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Short term distributional effects of public education transfers in Greece

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Abstract

The usual practice in empirical distributional studies is to use distributions of disposable income. However, a household's command over resources is determined not only by its spending power over commodities it can buy, but also on resources available to the household members through the in-kind provisions of the welfare state (as well as private non-cash incomes). In most modern societies, one of the most important public transfers in-kind to the members of the population takes place through the education system. One of the main aims of such transfers is the mitigation of socio-economic inequalities. The present paper examines the short-run distributional impact of public education in Greece using the micro-data of the 2004/5 Household Budget Survey. It employs static incidence analysis under the assumption that public education transfers do not create externalities. The aggregate distributional impact of public education is found to be progressive although the incidence varies according to the level of education under examination. In-kind transfers of public education services in the fields of primary and secondary education lead to a considerable decline in relative inequality, whereas transfers in the field of tertiary education appear to have a small distributional impact whose size and sign depend on the treatment of tertiary education students living away from the parental home (a result confirmed by inequality decomposition by factor components). When absolute inequality indices are used instead of the relative ones, primary education transfers retain their progressivity, while secondary education transfers appear almost neutral and tertiary education transfers become quite regressive. The main policy implications of the findings are outlined in the concluding section.

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1. Introduction and short literature review

Until recently, most empirical distributional studies were relying exclusively on distributions of disposable income or, more rarely, consumption expenditure. However, a household's command over resources is determined not only by its spending power over commodities it can buy but also on resources available to the household members through the in-kind provisions of the welfare state (as well as private non-cash incomes). Thus, from a theoretical point of view, a measure that counts in kind transfers is superior to the conventional measure of cash disposable income as a measure of a household's standard of living [Atkinson and Bourguignon (2000), Atkinson et al (2002), Canberra Group (2001)]. In most countries, developed and developing alike, one of the most important public transfers in-kind to the members of the population takes place through the education system. One of the main aims of such transfers is the mitigation of socio-economic inequalities. A number of national and cross-national empirical studies of the distributional effects of public education transfers either alone or in combination with other public transfer in-kind (such as health and housing) can be found in the literature [Meerman (1979), Jimenez (1986), James and Benjamin (1987), Lampman (1988), Evandrou et al (1993), Smeeding et al (1993), Selden and Wasylenko (1995), Whiteford and Kennedy (1995), Steckmest (1996), McLennan (1996), Huguenenq (1998), Harris (1999), Sefton (2002), Lakin (2004), Harding, Lloyd and Warren (2006), Garfinkel, Rainwater and Smeeding (2006), Marical et al (2006)]. They employ a variety of techniques and their results suggest that public education transfers reduce aggregate inequality, but the effect varies considerably according to the level of education and the country under examination.

Until relatively recently, the debate concerning such issues in Greece was rather limited. In Greece education services are provided free of charge by the state at all levels (primary, secondary and tertiary), the role of private education is limited and so in the public discourse it has been widely assumed that education subsidies have a progressively redistributive impact. The only relevant issue that has been widely discussed in the literature is that of unequal access to tertiary education [Meimaris and Nikolakopoulos (1978), Psacharopoulos and Papas (1987), Psacharopoulos (1988), Papas and Psacharopoulos (1991), Chryssakis (1991), Patrinos (1992, 1995) Katsikas and Kavadias (1994), Polydoridis (1995), Kyridis (1996), Kassotakis and

Papagelli-Vouliouri (1996), Gouvias (1998a, 1998b), Chryssakis and Soulis (2001), Psacharopoulos and Tassoulas (2004), Psacharopoulos and Papakonstantinou (2005). For a survey, see Tsakloglou and Cholezas (2005)]. Even though most of these studies are descriptive in nature (for example, no study uses probability analysis in order to investigate in detail the factors that affect the success or failure of candidates in the general examinations), their conclusions are very similar: children of parents with better educational qualifications and occupational background are far more likely to succeed in tertiary education examinations than students from lower socio-economic strata. This phenomenon is far stronger in Universities than in Technological Education Institutes. Further, a number of studies have shown that in Greece, as in many other countries, education is closely associated with inequality and that, ceteris paribus, the higher the educational level of the household head the higher the standard of living enjoyed by the household [Tsakloglou (1992, 1997)], and, in addition, there is evidence of inter-generational transmission of educational inequalities [Papatheodorou (1997), Papatheodorou and Piachaud (1998)]. Finally, while for a number of papers using static incidence analysis for the late 1980s and the early 1990s show that the aggregate effect of public education subsidies is strongly progressive, but the progressivity is due exclusively to the effect of primary and secondary education transfers [Tsakloglou and Antoninis (1999), Antoninis and Tsakloglou (2000, 2001)]. These studies also show that the aggregate progressivity of public education subsidies declined between the late 1980s and the mid-1990s.

Since the mid-1990s two very important developments took place. First, tertiary education expanded rapidly; according to the OECD (2006) between 1995 and 2003 the number of tertiary education students in Greece almost doubled. Second, the effects of demographic decline become evident and the number of students in primary education declined considerably, even though in the 1990s there was a large increase of the immigrant population in the country (many of them with their families). Under these circumstances, it is interesting to examine whether the results of earlier studies are still valid.

This is the aim of the present paper. The paper uses the information of the 2004/5 Household Budget Survey (HBS). The remaining of the paper is organized as follows. The next section provides a short description of the structure of the Greek education system. Section 3 is concerned with methodological issues, while section 4

presents the empirical results. Finally, section 5 concludes the paper and discusses its possible policy implications.

2. A brief overview of the Greek education system

According to the Greek constitution, education is provided free of charge at all levels. A limited number of private schools operate at the first two levels, whereby enrolment rates fluctuate around 6% for primary and secondary schools. At the tertiary level, in particular, degrees offered from private institutions, which are treated as commercial enterprises rather than educational institutions, are not officially recognized as equivalent to those of public institutions. The structure of the Greek education system is summarized in Chart 1.

Pre-primary education is not compulsory, while primary and lower secondary are. These levels are not diversified. The great majority of lower secondary education graduates continue to upper secondary education, which is diversified. Students can choose between General and Technical Vocational Upper Secondary Education. Graduates of the General Upper secondary Education are eligible to take part in the general examinations to enter the Higher Education Institutions, which operate under a numerus clausus status. Higher Education Institutions are divided into Universities (AEI) and Technological Education Institutes (TEI). Graduates of Technical Vocational Upper Secondary Education may also enter the Technological Education Institutions, either by participating in the general examinations or on the basis of their school certificate record. Until the early 1990s, about one third of the candidates succeeded in entering Technological Education Institutions. After the rapid expansion of tertiary education in the late 1990s and the early 2000s, this proportion has risen considerably, but varies considerably between faculties. Before entering the labour market, upper secondary education graduates can also participate in post-secondary non-tertiary education, which has a hybrid educational-vocational character. Both private and public institutions operate at this level.

Private demand for higher education is strong. As a result of the households' keen interest in the general examinations a very large number of private, costly crammer schools assisting the candidates have sprouted, operating in parallel with the official

education system but, in fact, substituting it in many respects. Moreover, the operation of numerus clausus in Greek higher education institutions and, until recently, the underdevelopment of post-graduate studies leads a large number of students to foreign universities. OECD estimates suggest that over 50,000 Greek students study abroad, most of them in British Universities, and Greece's number of tertiary education students studying abroad is the sixth in the OECD (behind South Korea, Germany, Japan, France and Turkey), but by far the first when it comes to tertiary students studying abroad per capita.

Table 1 provides an overview of the Greek education system in 2004/5 in terms of numbers of students (in both public and private schools), total expenditure (distinguished between current and investment expenditure) stated in current 2004 prices and average yearly cost per student attending a public school for each of the three levels of the education system. Taking into account that investment spending fluctuates a lot over time, the estimates for investment expenditures reported in the table are the averages (in real terms) of investments during the period 1998-2004. The analysis of the distributional impact of public education spending is based on the information included in this table. It should be noted that in the case of tertiary education the number of students refers to the number of regular students; i.e. students enrolled for the number of years required for obtaining a degree (in practice, few students graduate exactly on the number of years required for obtaining a degree). Spending per student in secondary education is almost 50% higher than the corresponding figure in primary education. It is interesting to note the substantial difference in spending per student in the two branches of tertiary education. While yearly spending per student in Universities is more than twice the average of primary and secondary education, spending per student per year in Technological Education Institutions is even lower than spending per primary education student.

3. Data and general methodology

The data used in the paper are the micro-data of the 2004/5 Greek Household Budget Survey, which was carried out by the National Statistical Service of Greece. The survey covers all the private (non-institutional) households of the country and its sampling fraction is 2/1000 (around 6,500 households or 18,000 individuals). The

baseline distribution is the distribution of disposable income. All monetary values were expressed in constant mid-2004 values in order to remove the impact of inflation. The distributions used are distributions of equivalised household disposable income per capita and they are derived using the "modified OECD equivalence scales" (Hagenaars et al, 1995) 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) in the household. Since the estimates in the HBS are expressed in monthly figures, the cost estimates of Table 1 are adjusted accordingly.

In line with the general approach of Aaron and McGuire (1970), the estimates derived in the next section rely on static incidence analysis under the assumption that public education transfers do not create externalities. No dynamic effects are considered in the present analysis. In other words, it is assumed that the beneficiaries of the public transfers are exclusively the recipients of the public education services (and the members of their households) and that these services do not create any benefits or losses to the non-recipients (i.e. the taxes that finance the transfers are already there). 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.[1] We also assume that the benefit is shared by all household members (not only 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 born by the household. Similar assumptions are standard practice in the analysis of the distributional impact of publicly provided services.[2]

[1] Only direct transfers are considered. Such indirect subsidies as discounted transport fares are not included in the following analysis. It is likely that in some remote rural areas as well as in some small islands where class sizes are very small and/or the students are transported to the nearest school at the expense of the state, the cost per student in secondary and, particularly, primary education is substantially higher than the corresponding costs in urban areas. However, no corresponding cost estimates are available and, furthermore, it is doubtful whether this higher cost translates into higher quality of the final product (education services). Due to lack of detailed information, we take no account of inequality within particular educational levels, even though it there is evidence that primary and secondary public schools in poorer areas are considerably less well equipped in terms of infrastructure than public schools located in more prosperous areas [Katsikas and Kavadias (1994)], while spending per tertiary education student varies considerably across faculties.

[2] Each student in the sample of the HBS is given the value of the transfer of the corresponding education level, thus assuming that he/she is using all the resources available to him/her.

4. Empirical results

4.1. Distribution of beneficiaries

We start by reporting the position of the direct beneficiaries of public education subsidies in the income distribution when the population is grouped in deciles according to their equivalised disposable income in Table 2. For both primary and, especially, secondary education the beneficiaries are concentrated in the lower half of the income distribution. This is likely to be the consequence of two factors. The first has to do with demographics. Households with children are less likely to have reached the top of their earnings capacity and/or have a lower share of earners and, hence, are more likely to be concentrated in the lower quintiles. The second has to do with private education. All private education students in the sample of the HBS belong to the top deciles of the income distribution. Likewise, the distribution of post-secondary non-tertiary education students is more skewed towards the bottom of the income distribution, but due to their small numbers, the pattern is pretty erratic. Regarding tertiary education students, a clear difference between AEI and TEI students is evident. TEI students are more likely to be concentrated towards the lower deciles of the distribution, while AEI students are more evenly spread across the income distribution. The last column reports the distribution of all beneficiaries, irrespective of their educational level and re-iterates the point made earlier; beneficiaries are mildly over-represented in the lower half of the income distribution or, in other words, they are relatively evenly spread across the entire distribution, apart from the top decile.

Almost all primary and secondary education students live with their parents. However, this is not the case with tertiary education students. Unlike the case of students living with their parents, in the case of tertiary education students living away from their parental homes there is the broader question of whether the equivalised household income per capita is a good approximation of their standard of living. As the evidence of Table 3 shows, about one third of tertiary education

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This treatment is unproblematic in the cases of primary and secondary education, but not necessarily so in the case of tertiary education, since most students spend longer than the minimum necessary for the accomplishment of their studies. As a result, the total value of the transfer to all the beneficiaries of tertiary education in our calculations is higher than the sum actually spent for the provision of the corresponding services by the state.

students live away from their parental homes.[3] There are no reasons to believe that students living away from their parents are a very distinct group of persons with low living standards, etc. However, as the evidence of the table shows, while the overwhelming majority (65%) of TEI students living with their parents can be found in the middle deciles (4-8), almost 90% of the TEI students living away from their parents are found in the bottom half of the income distribution and none in the top two deciles. The difference between the two groups is even more striking in the case of AEI students. Almost two thirds of those living with their parents can be found in the top four deciles, while over 80% of those living away from their parental homes are located in the bottom half of the income distribution. Typically, in most empirical studies, students living away from their parents who do not live in collective households are treated as independent units. However, as the evidence of Table 3 suggests, in our case this treatment may lead to misleading results regarding the distributional effects of public education subsidies to tertiary education students. For this reason and as a sensitivity exercise, we also report results excluding such students from the HBS sample. The evidence of Table 4 also confirms this indirectly. In this table, persons aged 18-24 - that is, the typical age bracket that students can be found in tertiary education[4] – are grouped according to their own educational status ("AEI students or graduates", "TEI students or graduates", "Other") and that of their father. The evidence of Table 4 implies a very clear correlation between father's and child's educational level.

However interesting, the results of Tables 2 and 3 provide only partial indirect evidence on the progressively redistributive role of public education subsidies, since they may be driven primarily by demographics. Table 5 attempts to isolate this factor. More specifically, this table reports the relative ratio of actual beneficiaries to

[3] The proportion of tertiary education students who study in places other than that where their families live is likely to be substantially higher, but a considerable proportion of these students were interviewed in the houses of their families during vacation periods, while a few others live in collective households (student halls) and were excluded from the HBS sample.

[4] The age limit of 24 was selected for two reasons. Firstly, since students are admitted to tertiary education after participating in competitive examinations operating on a numerus clausus basis, a considerable proportion of them start their tertiary education studies not in the age of 18 but in the age of 19 or 20. Secondly, since there are virtually no time limits for the period of studies in tertiary education institutions in Greece, the majority of students do not complete their studies during the normal period (3-6 years, depending on the type of institution). Indeed, our data show a sharp drop in the tertiary education participation rate only after the age of 24.

potential beneficiaries per decile for each educational level. For the construction of this indicator, first the number of the decile's children who benefit from public education transfers in a particular level is divided by the total number of children in the corresponding age bracket (5-11 for primary; 12-17 for secondary and 18-24 for the rest). In the next stage, the resulting ratio of each quintile and educational level is divided by the corresponding national ratio. As a result, figures above (below) one imply that the children of the corresponding quintile are overrepresented (underrepresented) among the beneficiaries of public education transfers.

The ratio of actual to potential beneficiaries in the case of primary education is almost everywhere apart from the top two deciles close or above 1 – clearly due to the concentration of private education students in the top deciles of the income distribution.[5] A similar pattern is also observed in the case of secondary education, the only difference being that a ratio substantially less than one is only observed in the top decile. Since only 4% of those aged 18-24 participates in post-secondary non-tertiary education, the pattern for the group is rather erratic, although there is evidence that the beneficiaries are relatively disproportionately concentrated in the bottom deciles. In the case of TEI students, ratios above one are observed in the middle of the income distribution, while ratios higher than one for AEI students are only observed in the top four deciles. Needless to say that the results for tertiary education students would appear to be substantially different if the sample was restricted to such students living with their parents only.

4.2. Size of public benefits

In the next stage, we examine the differential magnitude of the public education transfers per quintile. Table 6 depicts estimates of the mean transfer per capita for each decile for every level of education. In the cases of primary and secondary education, public transfers to the average member of the eight bottom deciles are higher than those received by the average member of the two top deciles and, especially, the top. In the case of post secondary non tertiary education the transfers are very modest but they are also higher in the case of the bottom six deciles than the top four. Lower average transfers per capita are also observed in the case of TEI and

[5] Note that primary education includes kindergartens, where participation is not compulsory.

they seem to be higher in the bottom half of the income distribution, while AEI transfers per capita are quite evenly spread across deciles, with slightly higher values observed in the cases of the eighth and the ninth deciles. The last column reports the corresponding figure taking all public education transfers together. Unsurprisingly, taking into account the above evidence, average transfers per capita per decile are not dramatically different in the case of the bottom eight deciles and decline sharply in the case of the top two deciles (particularly the top). Demographic composition of the deciles and private education incidence are the main moving forces behind the observed pattern.

Table 7 provides estimates of the proportional increases in the incomes of the various population deciles resulting from public education transfers. In all educational levels, the increase in the decile income diminishes as we move up the income distribution. The change is most rapid in the cases of primary and secondary education. All transfers taken together account for over a quarter of the income of the bottom decile, the corresponding share declining gradually as we proceed to higher deciles, reaching 1.8% in the case of the top decile.

4.3. Distributional effects

This sub-section is primarily devoted to the examination of the impact of public transfers to aggregate inequality and poverty. Before moving to the analysis of the aggregate distributional effects of public education transfers, it is interesting to have a look at the concentration curves of the various (equivalised) transfers per education level that are depicted in Chart 2. All of them lie inside the Lorenz curve of the distribution of equivalised disposable income, thus implying that they are likely to have an equalizing impact. Nevertheless, it should be also noted that these curves may hide considerable re-rankings of population members when moving from the distribution of disposable income to the augmented distribution of resources. It is also interesting to note that all concentration curves apart from that for AEI transfers lie mostly above the diagonal, thus implying strong redistributive effects of the corresponding transfers, given the average size of the transfer per capita.

Table 8 examines the impact of public education transfers per level of education on aggregate inequality; that is, it reports the proportional change in a number of

inequality indices when we move from the distribution of disposable income to the distribution of disposable income augmented by the public transfers of the corresponding educational level. As inequality indices we chose the widely used Gini index and two members of the parametric family of Atkinson (1970) indices. The value of the inequality aversion parameter in the latter is set at (e=0.5 and e=1.5). Both indices satisfy the desirable properties for an inequality index (anonymity, mean independence, population independence, transfer sensitivity). Higher values of e make the Atkinson index relatively more sensitive to changes closer to the bottom of the distribution while, in practice, the Gini index is relatively more sensitive to changes around the median of the distribution [Cowell (2000), Lambert, (2001)].

When moving from the distribution of disposable income to the augmented distribution of resources that includes both disposable income and the value of education transfers, the Gini index declines by 6.6%, while the two Atkinson indices decline by around 12%. Almost the entire effect is driven by the progressive redistributive impact of primary and secondary education transfers. TEI and post-secondary non-tertiary transfers reduce inequality, but only marginally. The sign of the effect of AEI transfers depends on the index used. In fact, when the value of the inequality aversion parameter of the Atkinson index rises beyond a certain level (higher than 0.5 but lower than 1.5) inequality increases as a result of these transfers. The latter implies intersecting Lorenz curves of the distribution of disposable income and the distribution of disposable income augmented by tertiary education transfers. This is confirmed in Chart 3, which depicts the difference in the two Lorenz curves. For the bottom 60%, the Lorenz curve of the augmented distribution dominates the Lorenz curve of the distribution of disposable income, while above 60% the dominance is reversed.

Table 9 is similar to Table 8 but instead of depicting the effects of public education transfers on inequality, it focuses on their effects on relative poverty. More specifically, it reports the changes in the values of a number of poverty indices when we move from the distribution of disposable income to the "augmented" distribution of resources that includes disposable income as well as the value of public education transfers. Caution is required here, as it is clear that these in-kind services are not precisely equivalent to cash disposable income. Nevertheless, it is instructive to

consider how relative income poverty measures change with a shift in the definition of resources. The table depicts changes in relative poverty; i.e. the poverty line is moving with the median of the distribution. More specifically, we adopted the approach of Eurostat and set the poverty line equal to 60% of the median of the corresponding distribution. The poverty indices selected belong to the parametric family of Foster et al (1984) (FGT). When the value of the poverty aversion parameter is set at a=0, the index becomes the widely used "head count" poverty rate, that is the share of the population falling below the poverty line. When a=1, the index becomes the normalized income gap ratio, while when a=2 the index satisfies the axioms proposed by Sen (1976) (anonymity, focus, monotonicity and transfer sensitivity) and is sensitive not only to the population share of the poor and their average poverty gap, but also to the inequality in the distribution of resources among the poor.

In may respects, the results reported in Table 9 are similar to those reported in Table 8. Relative poverty declines by around 12% irrespective of the poverty index used. Again, the change is driven almost exclusively by primary and secondary education transfers. Post-secondary non-tertiary and, particularly, TEI transfers reduce inequality, but only marginally. On the contrary, irrespective of the index used, relative poverty rises when AEI transfers are added to the concept of resources by approximately 2%.

4.4. Sensitivity analysis

As noted earlier, equivalised disposable income per capita may not be a good indicator of the living standards of tertiary education students living away from their parents. Therefore, in Table 10 we repeat the exercise of Tables 8 and 9 after removing them from the sample. Taking into account that tertiary education students living away from their parents have low incomes and receive large public transfers, it is not surprising to find that their removal from the sample results in less progressive distributional effects of public transfers. However, since these students are not that many, the reported aggregate effects of the public transfers do not change dramatically. The Gini index declines by 6.6% instead of 6.2% and the two Atkinson indices by 11.6% and 10.5%, instead of 12.3% and 11.2%. Likewise, the recorded declines in the three poverty indices are 10.3%, 9.8% and 11.1% instead of

11.4%, 11.0% and 12.5% respectively. However, when examining the effects to AEI and TEI students alone, the differences in the two sets of estimates are quite different. This time all indices record an increase in inequality as a consequence of AEI transfers, while the positive effect of TEI transfers is diminished. When looking at the changes in the poverty indices, both AEI and TEI transfers appear to increase relative poverty; the former by 3.5%, the latter by about 0.1%-0.3%.

The figures for spending per student in tertiary education institutions reported in Table 1 include expenditures on R&D. It can be argued that such expenditures are not primarily directed at benefiting third level students. However, at least some of these expenditures do benefit students – for example, improving the quality of teaching (by facilitating the research activities of university lecturers); or by facilitating the access of students, particularly at postgraduate level, to research infrastructures. As identification of the correct proportion of this expenditure to attribute to students is not possible, in Table 11 we compare results based on the exclusion of all R&D expenditures with the base case which includes them. The corresponding estimates for spending per student are taken from OECD (2006) and do not allow for a distinction between AEI and TEI students. A comparison of the results of Tables 8, 9 and 11 shows that the aggregate effects hardly change after the exclusion of R&D expenditures from the concept of resources that are directed to tertiary education students. After the aggregation of the two groups of tertiary education students, tertiary education transfers appear to affect marginally negatively recorded inequality and marginally positively recorded relative poverty.

Even though the results reported in Tables 8 and 9 are very interesting, they may be a little misleading, as the sample used for the examination of the distributional impact of public education includes several households that are very unlikely to benefit directly from public education (elderly households, childless couples, etc.). For this reason, we decided to repeat the exercise of these tables using two alternative approaches.

The first approach isolates the cohorts that are most likely to have members participating in the education system according to the age of the household head. More specifically, in this case the sample consists of all the households with heads aged 25-60. This sample includes the overwhelming majority of households with members in primary and secondary education as well as about two thirds of those

with members in tertiary education. The results are reported in Table 12. Qualitatively they do not differ substantially from the results of Tables 8 and 9 but quantitatively they are stronger. The Gini index declines by 8.4% and the two Atkinson indices by over 15%, while the recorded decline in the three poverty indices is around 27%. The difference between these results and the corresponding results reported in Tables 8 and 9 are almost exclusively due to the transfers in the fields of primary and secondary education.

The second approach isolates the households with members who could participate in the education system; that is, in this case the sample consists of all households with members aged 6-24 (3185 households). In this case almost all the current beneficiaries of public education are included in the sample, but the overwhelming majority of the non-beneficiaries is left out of the picture. The results are reported in Table 13 and in quantitative terms the estimates are even stronger than those of Table 12. Inequality indices appear to decline between 11.8% (Gini) and around 22% (Atkinson), while poverty declines by half.

4.5. Inequality and poverty decompositions

This section is devoted to decompositions of aggregate inequality and poverty and attempts to answer the question "how does the inclusion of public education transfers in the broader concept of resources affect the structure of inequality and poverty?". This is primarily accomplished by the decompositions of inequality and poverty by population sub-groups that are presented in Tables 15 and 16. However, before embarking on these exercises, we decompose aggregate inequality in the augmented distribution of resources by factor component [Shorrocks (1982)]. The results are reported in Table 14 and we rely on the family of "extended" or "distributionally sensitive" Gini indices [Donalson and Weymark (1980)]. The higher the value of the inequality aversion parameter, v, the higher the importance attached to changes closer to the bottom of the distribution. When v=2, the index becomes the well-known Gini index. The tables reports decompositions for v=2, 3 and 4.

The first column of the table reports the share of each component of the "augmented" income distribution; that is, disposable income and the public transfers for each level of the education system. All public transfers taken together account for

7.66% of the new concept of resources. This can be compared with the contribution of the public transfers to aggregate inequality that is reported in the next three columns of the table. Their contribution is lower than their total share, but it rises with the value of the inequality aversion parameter. The latter probably implies that the very bottom of the income distribution is likely to contain many non-beneficiaries of such transfers (indeed, Greece is a country with a serious problem of elderly poverty and the elderly almost by definition do not benefit from public education subsidies). It is interesting to note that the contribution of all public education transfers, apart from AEI transfers, to aggregate inequality is lower than their share in the augmented income distribution. The opposite is observed in the case of transfers to AEI students; yet another indication that even in a short term perspective such transfers increase rather than reduce inequality. The last three columns of the table report the income elasticity of aggregate inequality with respect to particular income components. Naturally, adding all elasticities together is equal to zero since increasing all income components by the same proportion leaves the inequality index unaffected (by the virtue of the scale invariance property). The corresponding estimates are in line with the rest of the findings of the table. At the margin, all public education transfers apart from transfers to AEI students reduce inequality. On the contrary, transfers to tertiary education students increase inequality. For example, ceteris paribus, a 1% increase in the value of AEI transfers would result in an increase of the conventional Gini index (for the augmented distribution resources; not the distribution of disposable income) by 0.008%. These estimates also confirm that the main progressively redistributive effects are due to primary and secondary education transfers and, while the progressivity of such transfers declines as the value of the inequality aversion parameter rises it declines faster in the case of secondary than in the vase of primary education.

Table 15 reports the results of inequality decomposition analysis by population subgroup using as index of inequality the mean logarithmic deviation (second Theil index – Theil (1967), Shorrocks (1984)) that is strictly additively decomposable, when the population is partitioned into mutually exclusive and exhaustive groups according to household type, socioeconomic group and educational level of the household head and age of the population member. After the inclusion of public education, aggregate inequality declines by 12.9% - a result comparable with the declines recorded by the Atkinson indices. Irrespective of the partitioning of the

population, inequality within particular population groups declines almost always, as does the share of the "within groups" component in aggregate inequality. On the contrary, inequalities "between groups" rise, as does the share of the "between groups" component in aggregate inequality. When examining the contribution of particular population groups to aggregate inequality, we observe that the contribution of groups with children declines (mono-parental households, couple with children up to 18, persons aged below 25, households headed by working age persons) while that of groups without children rises (older single persons or couples, younger single persons or couples, households headed by pensioners, persons aged over 64).

Table 16 is the counterpart of Table 15 in the case of poverty decomposition by population subgroups. The partitioning of the population in Table 16 is exactly the same as in Table 15 and the poverty indices used are those of the Foster, Greer. Thorbecke (1984) family for a=0, 1, 2, as in the main body of our analysis. As could be anticipated, after the inclusion of public education transfers in the concept of resources relative poverty appears to decline mainly in households with children (mono-parental households, couple with children up to 18, persons aged below 25, households headed by working age persons) and rise in groups without children (older single persons or couples, younger single persons or couples, households headed by pensioners, persons aged over 64), irrespective of the value of the poverty aversions parameter. Sometimes the recorded declines in poverty within particular socioeconomic groups are really spectacular (for example, the poverty rate of members of mono-parental households declines by 61.4% as we change the concept of resources). Contributions to aggregate poverty change accordingly.

4.7 Absolute inequality and distributions of young persons only

In line with the standard analysis of inequality, the above analysis is based on relativities since it is based on the mean independence axiom. This axiom is used in the framework of inequality analysis in order to avoid getting different estimates of particular inequality indices when the income distribution is measured in different metric units (dollars, euros, pounds, etc.). However, in the framework of the present analysis it can have a perverse effect, since in order to keep the level of inequality constant, the beneficiaries should receive transfers proportional to their (equivalised)

disposable income. This is a rather unusual treatment that contravenes the very rationale behind of public transfers. At least according to the Greek constitution, each beneficiary should be entitled to an equal amount of public transfers. Under these circumstances, it may be preferable to base our analysis on absolute rather than relative inequality indices [Kolm (1976), Blackorby C, and Donaldson D. (1980)].

This is done initially for the entire distribution in Table 17. The index used is the Gini index, although the same analysis can be performed using any index of inequality. The absolute index is the product of the relative index by the mean of the distribution. The estimates of interest are those reported in the last two rows of the table. They suggest that absolute inequality rises by 1.2% as a result of public education transfers. The entire increase is driven by the effect of tertiary education transfers (1.5%) while the effect of the rest of the transfers is marginally negative.

Nevertheless, even this treatment may be far from perfect. Public education transfers are not meant to benefit the entire population, but particular age groups only. Therefore, in Table 18 instead of assuming that the benefits of public education are shared by all household members, it is assumed that these benefits are captured exclusively by the students themselves. The distributions used are distributions of persons in particular age brackets and comparisons of the levels of both relative and absolute inequality before and after the transfers are made. These population groups are defined in such a way as to include the potential beneficiaries of each level of the education system (5-11, 12-17 and 18-24 for primary, secondary and tertiary education, respectively). More specifically, it is assumed that the pre-transfer welfare level of each member of these groups is determined by his/her level of equivalised disposable income while the post-transfer welfare level is determined by his/her equivalised disposable income plus the value of the public transfer in the corresponding education level, if he or she is participating.

The top panel of the table shows the results of relative inequality changes according to the Gini and the two Atkinson indices. As a consequence of the transfers' inequality among those aged 5-11 and 12-17 declines very significantly. In each case, the Gini index declines a little less than 20% and the two Atkinson indices by around a third. The aggregate effect of tertiary education transfers is progressive since they reduce inequality in the group of those aged 18-24 by 1.4%-3.7%. However, the positive effect is due exclusively to the impact of TEI transfers, while public transfers

to AEI students appear to increase relative inequality among the member of the group.

The lower panel of the table provides probably the best framework for the analysis of changes to absolute inequality as a result of public transfers. Only primary education transfers appear to reduce absolute inequality (by 1.5%-2.3%). This is probably due to the effect of private education, as almost all private education students who do not benefit from public education subsidies are located close to the top of the distribution of persons aged 5-11. On the contrary, public transfers to secondary education students cause a moderate rise in absolute inequality among those aged 12-17 (by 1.8%-4.8%). Despite the fact that the great majority of private education students who do not benefit from public education subsidies are located close to the top of the distribution of persons aged 12-17, the inequality-increasing effect should be attributed to the fact that the non-participation rates are substantially higher among the poorer rather than the richer member of the group. Transfers to tertiary education students clearly increase absolute inequality among population members aged 18-24; a result driven by the effect of transfers to AEI students. The latter increase absolute inequality by 14%-15%. It should be noted that this analysis was performed while all tertiary education students were included in the sample. Most probably, exclusion of tertiary education students living away from their parents would have resulted in a substantially higher increase in absolute inequality as a consequence of public education transfers to tertiary education students.

4.8 Overall progressivity

The final table of this section concerns the overall progressivity of public education transfers. For the purposes of the analysis, the family of distributionally sensitive Gini indices is utilized, when the inequality aversion parameter, v, is successively set at 2 (the usual Gini index), 3 and 4. The results are reported in Table 19. Kakwani (1977) indices are only examining the location of the recipients in the original income distribution (that is, the distribution of disposable income). According to this criterion, the most progressive transfers appear to be those to post-secondary non-tertiary education students, unless the inequality aversion parameter is set at relatively high levels (v=4), when the most progressive component of public

education appears to be the transfers to secondary education system. Irrespective of the value of the inequality aversion parameter, the lowest progressivity is recorded in the case of AEI transfers. The index of Reynolds-Smolensky (Reynolds & Smolensky (1997) takes into account the location of the recipient in the original distribution as well as the size of the transfer (but not the resulting re-ranking of population members after the transfers). It has been calculated for v=2 and demonstrates that the progressivity of public education transfers emanates from the transfers to primary and secondary education students while the rest of the transfers have a positive but marginally progressive impact. When the index is corrected for the effects of re-ranking [Atkinson (1980), Plotnick (1981)], the overall progressivity of the transfers declines, while that of transfers to AEI students is almost eliminated.[6]

5. Conclusions and policy implications

The aim of the paper was to examine the distributional impact of in-kind public education transfers in Greece. Ideally it would be desirable to examine this impact in a dynamic framework using lifetime income profiles of the population members. Since such data are not available in Greece, several alternatives were tried, exploiting cross-sectional information. The findings of the paper show that transfers-in-kind in the field of public education in Greece lead to a decline in aggregate inequality. This equalizing effect is the result of transfers in the fields of primary and secondary education, whereas the effect of transfers in the field of tertiary education and, especially, to University (AEI) students depended on the treatment of students living away from their parents. Under most plausible scenario, though, their effect was found to be regressive. The regressive distributional impact of tertiary education transfers is, in turn, due almost exclusively to transfers to University (AEI) students, while transfers to students of Technological Institutes (TEI) affect aggregate inequality very little.

In fact it is highly likely that the real distributional impact of in-kind transfers to University students is even more regressive, because, due to lack of detailed information in the HBS, we assigned the same transfer to each university student.

[6] In fact, if tertiary education students living away from their parental homes are removed from the sample, most of the indices reported in Table 19 for AEI transfers would have appeared with a negative sign.

However, there is sufficient indirect evidence that the offspring of the most well-off segments of the population are significantly over-represented in the faculties with the highest cost per student, such as medicine and engineering.[7]

Moreover, the paper examined the distributional impact of public education from a short-term static point of view whereas, from a dynamic point of view, a number of studies show that tertiary education graduates are likely to enjoy a considerably higher standard of living than the rest of the population. Table 20 highlights this point very clearly. In this table, the demographically homogeneous group of members of the sample of the HBS aged 35-50 is isolated and their living standards (this time approximated by their equivalised consumption expenditure, in order to avoid problems of unemployment or non-participation in the labour market) are examined. On average, the equivalent consumption expenditure of a University graduate with no further qualifications is 47.1% higher than that of the group mean, whereas that of persons with postgraduate or doctorate degrees is 75.7% higher than the group mean. Upper secondary education and TEI graduates also enjoy a level of consumption expenditure higher than the group mean, while the mean equivalent consumption expenditure of persons with only primary education or less is substantially lower than the group mean. These results are not due to a few outliers. University graduates are substantially over-represented in the top quintile while the opposite is true for persons with low educational qualifications. Therefore, it is not unlikely that even if a tertiary education transfer is directed to a student coming from a poor household and, hence, in the short-term appears to be progressive according to our methodology, it may turn out to be regressive from a long-term life-cycle perspective. In addition, in Greece, as in many developing countries, a positive relationship exists between father's education and returns to schooling, which implies that, *ceteris paribus*, returns to tertiary education are higher to offspring of better-off households [Patrinos (1995)]. In other words, the above evidence suggests that from a dynamic perspective the results of the paper may underestimate the regressive impact of public in-kind transfers of tertiary education services (even though this conjecture cannot be tested using the existing data).

Greece is a country where public opinion is firmly embedded in the idea that the rule of free public tertiary education should be applied indiscriminately to all citizens. In

[7] See the references reported in Section 1.

the rest of the paper we discuss, in the light of the evidence presented, a number of policies that might be able to mitigate such unwanted side effects. It has been suggested in the public discourse that a constitutional reform allowing the establishment of private tertiary education institutions would result in the enrollment of many offspring of well-off families to these institutions, thus freeing many places in public tertiary education institutions for offspring of poorer families and improving the distributional impact of public tertiary education. Indeed, the experience of the operation of private primary and secondary education seems to support this claim. Two counter-arguments are usually made to this argument. Firstly, the experience of several countries shows that when the better-off segments of the population do not benefit from a particular policy, they are unwilling to finance it, thus, jeopardizing the entire public policy in the relevant domain (in this case, public tertiary education) [Le Grand and Winter (1985), Dilnot (1995)]. Secondly, it is widely accepted that there are considerable asymmetries in the market for tertiary education services. The experience of some countries shows that the establishment of private tertiary education institutions may result in a decline rather than an improvement of the efficiency of tertiary education, unless it is accompanied by the establishment of a rigorous accreditation system. Further, since the professional skills required for university lecturers are more scarce than those required for primary and secondary school teachers, private universities may be better able to attract and reward them, thus leading to declining standards in public institutions.

Another alternative that has been suggested in the public discourse is the payment of fees in public tertiary education institutions (combined with a system of scholarships for students from poor families) or the imposition of a graduate tax [Barr (2004), Barr and Crawford (2005)]. Since the children of better-off families are over-represented in tertiary education and moreover, from a dynamic point of view, tertiary education graduates are likely to enjoy substantially higher life-time incomes than the rest of the population, such a policy is likely to improve the long-term distributional impact of public education. However, adoption of such a policy reform should be accompanied by the provision of long-term state guaranteed loans to tertiary education students, otherwise fees may act as a deterrent to potential students from poor or middle-income families. In addition, it should be noted that since tax evasion in Greece is rife, there is a danger that adoption of this kind of policies may result in

an implicit or explicit subsidization of students from well-off tax evading families. Furthermore, since a considerable proportion of Greek tertiary education graduates tend to work abroad for a brief period after their graduation, the design of such a graduate tax should be such that re-payments are guaranteed and it does not act as a disincentive for the return of these students to the Greek labour market.

However, the most effective policy for the improvement of the distributional performance of public tertiary education in Greece is likely to be the improvement of the progressivity of public post-compulsory secondary education. As noted earlier, upper-secondary education graduates are eligible to take part in competitive examinations operating under a *numerus clausus* status to enter tertiary education. Therefore, in theory, everybody has the same chances to succeed. However, the reality is very different. As noted earlier, the proportion of children from poor households who do not complete compulsory education is substantially higher than the corresponding proportion of children from rich households. Likewise, the evidence of the first row of Table 21, suggests that participation in the post-compulsory secondary education is positively related with the economic status of the student's household, although the relationship is not linear. Moreover, as the evidence of the next row points out, among the population members aged 15-17 who participate in secondary education, the proportion of those who attend technical rather than general education is higher among the poorer students. As a result, not only fewer students from poor households reach the starting line for tertiary education entrance examinations, but even those who reach it are more likely to be blocked from participating in examinations for a place in a university.

On top of these, even those students from poor households who reach the entrance examinations are less likely to succeed than students from rich households. Greek households spend considerable sums of money in order to prepare their children to succeed in these exams. As noted in Section 2, a large number of institutions offering private tuition to the candidates to succeed in the exams operate in parallel with the official education system [Kanellopoulos and Psacharopoulos (1997)]. As the evidence of the next row of Table 21 demonstrates, the probability that an upper secondary education student will attend a cram school or receive private tuition is positively associated with the socioeconomic status of his or her family. Further, it is not only the probability of attending a cram school or receiving private tuition that is

closely associated with the socioeconomic status of the student's family, but also the actual amount of spending in services of this kind. The evidence of the fourth row of the table shows that, on average, spending per upper secondary education student attending a cram school or receiving private tuition is twice as high for students belonging to the top than to the bottom quintile. As a consequence, the ratio of tertiary education (university) students to upper secondary (general upper secondary) education reported in the next row of the table show a lower ratio for the poorest quintile, while the ration of AEI/TEI students is strikingly higher in the top quintile than in the ret of the income distribution.

Under these circumstances, it is easy to understand why students from richer households are over-represented in tertiary education.[8] Hence, policies aimed to address these inequities - such as the provision of grants and other incentives to students from poor households in order to stay in education after the completion of compulsory education or the provision of free supplementary tuition in public schools - are likely to improve at the same time the distributional impact of both upper secondary and tertiary public education. Moreover, since there exists a considerably body of evidence that success or failure in education is closely associated with the student's social environment and cultural capital, successful policies aiming to reduce inequities in educational outcomes may need to start during the earlier rather than the later stages of the education system.

[8] Once again, if tertiary education students living away from their parental homes are removed from the sample, the evidence of Table 21 would have shown results even more biased towards the top quintiles.

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Table 1. Number of students and structure of public expenditure in the Greek education system 2004-2005

		Students	%	Current Spending	Capital Spending	Total Spending	Total spending per student
Primary	Public	740,167	94.0	1,634,948,193	160,121,571	1,795,069,764	2,425
	Private	47,134	6.0				
	All	787,301	100.0				
Secondary	Public	652,346	94.3	2,072,791,866	246,178,877	2,318,970,742	3,555
	Private	39,572	5.7				
	All	691,918	100.0				
Post-Secondary Non Tertiary	Public	16,233	43.0	40,055,951	33,824,609	73,880,561	4,551
	Private	21,229	57.0				
	All	37,462	100.0				
Tertiary A (AEI)		225,265	56.0	919,690,761	508,287,388	1,427,978,149	6,339
Tertiary B (TEI)		177,229	44.0	309,708,442	52,807,226	362,515,667	2,045
	All	402,494	100.0				

Table 2. Distribution of beneficiaries per decile

Decile	Primary	Secondary	Post-Sec. Non-tertiary	TEI	AEI	ALL
1 (bottom)	10.1	11.3	11.0	8.2	9.6	10.4
2	10.9	12.5	11.4	10.4	6.8	11.0
3	10.7	10.8	10.7	15.9	10.9	11.1
4	12.3	12.9	9.3	16.3	10.2	12.5
5	11.5	10.2	10.0	12.3	10.2	10.9
6	10.7	9.8	28.0	11.7	8.4	10.4
7	9.3	9.5	8.2	7.7	10.4	9.4
8	11.2	9.4	2.7	8.4	11.3	10.3
9	7.9	8.2	6.6	3.7	12.7	8.3
10 (top)	5.3	5.3	2.1	5.5	9.5	5.8

Table 3. Disaggregated distribution of tertiary education students

Decile	TEI students		AEI students	
	Living with their families	Living alone	Living with their families	Living alone
1 (bottom)	4.6	15.6	2.9	20.7
2	7.9	15.3	4.0	11.2
3	8.8	30.3	3.8	22.7
4	15.5	17.9	7.7	13.7
5	13.2	10.3	9.2	12.6
6	15.3	4.4	9.1	7.2
7	9.9	3.3	14.1	5.3
8	11.1	2.8	15.8	4.2
9	5.4	0.0	18.6	1.0
10 (top)	8.2	0.0	14.8	1.4
	67.2	*32.8*	*64.2*	*35.8*

Table 4. Distribution of persons aged 18-24 according to their own educational level

and the educational level of their father

Father's educational level	AEI students or graduates	TEI students or graduates	Other
Primary or less	13.1	26.9	47.1
Lower secondary	11.2	11.5	15.7
Upper secondary	38.7	46.3	26.2
TEI	9.5	6.0	3.5
AEI	27.4	9.3	7.5

Table 5. Ratio of actual to potential beneficiaries per decile

Decile	Primary	Secondary	Post-Sec. Non-tertiary	TEI	AEI	ALL
1 (bottom)	0.99	0.99	1.00	0.81	0.93	0.76
2	1.09	0.99	1.00	0.94	0.63	0.77
3	1.08	1.11	1.00	1.50	1.00	0.84
4	1.09	1.04	0.75	1.31	0.81	0.80
5	1.04	1.08	0.75	1.00	0.81	0.77
6	1.06	0.99	2.75	1.19	0.85	0.80
7	0.97	1.05	0.75	0.81	1.07	0.77
8	1.00	0.96	0.25	1.00	1.33	0.80
9	0.84	0.96	0.75	0.44	1.52	0.72
10 (top)	0.73	0.78	0.25	1.00	1.70	0.67

Table 6. Mean transfer per capita per decile (euro per month)

Decile	Primary	Secondary	Post-Sec. Non-tertiary	TEI	AEI	ALL
1 (bottom)	15.30	21.48	1.01	1.67	10.11	49.57
2	16.47	23.71	1.05	2.11	7.18	50.52
3	16.17	20.51	0.99	3.23	11.59	52.49
4	18.50	24.39	0.86	3.32	10.76	57.82
5	17.22	19.23	0.91	2.48	10.70	50.54
6	16.21	18.72	2.59	2.40	8.98	48.91
7	14.05	18.06	0.76	1.57	11.03	45.47
8	17.01	17.88	0.25	1.71	12.04	48.90
9	12.00	15.58	0.61	0.75	13.46	42.39
10 (top)	8.01	10.09	0.19	1.12	10.11	29.52

Table 7. Proportional change in income per decile

Decile	Primary	Secondary	Post-Sec. Non-tertiary	TEI	AEI	ALL
1 (bottom)	8.0	11.3	0.5	0.9	5.3	26.0
2	5.7	8.2	0.4	0.7	2.5	17.4
3	4.3	5.5	0.3	0.9	3.1	14.0
4	4.3	5.7	0.2	0.8	2.5	13.5
5	3.5	3.9	0.2	0.5	2.2	10.2
6	2.9	3.3	0.5	0.4	1.6	8.7
7	2.1	2.7	0.1	0.2	1.7	6.9
8	2.2	2.3	0.0	0.2	1.6	6.3
9	1.3	1.6	0.1	0.1	1.4	4.4
10 (top)	0.5	0.6	0.0	0.1	0.6	1.8

Table 8. Inequality indices: Distribution of all households

Inequality Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary	Baseline + TEI	Baseline + AEI
Gini	0.3252	0.3037	0.3159	0.3143	0.3247	0.3241	0.3250
Atkinson0.5	0.0863	0.0756	0.0814	0.0809	0.0860	0.0858	0.0860
Atkinson1.5	0.2424	0.2154	0.2287	0.2298	0.2414	0.2414	0.2428
% change							
Gini		-6.6	-2.9	-3.3	-0.2	-0.3	-0.1
Atkinson0.5		-12.3	-5.6	-6.2	-0.3	-0.6	-0.3
Atkinson1.5		-11.1	-5.7	-5.2	-0.4	-0.4	0.2

Table 9. Poverty indices: Distribution of all households

Poverty Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary	Baseline + TEI	Baseline + AEI
FGT(0)	0.1980	0.1754	0.1885	0.1800	0.1970	0.1972	0.2025
FGT(1)	0.0540	0.0480	0.0506	0.0494	0.0535	0.0538	0.0551
FGT(2)	0.0227	0.0199	0.0206	0.0207	0.0225	0.0227	0.0231
% change							
FGT(0)		-11.4	-4.8	-9.1	-0.5	-0.4	2.3
FGT(1)		-11.0	-6.2	-8.4	-0.8	-0.2	2.1
FGT(2)		-12.5	-9.4	-8.6	-1.0	-0.2	1.9

Table 10. Inequality and poverty indices: Distribution of all households (no students away from parental home)

Inequality

Inequality Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary	Baseline + TEI	Baseline + AEI
Gini	0.3251	0.3050	0.3156	0.3140	0.3245	0.3245	0.3260
Atkinson0.5	0.0862	0.0762	0.0813	0.0807	0.0859	0.0859	0.0865
Atkinson1.5	0.2423	0.2168	0.2283	0.2294	0.2413	0.2418	0.2438
% change							
Gini		-6.2	-2.9	-3.4	-0.2	-0.2	0.3
Atkinson0.5		-11.6	-5.7	-6.3	-0.3	-0.3	0.4
Atkinson1.5		-10.5	-5.8	-5.4	-0.4	-0.2	0.6

Poverty

Poverty Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary	Baseline + TEI	Baseline + AEI
FGT(0)	0.1967	0.1763	0.1865	0.1780	0.1958	0.1968	0.2036
FGT(1)	0.0535	0.0483	0.0501	0.0488	0.0531	0.0537	0.0554
FGT(2)	0.0225	0.0200	0.0203	0.0205	0.0222	0.0225	0.0233
% change							
FGT(0)		-10.3	-5.2	-9.5	-0.4	0.1	3.5
FGT(1)		-9.8	-6.5	-8.8	-0.8	0.3	3.5
FGT(2)		-11.1	-9.7	-9.0	-1.0	0.3	3.5

Table 11. Inequality and poverty indices: Distribution of all households (no R&D expenditures – OECD data)

Inequality

Inequality Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Tertiary
Gini	0.3260	0.3045	0.3167	0.3152	0.3244
Atkinson0.5	0.0867	0.0760	0.0819	0.0814	0.0859
Atkinson1.5	0.2432	0.2154	0.2296	0.2306	0.2414
% change					
Gini		-6.6%	-2.8%	-3.3%	-0.5%
Atkinson0.5		-12.3%	-5.5%	-6.2%	-0.9%
Atkinson1.5		-11.4%	-5.6%	-5.2%	-0.7%

Poverty

Poverty Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary
FGT(0)	0.1972	0.1723	0.1875	0.1819	0.1987
FGT(1)	0.0537	0.0468	0.0507	0.0498	0.0538
FGT(2)	0.0225	0.0192	0.0206	0.0209	0.0226
% change					
FGT(0)		-12.6%	-4.9%	-7.8%	0.8%
FGT(1)		-12.8%	-5.6%	-7.1%	0.3%
FGT(2)		-14.7%	-8.8%	-7.2%	0.0%

Table 12. Inequality and poverty indices: Distribution of households with head aged 25-60

Inequality

Inequality Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary	Baseline + TEI	Baseline + AEI
Gini	0.3265	0.2992	0.3145	0.3125	0.3259	0.3255	0.3263
Atkinson0.5	0.0879	0.0743	0.0817	0.0810	0.0876	0.0875	0.0877
Atkinson1.5	0.2494	0.2120	0.2302	0.2322	0.2480	0.2484	0.2497
% change							
Gini		-8.4	-3.7	-4.3	-0.2	-0.3	-0.1
Atkinson0.5		-15.5	-7.1	-7.9	-0.4	-0.5	-0.3
Atkinson1.5		-15.0	-7.7	-6.9	-0.5	-0.4	0.1

Poverty

Poverty Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary	Baseline + TEI	Baseline + AEI
FGT(0)	0.1432	0.1034	0.1242	0.1174	0.1421	0.1419	0.1462
FGT(1)	0.0383	0.0280	0.0329	0.0320	0.0381	0.0382	0.0399
FGT(2)	0.0168	0.0121	0.0138	0.0142	0.0166	0.0168	0.0175
% change							
FGT(0)		-27.8	-13.3	-18.1	-0.8	-0.9	2.1
FGT(1)		-26.9	-14.2	-16.6	-0.8	-0.4	4.2
FGT(2)		-27.9	-18.0	-15.8	-1.2	-0.3	3.8

Table 13. Inequality and poverty indices: Distribution of households with members aged 4-24

Inequality

Inequality Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary	Baseline + TEI	Baseline + AEI
Gini	0.3117	0.2751	0.2959	0.2923	0.3108	0.3106	0.3134
Atkinson0.5	0.0805	0.0628	0.0725	0.0713	0.0800	0.0800	0.0811
Atkinson1.5	0.2295	0.1783	0.2041	0.2066	0.2275	0.2286	0.2320
% change							
Gini		-11.8	-5.1	-6.2	-0.3	-0.4	0.6
Atkinson0.5		-21.9	-10.0	-11.4	-0.6	-0.6	0.7
Atkinson1.5		-22.3	-11.1	-10.0	-0.9	-0.4	1.1

Poverty

Poverty Indices	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary	Baseline + TEI	Baseline + AEI
FGT(0)	0.166	0.088	0.133	0.119	0.164	0.164	0.170
FGT(1)	0.044	0.022	0.034	0.031	0.043	0.043	0.045
FGT(2)	0.019	0.009	0.013	0.014	0.018	0.019	0.019
% change							
FGT(0)		-47.3	-19.7	-28.4	-1.4	-1.1	2.4
FGT(1)		-48.6	-22.7	-27.9	-1.5	-0.5	3.8
FGT(2)		-50.1	-28.3	-26.6	-1.9	-0.3	3.5

Table 14. Gini decomposition by factor components
(disposable income + public education transfers)

Income source	Income share	Contribution to inequality			Elasticity		
		v=2	v=3	v=4	v=2	v=3	v=4
Monetary income	92.34	96.41	95.19	94.45	0.0407	0.0286	0.0212
Primary Educ. transfers	2.71	0.54	0.94	1.21	-0.0217	-0.0177	-0.0150
Secondary Educ. transfers	3.09	0.79	1.32	1.70	-0.0230	-0.0177	-0.0139
Post-secondary Educ. transfers	0.14	0.03	0.06	0.08	-0.0011	-0.0008	-0.0006
TEI transfers	0.28	0.01	0.08	0.13	-0.0027	-0.0021	-0.0015
AEI transfers	1.44	2.23	2.41	2.43	0.0080	0.0097	0.0099
All Public Educ. transfers	7.66	3.61	4.81	5.55	-0.0407	-0.0286	-0.0212

Table 15. Inequality Decomposition by Population Subgroups

Characteristic of household or household head	A	B	C	D	E	F
Household type						
Older single persons or couples (at least one 65+)	7.8	0.1460	0.1460	0.0	6.3	7.2
Younger single persons or couples (none 65+)	18.0	0.2402	0.2318	-3.5	23.7	26.2
Couple with children up to 18 (no other HH members)	33.6	0.1826	0.1365	-25.3	33.7	28.9
Mono-parental household	1.5	0.1930	0.1316	-31.8	1.6	1.2
Other household types	39.1	0.1512	0.1325	-12.4	32.4	32.6
Within groups inequality		0.178	0.1528	-14.16	97.6	96.1
Between groups inequality		0.0044	0.0061	38.64	2.4	3.8
Socioeconomic group of HH head						
Blue collar worker	23.3	0.1006	0.0760	-24.4	12.8	11.1
White collar worker	14.9	0.1096	0.0897	-18.1	9.0	8.4
Self-employed	23.3	0.2618	0.2106	-19.6	33.4	30.8
Unemployed	2.3	0.1252	0.1109	-11.4	1.6	1.6
Pensioner	27.9	0.1754	0.1725	-1.6	26.8	30.3
Other	8.4	0.1831	0.1509	-17.6	8.4	8.0
Within groups inequality		0.1677	0.1433	-14.55	92.0	90.2
Between groups inequality		0.0146	0.0155	6.16	8.0	9.7
Educational level of HH head						
Tertiary education	20.4	0.1406	0.1197	-14.8	15.7	15.4
Upper secondary education	27.0	0.1495	0.1145	-23.4	22.2	19.5
Lower secondary education	13.0	0.1563	0.1200	-23.2	11.2	9.8
Primary education or less	39.5	0.1627	0.1487	-8.6	35.3	37.0
Within groups inequality		0.1537	0.1297	-15.61	84.3	81.6
Between groups inequality		0.0286	0.0291	1.75	15.7	18.3
Age of population member						
Below 25	27.0	0.1719	0.1279	-25.6	25.4	21.7
25-64	52.5	0.1770	0.1538	-13.1	50.9	50.8
Over 64	20.6	0.1781	0.1751	-1.7	20.1	22.7
Within groups inequality		0.1758	0.1512	-13.99	96.4	95.2
Between groups inequality		0.0065	0.0077	18.46	3.6	4.8
ALL		0.1824	0.1589	-12.9		

A: Population Share
B: Mean Log Deviation (Disposable Income)
C: Mean Log Deviation (Disposable Income + education benefits)
D: % Change in Inequality
E: % Contribution to Aggregate Income Inequality (Disposable Income)
F: % Contribution to Aggregate Income Inequality (Disposable Income + education benefits)

Table 16. Poverty Decomposition by Population Subgroups

Characteristic of household or household head	Popul. Share	FGT0				FGT1				FGT2			
		A	B	C	D	A	B	C	D	A	B	C	D
Household type													
Older single persons or couples (at least one 65+)	7.8	0.3804	15.7	15.1	19.9	0.0941	30.5	13.7	15.7	0.0323	41.0	11.2	18.5
Younger single persons or couples (none 65+)	18.0	0.2286	13.8	20.9	27.2	0.0725	14.2	24.3	27.9	0.0338	14.6	26.9	36.2
Couple with children up to 18 (no other HH members)	33.6	0.1979	-40.4	33.7	23.0	0.0538	-48.1	33.7	38.6	0.0232	-52.6	34.5	19.2
Mono-parental household	1.5	0.3085	-61.4	2.4	1.0	0.0834	-51.8	2.3	2.7	0.0417	-50.9	2.8	1.6
Other household types	39.1	0.1412	-10.0	28.0	28.8	0.0357	-11.6	26.0	29.8	0.0142	-14.8	24.6	24.6
Socioeconomic group of HH head													
Blue collar worker	23.3	0.1600	-33.6	18.9	14.4	0.0357	-41.6	15.5	17.7	0.0123	-46.5	12.7	8.0
White collar worker	14.9	0.0354	-41.7	2.7	1.8	0.0052	-35.5	1.4	1.7	0.0012	-34.0	0.8	0.6
Self-employed	23.3	0.2341	-26.0	27.6	23.4	0.0745	-33.2	32.3	37.0	0.0362	-35.7	37.4	28.2
Unemployed	2.3	0.3337	-18.4	3.9	3.6	0.0844	-8.8	3.6	4.1	0.0340	-2.0	3.5	4.0
Pensioner	27.9	0.2511	11.0	35.5	45.1	0.0668	21.2	34.7	39.8	0.0260	25.2	32.1	47.1
Other	8.4	0.2689	-10.5	11.4	11.7	0.0800	-17.5	12.5	14.4	0.0366	-23.7	13.6	12.2
Educational level of HH head													
Tertiary education	20.4	0.0393	-8.4	4.1	4.3	0.0095	-21.2	3.6	4.1	0.0033	-27.9	3.0	2.5
Upper secondary education	27.0	0.1532	-35.0	21.0	15.6	0.0425	-39.3	21.4	24.6	0.0184	-42.0	22.0	15.0
Lower secondary education	13.0	0.2096	-32.6	13.8	10.7	0.0553	-35.7	13.4	15.4	0.0251	-42.4	14.5	9.8
Primary education or less	39.5	0.3047	-0.7	61.1	69.4	0.0836	1.9	61.6	70.6	0.0345	2.6	60.5	72.7
Age of population member													
Below 25	27.0	0.2096	-40.8	28.7	19.4	0.0588	-47.4	29.5	33.9	0.0258	-51.5	30.9	17.6
25-64	52.5	0.1490	-13.3	39.6	39.3	0.0399	-14.8	39.0	44.7	0.0171	-16.6	39.8	38.9
Over 64	20.6	0.3038	13.6	31.7	41.2	0.0822	22.0	31.5	36.1	0.0322	26.6	29.3	43.6
All		0.1980	-11.4			0.0540	-11.0			0.0227	-12.5		

A: Value of the Index (Distribution of Disposable Income)
B: % Change in Poverty (after the inclusion of education benefits)
C: % Contribution to Aggregate Poverty (Disposable Income)
D: % Contribution to Aggregate Poverty (Disposable Income + education benefits)

Table 17. Absolute inequality indices

	Baseline	Baseline + All Transfers	Baseline + Primary	Baseline + Secondary	Baseline + Post-Sec. Non-tertiary	Baseline + TEI	Baseline + AEI
Relative Gini	0.3252	0.3037	0.3159	0.3143	0.3247	0.3241	0.3250
% change wrt baseline		-6.6	-2.9	-3.3	-0.2	-0.3	-0.1
Mean equiv. income	970.9	1051.4	999.4	1003.4	972.3	973.8	986.0
Absolute Gini	315.7	319.4	315.7	315.4	315.7	315.6	320.4
% change wrt baseline		1.2	0.0	-0.1	0.0	0.0	1.5

Table 18. Proportional change in relative and absolute inequality indices: Distributions of persons in particular age brackets

% change in relative inequality after public education transfers

Inequality index	5-11	12-17	18-24		
			All transfers	TEI transfers	AEI transfers
Gini	-18.4	-19.5	-1.4	-2.2	1.6
Atkinson0.5	-33.3	-33.6	-3.7	-3.6	1.3
Atkinson1.5	-36.1	-30.2	-1.6	-2.5	2.5

% change in absolute inequality after public education transfers

Inequality index	5-11	12-17	18-24		
			All transfers	TEI transfers	AEI transfers
Gini (v=2)	-2.3	1.8	13.2	0.3	14.0
Gini (v=3)	-1.8	3.5	14.2	0.7	14.7
Gini (v=4)	-1.5	4.8	14.5	1.0	14.7

Table 19. Progressivity indices (Gini based)

Transfer	Kakwani			Reynolds-Smolensky (original)	Reynolds-Smolensky (corrected for re-ranking)
	v=2	v=3	v=4		
Primary Education	0.401	0.530	0.596	0.0114	0.0093
Secondary Education	0.431	0.583	0.666	0.0140	0.0109
Post Secondary	0.460	0.588	0.646	0.0007	0.0005
TEI	0.432	0.544	0.571	0.0013	0.0010
AEI	0.230	0.296	0.336	0.0035	0.0002
All transfers	0.383	0.509	0.575	0.0294	0.0215

Table 20. Comparison of living standards of persons aged 35-50 according to their educational qualifications

Educational level	Mean equivalised consumption expenditure (Group Mean: 100.0)	Quintile				
		1 (bottom)	2	3	4	5 (top)
Primary completed or less	79.7	35.9	24.6	17.0	15.6	7.0
Lower secondary	90.0	29.7	22.8	22.3	12.6	12.7
Upper secondary	109.7	14.3	21.4	23.5	21.7	19.1
TEI	133.5	10.5	15.6	18.3	26.8	28.9
AEI	147.1	5.9	9.4	14.1	27.5	43.1
MSc/PhD	175.7	0.0	6.0	10.6	12.2	71.2

Table 21. Participation in education and private spending per upper-secondary education student per quintile

	Quintile				
	1 (bottom)	2	3	4	5 (top)
Persons aged 15-17 not in education, %	18.27	12.54	5.64	5.23	9.00
Upper secondary education students in technical education, %	34.10	30.72	25.24	8.01	11.90
Households with upper-secondary education students with expenditures on fees for cram schools and private tuition, %	48.99	42.70	63.58	72.22	81.96
Monthly mean private spending per upper-secondary education student attending a cram school or taking private tuition	167.0	155.4	199.0	275.3	333.5
Ratio of tertiary education to upper secondary education students	0.735	1.098	1.012	0.880	1.020
Ratio of university to general upper secondary education students	0.665	0.827	0.747	0.636	0.903
Ratio of AEI/TEI	1.43	1.06	1.22	1.82	3.43

Chart 1

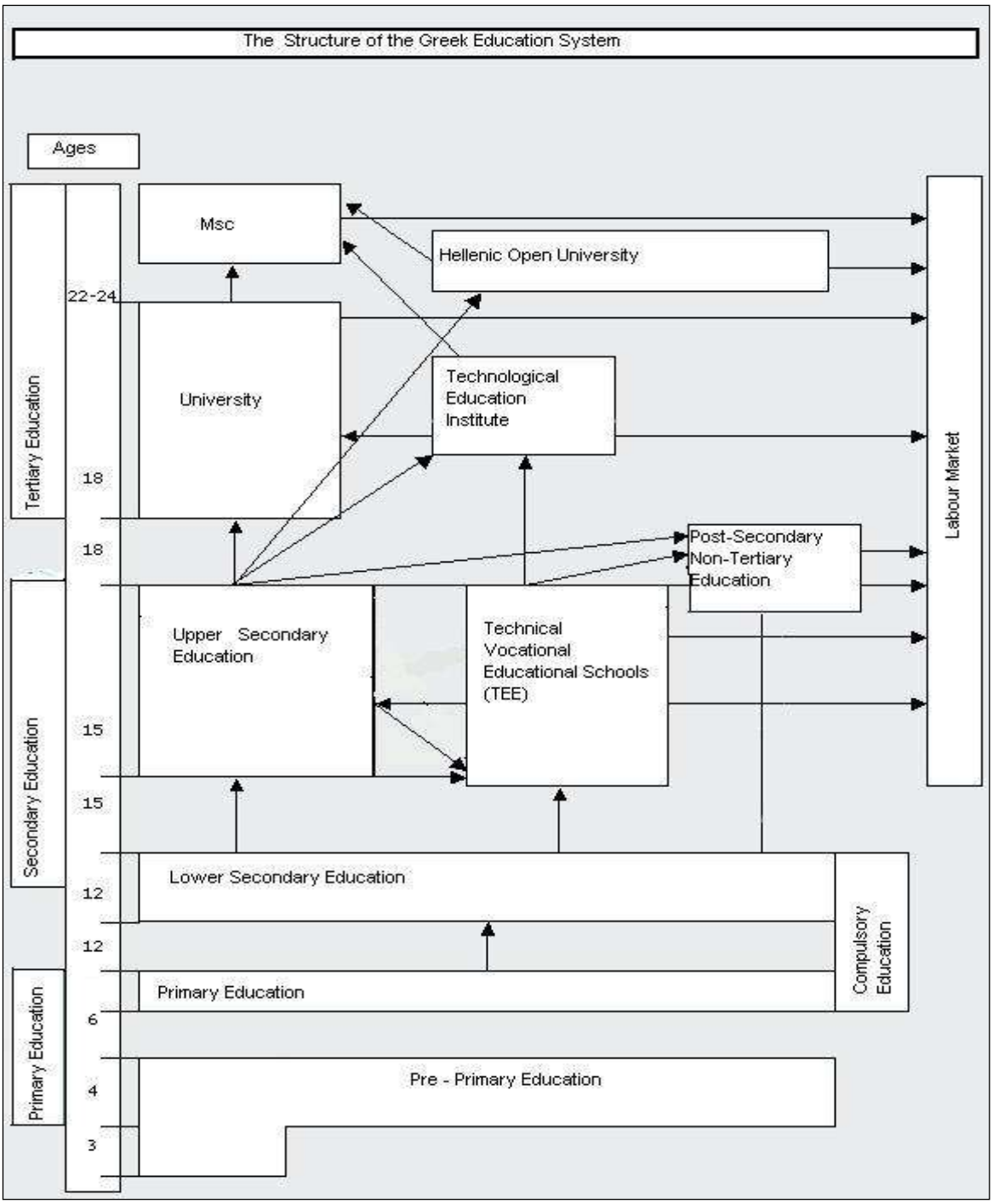

The Structure of the Greek Education System
Ages
Msc
Hellenic Open University
22-24
University
Technological Education Institute
Tertiary Education
18
18
Post-Secondary Non-Tertiary Education
Labour Market
Upper Secondary Education
Technical Vocational Educational Schools (TEE)
Secondary Education
15
15
Lower Secondary Education
12
12
Compulsory Education
Primary Education
Primary Education
6
Pre - Primary Education
4
3

Chart 2

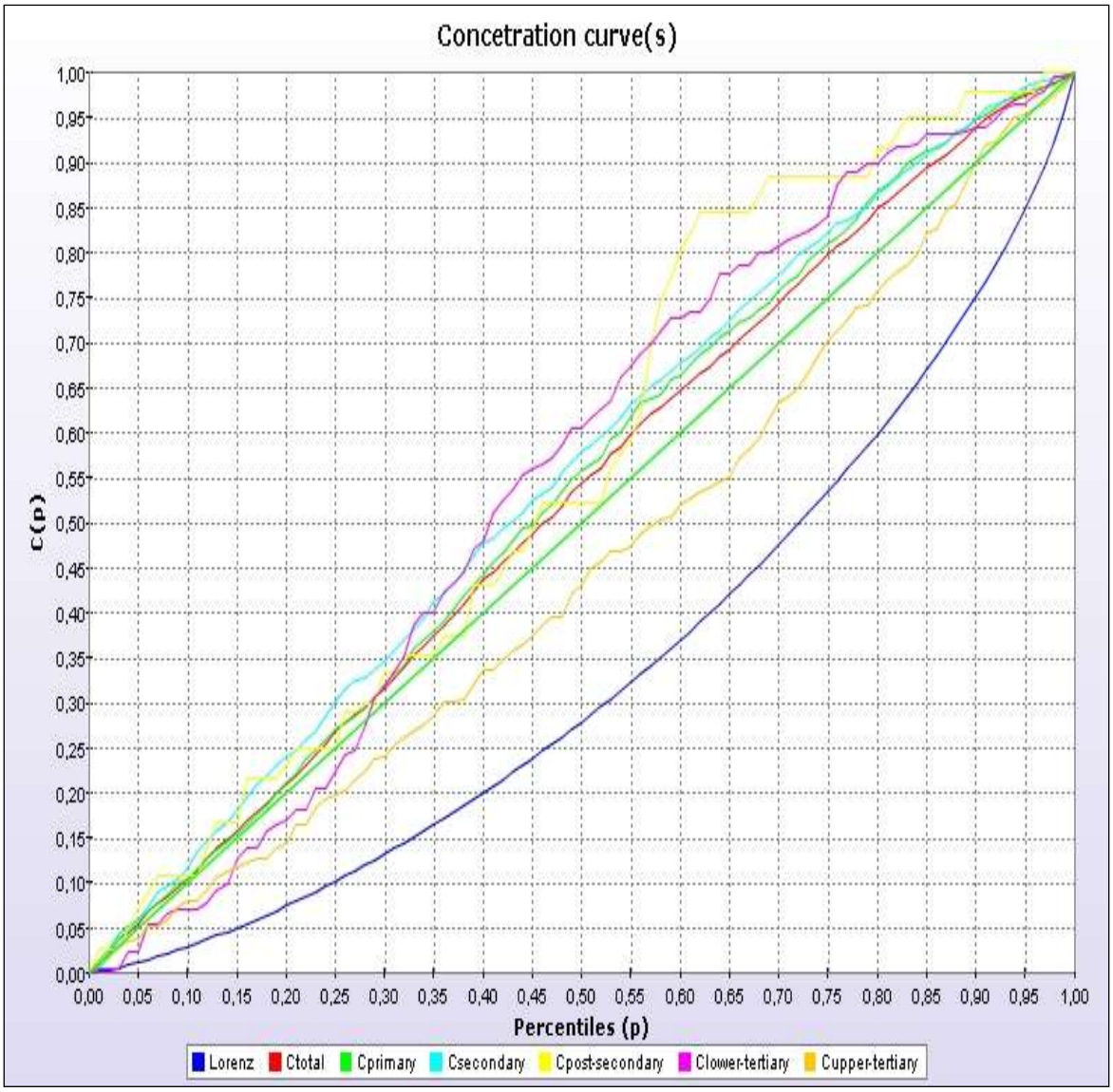
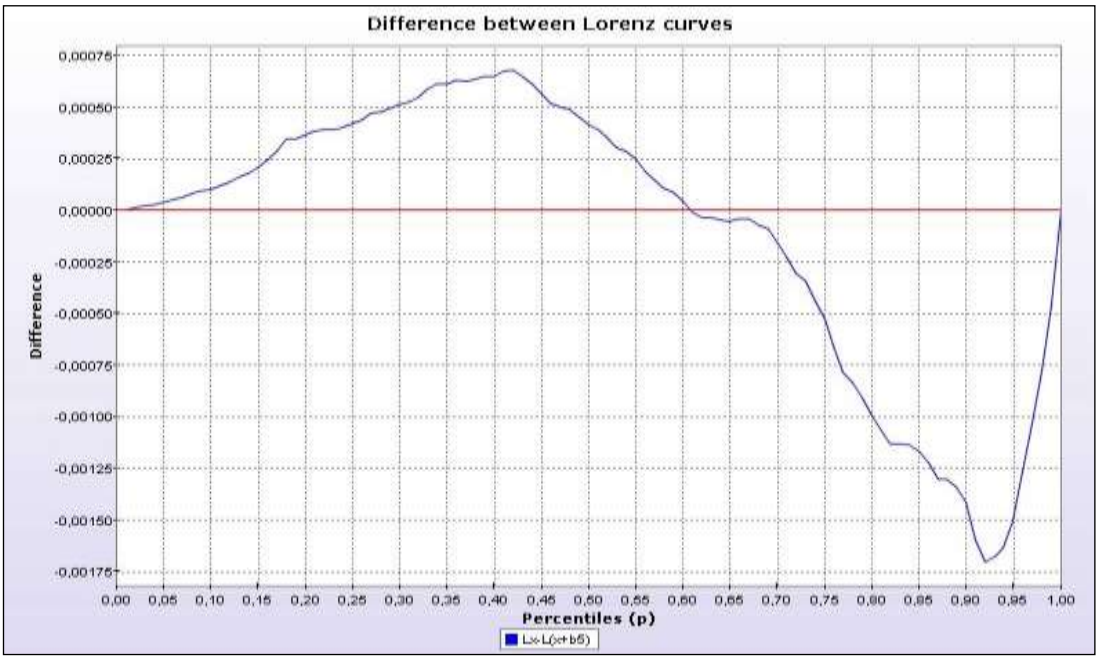

Concetration curve(s)
C(p)
Percentiles (p)
Lorenz
Ctotal
Cprimary
Csecondary
Cpost-secondary
Clower-tertiary
Cupper-tertiary

Chart 3.


Difference between Lorenz curves
0,00075
0,00050
0,00025
0,00000
-0,00025
-0,00050
-0,00075
-0,00100
-0,00125
-0,00150
-0,00175
Difference
0,00 0,05 0,10 0,15 0,20 0,25 0,30 0,35 0,40 0,45 0,50 0,55 0,60 0,65 0,70 0,75 0,80 0,85 0,90 0,95 1,00
Percentiles (p)
Lx-L(x+b5)