

Distributional effects
of public education transfers in Greece

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Athens, January 2007

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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.

JEL Classification Numbers: I21, D31

Acknowledgments: Financial support under "PENED" is gratefully acknowledged. The Reinforcement Programme of Human Research Manpower - "PENED" is co-funded by: 75% of Public Expenditure from E.U.- European Social Fund, 25% of Public Expenditure from Greek Public Sector - Ministry of Development - General Secretariat for Research and Technology and from Private Sector in the framework of Measure 8.3, Action 8.3.1, of the Operational Programme Competitiveness -Third Community Support Programme.

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.³ 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.⁴

3. 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 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.

4. 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

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

to him/her. 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.

of living. As the evidence of Table 3 shows, about one third of tertiary education students live away from their parental homes.⁵ 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 education⁶ - 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

5. 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.

6. 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.

factor. More specifically, this table reports the relative ratio of actual beneficiaries to 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.⁷ 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

7. Note that primary education includes kindergartens, where participation is not compulsory.

top four. Lower average transfers per capita are also observed in the case of TEI and 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 many 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 case 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 $\alpha=0, 1, 2$, 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.⁸

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.

8. 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.

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. 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.⁹

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

9. See the references reported in Section 1.

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 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 rest of the income distribution.

Under these circumstances, it is easy to understand why students from richer households are over-represented in tertiary education.¹⁰ 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.

10. 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) Tertiary B (TEI)		225,265	56.0	919,690,761	508,287,388	1,427,978,149	6,339
		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

<u>Decile</u>	Primary	Secondary	Post-Sec. Non-tertiary	TEI	AEI	<u>ALL</u>
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

<u>Decile</u>	TEI students		AEI students	
	Living with their families	<u>Living alone</u>	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	<u>ALL</u>
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)

<u>Decile</u>	Primary	Secondary	Post-Sec. Non-tertiary	TEI	AEI	<u>ALL</u>
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	<u>ALL</u>
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)**

<u>Income source</u>	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
<u>Relative Gini</u>	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

<u>Inequality index</u>	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

<u>Inequality index</u>	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)

<u>Transfer</u>	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

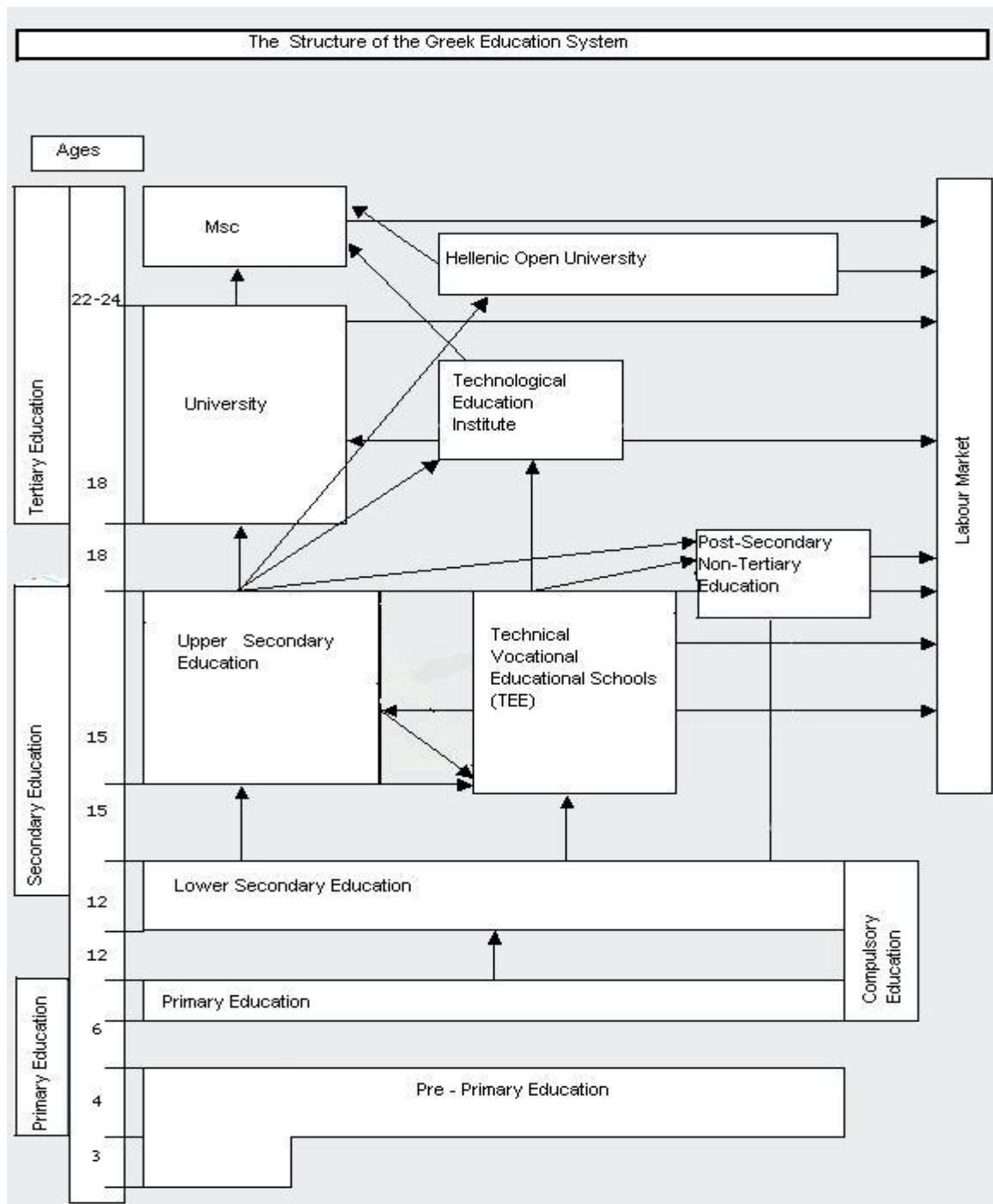


Chart 2

Concentration curve(s)

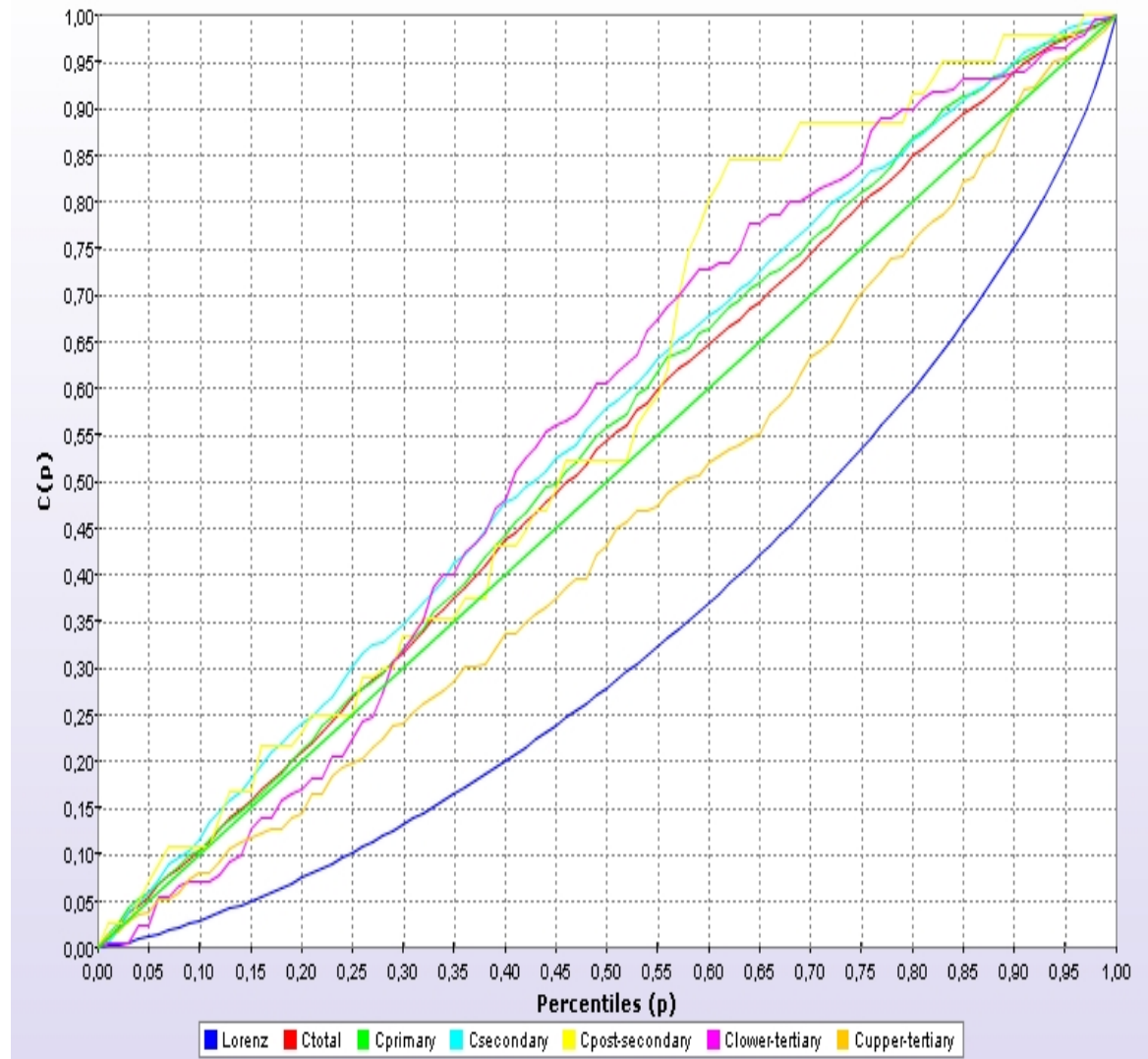
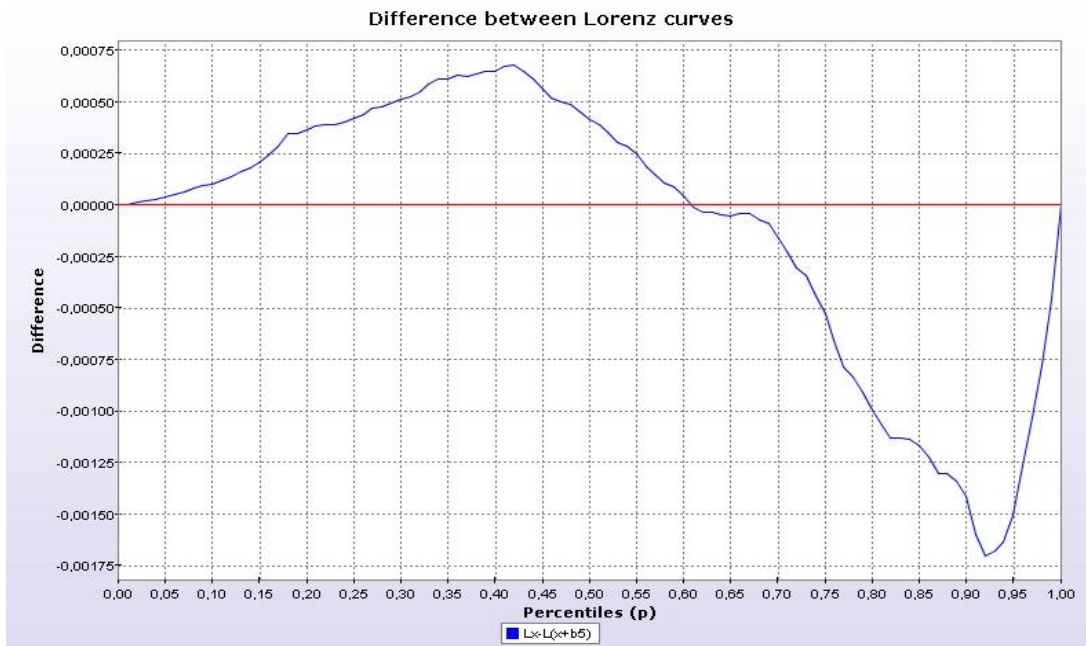


Chart 3.



DRAFT (NOT FOR CITATION)

**“WAGE INEQUALITIES IN GREECE: DEFINING FACTORS IN A
SAMPLE OF 1670 EMPLOYEES”**

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JUNE 2007

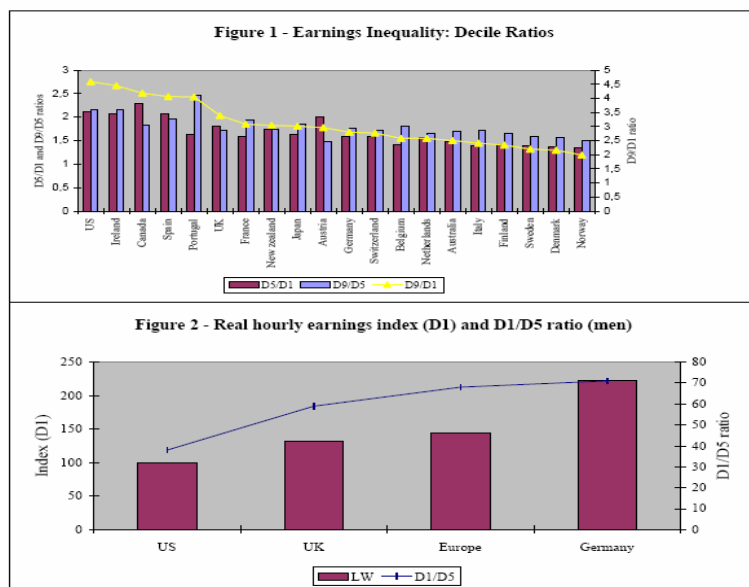
INTRODUCTION

After the 1980s, a **substantial rise in wage inequality** was experienced in most OECD economies. More specifically, in the U.S. in the 1980’s employees at the lower distribution tail (33rd percentile) experienced a 14 percent drop in real wages, employees at the median distribution tail (66th percentile) experienced only a 6 percent drop, and employees in the upper tail of the distribution experienced a 1 percent wage increase.¹ In EU countries, decile ratio (the ‘90/10 decile ratio’ expresses the dispersion in earnings between the top 10% of earners and the bottom 10%) ranges from between 2 and 3 (Table 1).

There is lack of information **on wage inequalities** concerning Greece. Therefore, the present contribution **aims at filling the gap** in research following statistical examination of wage inequalities of 1670 employees in contemporary Northern Greece (Thessaloniki) in the sectors of Information Technology, Food and Beverage, Hotels.

The paper is organized as follows: Initially, some significant empirical studies on **determining factors of wage inequalities** are presented. Then focus is placed on current **situation in Greece**, first using statistics and information from several sources (Eurostat, OECD) and second using descriptive statistics from our data. Finally, using a multiple linear regression analysis, it is intended to point out the **variables that shape wage differentiation** of brutto wage from minimum wage.

Table 1: Wage inequality



Source: “Wage inequalities and Low Pay: The role of labour market institutions”, Claudio Lucifora

¹ “The Internationalization of the U.S. Labor Market and the wage structure”, George J.Borjas, FRBNY, Economic Policy Review, January 1995.

1) WAGE INEQUALITIES: DETERMINING FACTORS

Theory of wage inequalities indicates that not a single factor can account for the full pattern of changes in the wage structure over the past decades, but rather a **combination of factors** as analysed below.

a) Globalisation, trade flows and immigration

Many theoretical and empirical efforts tried to evaluate the link between globalisation and labour market focusing on various **aspects globalisation**. More specifically Dreher and Gaston (2006) found that the **economic dimension of globalisation** has **worsened industrial wage inequality in developed countries**. To a lesser degree, the political and social dimensions of globalisation also seem to influence wage inequality. However, the impact of globalisation on inequality in less developed countries has been quite small. This is “justification” for Baghatti’s observation that “it is the developed countries rather than the developing countries that oppose greater integration”.

Trade flows and immigration as aspects of labour market internationalization contributed significantly to the rise in wage inequality. Trade openness has risen in the U.S. during recent decades, and as a result, the **demand for unskilled workers** and consequently their wages are affected. The explanation of this fact is that the imported goods compete with goods produced by relatively unskilled workers. In 1980, only 13% of workers with less than a high school education were immigrants; in the 1990s 25% of the high school dropouts were immigrants. **Immigrants** can change the shape of wage distribution as long as their **skill distribution** differs from the skill distribution of native workers. That is what happened in the U.S., there was an increase in aggregate wage inequality, since more recent immigrant waves tend to be less skilled than earlier waves. ²

b) Technological changes

Technological progress and especially computer revolution, have **increased demand for skilled workers** by enhancing their productivity. The more educated workers’ advantage derives from problem solving ability, receptiveness to change and ability to keep up with technology evolution in the working environment and not from specific skill acquired in school. On the other hand, technological change has **reduced demand for unskilled workers** perhaps because they lack the ability to use technically advanced methods. ³ Brauer and Hickok (1995) find that this shift in skilled workers demand not only increases inequality but also leads to an overshooting of inequality in the short-run. The increased hire rates for skilled workers requires

² “The Internationalization of the U.S. Labor Market and the wage structure”, George J. Borjas, FRBNY, Economic Policy Review, January 1995.

³ “Wage inequality and the effort incentive effects of technological progress”, Campbell Leith, Chol-Won Li, CESifo Working Paper No 513, June 2001, www.ssrn.com

higher wages to prevent these workers from quitting, while the increased rates of plenitude for unskilled workers allows firms to reduce unskilled wages.

Moreover, empirical studies suggest that unemployment is higher for unskilled employees relatively to skilled employees and their degree of job security is lower, which means that technological changes, even when they don't affect skill demand, will increase wage inequality.

c) Institutional factors: Regulation versus deregulation

In general, labour market institutions can influence wage formation and the structure of earnings “first because they have altering effects on market forces and second because they provide a different set of constraints and incentives for workers and firms involved in wage formation”.⁴ There are **three aspects of institutional factors** that seem to have great influence on wage inequality: Union density, collective bargaining and minimum wage settings. When all the above factors are considered together in order to explain wage distribution across countries, results show that over **60 per cent of the cross-country differences in low pay** can be accounted for by the different institutional settings.⁵

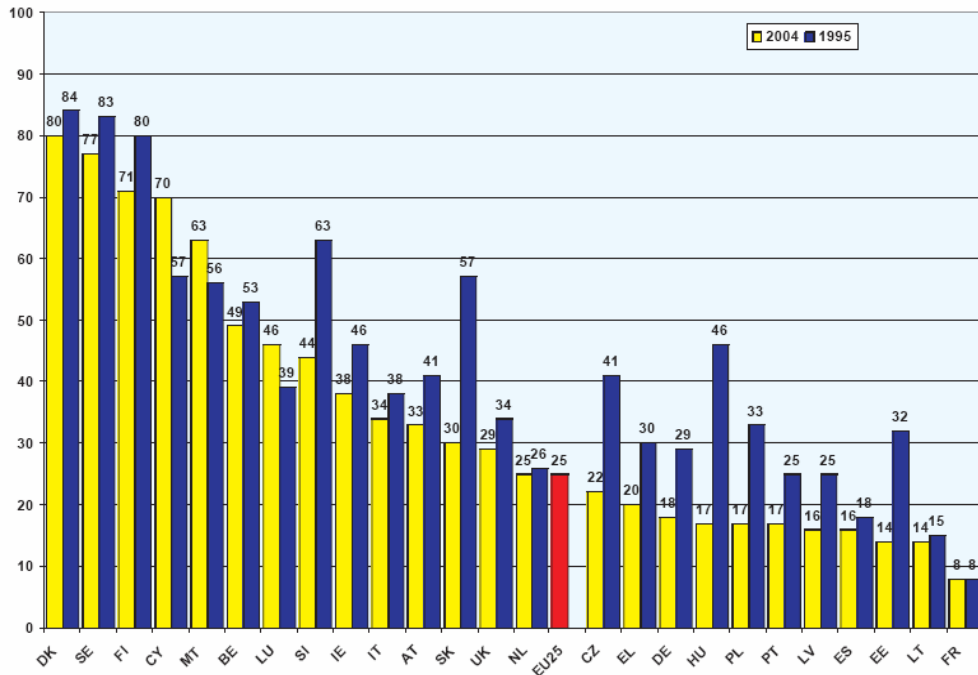
i) Union density

Unions play an important role, since they have the power to pursue egalitarian wage policies, enhance workers solidarity and **protect workers in the lower end of the earnings distribution and therefore minimise wage inequality.**

According to the table below, Greece is situated in a lower level with 20% union density in 2004. Between 1995 and 2004, most of the EU Member States experienced **a fall in union density**, which is a main characteristic of the last two decades: unions, due to increased competition and globalisation, have lost membership, power and influence. Greece together with other countries had a significant loss.

⁴ “Wage inequalities and Low Pay: The role of labour market institutions”, Claudio Lucifora, FEEM Working paper no 13.99, Università Cattolica del Sacro Cuore di Milano - Department of Economics; Institute for the Study of Labor (IZA), www.ssrn.com

Table 2: Net trade union density in EU25, 1995–2004 (%)



Note: The figures represent the total of gainfully employed members (excluding unemployed people, students or retired individuals) divided by the total population of wage earners in the country; Figures from 2004: Cyprus, Greece, Malta figures are from 2002; Figures from 1995: France figures are from 1996; Latvia and Lithuania figures are from 1998; EU25: weighted average.

Source: EIRO, *Industrial Relations of EU member states 2000-2004*, European Foundation for the Improvement of Living and Working Conditions, European Industrial Relations Observatory

ii) Statutory minimum wage

Minimum wages have the advantage to set a **wage floor of wages, reducing wage dispersion at the bottom of the distribution and minimizes wage inequalities**. David S.Lee (1999) finds for the U.S. that the erosion of the real value of the federal minimum wage rate during the 1980s is responsible for a great majority of the observed growth in inequality in the lower tail of the distribution. The estimates imply that the falling relative level of the minimum wage can explain “from 70 to 100 percent of the growth in inequality in the lower tail of female wage distribution and for men about 70% and 25% if the growth in the 50-10 and 50-25 differentials respectively”. In the EU, statutory minimum wage requirements are fixed in 18 of the 25 EU Member States.

iii) Collective bargaining coverage-Centralisation or deregulation

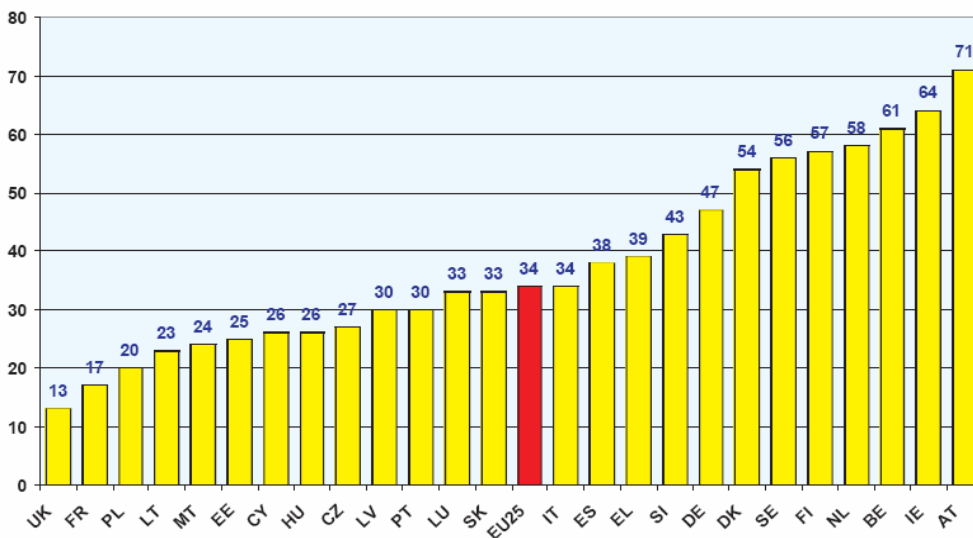
Bargaining coverage differs across Europe as well. Greece is near the EU average with collective bargaining coverage of 65% equal to Germany. **High collective bargaining coverage** rates are linked with a **high degree of centralisation** which seems to be a characteristic of the Nordic countries. Contrary, low collective bargaining rates are associated with a low degree of centralisation, taking as example the U.K., U.S. and Canada, commonly ranked as the most decentralized systems. The **Greek collective bargaining system** is a rather well regulated

⁵ ibid

system, which guarantees strong wage protection against labour market forces especially after Law 1876/1990. This law bounds the collective bargaining framework and has the following characteristics: Collective bargaining between employers and employees unions is obligatory and there is the possibility of arbitration (OMED) in case of disagreement. Collective agreements can be extended in the whole sector when the employee union covers more than 51% of the total employee number.

It is true that countries characterised by the most decentralised and deregulated labour market systems experienced the **largest wage inequalities increases** (e.g. USA). On the other hand, **centralised** regulated labour markets and highly centralised wage setting mechanisms are able to shape **equal wage distribution** across countries but are also characterised by “more rigid wage structures and greater immobility of wages face to economic shocks and business cycle fluctuations.”⁶ Therefore, empirical studies point out that labour regulation can cause disemployment effects, since it reduces job opportunities for outsider groups: the young, the old and the inexperienced. This image is also depicted in the comparison between the U.S. and Europe: “higher labor-demand volatility resulted to increase within-skill wage dispersion in the US and unemployment in Europe, through dynamic adjustment in laissez-faire markets and forward-looking behavior by employers in heavily regulated markets”.⁷

Table 3: Wage bargaining centralization EU 25



Note: The wage bargaining centralisation index combines a measure of trade union concentration with a measure of the prevalent level of bargaining. The index is compiled by Iversen (1999) and adapted by Visser. It classifies country and year according to the relative weight of three levels of bargaining (company, sectoral and national), and multiplies these weights by a measure of the concentration of trade union membership at each level. (For a complete methodological specification, see European Commission, 2004, p. 41.)

Source: EIRO, *Industrial Relations of EU member states 2000-2004*, European Foundation for the Improvement of Living and Working Conditions, European Industrial Relations Observatory

⁶ Wage inequalities and Low Pay: The role of labour market institutions”, Claudio Lucifora, FEEM Working paper no 13.99, Università Cattolica del Sacro Cuore di Milano - Department of Economics; Institute for the Study of Labor (IZA), www.ssrn.com

d) The still remaining gender pay gap

Despite the general rise in wage inequality, the pay gap between men and women seems to narrow: For example in the U.S., the female-to-male ratio rose from 59.7 to 68.7 percent between 1979 and 1989—a gain of 9.0 percentage points. However, the rate of convergence slowed in the following decade, with a further increase to 72.2 percent by 1999—an increase of only 3.5 percentage points.⁸ This wage gap remains constant also in Europe after the 1990s despite the enactment laws of equal treatment and the increased entering of women in the labour market. From the below table it seems that the US gender ratio is lower than the non-U.S. average. Empirical studies indicate that compared to women in other countries, U.S. women are better qualified relative to men and face less discrimination.⁹

Table 4: Female/Male ratios, median weekly earnings of full time workers

Female/Male Ratios, Median Weekly Earnings of Full-Time Workers

Country	1979–81	1989–90	1994–98	Change 1979–81 to 1994–98
Australia	0.800	0.814	0.868	0.068
Austria	0.649	0.674	0.692	0.043
Belgium	na	0.840	0.901	na
Canada	0.633	0.663	0.698	0.065
Finland	0.734	0.764	0.799	0.065
France (net earnings)	0.799	0.847	0.899	0.100
Germany (west)	0.717	0.737	0.755	0.038
Ireland	na	na	0.745	na
Italy	na	0.805	0.833	na
Japan	0.587	0.590	0.636	0.049
Netherlands	na	0.750	0.769	na
New Zealand	0.734	0.759	0.814	0.080
Spain	na	na	0.711	na
Sweden	0.838	0.788	0.835	–0.003
Switzerland	na	0.736	0.752	na
United Kingdom	0.626	0.677	0.749	0.123
United States	0.625	0.706	0.763	0.138
Non-US Average				
1979–81 sample	0.712	0.731	0.774	0.063
full sample	0.712	0.746	0.778	0.067

Notes: The years covered for each country are as follows: Australia: 1979, 1989, 1998; Austria: 1980, 1989, 1994; Belgium: 1989, 1995; Canada: 1981, average of 1988 and 1990, 1994; France: 1979, 1989, 1996; W. Germany: 1984, 1989, 1995; Italy: 1989, 1996; Japan: 1979, 1989, 1997; Netherlands: 1990, 1995; New Zealand: average of 1988 and 1990, 1997; Sweden: average of 1978 and 1980, 1989, 1996; Switzerland: 1991, 1996; United Kingdom: 1979, 1989, 1998; United States: 1979, 1989, 1996.

Source: Authors' calculations from unpublished OECD data.

Source: Gender differences in pay”, Francine D. Blau, Lawrence M. Kahn, NBER Working Paper 7732, June 2000

According to OECD 2002 data the **wage gap between men and women in Greece** is 13% which is the seventh smaller percentage between 19 most developed OECD countries and the 6th smaller within EU countries. After 1981 the gender wage gap in Greece has started to converge. The changes in collective bargaining regulations and minimum wage setting towards a more regulated system played a significant role to this convergence. Especially when we keep in mind that Greek employees wages are mostly situated in the lower wage dispersion tail, which

⁷ “Wage inequality and unemployment: US versus Europe”, Giuseppe Bertole and Andrea Ichino, CEPR Discussion Paper No 1186, May 1995.

⁸ “The US gender pay gap in the 1990s: Slowing Convergence”, Francine D. Blau and Lawrence M. Kahn, October 2003.

⁹ “Gender differences in pay”, Francine D. Blau, Lawrence M. Kahn, NBER Working Paper 7732, June 2000

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means that the more collective bargaining coverage and wider minimum wage setting the more greek female employees wages are protected.

Basic theory for the gender pay gap is the **discrimination theory**. According to Becker's (1957) model, discrimination is due to the **discriminatory tastes of employers, co-workers, or customers**. On the other hand, there is the theory of "**statistical discrimination**," according to which "differences in the treatment of men and women arise from average differences between the two groups in **the expected value of productivity** (or in the reliability with which productivity may be predicted), which leads employers to discriminate on the basis of that average".¹⁰ At the end, Bergmann's (1974) "**overcrowding**" model suggests that "discriminatory exclusion of women from "male" jobs can result in an excess supply of labor in "female" occupations, depressing wages there for otherwise equally productive workers".¹¹

What are the specific **factors** that lead to the still remaining pay gap between men and women? First of all women continue to **confront discrimination** in the labor market, although its extent seems to be decreasing. Moreover, women still retain main housework and child responsibility in most families, which means that women gather **less work experience than men**. According to the human capital model the higher the return to experience received by workers, regardless of sex, the larger will be the gender gap in pay.¹² Also, increased responsibilities and housework **decreases a woman's effort and productivity at her job (Becker 1985)**. Additionally, women tend to have shorter and more discontinuous work lives and therefore, they have less incentives to invest in higher education and job specification or training. Their **smaller human capital** investments will lower their earnings relative to those of men and will exclude them from highly paid and specified jobs.

Another important factor is underlined by Blau and Kahn (2001). According to them, **wage setting institutions are responsible for an important portion of the gender pay gap**. Collective bargaining agreements raise the relative pay of women, who tend to be at the bottom of the wage distribution. They also find that the extent of collective bargaining coverage in each country is negatively related to the gender gap. Deunionization is also a responsible factor for gender pay gap.

e) Education

Education has long been considered by governments as an **important policy tool** able to reduce economic inequality. **Theory of human capital** which was first shaped by Adam Smith, is the main education representative theory. In sum, human capital theory supports that education raises knowledge and productivity and contributes to the development and diffusion of new technologies that is why humans and in general societies invest in education. Education is

¹⁰ "Gender differences in pay", Francine D.Blau, Lawrence M.Kahn, NBER Working Paper 7732, June 2000

¹¹ "Gender differences in pay", Francine D.Blau, Lawrence M.Kahn, NBER Working Paper 7732, June 2000

considered as an investment which **compares the cost of education with future wages that people expect to receive by entering the labour market.**

A representative example of **supply and demand forces** related to education is the labor market entry of the **large baby boom cohort** that happened in the U.S. in the 1970s. These college graduates entry shifted out the supply curve of college graduates, and as a result reduced the payoff to college education. However, during the 1980's, the rate of increase in the supply of college graduates slowed dramatically and as a result, raised the wage gap between college graduates and less educated workers.¹³ Speaking in numbers, the difference between an educated male who is at the upper tail (90th percentile) of the income distribution and a less educated male at the lower tail (10th percentile) has risen from about \$13,275 in 1972 to about \$49,000 in 1995.¹⁴

In recent decades also European countries have experienced a significant expansion in educational attainment and in particular in **tertiary education**. This boom in education has represented a considerable (supply) shock to the European labour markets and significantly influenced the structure of wage differentials.¹⁵ In **Greece**, for educated men, wages in 1999 were lower than those of 1974, contrary with low educated older employees that faced an important rise in their wages during 1974-1999. For women the conclusion is the same, with the difference that all the groups of women employees were in a better place from 1974 to 1999. In general, average wages raise significantly with a higher education level. There is also a significant link between education and age. Wages raise together with age, until the age of 50-60 and then they start diminishing. This wage increase is even higher when there is a high level education for the first decades. As far as education return is concerned, varies at the level of 4-7,5% for men and 5-10% for women for 1974. In 1999 education return still remains an important factor reaching the level of 5-8% for men and 4-8% for women.¹⁶

¹² "Gender differences in pay", Francine D.Blau, Lawrence M.Kahn, NBER Working Paper 7732, June 2000

¹³ "The Internationalization of the U.S. Labor Market and the wage structure", George J.Borjas, FRBNY, Economic Policy Review, January 1995.

¹⁴ "Explaining rising income and wage inequality among the college-educated", Caroline M.Hoxby and Bridget Terry, NBER Working Paper 6873, January 1999.

¹⁵ "Wage dispersion, markets and institutions: The effects of the boom in education on the wage structure", Erling Barth and Claudio Lucifora, June 2006, www.iza.org

¹⁶ "Education and labour market", K.Kanellopoulos, K.Mavromaras, T.Mitrakos, Centre of economic research, Athens 2003

Table 5: Attainment in tertiary education: European countries

	1960	1965	1970	1975	1980	1985	1990	1995	2003	diff. 2003-1960
Austria	4.1	4.5	4.9	6	7.4	9.2	11.2	12.4	14.5	10.4
Belgium	7.8	9.9	12.1	13.7	15.3	17.9	20.8	24.6	29	21.2
Germany	4.2	6.7	9.1	11.4	13.2	15.6	18.5	20.5	24	19.8
Denmark	7.1	9.9	12.8	14.8	16.8	18.3	19.3	20.8	31.9	24.8
Spain	3.1	3.5	4	5.4	6.9	8.2	9.5	12.5	25.2	22.1
Finland	6.9	8.5	10.2	12.6	15.1	17.6	20.2	23.6	33.3	26.4
France	9.4	10.4	11.8	13.7	16.4	19.2	21.9	22.5	23.4	14
United Kingdom	4.9	6.3	7.6	8.9	10	11.9	13.9	18.9	28	23.1
Greece	3.7	4.3	4.9	6.6	8.5	9.7	10.9	14	18.3	14.6
Ireland	4	4.4	5.4	6.5	7.7	10.6	13.9	18.3	26.3	22.3
Italy (1)	2	2.7	3.4	4.1	4.7	5.4	6.3	7.8	10.4	8.4
Netherlands (1)	3.3	4.6	6	8.2	10.7	13.2	15.7	19.4	24.4	21.1
Norway	4.2	5.5	6.7	8.7	11.1	13.6	15.7	19.7	31	26.8
Sweden	4.8	5.7	6.7	10.1	13.6	17.1	20.5	24	33.4	28.6
Average (unw.)	5.0	6.2	7.5	9.3	11.2	13.4	15.6	18.5	25.2	
Stand. Dev.	2.1	2.5	3.1	3.5	3.9	4.4	4.8	5.0	6.9	

Source: Wage dispersion, markets and institutions: The effects of the boom in education on the wage structure”, Erling Barth and Claudio Lucifora, June 2006, www.iza.org

Barth and Lucifora (2006) examined **the role of institutional factors on wage distribution** and showed that there is a compressing effect of bargaining coordination on the wage premium attached to tertiary education as opposed to secondary education. According to Caroline M.Hoxby and Bridget Terry (1999) there are **three major sources** of education wage inequality growth: The first one or extensive margin, is the increasing **demographic diversity** of people who attend college. The second is an increasing **return to aptitude**. The third, or intensive margin, is college attributes. About 70% of the growth in inequality among recipients of baccalaureate degrees can be explained by these factors.

In a later study, Budria and Pereira (2005), after exploring the connection between education and wage inequality in nine European countries, find that **tertiary educated workers** (high educated workers) show much **larger wage dispersion** than workers with less education. They give three explanations for there tendencies: **over-education, ability, and quality and type of educational qualifications.**

f) Firm size

Numerous empirical studies have documented large differences **between firms** depending on the firm size, differences that are hard for the standard theory to explain. Jan Zabojsnik and Dan Bernhardt (2000)¹⁷ come to the following conclusions:

- Larger firms pay **significantly more than smaller firms** controlling for a variety of firm and worker characteristics, and this wage differential is greater for workers higher in the hierarchy.
- Larger firms offer **better working conditions** and higher levels of perquisites and non-performance contingent compensation, including pensions. For example, a 1986 study conducted for the Small Business Administration finds that 75 percent of large firms offered their employees sick leave, health and life insurance, paid vacation, and a pension/retirement plan, while only 7 percent of small firms provided similar benefits.
- More **technology intensive firms** or industries are larger (employ more workers), they **provide stronger investment** and therefore have workers who accumulate higher levels of human capital and receive higher wages. The big, technology intensive firms are also more **profitable**, which yields a correlation between profitability and wage level.
- Finally, smaller firms have higher growth rates, but are more likely to go bankrupt than larger firms, which means that larger firms provide more permanence to employees.¹⁸

There are three broad categories of factors determining **“within establishment dispersion”**: a) the degree of technological diversity. b) non competitive and institutional factors. c) compensation schemes. There are also several hypotheses suggesting **that within-establishment wage dispersion rises with establishment size** because larger establishments (i) employ workers with greater skill heterogeneity and (ii) rely more heavily on incentive-based pay schemes. On the other hand, other hypotheses predict that **between-establishment wage dispersion is higher at smaller establishments** because (i) the latter use a wide range of production technologies and (ii) unions are more prevalent among larger establishments which compress wages across occupations.¹⁹

g) Age-work experience

It seems that changes in **age and experience** of the working population exerts powerful influence on wage structure effects. An important factor is the **effect of demographic change on relative wages** with a representative example the U.S. “baby boom” generation. In the 1970s there was an increase in the labor market experience premium induced by the baby boom’s entry

¹⁷ “Corporate Tournaments, Human Capital Acquisition and the Firm size-wage relation”, Jan Zabojsnik and Dan Bernhardt”, 2000, www.ssrn.com

¹⁸ “Corporate Tournaments, Human Capital Acquisition and the Firm size-wage relation”, Jan Zabojsnik and Dan Bernhardt”, 2000, www.ssrn.com

¹⁹ “Establishment size and the dispersion of wages: Evidence from European countries”, Thierry Lallemand, Francois Rycx, September 2005, IZA DP 1778, www.iza.org.

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into the labor market. This experience premium increase was followed by a decrease in the 1980s as the baby boom progresses through middle age and approaches retirement.²⁰

Workers with different amounts of labor market experience are **imperfect substitutes in production**. Workers acquire human capital through on-the-job training and through learning-by-doing, and so more experienced workers have different tasks than do younger workers. When the supply of labor with a given level of experience increases, the wages of workers in that group will tend to decrease relative to those with different experience levels. The smaller the degree of substitutability between workers of different experience levels, the greater the change in relative wages that will result from a given change in relative supplies.

Institutional factors play again a significant role. According to Yolanda K.Kodrzycki (1996) deunionization, had a stronger influence for young workers who suffered from greater wage decreases. Jeffrey Grogger (2004) underlines that the increasing work experience premium in the U.S. is a result of the **welfare reform** that took place in the country in the 1990s which based on the belief that work will increase future experience, which will increase future wages and will decrease the need for welfare state.

2) SOME STYLISED FACTS: GREECE

i) Statistical information

Greece, has experienced a **widening gap of income inequality**: Approximately 21-23% of Greeks live below the poverty level and the income of 20% richest population exceeds 7 times the income of 20% poorest population. (European Industrial Relations Observatory, Greece). Another rather crucial factor is the high percentage of **poor employees**. According to Hellenic Statistic Service, this percentage reaches 32,2% of population in persisting poverty. (45,8% of this percentage are males and 20,4% females). Compared to other EU countries it is obvious that Greek employees receive the lowest wage in Europe with the exception of Portugal.²¹

Table 6: Annual wages in Euros (2003)

Country	Full time	Part time
Belgium	34.643	26.568
Denmark	44.692	13.995
Germany	40.056	19.180
Greece	16.739	9.451
Spain	19.220	6.530
France	28.847	13.802
Luxembourg	39.587	:

²⁰ "Population aging and the structure of wages", Robert K.Triest, Margarita Sapozhnikv and Steven A.Sass

²¹ Reply of Commissioner Mr. Spidlas at Hellenic Parliament Session

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Holland	36.600	12.600
Austria (2004)	34.995	15.185
Portugal	13.871	6.875
Finland	30.978	:
Sweden	32.177	26.425
U.K.	38.793	11.742

Source: European Commission (www.in.gr)

According to Eurostat Statistics in focus (1998), Greek population is divided in 10 equal groups (approximately 1 million each), decile ratios, placed in poverty order. The first group represents the poorest 1/10 population, the second the less poor 1/10 and the tenth group represents the richest 1/10 population. The richest 1/10 receives 26,3% of national income instead of 10% which should be if there was income equality. This percentage is equal with the income sum of 5 poorest groups (2,2%, 4,2%, 5,4%, 6,7%, 7,8%). The poorest group receives only 2,2% of national income. The three richest groups receive 54,1% of national income exceeding the income sum of the rest seven population groups which reaches 45,9%. (is the income that receive 7 million citizens).²²

ii) Our data

The sample consists of **60 Greek companies** that are active in the fields of **tourism, food and beverages and information technologies**, are situated in Northern Greece (Thessaloniki) and occupying **1670 employees in total**.

The following variables are being statistically analysed:

a) personal characteristics of the employee

- age (in years and categorized: 18-30, 31-40, 41-50, 51-60, 60 and more)
- gender (male-female)
- nationality (Greek., E.C., Third countries)
- marital status, (married, unmarried)
- number of children
- education, (primary school, junior high -Gymnasium, post junior high studies studies, high school-Luceum, after high school studies, technical education institutes-TEI, university-AEI, postgraduate studies)
- work experience (in years)

b) work organization

- specification (unskilled worker, skilled manual worker, Intermediate non-manual, licensed workers employee, Occupations with necessary TEI

²² "Wages and inequality of product distribution" INE GSEE Publication 2001, Part 3, <http://www.inegsee.gr/EKTHESI2001/meros3.htm>

degree, Occupations with necessary University degree Managerial and High paid jobs)

- working hours (Full time and continual working hours, Full time and split working hours, Full time and shifts, 1-4 hours, 5-7 hours)

c) company features (sector, size),

d) wages: collective agreements wages 2006 (in Euros), brutto wages 2006 (in Euros).

iii) Descriptive statistics

Wage inequality: The following table represents some **basic statistics of brutto wages 2006** of the sample. We can observe that mean wage of the sample is 1120,29 euros, median wage 937 and mode 769. Standard deviation is equal to 656,26. It is also remarkable that the 90th percentile receives an average wage of 1550 euros and the 10th percentile receives almost half, 769 euros. Percentile 90/10 is equal to 2,01. The difference between each percentile varies between 50 to 70 euros. This difference rises importantly for the eighth and ninth deciles (172 and 202 euros respectively)

Table 7: Brutto Salary 2006

N	Valid	1670
	Missing	0
Mean		1120,2934
Median		937,0000
Mode		769,00
Std. Deviation		656,26074
Percentiles	10	769,0000
	20	818,5000
	30	865,1200
	40	899,6620
	50	937,0000
	60	1000,0000
	70	1075,8200
	80	1247,4040
	90	1550,0000

A new variable is introduced: “differwage= brutto wage 2006-minimum collective agreement wage 2006”, in order to specify wage gap between brutto wage and minimum wage. If the cases where brutto wage is equal to minimum wage are excluded comes an important observation: 900 out of 1670 employees of our sample, almost 54%, earn a salary equal to minimum collective agreement salary. Observing the following table we can detect that mean difference between brutto wage and minimum wage is 435 euros and the standard deviation is 814, 767 euros, as well as means and standard deviations for the rest of independent variables. Our previous observation is justified, differentiation from minimum wage rises significantly for the last two percentiles.

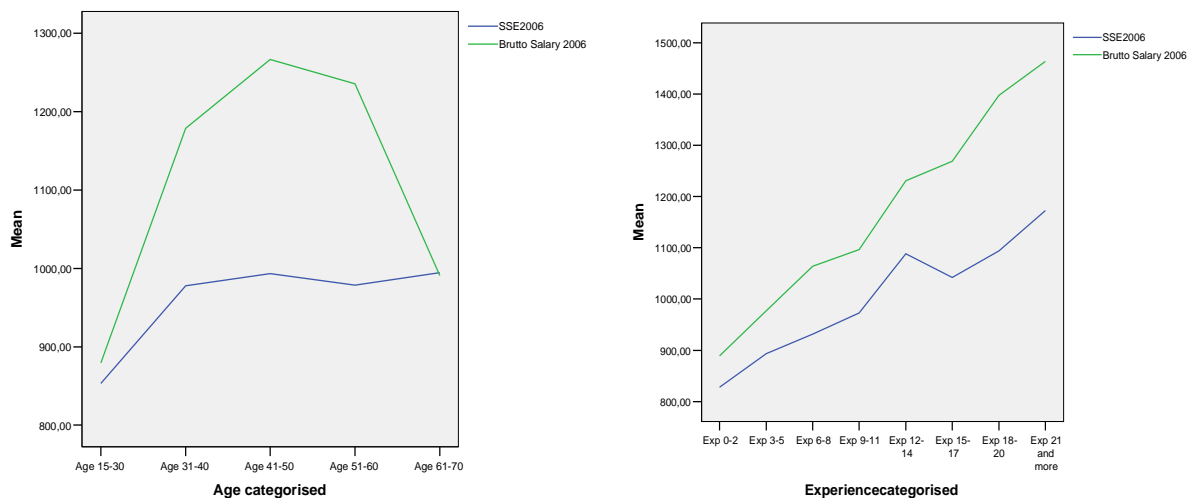
Table 8: Differwage descriptive statistics

	Mean	Std. Deviation	N			
Differwage	435,0482	814,76783	700	Percentiles	Valid	700
Employee gender	1,36	,482	700		Missing	0
Employee nationality	1,04	,272	700		10	11,5000
Marital Status	1,37	,484	700		20	37,3800
Number of children	,69	,920	700		30	55,3420
Job specification	3,83	1,497	700		40	88,1960
Level of education	4,81	1,677	700		50	147,4750
Working Hours	1,43	,838	700		60	225,6920
Company Sector	2,26	,728	700		70	343,8120
Employee age	36,70	8,917	700		80	524,9440
Company Size	50,53	35,195	700		90	1115,4810
Total Experience	8,19	7,369	700			

Age and working experience: As shown below (table 7), when one starts working at the age of 18, salary follows collective agreement minimum wages. Until the age of 30, wage differentiates slightly from minimum wages. This differentiation reaches its peak at the age of 31 until 50. Then brutto wage starts to converge with minimum wages until it equalizes again with minimum wage at the age of 60.

Years of **working experience**, tend to follow a different trend. At the beginning of working carrier, brutto wage is slightly higher from minimum wage. After 12 years of working experience the differentiation starts to rise. It should be mentioned that collective agreements in Greece give a 5% rise at the salary for every 3 or 2 years (depends on the specification) of work experience gained at the same sector.

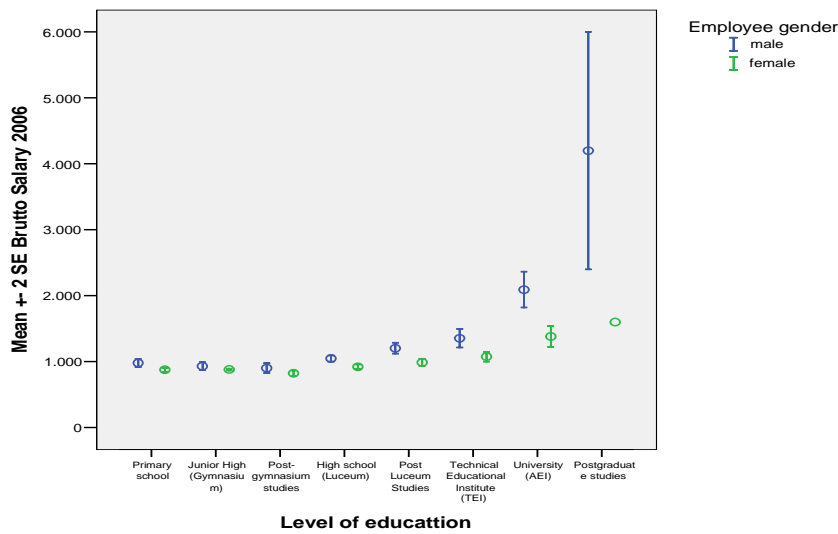
Table 9: Age-experience and brutto wages 2006



Gender and education: Male employees of the sample exhibit higher education rates than women. This difference is more obvious for tertiary educational level. It is also important to mention that **mean male wages** are higher in every educational level. The difference between male and female wages as well as wage dispersion rise significantly after secondary level studies

and they maximize for tertiary education. Greek collective agreements give a rise in wage of 18% for University graduates, and 13% for TEI graduates. In some collective agreements also an increase of 5% is predicted for postgraduate studies.

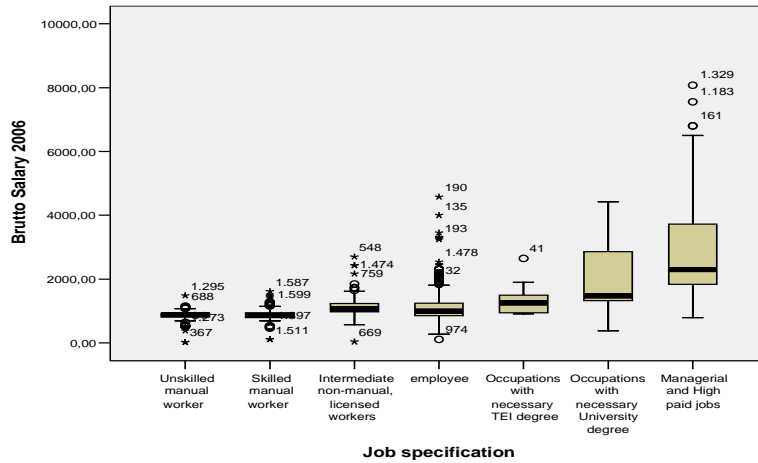
Table 10: Gender-Education and brutto wages 2006



Job specification: Almost half of the sample specification is administrative employees (42,4%) followed by manual workers with a percentage of 39,5% (17,2 unskilled and 22,3 skilled). Employees with a necessary TEI or university degree count for 2,9% (1,8 and 1,1 respectively). Managerial and highly paid jobs employees own a percentage of 7,6%. Women exceed men at the specification of unskilled and skilled worker and administrative employee. The rest of the specifications are dominated by men.

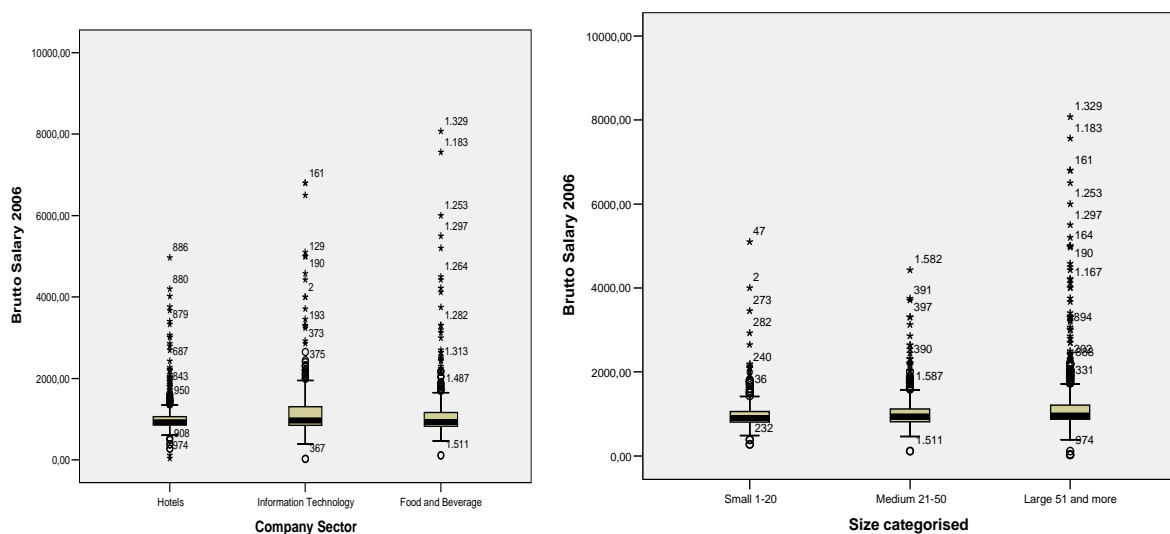
The wage structure and wage dispersion of specification can be observed at the following table. Median wages of centralized 50% of the sample are almost equal for unskilled and skilled manual workers. Median wage of centralized 50% of the sample for intermediate licensed workers are higher than administrative employees. Wage dispersion is more noticeable at the specification of administrative employees, which represents half the sample. Wages and wage dispersion tend to rise and distribution is more asymmetric for the specifications of employees, occupations with necessary TEI and university degree and managerial highly paid jobs. Also asymmetry for the upper 25% is more obvious for managerial jobs as can be seen from boxplot “wheeskers”

Table 11: Job specification and brutto wages 2006



Sector and firm size: Median wages are almost equal for the three examined sectors of our sample. However, wage dispersion and asymmetry is more obvious at the sector of food and beverages (as indicated by outliers). Also asymmetry for the 50% percentile of the sample can be observed for the Information Technology sector. This is linked with the fact that the sector of hotels is a strongly unionised sector, and wages are defined from a single collective agreement. Moreover, most of employees in the sector of hotels are workers. Unionism is not that strong for the sectors of Information Technology and Food and Beverages. It should also be mentioned that wages for food and beverage employees are defined by several agreements and there is a diversity of specifications in both sectors. Wage dispersion and asymmetry is more obvious at **large firms**, which have more outliers than medium and small firms. Median wages for the 50% percentile however, are almost equal for every firm size.

Table 12: Sector-Firm size and brutto wages 2006



3) REGRESSION ANALYSIS

According to the theory of section 1, wage inequality is a function of several variables:

$$Y = F(x_1, x_2, x_3, \dots, x_k)$$

Where Y we use the dependent variable differwage and x_1 to x_k are the following ($k=11$) independent variables: age, gender, education, nationality, working experience, marital status, number of children, specification, working hours, sector, firm size.

Using SPSS we run multiple linear regression analysis with the method “stepwise”. The following table with the variance analysis indicates that our result is statistically significant.

Table 13: Variance and regression analysis

	Sum of Squares	df	Mean Square	F	Sig.
Regression	173167008,279	5	34633401,656	82,497	,000(e)
Residual	292189470,466	696	419812,458		
Total	465356478,745	701			

e Predictors: (Constant), Job specification, Employee age, Employee gender, Marital Status, Company Size
 f Dependent Variable: Differwage

a Dependent Variable: Differwage

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-875,992	218,785		-4,004	0,000		
Job specification	263,969	16,942	0,485	15,581	0,000	0,932	1,073
Employee age	17,932	3,267	0,196	5,489	0,000	0,706	1,417
Employee gender	-155,202	52,512	-0,092	-2,956	0,003	0,936	1,068
Marital Status	-173,001	59,866	-0,103	-2,890	0,004	0,713	1,402
Company Size	1,797	0,707	0,078	2,541	0,011	0,967	1,035

The independent variables that are statistically significant for brutto wage differentiation from minimum wage (differwage) are the following: **job specification, employee age, gender, marital status and company size**. These variables put together, determine the differentiation at the percentage of **36,8%**. It is observable that job specification has the strongest and positive influence on minimum wage differentiation “differwage”. Also employee age and company size have positive impact on wage differentiation. The variables gender and marital status have negative impact on wage differentiation and stronger is the impact of marital status. This means that women have less differentiation from minimum wages than men. The same applies for marital status, where unmarried employees differentiate less from minimum wages than married.

4) CONCLUSIONS

Wage inequalities rose significantly in most developed countries during recent decades. This rise attracted the interest of several researchers, who attempted to indicate the factors that influence wage inequalities. Empirical studies point out a **series of factors**: aspects of globalization (economic dimension, trade and immigration), technological growth, institutional factors (unions, minimum wages, collective bargaining coverage), gender, education, age and experience, firm size.

In order to have an image from **Greek reality**, we used a **sample of 1670 Greek workers**, employed by 60 companies situated in Northern Greece (Thessaloniki) that activate in the fields of hotels, food-beverage and information technology. Dividing our sample in 10 percentiles, it is observable that the 90th percentile receives an average wage of 1550 euros and the 10th percentile receives almost half, 769 euros. The difference between each percentile varies between 50 to 70 euros. This difference rises importantly for the two last percentiles (172 and 202 euros respectively). We also find that a percentage **of 54%** of our sample earns a **salary equal to minimum wage** as defined from collective agreement.

After having applied a multiple linear regression model and tested 11 independent variables (age, gender, education, nationality, working experience, marital status, number of children, specification, working hours, sector, firm size) it is showed that only **five variables** have **statistically significant effects** on the gap between brutto wages and minimum collective agreement wages: job specification, employee age, gender, marital status and firm size. Job specification has the strongest and positive influence on minimum wage differentiation followed by employee age and company size. The variables gender and marital status have negative impact on wage differentiation which means that women and unmarried employees have less differentiation from minimum wages. These five variables put together account for **36,8% of the brutto salary differentiation from minimum collective agreement wages**.

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**London School of Economics and Political Science
European Institute, Hellenic Observatory**

**The 3rd Hellenic Observatory PhD Symposium
Contemporary Greece: Structures, Context and Challenges**

Poverty and Material Deprivation in Greece: Growing Together and Getting Grey?

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Abstract

The present study offers a primer on poverty and material deprivation in Greece. For a number of aspects including financial stress, capacity to afford leisure and social activities, ownership of durable goods and housing conditions, income appears to be a key element in the resources available to the households, being inversely related to the level of deprivation. Moreover, the empirical analysis reveals that many groups that are found to be of high poverty risk, such as elderly persons, individuals with health disabilities, unemployed persons, or persons with low education, appear to be at high deprivation risk as well. This implies that for many vulnerable population groups, (income) poverty risk is associated with (material) deprivation risk. Finally, based on the stochastic dominance technique the present analysis suggests that poverty is grey in colour in Greece, irrespective to the selection of the poverty line.

Keywords: poverty, material deprivation, composite deprivation index, stochastic dominance analysis

Introduction

The present study focuses on the investigation of poverty in Greece, emphasising on the age dimension. Monetary measures are certainly instructive to assess income poverty, but they might not capture fully non-monetary dimensions of well-being (OECD [2006]). Hence, the poverty analysis of the present research is supplemented by non-monetary indicators of the living conditions, based both on respondents' self-assessments of their own conditions and on measures of ownership of consumer goods. In other words, beyond income poverty, the present study deals with the concept of social and material deprivation in Greece, incorporating in the latter aspects such as financial stress, capacity to afford leisure and social activities, ownership of durable goods and housing conditions.

There are a number of reasons that justify the concern to investigate how poverty is associated with age in Greece. First, it is triggered by the empirical results of the existing literature which indicate that poverty is quite prominent among the elderly. For instance, the Greek Report on Pensions Strategy (2002) portraying the central characteristics of poverty in Greece, depicts that "low income is grey in colour". In line with this finding, a number of well-documented poverty studies in Greece argue that old age remains still an important poverty risk factor in Greece. Interestingly enough, poverty studies focusing on the living standards of persons in middle and old age in Europe (see Lyberaki and Tinios [2006] using data from the SHARE survey) indicate that old age poverty and its non-financial dimensions might be more serious than it is currently thought in many European countries.

Secondly, the link of poverty with the age dimension is further prompted by the concern to bring into relief certain aspects of the living conditions of the elderly. Stated otherwise, it is equally important to know not only whether the elderly lag behind younger population groups in terms of income but also whether there are significant hardships in the field of material deprivation. As it is proposed for all the vulnerable groups in the society, strengthening our awareness of the priority needs of the older poor represents a crucial step to tackle subjective feelings as well as other concerns often expressed by these vulnerable groups.

At the same time, the investigation of the relationship between income and deprivation in Greece is justified on our concern to examine whether those classified as financially disadvantaged face also material hardships. Recent studies suggest that Greece is among the countries with the highest levels of overlap between poverty and deprivation in Europe. Guio (2005a) reports that around 60% of the people facing monetary poverty in Greece are also deprived, while Förster (2005) estimates a slightly higher percentage. Taking these estimates as an inspiring starting point, the present analysis aims to make one further step: to examine the influence of an individual's income status on the deprivation level; and to investigate how

deprivation risk varies by sub-groups of the population. Exploring the socio-demographic determinants of deprivation is certainly an instructive task for policy making decisions, since it provides meaningful insights on whether income poverty risk is associated with material deprivation risk for certain population groups.

Using data obtained from EU-SILC [2004] (Survey of Income and Living Conditions) for Greece, some of the key research questions that will be dealt with are:

- How does poverty rate vary across sub-groups of the society? Are there any population-groups facing significant high poverty risk? Which policy recommendations can be justified on the basis of the estimated poverty profile in Greece?
- How much does income status affect material deprivation? How does deprivation vary by socio-demographic characteristics? Are there any population groups being at high risk of poverty and deprivation?
- Is poverty grey in colour in Greece, irrespective of the selection of a poverty line?

The rest of this study proceeds as follows: section 2 provides a brief background of poverty in Greece. Section 3 discusses conceptual and methodological issues related to the poverty analysis. Section 4 presents the empirical findings, commenting on them. The study concludes on Section 5.

2. Brief background of poverty and deprivation in Greece

This section aims to illustrate certain aspects and characteristics of poverty and deprivation in Greece. To serve this purpose, this section reviews a number of recent poverty studies, portraying some of the “stylised facts” of poverty and material deprivation in Greece.

Starting from the poverty risk, using the threshold of 60% of equivalent median income, estimates provided by Eurostat indicate that poverty rate in Greece fluctuates around 20% over the recent past. Guio (2005b) based on EU-SILC (2003) data, reports that Greece is on the group of the countries with the highest poverty rate in EU. Apart from Greece, the group of the countries with the highest poverty rate consists of Slovakia, Ireland (21%) followed by Portugal, Italy and Spain (19%). At the other extreme, the share of population at poverty risk in Finland and Sweden is around 11% and in Denmark, France and Holland (12%). Unquestionably, these figures indicate that Greece’s relative position, with respect to poverty rate, lags significantly behind the better-performing countries in EU.¹

As regards trends over time, Tsakloglou (1990) documents a declining trend in both absolute and relative poverty in Greece over the period 1974-1982. Moreover, based on data of Household Budget Surveys until the mid-1990s, Tsakloglou (1999) notes that in absolute terms, poverty continued to decline during the period 1982-1994 in Greece, however at a slow rate. On the other hand, relative poverty increased between 1982 and 1988, but declined further during the period 1988-1994. Nevertheless, the level of the relative poverty remained rather constant over the period 1995-2003, ranging between 20% and 22%.

Regarding the poverty profile, the National Action Plan for Social Inclusion [2003-2005] reports that poverty is more prominent among the elderly and is more prevalent in rural than in urban areas. At the same time, education is highlighted as the most fundamental factor associated with poverty. Interestingly enough, Panopoulou and Tsakloglou (1998) demonstrate that persons in old age, persons with low educational qualifications and households residing in rural areas are consistently classified as high poverty-risk population groups, irrespective of the welfare indicator, level of the poverty line, or the size of the equivalence scales used in the analysis.

Focusing more on the old age dimension of poverty in Greece, according to the Greek National Strategy Report on Pensions (2005) individuals over 65 years of age face a poverty risk by 28%. Moreover, females aged over 65 years run the risk of poverty by 30%, while the corresponding figure for males is estimated around 25.8%. Lyberaki and Tinios (2005) based

¹ As it is illustrated in the National Plan for Social Inclusion (2003-2005) the poor in Greece, to a far greater extent than in the EU, live in their own home. In particular, taking into account the fact that 70% of those at poverty risk in Greece occupy their own home reduces the level of risk in Greece almost by three percentage points.

on data obtained from SHARE survey (Survey on Health, Ageing and Retirement in Europe) report that the group of persons aged over 65 appears to be at substantially greater poverty risk compared to the group still of working age (50-65) years, documenting that advanced age remains still an important poverty risk factor in Greece.

Finally, focusing on the empirical findings regarding the extent of the overlap between poverty and non-monetary deprivation indicators, Papapodoulos and Tsakoglou (2001a) estimated that 47% and 41% of those classified as deprived in the fields of living conditions and necessities of life, respectively, were also falling below the poverty line. According to the same study, the corresponding figure for those classified as deprived in the field of social relations is 21%. In another study, Papapodoulos and Tsakoglou (2001b) report that the “retired” in Greece represent a risk group that enjoys a considerably lower standard of living, facing high risks of both poverty and non-monetary deprivation than the rest of the population. Definitely, although the overlap between income and material deprivation in Greece seems to be less than full, the empirical findings of the studies mentioned above indicate that there is a remarkable share of income poor that also suffer from material deprivation.

3. Methodology

Next are discussed some methodological issues relevant to the empirical analysis of the present research. In particular, section 3.1 focuses on the issues related to the poverty measurement. Next, section 3.2 deals with the construction of a deprivation index, while section 3.3 emphasises on the issue of making poverty comparisons, describing the stochastic dominance technique.

3.1 Poverty: identification and aggregation

According to Sen (1982) the measurement of poverty can be split into two distinct operations: the identification of the poor and the aggregation of their poverty characteristics into a useable and meaningful measure of poverty.

The first step in the identification of poverty is to choose an indicator of welfare such as income or consumption. Lipton and Ravallion (1995) argue that consumption is often preferred over current income because is believed to be a better indicator of long-term average well-being reflecting the ability to save. However, income has its own advantages: is often a better developed module than consumption in household surveys and is generally used as a measure of welfare in developed countries. The present poverty analysis selects income as monetary indicator of poverty, mainly because it is a well-developed module in the EU-SILC (2004) household survey.

Moreover, when computing poverty measures it has to be taken into account that household size and demographic composition vary across households. A widely-used approach that deals with both size and composition effects is the use of equivalent scales. The equivalence scale used in this application is based on the one defined by Eurostat, which is 1.0 for the head of the household, 0.5 for other adult and children over thirteen years and 0.3 for other children.

Having chosen the equivalent income as measure of well-being at individual level, the next step is to define a poverty line in order to identify the poor. Poverty lines are set either in a relative or in an absolute way and represent thresholds or cut-off points that separate the poor from the non poor. Relative poverty lines, which are also used in the present poverty analysis, are defined in relation to the overall distribution of equivalent income, being usually set at 50% or 60% of the median equivalent income in the country.

Next to the identification of the poor is the problem of aggregation; that is to construct summary measures of the extent of poverty. The present poverty analysis focuses on the Foster-Greer-Thorbecke (1984) class of poverty measures, which is defined as follows:

$$P(\alpha) = \frac{1}{N} \sum_{i=1}^k \left(\frac{z - y_i}{z} \right)^\alpha \quad (1)$$

where y_i is the equivalent income of individual i ; N is the total population; z is the poverty line; k is the number of the poor; and α is the parameter that reflects the degree of aversion to inequality among for poor.

For instance, setting $\alpha=0$, derives the head-count index that corresponds to the fraction of individuals falling below the poverty line. For $\alpha=1$ the poverty gap index is derived, which captures the intensity of the poverty. In other words, it presents the mean aggregate shortfall of the income of the poor from the poverty line. For $\alpha=2$ the squared poverty gap index is obtained, which takes into account the inequality among the poor, capturing the severity of poverty.

Finally, a poverty profile technique is employed in the present research in order to investigate whether certain population groups are at higher risk of poverty than others. According to World Bank (2005) a poverty profile is simply a comprehensive poverty comparison, showing how poverty rate varies across sub-groups of the society. The poverty profile is instructive not only for a better understanding of who the poor are, but also for depicting the differences between poor and non-poor. In this framework, the present research aims to provide a detailed poverty profile looking at the incidence of poverty and the distribution of the poor along socio-economic and demographic characteristics of the population.

3.2 Deprivation index

In measuring material deprivation, the existing literature has provided a variety of typologies based on different measurement approaches. Starting from a broader context, building a multi-dimensional measure of material deprivation requires, first, a selection of a subset of events (items) among those collected through surveys and second, their aggregation into a summary index of the probability that a person experiences deprivation (OECD [2006]). With respect to the former, the selection of the events depends, *inter alia*, on the culture of a community, corresponding to socially perceived necessities. The issues related to the choice of the deprivation events in this application are discussed in more detail in section 4.2. Having identified an appropriate set of events, the aggregation into a composite index is usually based either on a simple count or on a weighted approach.

The simple count approach is based on binary deprivation scores, namely one or zero, capturing whether a person lacks each of the selected events or not. Next, a simple count index is constructed based on the number of events lacked. Townsend (1979) originally

proposed this approach as a measure of deprivation assuming homogeneity in tastes for the member of a community. This simple count approach is quite straightforward and uncomplicated to understand, albeit not free of criticism. In particular, the major shortcoming of the simple count approach is that a not-widely owned event is ranked equally with an event that is perceived as much more important to the society. As a result a single event may exert a disproportionate effect on the overall deprivation measure (Willits [2006]).

The weighted approach assumes that in the aggregation of the deprivation scores into a summary index, each event should be weighted in some way instead of counting equally as in the case of the simple index. One way of weighting events unequally is the prevalence weighting approach, according to which each of the selected events is weighted by the proportion of the individuals not lacking the particular event. The rationale underlying this approach is that assigning higher weights to the events that most people experience, makes the level of deprivation of those who are lacking such events more severe (Willits [2006]; Papadopoulos and Tsakloglou [2001c]). To control for the influence of tastes in consumption behaviour Desai and Shah (1988) introduced a two-stage econometric methodology for the construction of a deprivation index. This two-stage approach has been employed in other studies of relative deprivation (see Delhousse, Lutgens and Perelman [1993] for Belgium) and is going to provide the empirical framework within which to address the present empirical analysis.

Following Desai and Shah (1988) and B. Delhousse et al. (1993) binary dependent variable models² of each event are regressed on a set of exogenous variables capturing socio-demographic characteristics and income classes. The estimation of these probabilities constitutes a crucial aspect in the construction of the index, since it controls for socio-demographic characteristics and taste elements. The outcome of these estimations is presented as adjusted probabilities corresponding for each event and for each individual as a member of a particular group in the society. The distances between individual and community estimated probabilities are then computed and the index of relative deprivation is obtained by a weighted sum as indicated below:

$$D_j = \frac{1}{I} \sum_{i=1}^I \lambda_i \delta_{ij} \quad j=1, \dots, J \quad (2)$$

² In particular a probit model is estimated for every selected even in which the dependent variable equals to one in the case that the individual experiences the event or equals to zero if the individual lacks the even. The set of the explanatory variables remains unchanged in all the regressions.

where i denotes consumption events, δ_{ij} denotes the estimated distance between the individual and the community experience for the i^{th} event, and λ_i denotes the weight given to the i^{th} event within the overall bundle of the experience events. To be more specific, following the approach employed by B. Delhaussse et al. (1993) the distance δ_{ij} can be defined as follows:

$$\widehat{\delta}_{ij} = - (\widehat{\theta}_{ij} - \bar{\theta}_i) \quad (3)$$

where $\bar{\theta}_i$ is the estimated mean probability for the i^{th} event and $\widehat{\theta}_{ij}$ is the estimated probability for individual j to experiment the i^{th} event controlling for socio-economic and demographic characteristics.

3.3 Making comparisons

When comparing poverty measures over time or between groups, it is crucial to test the robustness of the observed changes in poverty indexes (Coudouel et al. [2002]). This is because the robustness of poverty comparisons, as Ravallion [1992] argues, can be compromised by errors in survey data and arbitrariness about both the poverty line and the precise poverty measure. In order to deal with the sensitivity of the ranking of poverty levels (between individuals aged less than 65 years and individuals aged 65 years or more) to the use of different poverty lines, the poverty analysis employed in the present research is based on the stochastic dominance technique.

As Deaton (1997) states, stochastic dominance is about ranking distributions. For instance, consider two income distributions y_1 and y_2 (for two groups A and B respectively) with cumulative distribution functions (CDFs) $F(y_1)$ and $F(y_2)$. These two cumulative distribution functions may also be thought of as the poverty incidence curve for each group, since each point of the curve gives the proportion of the population with income less than the amount on the horizontal axis. If the poverty incidence curve of group A is somewhere below and nowhere above the poverty incidence curve of group B, then poverty is lower for the first group than the second group, independently to the selection of a poverty line. This is called the first order stochastic dominance. If poverty incidence curves cross each other, then some poverty lines are likely to rank the situation differently. In this case, the analysis can be restricted by applying the second order and the third order dominance tests.

Unlikely to the first order dominance test that focuses on the head-count index, second-order stochastic dominance focuses on additive measures such as the poverty gap index and the squared poverty gap index. Second order dominance tests involve comparing the poverty deficit curves, namely the integrals of the cumulative income distribution functions. In this framework, the distribution of group A dominates the distribution of group B if the deficit

curve of the former is somewhere below and nowhere above the deficit curve of the of the latter. Quisumbing et al (2001) provide an application of both first and second-order dominance criteria in their study on the association between poverty and gender.

Finally, the *third-order stochastic dominance* is applied when the poverty deficit curves intersect. To apply the third order dominance test, poverty severity curves are drawn using the squared poverty gap index. In this case, an unequivocal poverty comparison independent to the selection of the poverty line requires that the poverty severity curve is everywhere higher in one of the two situations being compared (Ravallion [1992]).

4. Empirical results

This part of the paper presents the empirical evidence of the present analysis. In particular, section 4.1 provides a detailed poverty profile looking at the incidence of poverty and the distribution of the poor along socio-economic and demographic characteristics of the population. Next, section 4.2 offers a broad assessment of material deprivation and its determinants in Greece. Finally, section 4.3 compares poverty measures for individuals aged less than 65 years and individuals aged 65 years or more, using the stochastic dominance technique as well.

4.1 Poverty Profile

The main objective of this section is to present a detailed profile of poverty in Greece, classifying individuals to certain types of population groups according to age, gender, employment status, education, health, marital status, region and nationality.

For clarification of the computation of the summary statistics shown below, two methodological assumptions are noteworthy. First, equivalent income is adopted as the welfare measure at individual level. As mentioned earlier, income is a better developed module than consumption in EU-SILC (2004), so the choice of income instead of consumption is largely pragmatic. Secondly, the incidence of poverty for each sub-group is estimated and reported according to two relative poverty lines: the base poverty line set at 60% and one set at the 50% of the median equivalent income in the country. Testing the results with both poverty lines allows for checking the sensitivity of poverty comparisons across the sub-groups, offering more valid inferences about population groups that are at high risk of being poor.

Table 1 presents summary statistics on income measures based on a sample of 13990 individuals of the EU-SILC (2004) survey for Greece. As it is reported in the third column, low mean equivalent income is more pronounced for those aged over 75 years, for those who have a compulsory nine-year level of education or less, for those being unemployed, as well as for those who suffer from health disabilities. On the other hand, high mean equivalent income is observed for those who possess university qualification and for those who participate in the labour market. Furthermore, high mean income is also depicted in the case of the households residing in Attica region, which is mostly dominated by urban areas.

Next, attention turns to the fourth and the fifth column of Table 1, which present the poverty incidence for each sub-group according to two poverty lines set at 60% and 50% respectively of the median equivalent income. The poverty line set at 60% of the median equivalent

income, classifies almost one out of five individuals (20.1%) as being poor. According to the poverty line set at 50% of the median equivalent income, the poverty incidence is estimated around 13%.

Starting from the demographic characteristics, age emerges as an important dimension of poverty in Greece. In particular, while poverty incidence is estimated about 17% for individuals aged between 36 and 55 years, it raises steadily (reaching 23.2%) for the persons aged between 55 and 64 years. Moreover, poverty appears to be more acute for the oldest members of the population, with the estimating poverty rate (34.4%) suggesting that one out of three persons aged 75 years or more faces the risk of being poor. Focusing on the gender dimension of poverty in Greece, it becomes evident that females face a higher poverty risk compared to males. It is noteworthy that poverty rate is higher for females than males according both to the poverty line set at 60% and to the one set at 50% of the median equivalent income.

Interestingly enough, the empirical results offer evidence for a strong inverse relationship between poverty and education level. Indeed, the emerging picture is quite straightforward: poverty rate is estimated 28.4% for individuals with compulsory nine-year level of education or less, 14.2% for individuals possessing high school education, and further decreased (5%) for those with university education. Unquestionably, the estimated results highlight the contribution of education to raising income and living standards.

Concerning the regional variation in poverty incidence, Central and Northern Greece display the highest poverty rates 27.3% and 26% respectively. On the other hand, households residing in Aegean islands and Crete, face a lower poverty risk 20%. Finally, Attica region, which consists almost totally by urban areas, has the lowest poverty incidence (11.5%).

Furthermore, participation in the labour market appears as an important determinant of poverty status. In particular, the estimated poverty rates suggest that poverty incidence is much higher than the average for persons being unemployed (29.3%), for retired (26.1%) and for other inactive population groups (25.3%) including students or persons engaged in housing activities. On the other hand, persons participating in the labour market face a considerably lower poverty risk (13.5%).

Overall, the poverty profile presented in this section reveals that poverty in Greece has important demographic and socio-economic dimensions that are in line with the findings of other poverty studies in Greece. On the one hand, poverty rates are quite low among the well educated and among those who participate in the labour market. On the other hand, poverty increases with age and becomes quite acute for the oldest-old. Moreover, poverty risk is also high for those with low education, and for individuals who face health disabilities. It is worth

to note that although most of these dimensions have already been subject to poverty alleviating policies implemented in Greece, they do still remain important determinants of poverty in Greece.

Table 1
Summary statistics on income measures, EU-SILC 2004, sample of 13990 individuals

	Number of Observations	Equivalent income: Mean value	Poverty line: 60% of median	Poverty line: 50% of median
Age				
Age Dummy: 16 – 35 years	4315	10188	17,9%	11,2%
Age Dummy: 36 – 54 years	4473	11034	17,0%	10,9%
Age Dummy: 55 – 64 years	1867	10525	19,6%	13,2%
Age Dummy: 65 – 74 years	1960	9039	23,2%	14,2%
Age Dummy: over 75 years	1375	7764	34,4%	24,0%
Gender				
Male	6716	10377	18,5%	11,7%
Female	7274	9909	21,5%	14,0%
Marital Status				
Single	3523	10348	17,7%	12,4%
Married	8801	10265	19,9%	12,1%
Other marital status	1666	8961	26,0%	18,5%
Nationality				
Foreign-born	971	8768	23,8%	13,3%
Greek-born	13019	10252	19,7%	12,9%
Education				
Compulsory nine year Education or Less	7594	7947	28,4%	18,6%
High School Education	4373	10793	14,2%	8,7%
University Education	2023	15905	5,0%	3,2%
Region				
North Greece Region	4945	8746	26,0%	16,1%
Central Greece Region	3173	8815	27,3%	18,7%
Attica Region	4458	12020	11,5%	7,3%
Aegean Sea Islands and Crete Region	1414	9631	20,1%	13,3%
Health Status				
None Chronic Disease	11178	10586	18,2%	11,6%
Health Disability	2812	8229	27,9%	18,6%
Employment Status				
In Employment (full-time or part-time)	6530	11626	13,5%	8,4%
Unemployed	718	8065	29,3%	20,1%
Retired	3175	9061	26,1%	17,6%
Inactive (housing activities; students etc)	3567	8637	25,3%	16,0%
Total	13990	10169	20,1%	13,0%

Source: EU-SILC 2004, author's estimates

Notes: poverty line 60% of median equivalent income is set at 5280 euro

Poverty line 50% of median equivalent income is set at 4400 euro

4.2 Income status and material deprivation

The purpose of this section is to offer a broad assessment of material deprivation and its determinants in Greece. More specifically, the empirical analysis presented in this section aims to explore certain aspects of deprivation, to identify population groups that are at deprivation risk and to investigate the relationship between income and deprivation in Greece. To serve this purpose, a composite index of deprivation is constructed, on a basis of a number of selected events reported in the EU-SILC (2004) survey, capturing both objective and subjective dimensions of deprivation in Greece.

Thirteen events that serve as indicators of the concept of material and social deprivation have been selected. Starting from the subjective dimensions of deprivation, two events capturing the *financial stress* of the households are described as follows: **(i)** The household hasn't been in arrears on utility bills -electricity, water, gas- in last 12 months, **(ii)** The household hasn't been in arrears on hire purchase installments or other loan payments in last 12 months.

Turning to the objective dimension, these include eight events in relation to the households' capacity to afford basic leisure and to the availability of consumer durables. In particular, the three events that capture *the capacity to afford leisure and social activities* are: **(iii)** Capacity to afford paying for one week annual holiday away from home, **(iv)** Capacity to afford one meal containing meat or fish every two days, **(v)** Capacity to face unexpected financial expenses.

In the same way, the list of the selected *durable goods* includes: **(vi)** Television, **(vii)** Personal Computer, **(viii)** Washing Machine, **(ix)** Car and **(x)** Home-ownership.

Finally, to capture the availability of basic *facilities in the dwelling*, the three events that have been selected are: **(xi)** Heating, **(xii)** Water Closet and **(xiii)** Bathroom.

A primary investigation of the relationship between current income and deprivation is presented in Table 2. In particular, individuals are classified into four income quartiles according to the equivalent disposable income. Hence, in the first (bottom) quartile fall individuals with relatively low incomes, while the fourth quartile (richest) stands for the top of the income distribution. Overall, the observed frequencies appear to differ substantially across income quartiles in many events, indicating that income is a key element in the resources available to the households.

Table 2
Observed frequencies (%) of selected events by income status

<i>Events</i>	<i>1st Quartile (Poorest)</i>	<i>2nd Quartile</i>	<i>3rd Quartile</i>	<i>4th Quartile (Richest)</i>	<i>Total</i>
<i>a. Financial Stress</i>					
the household hasn't been in arrears on utility bills - electricity, water, gas- in last 12 months	60.9	68.1	78.0	90.2	75.0
the household hasn't been in arrears on hire purchase installments or other loan payments in last 12 months	88.8	86.6	87.8	91.6	88.8
<i>b. Objective dimensions of household's well-being</i>					
capacity to afford paying for one week annual holiday away from home	19.8	35.0	58.9	85.3	51.2
capacity to afford one meal containing meat or fish every two days	79.9	89.0	94.8	98.8	91.0
capacity to face unexpected financial expenses	44.0	54.3	66.0	85.9	63.4
Television	97.4	99.3	99.2	99.8	98.9
Personal Computer	17.4	22.8	35.5	58.5	34.4
Washing Machine	89.7	95.3	97.1	99.1	95.5
Car	57.6	66.7	80.5	92.3	75.0
Home-ownership	75.9	75.8	76.1	80.4	77.1
<i>c. Dwelling conditions</i>					
Heating	68.3	78.2	86.6	93.7	82.2
Water-closet	94.4	97.8	98.6	99.5	97.7
Bath-room	90.1	95.5	97.8	99.6	96.0

Source: EU-SILC 2004

Note: Figures refer to the experience of events (ie percentage of individuals not lacking each event).

Focusing, first, on the subjective dimensions of deprivation, on average, 60.9% of the individuals classified into the first income quartile report having been able to pay in time utility bills in the last 12 months, while the corresponding figure for the individuals classified into the top quartile is significantly higher, reaching 90.2%.

Apart from financial stress, considerable variation in the observed frequencies across income quartiles is also depicted in the case of objective indicators of household's well-being. To be specific, 19.8% of the individuals of the first income quartile report being able to afford one week of holiday per year, while the equivalent figure exceeds 85% for those who fall into the top income quartile. In the same way, the percentage of the individuals who report being able to face unexpected financial expenses (85.9%) appears to be almost two times higher compared to the corresponding percentage of those classified into the first income quartile (44%).

On the other hand, the differences across income quartiles in the share of individuals possessing durable goods are less pronounced in most of the selected consumer events. Noteworthy differences, across income quartiles, are mainly depicted in the proportion of people declaring that they do possess a personal computer (17.4% for the first quartile; 58.5% for the fourth quartile) and in percentage of those who own a car (57.6% for the first quartile; 92.3% for the fourth quartile). On the contrary, 75.9% of the individuals who are classified in the first income quartile report home-ownership, which doesn't differ substantially, compared to the corresponding figure for those classified in the top income quartile (80.4%). Finally, turning on the dwelling conditions, 68.3% of individuals of the bottom income quartile report not lacking central heating in the household within which they reside, while the matching estimate for those classified into the top income quartile is 93.7%.

Close to Delhaussé et al (1993) methodology, a probabilistic model is estimated for each of the thirteen selected events, using demographic, socio-economic, as well as income classes as explanatory variables. A deprivation index is then constructed by the weighted sum of the computed distances between individual and community estimated probabilities. The weights are defined as the mean frequencies for each event in the whole society.

The second column of Table 3 presents the mean value of the deprivation index for certain types of population groups classified by age, gender, employment status, education, health, marital status, region and nationality. Generally, positive mean values of the deprivation index indicate high deprivation risk, while a value close to zero corresponds to the norm in the community. Consequently, if a population group exhibits a negative mean value of the deprivation index, this is a sign of low deprivation level among the group.

The classification of the population into sub-groups allows for portraying a consistent picture of the demographic and socio-economic characteristics of persons that are at risk of material deprivation. Starting from the age dimension, the emerging picture suggests that deprivation increasing among the elderly. In particular, the mean value of the deprivation index increases for the higher age categories reaching its highest value for those aged over 75 years. On the basis of these results, it can be argued that deprivation appear to be more prevalent among the elderly, compared to other (younger) age groups.

Concerning the gender dimension, women exhibit, on average, slightly higher mean value of the deprivation index (0.0211) compared to men (0.0095). As regards the marital status, married persons are on average less deprived than singles. On the contrary, persons in other marital status, (such as widows, divorced etc) appear to be especially vulnerable to deprivation.

Table 3
Levels of deprivation and categorical effects by population groups, EU-SILC (2004)

<i>Classes</i>	Mean index value	95% Confidence interval	
<i>Age</i>			
Age Dummy: 16 – 35 years	0.0130	0.0109	0.0151
Age Dummy: 36 - 54 years	-0.0065	-0.0085	-0.0044
Age Dummy: 55 – 64 years	0.0050	0.0020	0.0079
Age Dummy: 65 – 74 years	0.0403	0.0370	0.0436
Age Dummy: over 75 years	0.0822	0.0782	0.0862
<i>Gender</i>			
Male	0.0095	0.0078	0.0112
Female	0.0211	0.0193	0.0229
<i>Marital Status</i>			
Single	0.0186	0.0161	0.0210
Married	0.0026	0.0012	0.0040
Other marital status	0.0785	0.0745	0.0824
<i>Nationality</i>			
Foreign-born	0.0856	0.0809	0.0904
Greek-born	0.0095	0.0083	0.0107
<i>Education</i>			
Compulsory nine year Education or Less	0.0490	0.0475	0.0505
High School Education	-0.0066	-0.0084	-0.0048
University Education	-0.0477	-0.0498	-0.0455
<i>Region</i>			
North Greece Region	0.0170	0.0151	0.0189
Central Greece Region	0.0223	0.0197	0.0250
Attica Region	0.0050	0.0028	0.0071
Aegean Sea Islands and Crete Region	0.0411	0.0367	0.0455
<i>Health Status</i>			
None Chronic Disease	0.0034	0.0022	0.0047
Health Disability	0.0664	0.0636	0.0693
<i>Employment Status</i>			
In Employment (full-time or part-time)	-0.0051	-0.0068	-0.0035
Unemployed	0.0575	0.0525	0.0626
Retired	0.0448	0.0419	0.0477
Inactive (housing activities; students etc)	0.0214	0.0191	0.0237
<i>Income</i>			
Equivalent Income: 1 st quartile	0.0906	0.0887	0.0926
Equivalent Income: 2 nd quartile	0.0430	0.0413	0.0446
Equivalent Income: 3 rd quartile	-0.0026	-0.0040	-0.0013
Equivalent Income: 4 th quartile	-0.0565	-0.0573	-0.0556

Source: EU-SILC 2004, author's estimates

Notes: *f* denotes reference category

Focusing on the ethnicity, it becomes evident that material hardship is on average higher among foreign-born, compared to Greek-born individuals. Turning to the education dimension, the emerging picture portrays that material deprivation is inversely correlated with the level of education. To be specific, persons with low education are more affected, on average, by deprivation in relation to individuals with higher level of education. Moreover, deprivation appears to be substantially diminished among those with university education.

Furthermore, material deprivation appears to be strongly associated with health status, with the estimated results indicating that people who face sickness and disability problems record, on average, higher level of deprivation compared to the rest of the population. With reference to the employment status, those being unemployed experience, on average, higher level of deprivation compared to individuals in any other labour market status. Moreover, the estimated results suggest that participation in the labour market is an important factor preventing deprivation.

As expected, income status is estimated to be inversely related to the level of deprivation. In particular, people who are classified in the first (bottom) income quartile record, on average, higher level of deprivation compared to persons in higher income quartiles. In addition, moving towards higher income quartiles (that stand for higher incomes) the level of deprivation diminishes significantly, becoming remarkably low for those who are classified into the fourth (top) income quartile.

Overall, based on the deprivation analysis presented in this section, a number of inferences can be drawn. First, individuals classified into the bottom income quartile display, on average, lower frequencies in the experience of most of the selected events, compared to those classified into higher income quartiles. Unquestionably, this implies that income appears to be a key element in the resources available to the households. Moreover, the variation of the estimated deprivation index across income quartiles indicates that income status appears to be inversely related to the level of deprivation.

Secondly, with respect to the identification of the population groups that are at deprivation risk, the empirical analysis reveals that individuals aged over 75 years, those being divorced or widowed, those with low education, persons with health disabilities, unemployed persons and those who are classified in the first and in the second income quartile record, on average, high deprivation levels. Making the link to the findings of the poverty profile, it becomes evident that many groups that are found to be of high poverty risk, such as elderly persons, individuals with health disabilities, unemployed persons, or persons with low education, appear to be at high deprivation risk as well. This implies that for many vulnerable population groups, (income) poverty risk is associated with (material) deprivation risk.

4.3 Comparing poverty measures: the age dimension

This section compares poverty measures for individuals aged less than 65 years and individuals aged 65 years or more. In order to deal with the sensitivity of the ranking of poverty levels between these two age-groups to the use of different poverty lines, the poverty analysis presented in this section is further based on the stochastic dominance technique.

Table 4 shows poverty estimates of the FGT group of indicators (headcount, poverty gap and squared poverty gap index) for those aged less than 65 and for those aged 65 years or more, using a wide range of relative poverty lines. Estimates for the headcount index, which show the proportion of people that is counted as poor, indicate that poverty incidence is higher for those aged over 65 years than those aged less than 65 for all the selected poverty lines. For the baseline poverty line set at 60% of the median equivalent income, the poverty rate of those aged more than 65 years (27.8%) exceeds almost by ten percentage points the corresponding figure of those aged less than 64 years (17.9%).

Table 4
FGT class of measures across different poverty lines, by age group

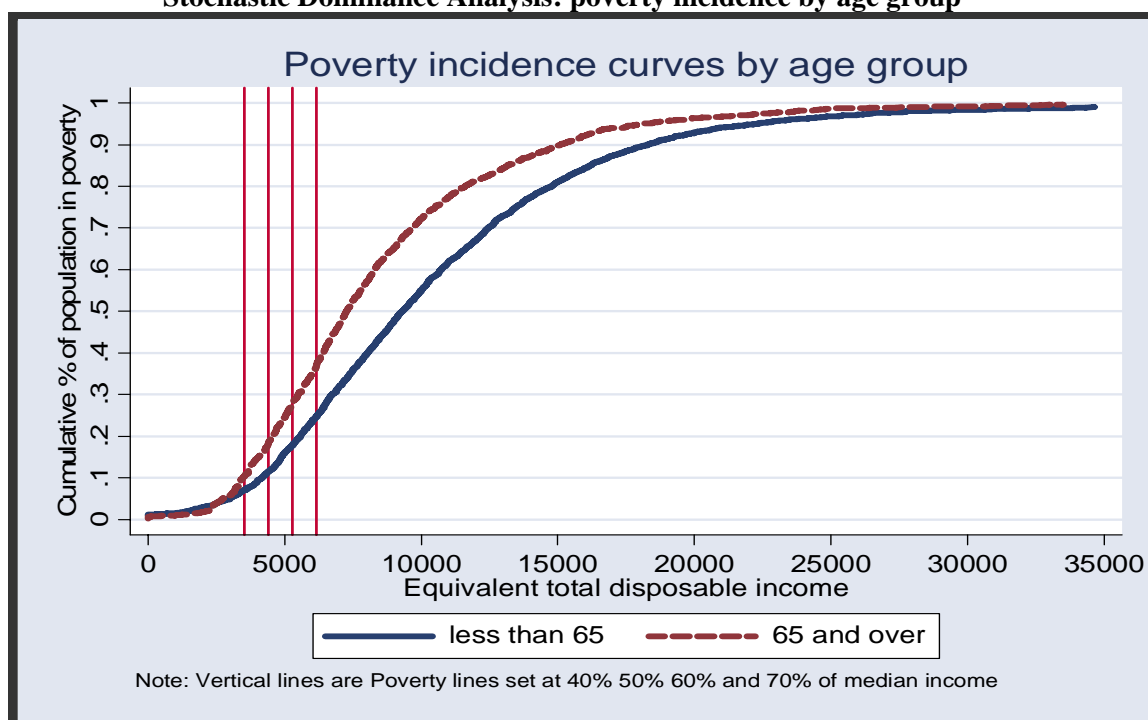
	Poverty lines							
	40% of median		50% of median		60% of median		70% of median	
FGT index	<=64	>=65	<=64	>=65	<=64	>=65	<=64	>=65
Headcount ratio (a=0)	7,1%	10,4%	11,4%	18,3%	17,9%	27,8%	24,8%	36,8%
<i>Standard error</i>	0,0027	0,0057	0,0034	0,0073	0,0042	0,0084	0,0047	0,009
<i>Conf. interval</i>	(0,0656 - 0,0765)	(0,0925 - 0,1151)	(0,1076 - 0,1212)	(0,1682 - 0,1969)	(0,1703 - 0,1868)	(0,2613 - 0,2945)	(0,2382 - 0,2568)	(0,3505 - 0,3862)
Poverty Gap (a=1)	4,9%	3,0%	5,7%	5,3%	7,2%	8,2%	9,2%	11,7%
<i>Standard error</i>	0,0052	0,0028	0,0044	0,0031	0,0039	0,0035	0,0036	0,0039
<i>Conf. interval</i>	(0,0387 - 0,0593)	(0,0247 - 0,0359)	(0,0487 - 0,0660)	(0,0466 - 0,0590)	(0,0644 - 0,0798)	(0,0754 - 0,0894)	(0,0851 - 0,0994)	(0,1088 - 0,1244)
Squared Poverty Gap (a=2)	26,0%	2,2%	18,5%	2,9%	14,8%	4,1%	13,1%	5,7%
<i>Standard error</i>	0,0052	0,0071	0,0566	0,0053	0,0404	0,0044	0,0305	0,0041
<i>Conf. interval</i>	(0,0906 - 0,4283)	(0,0085 - 0,0364)	(0,0739 - 0,2962)	(0,0188 - 0,0397)	(0,0688 - 0,2275)	(0,0322 - 0,0497)	(0,0707 - 0,1906)	(0,0487 - 0,0645)

Source: EU-SILC 2004, author's estimates

Turning to the poverty gap index, which presents the mean aggregate shortfall of the income of the poor from the poverty line, the emerging picture suggests that for relative low poverty lines (corresponding to the 40% or 50% of the median equivalent income), poverty gaps are lower for those aged 65 years or more, compared to the younger group. On the other hand, the reverse becomes evident according to the baseline poverty line (60% of the median) or the relative high poverty line set at the 70% of the median equivalent income. These results reveal that for relative low poverty lines (set at 40% or 50% of the median equivalent income) poverty gaps of the older age-group are lower compared to the younger group. Concerning the severity of poverty, the squared poverty gap index indicates that the inequality among those defined as poor is higher for the younger age group than the group of those aged 65 years or more.

The above analysis made by summary statistics is further confirmed by the stochastic dominance analysis. By plotting the poverty incidence curves, it is possible to check graphically which of the two age-groups shows a higher level of poverty. As already mentioned in a previous section, each point of the poverty incidence curves corresponds to the proportion of the population with income less than the amount given as the horizontal axis. Figure 1 confirms the results obtained by computing the poverty indexes: poverty incidence is unambiguously lower for those aged less than 65, compared to those aged 65 years or more, over a rather relevant range of poverty lines.

Figure 1
Stochastic Dominance Analysis: poverty incidence by age group



Source: EU-SILC 2004, author's estimates

6. Conclusions

Using data obtained from EU-SILC [2004] survey for Greece, the main objective of the present study has been the investigation of poverty in Greece, focusing particularly on the age dimension.

Regarding the poverty profile the emerging picture suggests that many of the dimensions that have already been subject to poverty alleviating policies implemented in Greece, they do still remain important determinants of poverty in Greece: old-age, low education and health disabilities are found to exert significant influence on the poverty risk.

With respect to the identification of the population groups that are at deprivation risk, the empirical analysis reveals that individuals aged over 75 years, those being divorced or widowed, those with low education, persons with health disabilities, unemployed persons and those who are classified in the first and in the second income quartile record, on average, high deprivation levels. In other words, many of the vulnerable population groups face both income poverty and material deprivation risk.

Concerning the poverty comparison between persons aged less than 65 and persons aged 65 years or more, estimates for the headcount index, indicate that poverty incidence is higher for those aged over 65 years than those aged less than 65 over a wide range of poverty lines (ranging from 40% to 70% of the median equivalent income). These summary statistics are further supported by the stochastic dominance analysis.

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