have regard either for the money-worth of the goods and services utilized during a certain period or for the money itself received during the period supplemented by the money-worth of such good and services as are received directly without a money transaction*". Thus, Haig (1921, p.59) defined income as "*the increase or accretion in one's power to satisfy his wants in a given period of time, insofar that power consists of (a) money itself, or (b) by anything susceptible in valuation in money terms*". Simons (1938, p. 50) proposed a neat and comprehensive definition that breaks down an individual's income into the actual consumption and the net increase of his wealth during a certain period of time: "*Personal income may be defined as the algebraic sum of (1) the market value of rights exercised in consumption and (2) the change in the value of the store of property rights between the beginning and the end of a period.*". This definition is also known as Haig-Simons definition of income or as the Hicksian concept of income after its elegant presentation in Hicks (1939).

The above definition can serve as a definition of full income. It moves beyond monetary income and, therefore, reflects more accurately the actual well-being of economic agents. It should be made clear that (a) full income measures the individual's potential to consume and not just her realized consumption, and, (b) it refers to the "market value" of rights exercised in consumption. The latter implies that consumption should not arise necessarily from a market transaction that took place at the particular income reference period. Therefore, the definition of full income should include items such as the consumption of services derived from physical assets[1], publicly provided goods and services[2], home production of goods and services and non-pecuniary benefits from work. Note that the monetary value of leisure time is not included in the Haig-Simons definition.

The importance of using full income for the analysis of income inequality and poverty has been well understood in empirical economics, (see for example the early contributions of Smeeding (1977, 1982)). In recent years, experts in the field have made clear that distributional studies should move beyond the use of conventional

[1] As Marshall (1920, p. 64) explains "*But a broader use of this term is occasionally needed, which embraces the whole income of benefits of every sort which a person derives from the ownership of property however applied: it includes for instance the benefits which he gets from the use of his own piano, equally with those which a piano dealer would win by letting out a piano on hire.*".

[2] Pure public goods are excluded.

measures of monetary disposable income (Atkinson and Bourguignon, 2000; Canberra Group, 2001; Atkinson et al., 2002). Indeed, a rich literature emerged that takes into account non-monetary income. Yet, most of these studies focus on particular non-monetary income components. For example, a number of studies focus on the distributional effects of in-kind public education transfers (James and Benjamin, 1987; Selden and Wasylenko, 1995; Tsakloglou & Antoninis, 1999; Antoninis and Tsakloglou, 2001; Callan et al., 2008). Similarly, several authors add the monetary value of imputed rents in the distributions of disposable income in order to measure the distributional consequences of homeownership (Yates, 1993; Frick and Grabka 2003; Gasparini and Escudero, 2004; Pryor 2007; Frick et al., 2010). Others, motivated by the fact that in developed countries nearly half of welfare state budget finances the provision of publicly provided services, study the combined distributional effects of in-kind public transfers, (Evandrou et al., 1993; Aaberge et al., 2006; Garfinkel et al., 2006; Marical et al., 2008; Paulus et al., 2010). These authors are interested in exploring certain distributional aspects of specific non-monetary income and do not provide an overall picture of the distributional effect of non-monetary incomes. On the contrary, there are few studies that take into account both in-kind public transfers and private non-monetary incomes in order to reassess aggregate inequality (or poverty) under a definition of full (or near full) income (see, for example, Smeeding et al., 1993; Whiteford and Kennedy, 1995; Callan and Keane, 2009). In the context of Greece, there is a lack of such study and the present paper attempts to fill this gap. In particular, we estimate the monetary value of in-kind public transfers in the fields of education and health care, imputed rents, consumption of own farm and non-farm production, in kind intrahousehold transfers and fringe benefits and add them to the distribution of monetary disposable income, thus deriving the distribution of full income. The next section describes the methodology. Section 3 contains the results of empirical analysis and, finally, section 4 concludes.

2. Methodological settings

The study utilizes the microdata of the 2004/5 Greek Household Budget Survey (HBS) that covers the entire Greek population and has a sample of over 6,500 households with almost 17,500 members. The database includes information about all monetary incomes (wages, pensions, capital income, income from self-employment and social transfers) net of income taxes and social insurance contributions as well as non-monetary income components such as consumption of own farm and non-farm production, in-kind intrahousehold transfers and fringe benefits. It also includes information that can be used for estimating the monetary value of publicly provided services (education and health care) and the monetary value of homeownership (imputed rents). Our purpose was to exploit all the available information of the survey so as to compile a comprehensive list of non-monetary income components. Unfortunately, the HBS does not contain time-use information – in fact, no such information is available in Greece – and, consequently we were not able to estimate the value of home production of services.[3]

[3] The rest of the transfers of in-kind public services in Greece are either very small in size (publicly housing, childcare etc) or they are pure or almost pure public goods (defense, law and order, etc).

Income is set as proxy of the unobservable welfare of the household. The unit of analysis is the individual in the context of the household and the distributions used are distributions of equivalised household disposable income per capita. In order to compare meaningfully the incomes of heterogeneous households, income is adjusted using the "modified OECD equivalence scales" that assign weights of 1.00 to the household head, 0.50 to each of the remaining adults in the household and 0.30 to each child (person aged below 14). Furthermore, cost-sharing within the household is assumed. The household is treated as a single spending unit and all incomes are added up in order to form total household income.

In the main part of the empirical analysis, relative inequality is measured using the Gini index and indices from the parametric family of Atkinson indices. They satisfy the basic axioms of inequality measurement (symmetry, mean independence, population invariance and the principle transfers). The Atkinson indices are explicitly based on social welfare functions. Their welfare interpretation is simple; they measure the proportion of total income that could be redistributed with no loss of social welfare, if the remaining income were to be equally distributed {Lambert (2001)]. By setting arbitrary values at the inequality aversion parameter that characterises the index, the analysis can capture a wide range of distributional preferences. For the purposes of the study, the parameter was set at 0.5 and 1.5. Taking into account that, in comparison with other indices used in empirical studies, the Gini index is relatively sensitive to changes clos to the middle of the distribution while the Atkinson index for inequality aversion parameters 0.5 and 1.5 are relatively more sensitive to changes close to the top and bottom of the distribution, respectively, this choice covers a wide range of social preferences with regard to aversion to inequality. When we attempt inequality decomposition by factor components we use the family of "ethically flexible" Gini indices, while when we attempt decomposition by population sub-groups we use the Mean Log Deviation.

The following paragraphs describe briefly the estimation techniques used for the computation of the monetary value of non-monetary income components.

Estimation of imputed rents: The imputed income derived from homeownership is estimated using the "opportunity cost" approach, (Frick and Grabka, 2003). The rationale of this approach is that if the homeowners weren't homeowners they would have had to pay a rent. This fictitious rent could be estimated using information from the actual rental market. The procedure goes as follows; first, we gather information on housing characteristics (size of the dwelling, neighborhood characteristics, construction year, house amenities etc.) as well as actual rents paid (for renting households). Then, we use the subsample of renters in order to estimate a hedonic model of rent determination and, in the next stage, we apply the model's estimates to the subsample of homeowners in order to derive an estimate of the rent they would have had to pay if they were renters. The model controls for selectivity bias through a two-stage Heckman procedure which consists of a selection equation in the first stage and a hedonic regression in the second stage. Net imputed rents were computed after subtracting mortgage interest payments as well as other owner-related costs.[4]

Estimation of education transfers: The estimates of the monetary value of in-kind public transfers in the field of education by education level (primary secondary and tertiary) were derived using static incidence analysis under the assumption that

[4] Detailed estimates are available from the authors on request.

public education transfers do not create externalities, (Tsakloglou and Antoninis, 1999). The beneficiaries of the public transfers are assumed to be the recipients of the public education services. Moreover, it is assumed that the value of the transfer to the beneficiary is equal to the average cost of producing the public education services in the corresponding level of education. We also assume that the benefit is shared by all household members (not only by the direct beneficiary); in other words, we implicitly assume that in the absence of the public transfer the burden of financing the provision of education services would be borne by the household. Since the HBS provides information on whether the students in its sample attend a private or a public educational institution, the corresponding benefits were allocated only to students attending public institutions.[5]

Estimation of public health care transfers: In order to estimate the value of public health care services, the risk-related "insurance value approach" was adopted (Smeeding et al., 1993). The "insurance value" is the amount that an insured person would have to pay in each age group so that the government would have just enough revenue to cover all claims for the persons that belong to this group. In other words, the value of public health care services provided are equivalent to funding an insurance policy where the value of the premium is the same for everybody sharing the same characteristics, such as age. Then, this value is added to the income of each individual. We calculated per capita expenditures for each age group using the information of the OECD Social Expenditure database (SOCX). The estimates include all public expenditure on health care, including inter alia, expenditure on in-patient care, ambulatory medical services, pharmaceutical goods and prevention, but they do not include non-reimbursed individual health expenditures or cash benefits related to sickness.

Estimation of consumption of own farm and non-farm production, fringe benefits and in-kind transfers from other households: The monetary value of these non-cash components was readily available in the HBS. Some of the information was self-assessed, in some cases information on quantities was provided by the respondents and was combined with price information by the enumerators, while in the case of company cars an elaborate estimation method was applied using characteristics of the vehicle.

Finally, the full income was defined as the sum of monetary disposable income, private non-cash income and in-kind public transfers.

3. Empirical Results

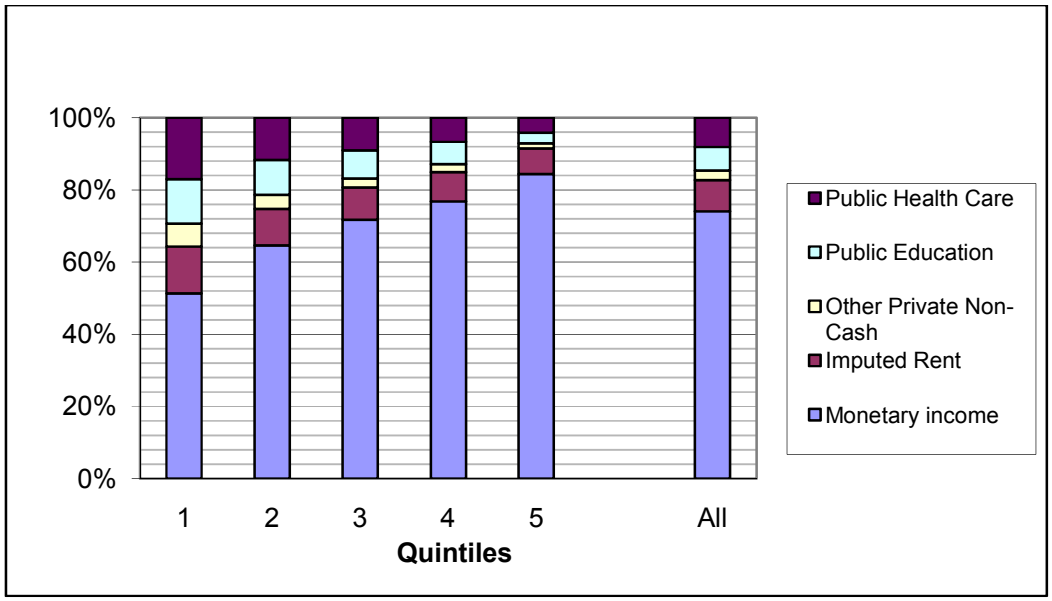
3.1 Composition of full income distribution

The Graph 1 depicts the composition of full income both for the entire population and for quintiles (when the population is ranked into five groups of equal size from the poorest to the richest according to their equivalized full income). The composition of full income for the entire population is depicted in the last column of the graph. Over a quarter of full income is non-monetary. Imputed rent is the largest non-monetary component; 8.7 per cent of full income. The large share of imputed rent is not surprising since over four fifths of the population live in owner occupied dwellings and the great majority are outright owners (without mortgages). Public

[5] For a detailed description of the method used for the derivation of these estimates see Koutsampelas and Tsakloglou (2012)

health care services represent 8.0 per cent of full income, in-kind education transfers 6.5 per cent and, finally, 2.7 per cent of full income stems from other private non-cash income sources.

Graph 1: Composition of full income per quintile



Source: Greek Household Budget Survey, 2004/5.

The composition of full income varies across quintiles. The relative share of monetary income increases as we move up to higher quintiles. Simply put, the richer the quintile, the heavier its reliance on monetary income. This is an interesting finding that, to some extent, reflects the unequal outcomes of private markets (since rewards in markets are mostly in cash). Thus, non-monetary income accounts for less than a sixth of the full income of the richest quintile, but almost half of the full income of the poorest quintile. The large share of non-monetary income of the poorest quintile is due to the high importance of in-kind public transfers (almost 30 per cent is accounted by public education and health care transfers in-kind). Focusing on non-cash incomes, we observe that as we move to richer quintiles, non-monetary resources consist mainly of "private" components. In the top quintile, private non-monetary income components account for 8.5 per cent of full income, while the corresponding share of public in-kind transfers is 7.1 per cent.

The distribution of full income differs substantially from the distribution of monetary income. Table 1 highlights these important differences. The left panel of the table compares the quintile income shares of monetary income and the induced changes in the income shares of quintiles as we add the non-cash components. The income shares of the three lower quintiles increase, while those of the fourth and, particularly, the fifth quintile decrease as we move from the monetary to the full distribution of income. The most pronounced differences are observed in the poorest quintile due to its heavy dependence on in-kind public transfers. Its income share increases from 7.42% to 8.57% if we add only private non-cash income to monetary disposable income, to 9.48% if we add only in-kind public transfers and to 10.21%

Table 1: Descriptives

Quintile	*Income shares*				*Non-monetary income as % of monetary income*			*Mean monthly non-monetary income per capita*		
	Mone-tary income	*Plus private non-cash incomes*	*Plus public non-cash incomes*	*Plus all non-cash incomes*	*private non-cash incomes*	*public non-cash incomes*	*all non-cash incomes*	*private non-cash incomes*	*public non-cash incomes*	*all non-cash incomes*
1	7.42	8.57	9.48	10.21	37.6	57.2	94.7	91.9	129.6	221.6
2	12.56	13.27	13.98	14.34	21.7	33.0	54.6	88.3	124.1	212.4
3	16.96	17.29	17.68	17.73	15.9	23.5	39.5	82.7	115.8	198.5
4	22.87	22.65	22.53	22.37	13.5	16.7	30.1	92.8	108.8	201.6
5	40.18	38.22	36.32	35.34	10.1	8.4	18.5	123.4	96.9	220.3
All					15.4	19.7	35.1	95.8	115.0	210.9

Source: Greek Household Budget Survey, 2004/5.

when we consider all income sources together. The middle panel of the table describes the relative size of non-monetary income (the ratio of the sum of the non-monetary income to the monetary income of the quintile). We observe that the relative size of non-cash income is negatively correlated with disposable income. Finally, the right panel of the table reports monthly estimates of the mean value of non-cash income per capita for each quintile. A U-shaped pattern emerges. Mean private non-cash income decrease initially (€91.8, €88.3, €82.7 for the first three quintiles) and thereafter increases (€92.8, €123.4 for the top quintiles). This pattern reflects the fact that the consumption of own production and in-kind intra-household transfers are concentrated more to the bottom of the income distribution, while imputed rents increase as we move up to richer quintiles (naturally, richer households reside in more luxurious homes). On the other hand, the average value of in-kind public transfers is negatively correlated with monetary income. This is because the elderly, who are disproportionately concentrated in the poor quintiles, benefit most from in-kind public health care transfers, while the rich households substitute publicly provided education with private services.

3.2 Concentration curves

The findings of section 3.1 imply that non-monetary income is more equally distributed than monetary income. This is examined analytically in Graph 2 that plots the concentration curve for each non-monetary component and compares it with the Lorenz curve for the distribution of monetary income and the line of complete equality.

All concentration curves (apart from that of imputed rent) lie above the line of complete equality. In-kind public transfers and other private non-cash incomes are disproportionally concentrated to the poorest quintiles in both absolute and relative terms. Other private non-cash incomes are most "equally" distributed, followed by public health care services, public education transfers and, finally, imputed rents.

Graph 2: Concentration curves for non-monetary income components

Notes:

(a) L(p): Lorenz curve for the distribution of monetary income
$C_{ir}(p)$: Concentration curve for imputed rents
$C_{other}(p)$: Concentration curve for other private non-monetary incomes
$C_{educ}(p)$: Concentration curve for public education transfers
$C_{health}(p)$: Concentration curve for public health care transfers

(b) DAD software was used for the estimation of the concentration curves

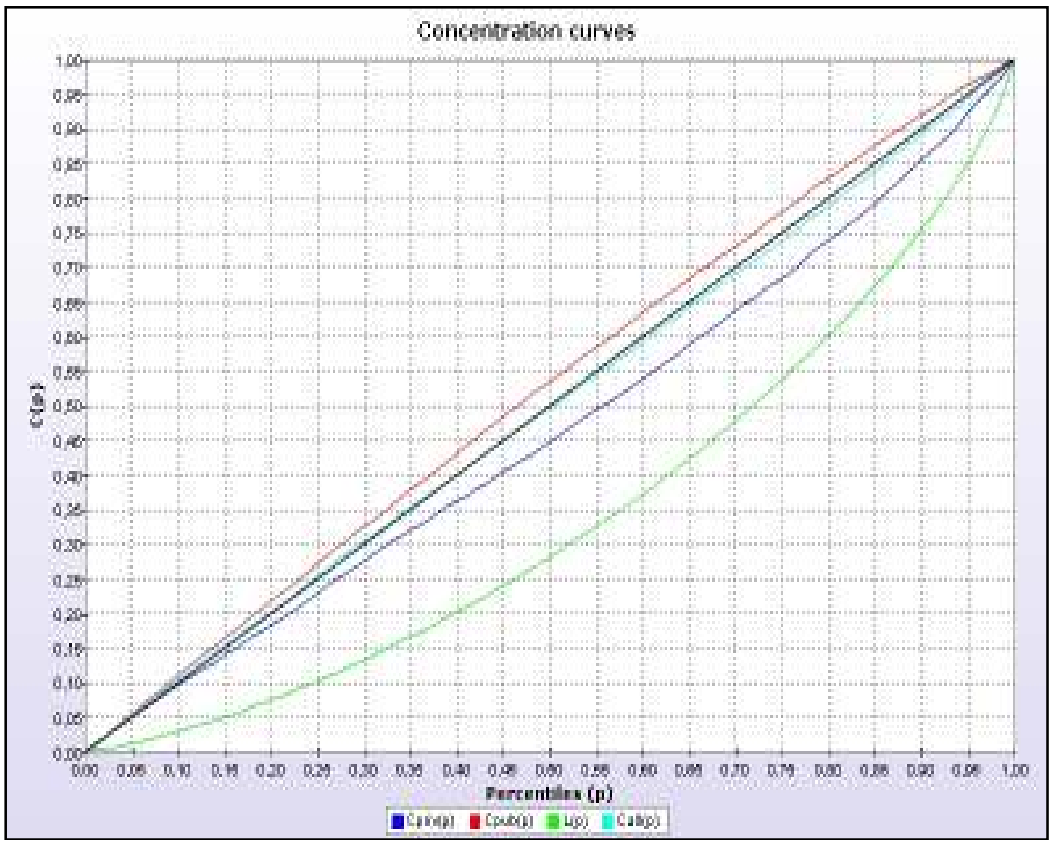
The ranking reverses in the upper part of the distribution, where the concentration curve for public education transfers dominates the rest of the concentration curves.

Graph 3 plots the aggregate concentration curves for private, public and total non-monetary incomes. The concentration curve for total non-monetary incomes almost coincides with the line of perfect equality indicating that these components, as a whole, are equally distributed in absolute terms. This is the combined outcome of the distribution patterns of the public and private non-cash incomes. As anticipated, the concentration curve for public non-monetary incomes lies wholly above the concentration curve for private non-monetary incomes.

3.3 Inequality comparisons

The former analysis provides qualitative evidence that non-monetary incomes are likely to exert an equalizing effect on the income distribution. In this section, we estimate indices of relative inequality in order to measure the redistributive effect of these components and, ultimately, reassess aggregate inequality under the more comprehensive definition of full income. The figures in Table 2 measure the

Graph 3: Concentration curves for public, private and all non-cash incomes



Notes:

(a) L(p): Lorenz curve for the distribution of monetary income
$C_{pub}(p)$: Concentration curve for in kind public transfers
$C_{priv}(p)$: Concentration curve for private non-monetary incomes
$C_{all}(p)$: Concentration curve for all non-monetary incomes

(b) DAD software was used for the estimation of the concentration curves

proportional changes in each inequality index when we move from the distribution of disposable income to the distribution of full income. Public health care transfers induce the largest decline in inequality (the Gini index declines by -10.9% and the two Atkinson indices by -20.8% and -23.3%, respectively). Despite their progressivity, other non-monetary incomes exhibit the smallest inequality-reducing effect, due to their small size in absolute terms (the Gini index declines by -3.4%, Atkinson (e=0.5) by -7.1% and Atkinson (e=1.5) by -8.5%). The redistributive effect of in-kind public transfers is stronger than that of private non-cash incomes. The value of the Gini index declines by -16.8% due to in-kind public transfers against a -8.3% reduction due to private non-monetary incomes. The corresponding percentages for Atkinson (e=0.5) are -30.9% and -16.7% and for Atkinson (e=1.5) -32.5% and -19.3%, respectively. Full income is far less unequally distributed than the monetary income. When non-monetary income components are added to the concept of resources, Gini declines by 22.1%, Atkinson (e=0.5) by 39.6% and Atkinson (e=1.5), that is the most sensitive of the three to changes close to the bottom of the distribution, by a staggering -41.8%.

Table 2: Inequality under alternative income concepts

Index of inequality	*distribution of monetary income*	*% change to inequality due to the addition of:*						
		imputed rents	*other non-cash incomes*	*private non-cash incomes*	*public education transfers*	*public health care services*	*public non-cash incomes*	*all non-cash incomes*
Gini	0.3217	-5.3	-3.4	-8.3	-6.4	-10.9	-16.8	-22.1
Atkinson 0.5	0.0849	-11.1	-7.1	-16.7	-12.1	-20.8	-30.9	-39.6
Atkinson 1.5	0.2406	-13.3	-8.5	-19.3	-10.8	-23.3	-32.5	-41.8

Source: Greek Household Budget Survey, 2004/5.

3.4 Structure of inequality

Naturally, the transition from monetary income to full income is likely to change not only the level but the structure of inequality. In Table 3, we estimate the contribution of each component of monetary and full income to total inequality and the corresponding elasticities of inequality using factor component analysis (Shorrocks, 1982). For the purposes of the analysis, we employ the parametric Gini index (Blackorby and Donaldson, 1978). The higher (lower) the value of the inequality parameter n (in our case n = 0.5, 2 and 4), the more sensitive the index to changes close to the bottom (top) of the distribution.[6]

The first two columns report the shares of monetary and non-monetary income components in the two distributions. The remaining of the table reports the contribution of each component to aggregate inequality and the elasticity of inequality with respect to the corresponding income component; that is, the ceteris paribus proportional change in aggregate inequality due to an increase of each particular component by 1%.[7] Several interesting results are reported in the table. As expected the contribution of non-monetary components to aggregate inequality is lower than their income share and, hence, they tend to reduce inequality. However, in the cases of public education and imputed rent this progressivity declines as the value of the inequality aversion parameter rises. This may be an indication that relatively few beneficiaries as such non-cash incomes are located to the very bottom of the distribution. Mild declines are also observed regarding other private non-cash income components while no such trend is observed in the case of public health care transfers. Irrespective of the value of the inequality aversion parameter, the (negative) elasticity of inequality in the distribution of full income is always higher with respect to non-monetary public rather than non-monetary private incomes. Further, it is worth noting that the equalizing effect of monetary income components such as pensions, other social transfers and self-employment income from agricultural activities declines when we move from the distribution of monetary income to the distribution of cash income, while the disequalizing effects of components such as capital income, income from self-employment in the non-agricultural sector and (in most cases) wages and salaries rise. All in all,

Next, we turn to inequality decomposition by population sub-groups (Shorrocks, 1980). In this type of inequality decomposition, when the population is partitioned

[6] When n=2, the index is the usual Gini index.

[7] Naturally, for each distribution, the sum of all elasticities is equal to zero.

Table 3: Inequality decomposition by factor components

Income component	*Income Share*		*n=0.5*				*n=2*				*n=4*			
	Mone-tary	*Full*	*Monetary*		*Full*		*Monetary*		*Full*		*Monetary*		*Full*	
			Contri-bution	*Elasti-city*	*Contri-bution*	*Elasti-city*	*Contri-bution*	*Elasti-city*	*Contri-bution*	*Elasti-city*	*Contri-bution*	*Elasti-city*	*Contri-bution*	*Elasti-city*
Wages and salaries	0.481	0.357	0.251	-0.229	0.237	-0.120	0.517	0.037	0.446	0.089	0.566	0.086	0.479	0.123
Non-agric. Self-empl. income	0.195	0.145	0.461	0.266	0.454	0.309	0.289	0.093	0.278	0.134	0.239	0.044	0.230	0.086
Agric. Self-empl. income	0.044	0.033	0.097	0.053	0.068	0.035	0.026	-0.018	0.027	-0.006	0.024	-0.021	0.025	-0.008
Capital income	0.042	0.031	0.106	0.065	0.106	0.075	0.075	0.033	0.074	0.043	0.063	0.021	0.062	0.031
Pensions	0.206	0.153	0.041	-0.166	0.042	-0.111	0.090	-0.116	0.094	-0.059	0.103	-0.103	0.110	-0.043
Other social transfers	0.032	0.024	0.044	0.011	0.043	0.019	0.003	-0.029	0.004	-0.020	0.005	-0.027	0.005	-0.019
Monetary incomes		*0.742*			*0.951*	*0.209*			*0.922*	*0.180*			*0.910*	*0.169*
Imputed Rent		0.087			0.054	-0.033			0.066	-0.020			0.067	-0.019
Other private non-cash incomes		0.027			0.006	-0.021			0.008	-0.019			0.009	-0.018
Public education transfers		0.065			-0.004	-0.069			0.015	-0.050			0.023	-0.041
Public health care transfers		0.080			-0.006	-0.086			-0.011	-0.091			-0.010	-0.090
Non-monetary private		*0.113*			*0.060*	*-0.054*			*0.074*	*-0.039*			*0.077*	*-0.037*
Non-monetary public		*0.145*			*-0.010*	*-0.155*			*0.004*	*-0.141*			*0.013*	*-0.132*
Non-monetary (all)		*0.258*			*0.049*	*-0.209*			*0.078*	*-0.180*			*0.090*	*-0.169*

into non-overlapping and exhaustive groups, aggregate inequality is attributed to inequalities "within" groups and inequalities "between" groups. Since neither the Gini index nor the Atkinson index are additively decomposable, for the purposes of our analysis we used the Mean Log Deviation as index of inequality. [8] The population is partitioned according to household type, socioeconomic status of the household head, educational level of the household head and age of the population member.

The results of decomposition inequality by population subgroups are reported in Table 4. The first column of the table (A) reports the population shares of the various subgroups and the next two columns (B and C) their relative mean incomes (Greece: 100.0) under the two concepts of resources. Column D reports the points of percentage difference in mean relative incomes as we move from monetary income to full income. The following columns show the level of inequality within each subgroup using monetary and full income (E and F) and the proportional change in the index (G). Finally, columns H and I report the contribution of each subgroup to aggregate inequality in the distribution of monetary and full income. Below each population grouping we report the value, the proportional change and the contribution to aggregate inequality that can be attributed to inequality "within groups" and "between groups".

In comparison to other inequality indices that are widely used in similar studies, the Mean Log Deviation is relatively more sensitive to changes close to the bottom of the distribution. The level of decline in aggregate inequality recorded by the Mean Log Deviation when we move from the distribution of monetary income to the distribution of full income (-42.8%) is similar to that recorded by the Atkinson (1.5) index. The results of Table 4 suggest that irrespective of the concept of resources, the bulk of inequality emanates from differences "within" rather than "between" population subgroups. However, the proportion of aggregate inequality accounted by differences "between groups" varies very considerably across population partitions (over 15% when the population is partitioned by the household head's education level, 8-10% when it is partitioned by the household head's socioeconomic status, less than 4% when it is partitioned by household type or age of the population member). The results of column D suggest that when we move from the distribution of monetary income to the distribution of full income we observe a substantial improvement in the relative income position of a number of low-income groups (elderly and mono-parental households) and a decline in the relative position of well-off groups (member of households with heads who are white collar workers or tertiary education graduates). Regarding the change in the level of inequality within particular population subgroups when we move from the distribution of monetary income to the distribution of full income, the evidence is not entirely clear, although as a rule the decline is proportionally larger in high-inequality groups (mono-parental households, households with heads with low educational qualifications) and smaller in low-inequality groups (member of households with heads who are blue or white collar workers or tertiary education graduates). However, there are also striking exceptions (see, for example, the spectacular decline in the

[8] Technically, any additively decomposable index can be used. The advantage of Mean Logarithmic Deviation is that within-group inequality contributions do not depend on the mean income of the groups or, in other words, subgroup inequality is only population-weighted. This is an attractive property in our context.

Table 4: Inequality decomposition by population subgroups

Characteristic of household or household head	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*
Household Type									
Older single persons or couples (at least one 65+)	7.8	71.4	82.7	11.3	0.139	0.067	-52.1	6.1	5.1
Younger single persons or couples (none 65+)	18.0	98.4	98.8	0.4	0.227	0.125	-44.8	22.8	22.0
Couples with children up to 18 (no other HH members)	33.6	103.5	104.8	1.3	0.179	0.104	-42.1	33.7	34.1
Mono-parental households	1.5	82.0	93.2	11.2	0.211	0.091	-56.9	1.8	1.3
Other household types	39.1	104.3	100.2	-4.1	0.151	0.094	-38.0	33.0	35.8
"Within groups" inequality					0.174	0.101	-42.2	97.6	98.6
"Between groups" inequality					0.005	0.002	-64.5	2.4	1.4
Socioeconomic group of HH head									
Blue collar worker	23.3	88.5	88.1	-0.4	0.095	0.058	-38.8	12.4	13.2
White collar worker	14.9	137.1	129.2	-7.9	0.102	0.069	-32.4	8.5	10.1
Self-employed (non-agricultural sector)	20.2	110.8	110.0	-0.8	0.263	0.147	-44.0	29.7	29.0
Self-employed (agricultural sector)	3.0	90.6	92.7	2.1	0.300	0.159	-46.9	5.0	4.6
Self-employed	23.3	108.0	107.9	-0.1	0.270	0.150	-44.4	35.1	34.2
Unemployed	2.3	71.2	75.1	3.9	0.139	0.076	-45.0	1.8	1.7
Pensioner	27.9	89.5	92.8	3.3	0.168	0.088	-47.2	26.1	24.1
Other	8.4	86.7	90.6	3.9	0.175	0.087	-50.0	8.2	7.2
"Within groups" inequality					0.164	0.092	-43.7	91.7	90.1
"Between groups" inequality					0.015	0.010	-31.6	8.3	9.9
Education level of HH head									
Tertiary education	20.4	146.9	136.6	-10.3	0.137	0.097	-28.9	15.6	19.4
Upper secondary education	27.0	101.2	101.6	0.4	0.147	0.085	-42.2	22.1	22.3
Lower secondary education	13.0	89.0	90.6	1.6	0.149	0.082	-45.2	10.8	10.4
Primary education or less	39.5	78.6	83.1	4.5	0.160	0.078	-51.2	35.3	30.1
"Within groups" inequality					0.150	0.084	-43.9	84.3	82.9
"Between groups" inequality					0.029	0.018	-37.0	15.7	17.1
Age of population member									
Below 25	27.0	95.9	98.6	2.7	0.171	0.096	-43.8	25.8	25.4
25-64	52.5	109.2	105.0	-4.2	0.174	0.109	-37.7	51.1	55.7
Over 64	20.6	82.2	89.3	7.1	0.172	0.085	-50.4	19.8	17.2
"Within groups" inequality					0.173	0.101	-41.9	96.4	97.9
"Between groups" inequality					0.006	0.002	-68.6	3.6	2.1
ALL					0.179	0.102	-42.8		

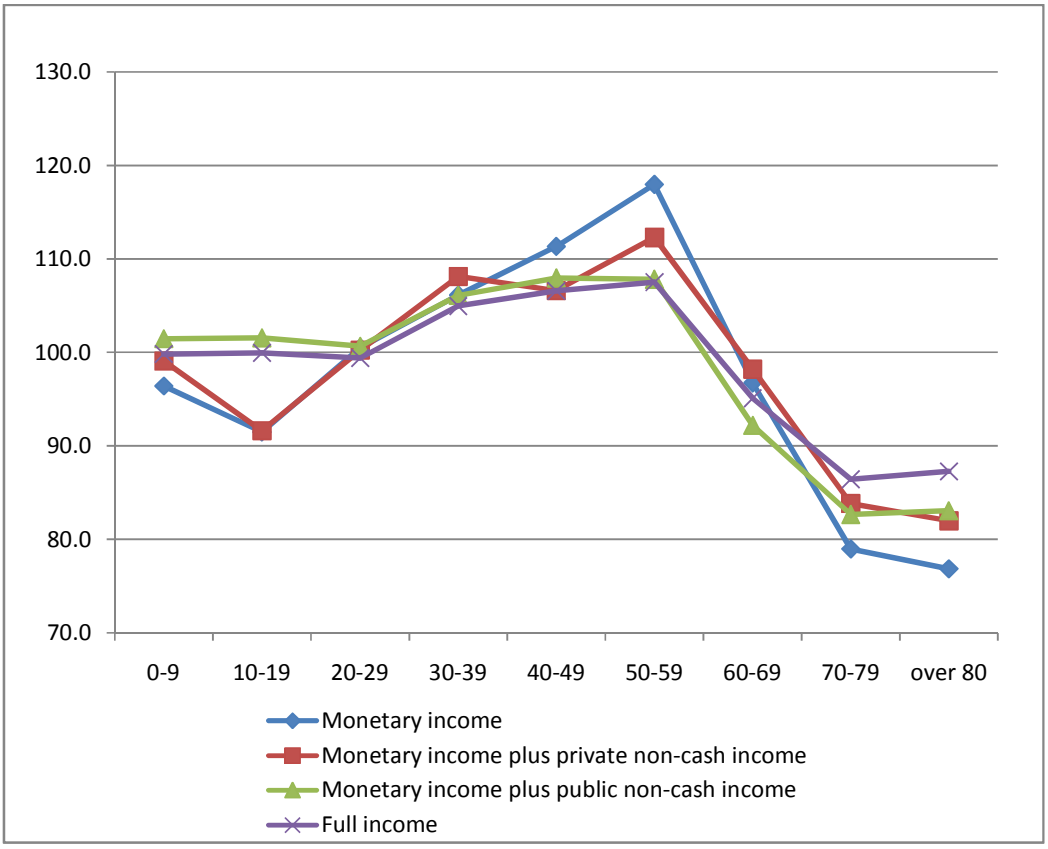
Notes:
A: Population Share
B: Relative Group Income (Monetary Income, Greece: 100.0)
C: Relative Group Income (Full Income, Greece: 100.0)
D: B-C
E: Mean Log Deviation (Monetary Income)
F: Mean Log Deviation (Full Income)
G: % Change in Inequality
H: % Contribution to Aggregate Income Inequality (Monetary Income)
I: % Contribution to Aggregate Income Inequality (Full Income)

low-inequality group of households consisting of elderly single or elderly couples). As a consequence of these changes, the movement from the distribution of monetary income to the distribution of full income is associated with an increase in the share of inequality that is accounted by differences "between group" when the population is partitioned according to education level (from 15.7% to 17.1%) and socioeconomic group (from 8.3% to 9.9%) of the household head, whereas when the population is partitioned according to demographic factors (household type and age of the population member), the share of differences "between-groups" declines further from already low levels (from 2.4% to 1.4% and 3.6% to 2.1%, respectively).

3.5 Non-monetary income in a life cycle perspective

The evidence of Table 4 seems to suggest that the non-cash components are age-related and, therefore, it may be better to examine them in a life-cycle perspective. Indeed, education-related transfers are directed almost exclusively to households with young members, while health-related transfers accrue disproportionally to the elderly. To some extent, this also holds for imputed rents. Graph 4 depicts the the relative income position (average equivalized income of the group relative to the overall average income) of ten-year age cohorts under alternative concepts of resources. There are four lines in the graph, corresponding to monetary income, monetary income augmented by private in-kind incomes, monetary income augmented by public in-kind incomes and full income.

Graph 4: Relative income position per age cohort (Greece: 100)



As the graph indicates, non-monetary income flattens the life-cycle profile of relative income positions. If we ignore non-monetary income, we observe that the middle-aged are better off than the young and the elderly. However, after taking into account non-monetary income, both the young and the elderly improve their relative income positions. Both private and public in-kind incomes are contributing to this change, but careful inspection of the evidence reveals that the effect of publicly provided non-cash incomes is substantially stronger. Hence, non-cash incomes seem to enables households to smooth their consumption across their lifecycle.

4. Conclusions

In this paper, we estimated the distribution of full income in Greece using a large, but not exhaustive, list of non-monetary incomes. The non-cash incomes considered account for over a third of disposable income. Inequality declines sharply when we move from the distribution of disposable monetary income to the distribution of full income, irrespective of the index of inequality used. Both private and public non-cash incomes are far more equally distributed than monetary income, but the inequality-reducing effect of publicly provided in-kind services is stronger. The structure of inequality changes when non-cash incomes are included in the concept of resources, but the changes are not dramatic. Further, non-cash incomes appear to accrue more heavily to younger and older individuals, thus reducing differences across age groups.

As noted in the introduction, the most important omission from our analysis was that of home-produced services. Time use data are needed in order to estimate the distributional effects of these services and no such information is available in Greece. However, it should be noted that the estimation of the value of home-produced services is marred with numerous theoretical and empirical problems. From a theoretical point of view, the most important problem is that it is not entirely clear which services should be included in the list, since many of them are clearly leisure-related.[9] From an empirical point of view, it is not obvious whether the time spent for the production of these services should be evaluated at the opportunity cost of the individual involved (i.e. her wage rate, using an "opportunity cost" approach) or the market wage used for the production of such services. As Jenkins and O'Leary (1996) show using UK data, the resulting estimates as well as their distributional consequences vary widely depending on the method employed.[10]

One important caveat of the paper has to do with the equivalence scales used in the analysis. In line with most studies found in the relevant empirical literature, we used

[9] As Marshall (1920, pp. 64-65) puts it eloquently "*From this point of view income is regarded as including all the benefits which mankind derive at any time from their efforts, in the present and in the past, to turn nature's resources to their best account. The pleasure derived from the beauties of the rainbow, or the sweet taste of the fresh morning air, are left out of the reckoning, not because they are unimportant, nor because the estimate would in any way be vitiated by including them; but solely because reckoning them in would serve no good purpose, while it would add greatly to the length of our sentences and the prolixity of our discussions. For a similar reason it is not worth while to take separate account of the simple services which nearly every one renders to himself, such as putting on his clothes; though there are a few persons who choose to pay others to do such things for them. Their exclusion involves no principle; and time spent by some controversial writers on discussing it has been wasted. It simply follows the maxim De minimis non curat lex*".

[10] Similar conclusions are also reached by Frick et al (2007) for Germany and D'Ambrosio and Gigliarano (2008) for Italy.

the same equivalence scales for the analysis of both monetary income and full income. This is probably uncontroversial in the case of private non-cash incomes, but may be problematic in the case of public education and public health care where needs are characterized by strong life-cycle patterns. The equivalence scales that are used in order to measure inequality in disposable monetary income are "conditional" on the existence of free public education and free public health care (Pollak and Wales, 1979; Blundell and Lewbel, 1991). By including publicly provided services in the new concept of resources (full income), essentially we treat them like private commodities that households must pay for in order to obtain them. Hence, it might be argued that the equivalence scales should be modified so as to reflect the higher needs of particular types of households for these services. In other words, the results may overestimate the redistributive impact of publicly provided non-cash incomes (Radner, 1997). The construction of "appropriate" equivalence scales is not an easy task and there is no widely acceptable method for accounting for differences in needs for such services.[11]

Finally, it should be noted that the results of the paper have clear policy implications. Non-monetary incomes are large in size, improve the welfare of their recipients and they are allocated in a very different pattern than monetary incomes. Therefore, ignoring non-cash incomes when designing policies aiming to reduce inequality and/or alleviate poverty can easily result in imperfect targeting, misallocation of resources and inefficiencies.

[11] A number of studies attempting to analyse this problem can be found in the literature, but they usually focus on small population groups (esp. the disabled); see, for example Jones and O'Donnell (1995), Klavus (1999), Zaidi and Burchardt (2005), and Berloffa et al. (2006). An interesting theoretical approach is explored in Aaberge et al. (2010). Their results as well as the results of Paulus et al (2010) suggest that, once differences in needs is accounted for, the redistributive effects of publicly provided services are more modest than those derived using conventional equivalence scales.

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