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# **The distributional impact of public education expenditure in the United Kingdom**

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## 1 Introduction

Economic research concerning individual's economic well-being and its distribution across family types has traditionally employed a cash-based concept of resources, typically equivalised household disposable income (Brewer et al., 2004). This income measure accounts both for household private income and its interaction with the tax-benefit system, also adjusting for different family sizes and needs.

However, if what we are interested in is individuals' command over resources, the addition of government cash transfers and the deduction of any income tax and social security contribution are only the first steps towards a more comprehensive well-being measure. The picture that we get about income inequality and poverty, and their dynamic over time and over the life-cycle might be significantly altered once indirect taxation, non-cash transfers and other non-cash incomes deriving from private sources (charities, the household itself) are accounted for.

The analysis performed in this paper concerns non-cash benefits and in particular it focuses on how accounting for public expenditure for education alters the current distribution of individual well being in the United Kingdom. Since 1996, "Education, Education, Education" is claimed to be a priority for the British government.<sup>1</sup> In fact low educational qualification and poor performance at school have been found to be strong predictors of later social exclusion (Hobcraft, 2000). Considering the close link between differential educational outcomes and inequality of future opportunities, and the child poverty target the British government has committed to, improvements in public services such as education are currently seen as essential to the purpose of increasing the life chances of children born in low income households.

Education, as a divisible public good, confers private benefit to recipients. In other words, public education delivers a service that beneficiaries would otherwise need to spend cash resources on and in this respect is regarded as a non-cash government transfer. The government itself might want to use non-cash benefits as further instruments to reach distributional targets (Smeeding et al., 1993). Our analysis will focus on such *immediate* impact of educational transfers on individuals' resources, while the study of the long term effects of educational expenditure on individuals' well being in later life is beyond the scope of the paper. Also social externalities arising from investment in education will be disregarded.

The study of the distributional impact of public education non-cash transfers requires micro-level survey data representative of the UK population, besides national accounts aggregates for current public education expenditure. We use two alternative datasets, Family Expenditure Survey 2000/01 and Family Resources Survey 2003/04<sup>2</sup>, containing information about household

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<sup>1</sup> From Blair's Labour Party Conference 1996 speech.

<sup>2</sup> More detail on the survey data analysis can be found in the Appendix. Family Expenditure Survey 2000/01 is the current Euromod database for the United Kingdom and the Family Resources Survey 2003/04 if the future Euromod database.

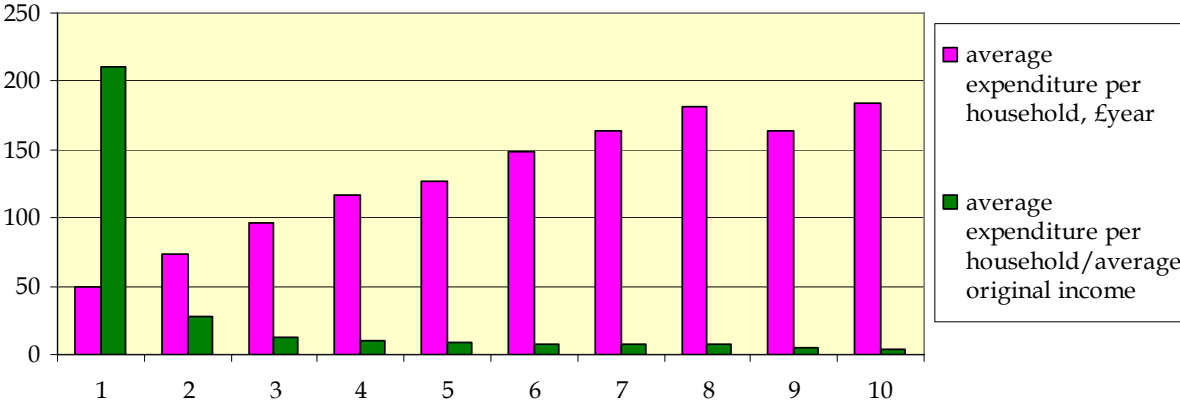
cash income together with information about the number of people receiving public education at different levels.

The rest of the paper is organised as follows: after a brief literature review in section 2, section 3 explains the structure of the current United Kingdom education system and describes the details of public education expenditure, also in international perspective. Section 4 deals with the methodology that has been used to estimate the incidence of education spending on households and some related issues; section 5 presents the results of the distributional analysis and compares them with previous literature findings. Section 6 concludes. Details of the data analysis can be found in the Appendices.

**2 Previous literature and findings**

A comprehensive study concerning the distributional impact of public expenditure and taxation for the UK in 1971 is available in O’Higgins and Ruggles (1981). Using Family Expenditure Survey data and aggregates from the national accounts, they allocated public expenditure for a wide range of divisible and non divisible public goods and services, including education, and direct and indirect taxation to households. They found educational expenditure to be declining in proportional terms as income increased, but to increase in absolute values across income deciles, with absolute spending three times higher in the top decile than in the bottom one; also they found households with four people or more to benefit the most.

**Figure 2.1: The distribution of education public expenditure by original income decile in the UK**



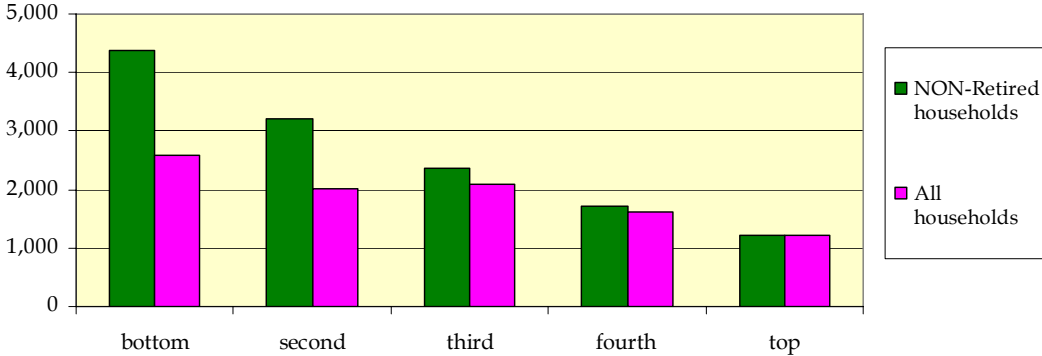
Source: O’Higgins and Ruggles (1981)

Smeeding et al. (1993) used the Luxembourg Income Study database to study the poverty and income distribution impact of some non-cash subsidies including health, education (for primary and secondary levels only) and housing in different countries, including the UK at the beginning of the 1980s. They found strong evidence of an equalizing effect of non-cash transfers,

reinforcing the impact of cash benefits; in particular health and educational expenditures were found to “even out fluctuations in the risk of poverty over the life cycle”. More recently Harding et al., 2006, compare the distributional impact of health, education and housing indirect benefits for the UK and Australia in 2001 and conclude that there is pro-poor effect, even though the effects of such transfers are less progressive than the conventional cash ones. Results for UK are based on ONS (2003) and basically confirm the picture that emerges in Smeeding et al. (1993).

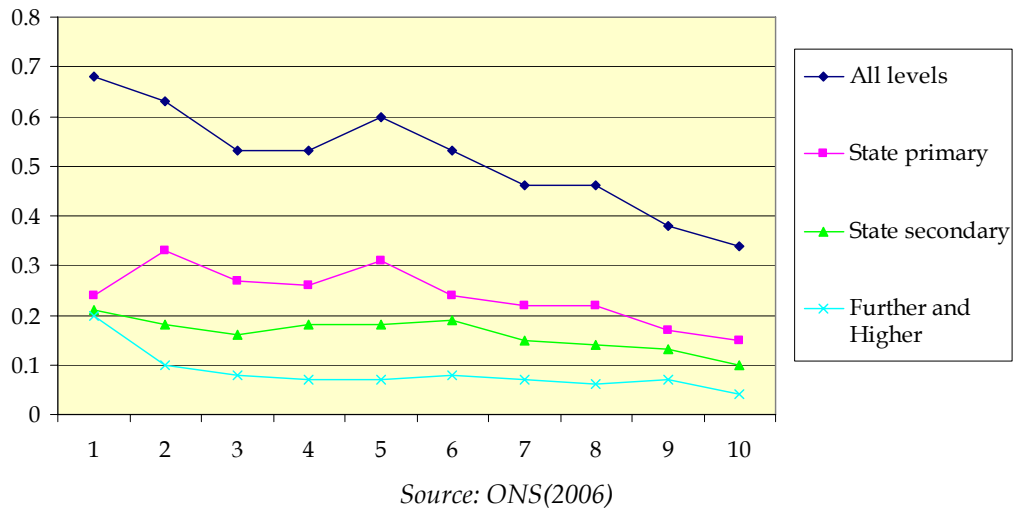
The UK Office for National Statistics has for many years published an annual analysis concerning how taxes and benefits redistribute income between various groups of households in the country, using Family Expenditure Survey data. Cash benefits are again showed to play the largest role (ONS, 2006). In the most recently published report, the absolute amount households receive as an education transfer is found to decrease gradually across income quintiles, as shown in Figure 2.2. The fact that households in the lower quintiles receive the highest subsidy for education is partly explained by the fact that children in higher quintiles are more likely to enrol in independent self maintained schools and also to the concentration of children in the lower end of the income distribution. As Figure 2.3 makes clear, students are not spread evenly throughout the income distribution. The number of people in education is constantly decreasing for all education levels from the bottom to the top decile, with the only exception of the 5<sup>th</sup> decile. Considering each education level separately the decreasing pattern is particularly evident from the fifth decile.

**Figure 2.2: Education non-cash benefit in each equivalent household income quintiles**



Source: ONS(2006)

Figure 2.3: Average number of people in education in household by eq. income decile



### 3 The structure of the UK education system

Education policy responsibility in the United Kingdom is currently shared by different government departments, reflecting the decentralised structure of the country:

- the Department for Education and Skills in England
- the Welsh Assembly Government Department for Training and Education in Wales
- the Scottish executive Education Department and the Scottish Executive Enterprise, Transport and Lifelong Learning Department in Scotland
- the Department of Education and the Department for Employment and Learning in Northern Ireland

Even so, the education system general framework is common across the four countries. Table 3.1 summarizes the structure of the United Kingdom system, listing the main institutions providing education, students' age and whether compulsory, for each education level. Education is organized in primary, secondary, further and higher education. The law requires parents in Great Britain to ensure that children get full-time education from 5 to 16 years old (4 to 16 in Northern Ireland). Alternative education satisfying the Local Education Authority (LEA) requirements must be provided to children not attending school. After compulsory education, students can proceed with further education at school (known as the "Sixth Form") and later at higher education institutions, or enter vocational Further Education colleges.

<b>Table 3.1: The structure of the UK education system</b>		
<b>Primary education</b>		
1. <b>Primary school</b> (from the start of the term after the fifth birthday)	Ages 5-11	Compulsory
<b>Secondary education</b>		
2. <b>Secondary school</b>	Ages 11-16	Compulsory
3a. <b>Sixth Form College</b> (academic)	Age 16-19	Non compulsory
3b. <b>Further Education</b> (vocational)	Ages 16+	Non compulsory
<b>Tertiary education</b>		
4. <b>Higher Education Institutions</b>	Age 19+	Non compulsory

### *Pre-school education*<sup>3</sup>

65 % of three and four year old children in 2004 were enrolled in schools aiming at developing children's key skills before compulsory education starts (ONS, 2005). In England and Scotland three and four years old children are entitled to free part time pre-school education; the same applies to four year old children in Wales<sup>4</sup> and for the year immediately before compulsory primary education in Northern Ireland.

### *Schools*

Most of the pupils in the United Kingdom are provided with free education in publicly funded schools, while only a very small proportion attend independent fee-paying schools. Publicly maintained school can be either community schools (owned and funded by Local Education Authorities), grant maintained schools or voluntary schools such as those connected to particular religious faiths. Table 3.2 reports the number of schools per school type in United Kingdom in 2003/2004.

<b>Type of School</b>	<b>England</b>	<b>Wales</b>	<b>Scotland</b>	<b>Northern Ireland</b>	<b>United Kingdom</b>
State Nursery	463	37	2836	100	3436
State Primary	17,758	1602	2248	911	22519
State Secondary	3,395	227	386	233	4241
Non maintained	2,165	59	117	17	2358
Special Schools	1,131	43	225	47	1446
Pupil referral units	357	29	.	.	386
<b>All schools</b>	<b>25,269</b>	<b>1,997</b>	<b>5,812</b>	<b>1,308</b>	<b>34,386</b>

*Source*<sup>5</sup>: ONS from Department for Education and Skills; National Assembly for Wales; Scottish Executive; Northern Ireland Department of Education.

Primary School lasts until 10 or 11 in England, Wales and Northern Ireland and until 12 in Scotland. In some parts of England, middle schools cover age ranges between 8 and 14, leading to upper secondary school. All maintained secondary schools in Wales and Scotland are "comprehensive", accepting pupils regardless of their ability. Non selective schools also in England covered the 88% of maintained schools pupils in 2004, while in

<sup>3</sup> Pre-school education will not be considered in the following national distributional analysis, as well as "permanent" learning (e.g. work related training).

<sup>4</sup> In 2004 a pilot scheme was implemented to provide pre-school education from three years old.

<sup>5</sup> Websites reported in the References.

Northern Ireland the 41 % of secondary school students attended “grammar” schools selecting prospective pupils on the basis of transfer tests.<sup>6</sup>

Special education schools provide education to “special education needs” children, 1.5 million in 2003/04, experiencing significantly higher difficulty in learning than same age children or disability compromising the use of normal education facilities. The current strategy in England is to integrate them in mainstream schools even though Special Schools will continue to be responsible for children experiencing the most severe needs.

Pupils in England, Wales and Northern Ireland follow their National Curriculum, defined for age groups and split into 4 Key Stages (1 and 2 in primary schools and 3 and 4 in secondary schools) as shown in table 3.3:

<b>Table 3.3: Organization of compulsory school years</b>	
	Pupils age
<b>England and Wales</b>	
Key Stage 1	5-7
Key Stage 2	7-11
Key Stage 3	11-14
Key Stage 4	14-16
<b>Northern Ireland</b>	
Key Stage 1	4/5-8
Key Stage 2	8-11
Key Stage 3	11-14
Key Stage 4	14-16

The curricula state the statutory minimum schools are required to provide, defining what students are entitled to be taught and the expected performance attainment. Schools can add further content to the National Curriculum and decide how to organize the teaching. School management is performed in partnership with LEAs in Great Britain, while boards of governors manage individual schools in Northern Ireland.

#### *Further Education and Higher Education*

Almost three quarters of 16 year olds continued full-time education after compulsory schooling in 2004(ONS, 2005). After Key stage 4, students can stay on at school for academic learning or enrol in Further Education colleges for vocational learning. In England students aged 16-19 in further education are entitled to free education and further financial support schemes<sup>7</sup> are being implemented in all United Kingdom.

<sup>6</sup> Transfer test selection is due to end in 2008.

<sup>7</sup> The “Education Maintenance Allowance” scheme helps students to get more qualifications or vocational skills after 16, with up to £30 a week, which is means tested on parental income.

In Great Britain, approximately the 40% of young people enter higher education: there are 89 universities, besides the colleges of universities of London and Wales, and 60 higher education colleges awarding their own degrees (some approved by a university or national body). Both are legally independent institutions with individual governing bodies.

Students usually spend three or four years at university to obtain the bachelor's degree.<sup>8</sup> Postgraduate study includes both masters degrees lasting one full time equivalent year and research doctorates (PhD) lasting three full time equivalent years. Higher education students need to pay significant tuition fees, even though means tested reductions towards tuition fees and loans and grants towards living costs are available. There exists only one private university, the University of Buckingham not receiving any public funds.

<b>Table 3.4: Students in the United Kingdom</b>						
<b>Schools</b>	2000/01			2003/04		
	<i>(thousands)</i>		%	<i>(thousands)</i>		%
Primary	4413.7		27.08	4796.7		28.43
Secondary	3916.9		24.03	4013.1		23.79
Special	107.7		.066	103.2		0.61
Private	631.8		3.88	695.5		3.90
	<i>Full time</i>	<i>Part time</i>		<i>Full time</i>	<i>Part time</i>	
<b>Further Education</b>	1086.0	3903.4	30.61	1079.8	3770.3	28.75
<b>Higher Education</b>	1311.8	928.9	13.74	1428.7	1017.4	14.50
<i>% overseas</i>	14.58	4.01		16.09%	7.31%	

Source: Education and Training Statistics for the UK, ONS

Table 3.4 presents the total number of United Kingdom students in 2000/01 and 2003/2004 for different education levels and institution types, both in absolute terms and as a proportion of the total number of students in the country. More than half are enrolled in publicly funded primary and secondary schools; students in independent self-maintained schools represent less than the 4%. An even smaller proportion is enrolled in dedicated Special Schools.

For higher levels of education there is a significant number of part-time students, more than 3/4 in the case of further education students. Thousands of overseas students are enrolled in further and higher education; their fees pay the full cost of their courses, while EU students pay the same fees applicable to home students.

<sup>8</sup> Students are required to graduate in a specific number of years.

### **3.1 The United Kingdom in international perspective**

In comparison with other OECD countries, the United Kingdom shows a strong performance in terms of expected years of education, occupying a top position with 20.7 years of education expectancy <sup>9</sup>(OECD, 2006). The average class size at primary level, 24.3, is instead one of the largest but this can be partly explained by longer annual duration of instruction time and comparatively high teacher salaries. The same ratio decreases to 21, below the average OECD level, for secondary education and to 17.8, again above the OECD average of 15.5 for tertiary education. The United Kingdom has also one of the highest entry rates for vocational tertiary education while the relative standing in higher education participation has been observed to decline: the 20% increase in tertiary enrolment from 1995 to 2003 was well below the OECD average of 38%. The below average entry rates performance for higher education seems to clash with the strong labour market and financial incentives in terms of earnings, employment benefits and employment probability for students completing higher education. In terms of earnings, tertiary graduates earn 58% more than secondary education level qualified workers; also, they show lower risk of unemployment and the labour market value of qualifications seems not to be subject to an inflation effect (OECD, 2006). At the same time, higher education students have a low dropout rate pointing out that United Kingdom universities operate efficiently: the 78% of students entering university manage to complete their degree, well above the OECD 70% average.

The reasons behind low enrolment seem to concern more the limited extent of public subsidies for tertiary studies and the insufficient pool of individuals qualified to enter higher education due to the limited progress at the upper secondary level; in other words, low participation rates at 18 and 19 years old might act as a bottleneck for further progress to higher education levels.

### **3.2 Expenditure for education**

In comparison to other OECD countries, the United Kingdom shows a consistent rise in education spending, both in absolute and relative terms. Expenditure for education represented the 6.1% of GDP (against an OECD average of 5.9%) and the 11.9% of public expenditure in 2003.

State schools in England, Wales and generally also in Scotland receive most funding from the Local Education Authorities (LEAs), mainly on the basis of pupils number. Some resources are also allocated to schools directly by the Government. In Northern Ireland schools are funded by five education and library boards maintained by the Northern Ireland Executive.

Further education and higher education public resources are instead mainly provided directly from the government. Government expenditure for higher education is allocated by Higher Education Funding Councils in Great Britain and by the Department for Employment and Learning in Northern

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<sup>9</sup> Education expectancy reflects the years of education a child at the age of five can expect to undertake. It is calculated by adding the net enrolment rates for each single year of age from five onwards.

Ireland. Table 3.5 reports current prices public expenditure<sup>10</sup> for education in 2000/01 and 2003/04 at different levels both in terms of current and capital expenditure. The increase in real expenditure from 2000/01 to 2003/04 is partly explained by teachers pay, the main component (75% at primary and secondary levels) rising over time with general earnings.

Even though the United Kingdom shows one of the lowest public/private funding proportions among OECD countries (85% of total education expenditure was public in 2003, with private spending coming both from households and other private entities), private expenditure seems not to have caused a contraction in the public one. Investment in education is claimed to be one of the current government priorities; additional resources have been invested mainly at the school level where the increase from 1995 to 2003 was 49% (the percentage being only 20% at the higher education level). Investment in education for schools (mainly for the use of new technology) is well above the OECD average, even though at the tertiary level the share of capital expenditure is considerably below the OECD average.

Table 3.6 shows the annual expenditure for full time equivalent student for each level in 2000/01 and 2003/04.

<b>Table 3.5: Education Public Expenditure</b>					
<b>2000/01</b>	<b>Current Spending (£ millions)</b>		<b>Capital Spending<sup>11</sup> (£ millions)</b>		<b>Total Spending (£ millions)</b>
	Central Government	Local Education Authorities	Central Government	Local Education Authorities	
Schools	1,462.6	23,608.1	176.6	1,256.4	26,503.7
Further Education	4,159.1	1,251.4	63.2	31.2	5,504.9
Higher Education	5,799.3	11.5	98.4	-	5,909.20
<b>2003/04</b>					
Schools	1,877.3	29,907.0	163.8	1,950.0	33898.1
Further Education	6,151.6	593.9	269.3	73.8	7088.6
Higher Education	6,954.6	-	317.0	-	6911.6

Source: *Education and Training Statistics for the UK, ONS*

<sup>11</sup> Figures obtained as the last five years average

<sup>10</sup> Figures do not include expenditure for “student support” (in order not to double count them when adding the transfer to household income) and “other educational services”, whose allocation to different education levels is not straightforward.

Spending per student at all levels exceeded<sup>12</sup> the OECD average expenditure in 2003, especially for primary and secondary education; the level of spending is increasing sharply from the primary to the tertiary level<sup>13</sup> (with the only exception of special schools where the higher cost is justified by the particular students needs).

The increase from 1995 to 2003 was 26%, below the OECD average of 33% (this is partly explained by the great increase in the number of students in the United Kingdom).

<b>Table 3.6: Annual average spending per full-time equivalent student<sup>14</sup></b>					
		2000		2003	
		UK	OECD average	UK	OECD average
Primary		2,516	2,843	3,670	3,418
Secondary	and	3,888	3,866	4,572	4,366
Further					
Special <sup>15</sup>		11,860	-	14,050	-
Higher <sup>17</sup>		6,268	6,212	7,442	7,058
Higher	excluding	4,823	-	5,726	5,075
R&D <sup>18</sup>					

*Source: OECD Education at a Glance; ONS, Statistics of Education*

<sup>14</sup> OECD B11 indicator, converted by GDP PPP ; figures exclude public subsidies for student living expenses.

<sup>15</sup> Special schools figure relates to England only but has been used for all the whole UK in further distributional analysis.

<sup>16</sup> Expenditure per pupil in special education is problematic to calculate; in fact expenditure in this category might include support for students in mainstream schools as well as special schools.

<sup>17</sup> Higher education figures include also the amount covered by tuition fees paid by students. These have been subtracted later when imputing the public education transfer for the distributional impact analysis..

<sup>18</sup> Figure for 2000/01 was not available so has been computed as a proportion of total higher education average spending (using the 20003/04 proportion)

<sup>12</sup> Higher unit expenditure does not necessarily imply higher education achievements or higher quality of education services. Higher unit expenditure is influenced by several factors like teacher salaries and pensions, teaching materials and facilities, the number of students, particular policies being implemented to attract teachers or reduce class sizes etc.

<sup>13</sup> The way expenditure is distributed to different services varies across levels: while at the primary and secondary level it is mostly devoted to instructional services, at the tertiary level approximately one third of the expenditure is devoted to Research and Development

### *Education expenditure, deprivation and household income*

There seems to be a relevant gap in attainment between children from disadvantaged backgrounds and their peers at all ages. Expenditure, especially when targeted to the most deprived schools, has been shown to have a positive impact on improving attainment. In this respect, the way central resources are allocated to LEAs and then to schools deserves particular attention. Central allocation of education funding to LEAs takes into account local circumstances and deprivation (usually measured in terms of number of students eligible for free school meals<sup>19</sup>) among other factors. Nevertheless, LEAs have discretion over the distribution of public resources to schools and the current requirement placed on LEAs to allocate resources on the basis of deprivation is quite limited. LEAs have been observed to be less responsive to deprivation issues than other cost pressures; resources are often allocated on an historical basis with the effect that schools with similar levels of deprivation can receive quite different levels of funding. The government is currently committed to take a range of steps in order to achieve a more equitable distribution of deprivation funding to schools (Department for Education and Skills, 2005).

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<sup>19</sup> Eligibility for free school meals depends on household financial resources.

## 4 Data and methodology

The study of the distributional impact of public education non-cash transfers requires micro-level survey data representative of the UK population on the one side, and national accounts aggregates for current public education expenditure on the other.

We use two alternative datasets, Family Expenditure Survey 2000/01 and Family Resources Survey 2003/04 <sup>20</sup>, containing information about household cash income together with information about the number of people receiving public education at different levels. We focus on primary, secondary, special, further and higher education levels. Details of how these education levels are defined is provided in Appendix 2. The two surveys presents several differences with respect to the available information on education. As a consequence, the analysis conducted with each of them has sometimes used a different set of assumption. Also, differences in the results obtained from the two different data sources must be interpreted with caution. For example in FES only the full time student status is observed for post-compulsory education ages and therefore the part time students aged above 16 have not been imputed any public education transfer. FRS data offer a more detailed set of educational categories but on the other hand no distinction is reported between public and private education adult students; therefore they have all been assumed to be public education recipients.

Appendix 3 compares the administrative and the survey total and proportion al number of students in each education level for both FES and FRS. Quite a few differences are observed; we are partly able to explain them considering the way figures from different sources have been built. For example, the lower surveys total number of students in further education in comparison to the administrative figure can be explained considering that long-life learning and other adult courses students are included in the administrative figures but not in the surveys totals. Also, the larger proportion of higher education students in FRS than FES reflects the exclusion of part-timers from FES.

The imputation methodology is based on a “cost of provision” approach, as used in the previous studies. In other words, the educational benefit received by households is made equal to the cost sustained by the government in providing the service, rather than on the utility each household derives by such expenditure. The utility approach would in fact present non trivial difficulties related to the utility measurement. On the other side, using the cost of provision approach, the

*“recipient’s value of non cash income may be overstated in some cases, particularly for those families on low incomes who might well have chosen to spend the monetary value of non-cash subsidies in other areas had these been provided as cash transfers”*

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<sup>20</sup> More detail on the survey data analysis can be found in the Appendix. Family Expenditure Survey 2000/01 is the current Euromod database for the United Kingdom and the Family Resources Survey 2003/04 if the future Euromod database.

as pointed out in Smeeding et al (1993).

Imputation of the education subsidy has been performed assigning to each household with people in public education a transfer whose amount was based on the average UK estimated expenditure per full-time equivalent student in each education level, as provided by OECD<sup>21</sup> and shown in Table 3.6 (R&D expenditure has been excluded for tertiary education students). Only half of the average annual cost per full time equivalent students has been imputed to part time students.

Children attending private education and “drop outs” were not assigned the transfer. Also, the cost sustained by the household itself for the education service, as it happens in the case of university fees, has been accounted for so that only the net amount of the education transfer has been imputed. The amount of undergraduate university fees<sup>22</sup> at the UK or EU students rate<sup>23</sup> has therefore been deducted from the average cost figure.

The analysis of the distributional impact of public education non-cash transfers is performed by comparing the baseline distribution of household disposable income with the distribution of household disposable income once the non-cash transfer received in relation to any student in the household has been accounted for. As households differ in terms of size and composition, it would be misleading to compare household disposable income across very heterogeneous households. Both different needs related to different households composition and economies of scale for larger household sizes can be accounted for using an equivalence scale. We use the OECD modified equivalence scale<sup>24</sup> in order to meaningfully compare income and transfer amounts for households of different size and composition. Distributional analysis then has been performed at the individual’s population level. Also, our analysis will not consider a relevant proportion of post-compulsory education age students, those living in halls of residence. This is due to the available data, as each survey sampling only considers private households. Finally a comparison between 2000/01 and 2003/04 is to be performed keeping in mind the use of two different datasets; therefore different results are likely to reflect both dataset differences besides potential changes over time. Previous studies (Sutherland, Taylor and Gomulka, 2002; Frosztega et al., 2000) have found that households income distributions are significantly different in FRS and FES, with lower FRS than FES average income. All such aspects and methodological choices should be borne in mind when interpreting the distributional impact results as they can potentially have a critical influence.

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<sup>21</sup> Based on national statistics.

<sup>22</sup> £1050 in 2000/01; £1125 in 2003/04.

<sup>23</sup> Overseas students are required to pay fees covering the full amount of the service cost. Beside the consideration that most overseas students live in university accommodation and therefore are not represented in the analysed surveys, we would not be able to identify them as non-British students might be second generation immigrants.

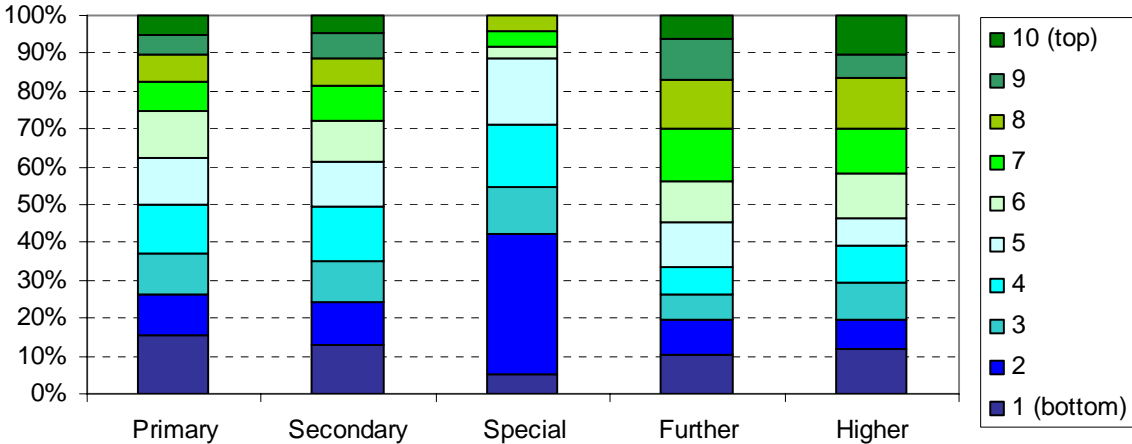
<sup>24</sup> OECD modified equivalence scale assigns value 1 to the first adult in the household, 0.5 to any other adult (aged 14+) and 0.3 to each child (aged less than 14 years old)

**5 Distributional impact of public expenditure for education<sup>25</sup>**

*5.1 Public education beneficiaries*

The distribution of the beneficiaries of public education in 2000/01 and 2003/04 for different education levels across income deciles is represented in Figures 5.1 and 5.2. In both years (and datasets), primary, secondary and special school beneficiaries appear to be more concentrated in the lower and middle deciles, while the share of beneficiaries is constantly decreasing in the top three deciles. Further education and higher education beneficiaries appear to be more evenly distributed across deciles. Even though income share patterns resemble each other in the two years, there appear to be some differences, possibly due to the use of different surveys. In 2000/01 both further and higher education beneficiaries appear mainly concentrated in the 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> deciles, whereas in 2003/04 further education beneficiaries appear more uniformly distributed across deciles. In contrast, the higher education beneficiaries show a marked concentration in the top deciles.

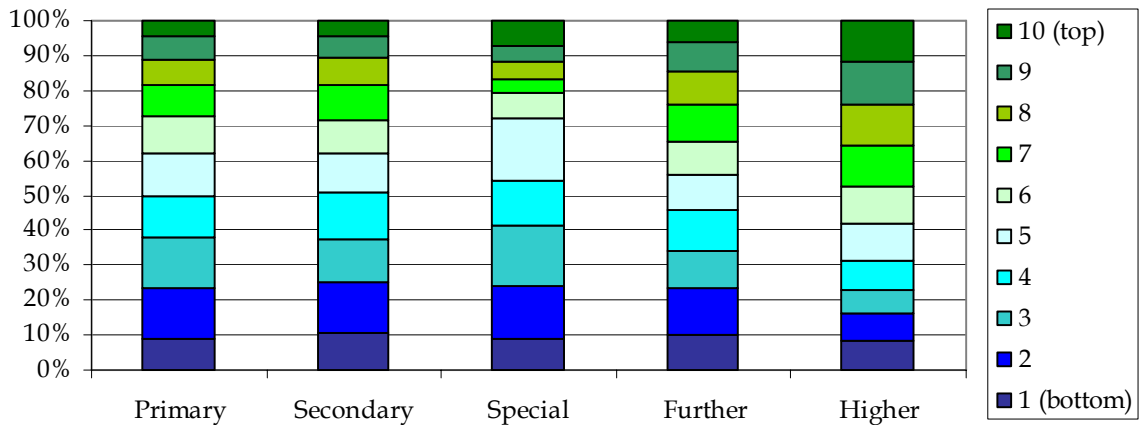
**Figure 5.1: Population shares of beneficiaries**



*Source: our elaboration using FES 2000/01 data*

<sup>25</sup> All the graphs presented in this section are based on the distributional analysis results, reported in tables in the Appendix 1.

**Figure 5.2: Population shares of beneficiaries**

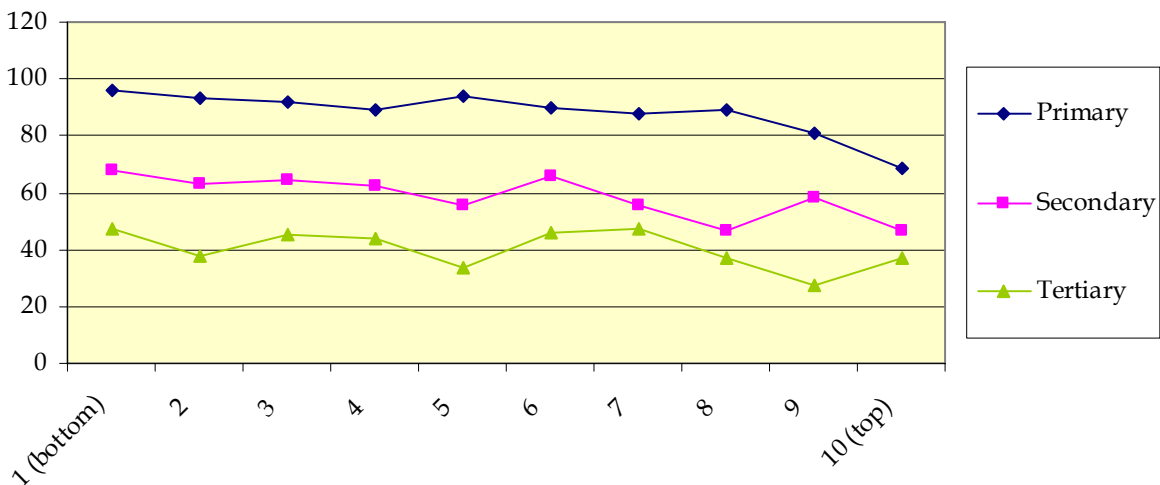


Source: our elaboration using FRS 2003/04 data

Considering all education levels at the same time, beneficiaries appear somewhat concentrated in the bottom and middles of the income distribution.

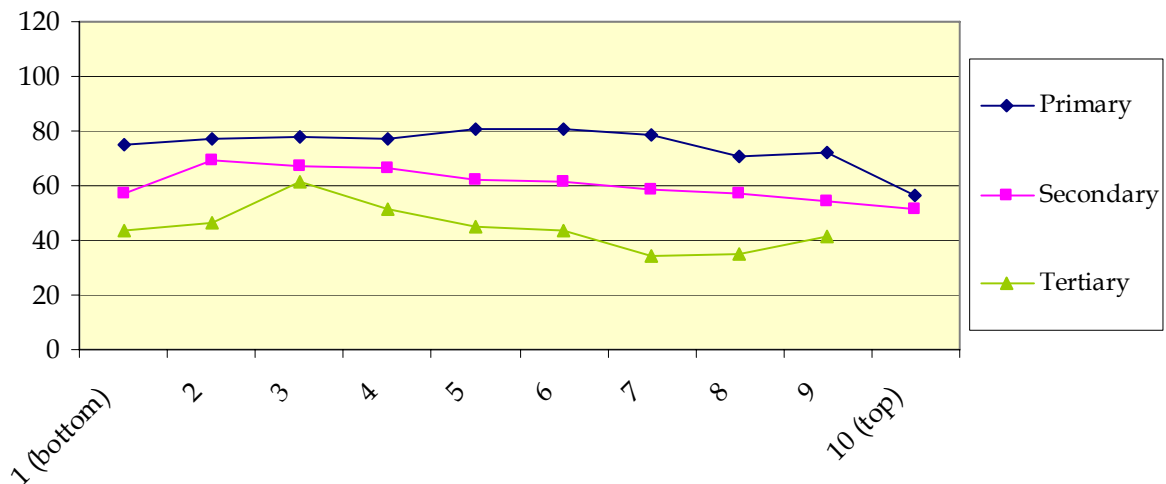
Figures 5.3 and 5.4 show the ratio of actual to potential beneficiaries across income deciles for different education levels. Potential beneficiaries are defined according to age (see Appendix 2 for more detail on this definition). Only primary, secondary and tertiary levels are considered as it not possible to identify potential beneficiaries of special education nor to separate further and higher education potential beneficiaries of tertiary education in our data. As one would expect, participation in public education seems to be gradually decreasing as income rises, especially at the primary and secondary levels; tertiary levels presents a different pattern, sometimes decreasing as income rises but with some exceptions. This kind of pattern can be explained considering that students from higher income families are more likely to attend private schools.

**Figure 5.3: Actual/potential beneficiaries**



Source: our elaboration using FES 2000/01 data

**Figure 5.4: Actual/potential beneficiaries**



*Source: our elaboration using FRS 2003/04 data*

Figures 5.3 and 5.4 also show participation falling from primary to secondary and tertiary levels for all income deciles, reflecting higher drop-out rates after compulsory schooling ends.

### *5.2 Public education transfers, inequality and poverty*

Figure 5.5 shows how the income distribution is altered in terms of income shares if the imputed value of public education subsidies received by households is included in the household income measure. In both the datasets, the income share of the first six deciles is increased, while the opposite happens for the top three deciles, indicating the inequality reducing effect of education expenditure. The increase in income share in the lower deciles appears to happen mainly “at the expense” of the top income decile. While in 2000/01 FES the increase in income share in the first six deciles falls in size as income rises, in 2003/04 FRS the increase in income share is a reverse u shape across deciles, with the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> deciles benefiting the most.

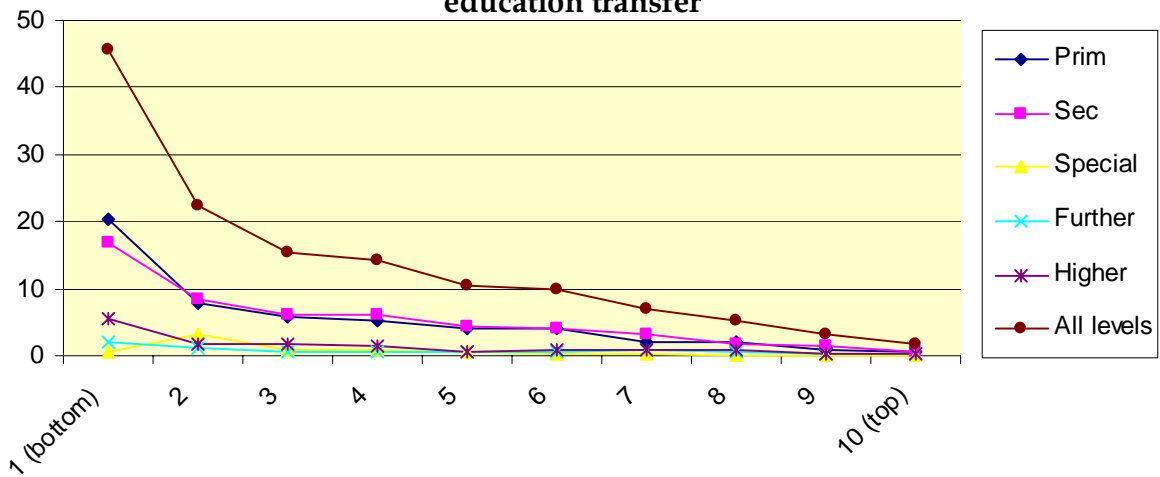
**Figure 5.5: Income share change after education subsidy**



Source: our elaboration using FES2000/01 and FRS 2003/04 data

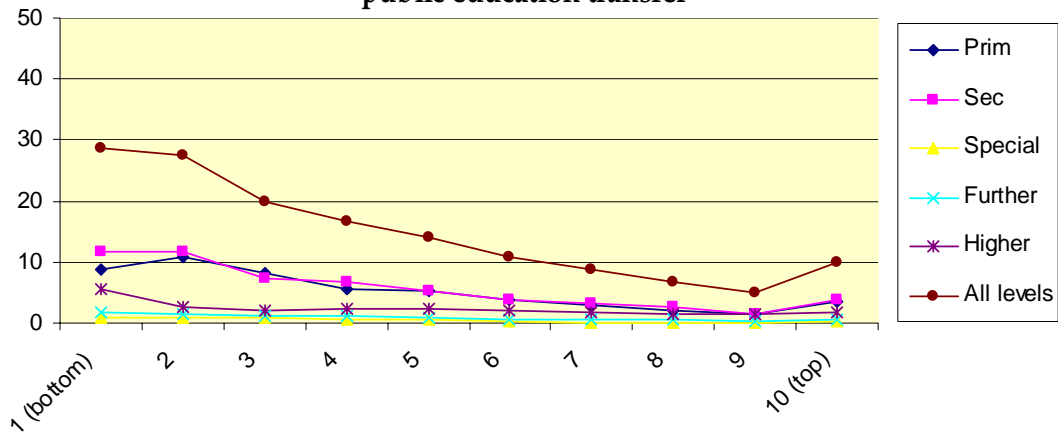
As one would expect, the proportional increase in disposable income at each education level falls sharply across deciles; looking at each education level separately, the decreasing pattern is particularly evident for primary and secondary education (Figures 5.6 and 5.7).

**Figure 5.6: percentage increase in disposable income due to public education transfer**



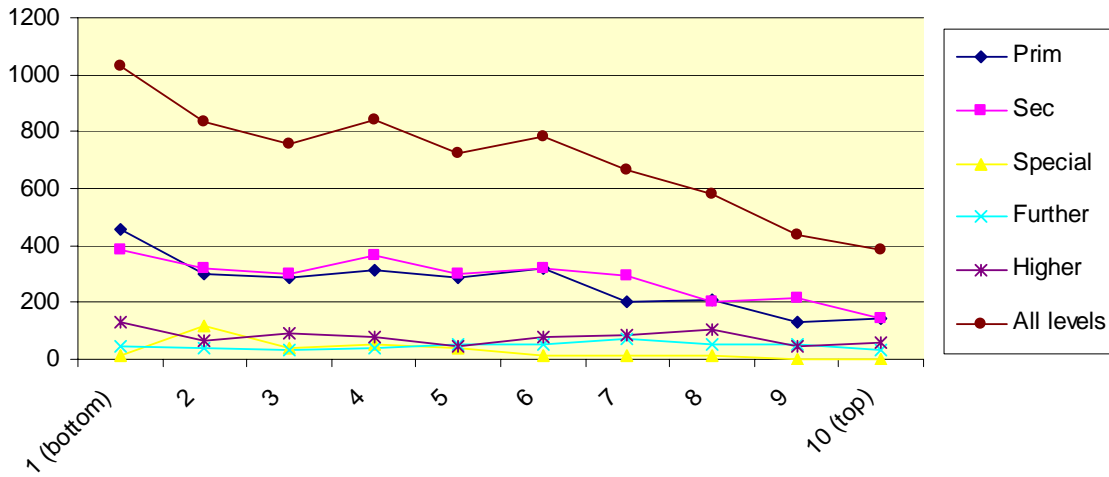
Source: our elaboration using FES 2000/01 data

**Figure 5.7: Percentage increase in disposable income due to public education transfer**



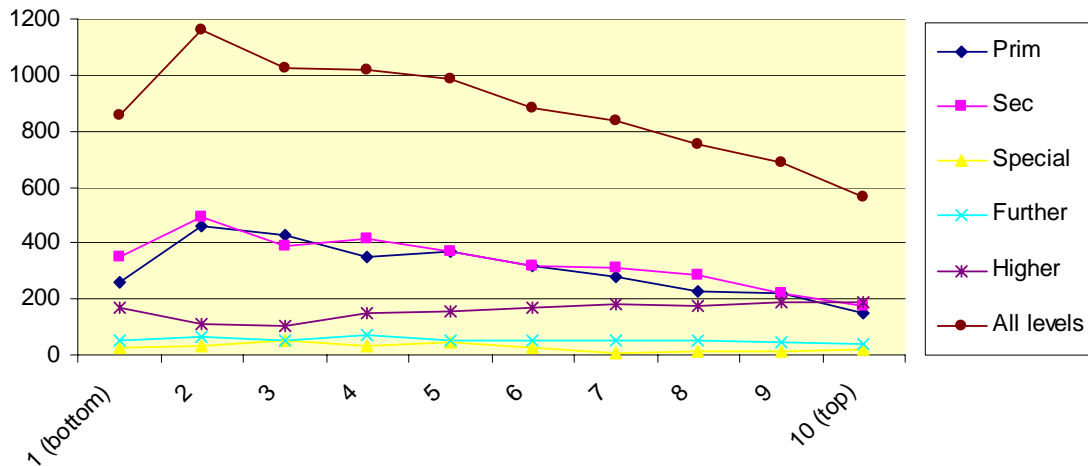
Source: our elaboration using FRS 2003/04 data

**Figure 5.8: Mean transfer per capita**



Source: our elaboration using FES 2000/01 data

**Figure 5.9: Mean transfer per capita**



Source: our elaboration using FRS 2003/04 data

Considering the average education transfer per capita in each education level, primary and secondary education levels seem to receive more on average in all income deciles, reflecting the higher number of people in education at those levels rather than in the higher levels (Figures 5.8 and 5.9).

Poverty and inequality indices for both years, with their relative change after the education transfer are reported in table 5.1:<sup>26</sup>

	Baseline <sup>28</sup>	After all transfers <sup>29</sup>	Percentage change after public transfer by education level					
			All	Primary	Secondary	Special	Further	Higher
<b>2000/01 FES</b>								
Gini	0.338	0.307	-4.4	-4.4	-3.6	-0.4	-0.4	-0.8
Atkinson 0.5	0.097	0.080	-8.4	-8.4	-6.7	-0.7	-0.9	-1.7
Atkinson 1.5	0.289	0.245	-8.2	-8.2	-5.5	-0.3	-1.1	-1.4
FGT0	0.213	0.198	-2.0	-2.0	-3.2	-0.6	0.5	-0.3
FGT1	0.067	0.052	-12.7	-12.7	-8.4	0.06	-0.9	-2.8
FGT2	0.029	0.021	-17.4	-17.4	-10.9	0.8	-1.7	-4.1
<b>2003/04 FRS</b>								
Gini	0.325	0.295	-4.167	-4.1	-4.3	-0.1	-0.6	-0.8
Atkinson 0.5	0.089	0.075	-7.371	-7.3	-7.6	-0.2	-1.1	-1.8
Atkinson 1.5	0.281	0.243	-5.928	-5.9	-5.5	-0.0	-0.6	-2.6
FGT0	0.171	0.160	-4.817	-4.8	-5.6	1.0	-0.8	1.6
FGT1	0.041	0.041	-1.807	-1.8	-4.1	1.3	-0.6	0.2
FGT2	0.017	0.017	-3.360	-3.3	-5.3	1.2	-0.6	-2.2

Source: our calculations using Family Expenditure Survey 2000/01 and Family Resources Survey 2003/4 data

According to both the Gini and the Atkinson indices, inequality is reduced in both years and all education levels after public education subsidies are taken into account in the disposable income definition. The decrease in inequality is particularly striking for primary and secondary schooling.

The inequality reducing impact of the public education transfer is confirmed by looking at the pre-transfer and post-transfer Generalised Lorenz curves shown in Figure 5.10, considering both all education levels and households with students in each level separately. The Generalised Lorenz curve accounts both for the inequality of the income distribution and for the level of the disposable income mean. What emerges clearly is the welfare dominance of the post-transfer disposable income distribution; the decrease in inequality is accompanied by an increase in the disposable income mean. This result is not surprising if we consider that the education expenditure is being

<sup>26</sup> Figures for special school are to be interpreted keeping in mind the small number of students involved. This, and the fact that we let the poverty line change for each education level separately, might explain the quite different pattern of inequality and poverty change observed for this group of students.

<sup>27</sup> All indices have been calculated using population weights. The indices' "percentage change after public transfer by education level" has been computed adding to the baseline distribution the public transfer related to the education level considered only. Each time this was done for a different education level the poverty line has been re-calculated.

<sup>28</sup> Baseline distribution (equivalised disposable income)

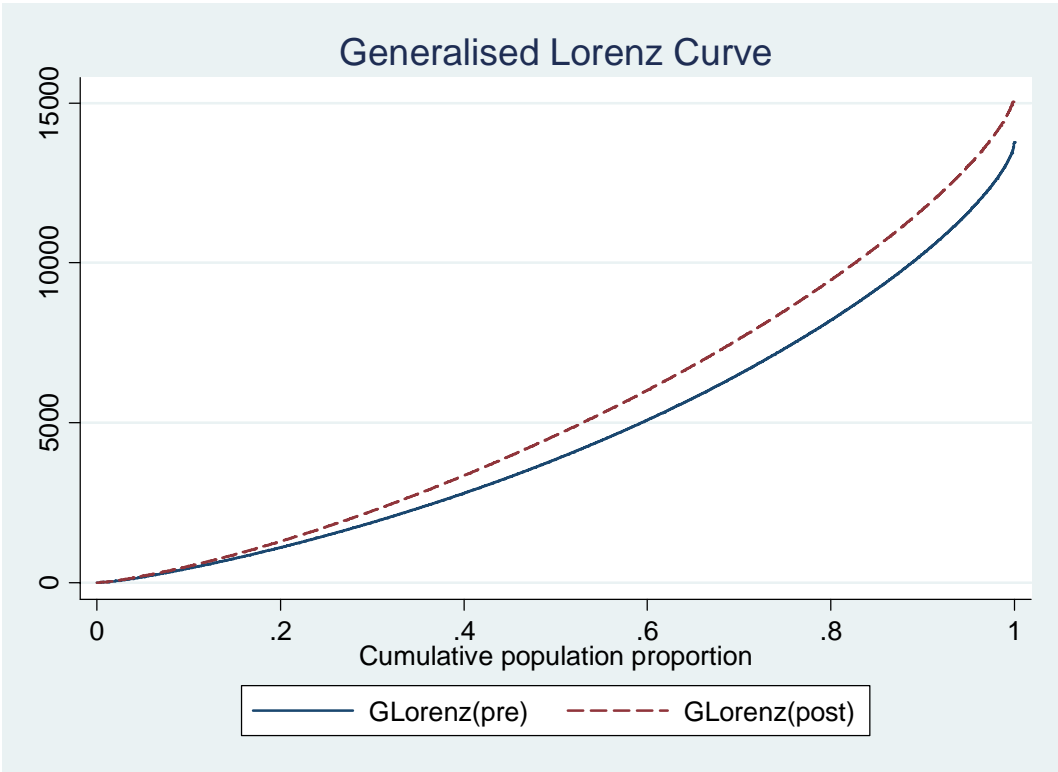
<sup>29</sup> Distribution of equivalised (disposable income + public education transfers)

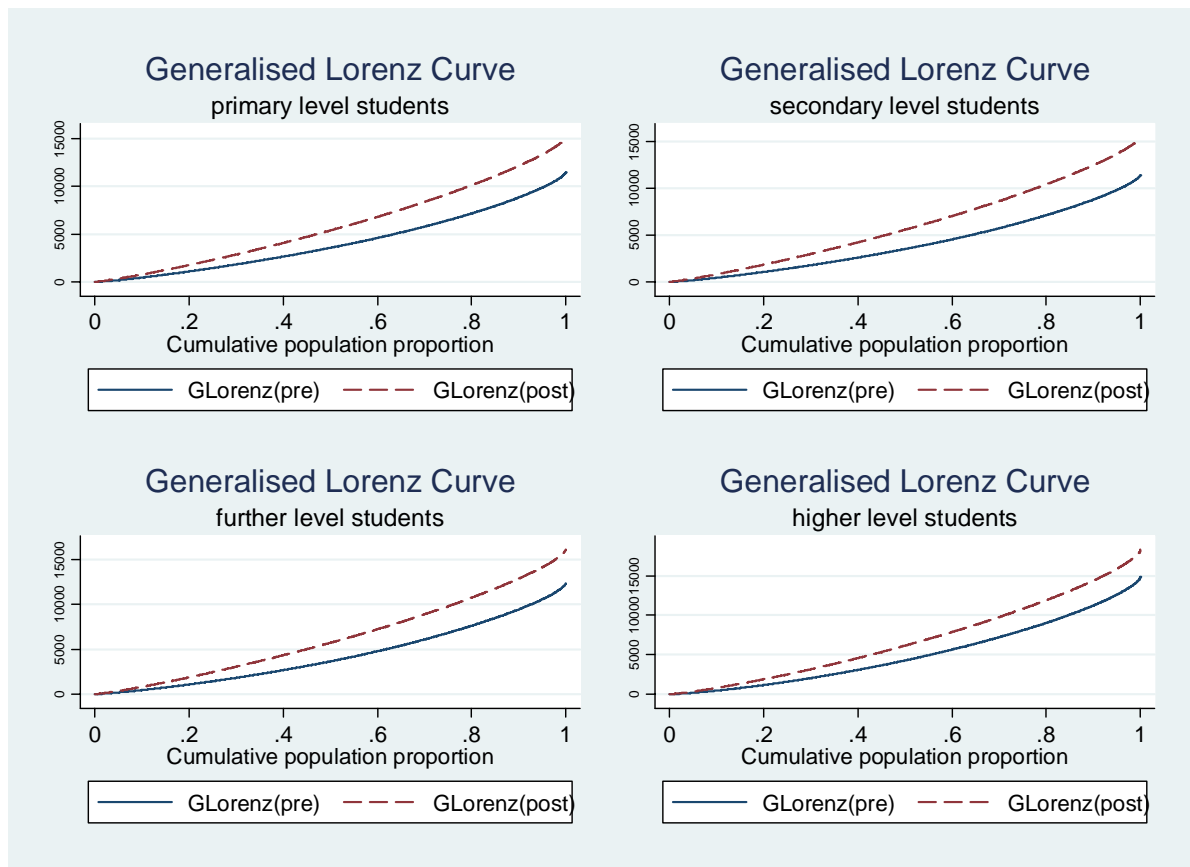
seen in this context as a net transfer from the government to households. In other words, the issue of how this educational expenditure is financed by households through taxation is not dealt with: the pre-transfer household disposable income distribution already accounts for taxes paid and cash benefits received. Nevertheless, what emerges is that accounting for public expenditure for education when analysing household disposable income distribution yields a “welfare-improved” picture in the UK, relative to cash income alone.

For the interpretation of poverty results shown in Table 5.1 it must be borne in mind that the poverty line, defined as the 60% of median income, has been allowed to change once the education transfer has been accounted for, separately for each education level. The headcount ratio FGT0 expressing the proportion of poor households generally falls as a result of adding education, the main decreases happening at the primary and secondary levels, with the only exception of further education in the FES 2000/01 and higher education in the FRS 2003/04.

A similar pattern of general poverty reduction appears in the average normalized poverty gap FGT1 with the only exception of higher education in 2003/04. Finally the average squared normalized poverty gap FGT2, mostly sensitive to large poverty gaps, consistently detects a poverty reducing effect of educational transfers in all education levels.

Figure 5.10

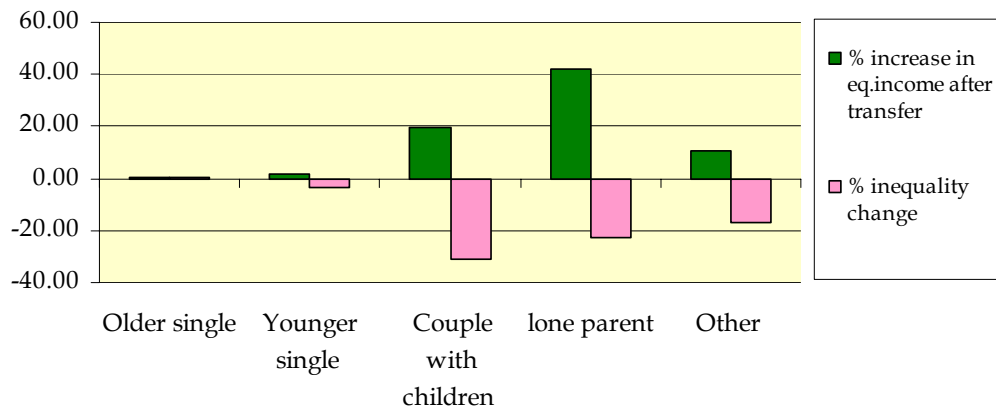




### 5.3 Inequality and poverty across household characteristics.

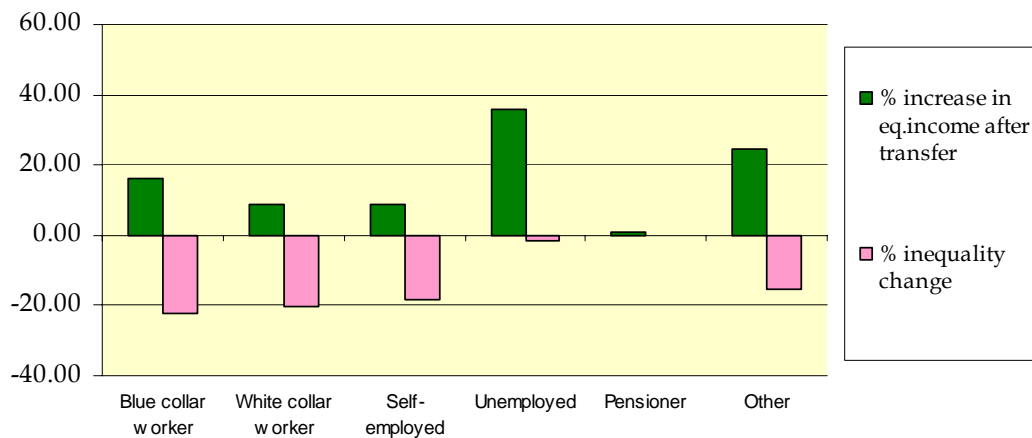
Figures 5.11a-5.11d present the percentage increase in household disposable income and the percentage change in inequality after the education transfer is accounted for, across different groups of households in 2003/04. Groups are defined looking at the household composition type and at the the head of household's socioeconomic status, education and age. As expected, a striking increase in disposable income and a significant reduction in inequality, measured by mean-log deviation, is evident for lone parent households and for couples with children. Considering the head of household's socioeconomic group, the pattern of increase in income across categories seems explained more by the pre-transfer income level, than by the distribution of students across different types, with unemployed head households experiencing the highest proportional income increase. In terms of the education of the head of household education, households where the level of education is low experience the highest income increase (again possibly due to the pre-transfer level of income) while the inequality reduction gets constantly higher for higher levels of education of the head of household. A significant inequality reduction is also experienced by 25-64 years old heads of household, while the highest increase in income is observed for youngest head households (again, probably due to low levels of pre-education transfer income).

**Figure 5.11a: Distributional effect by household types**



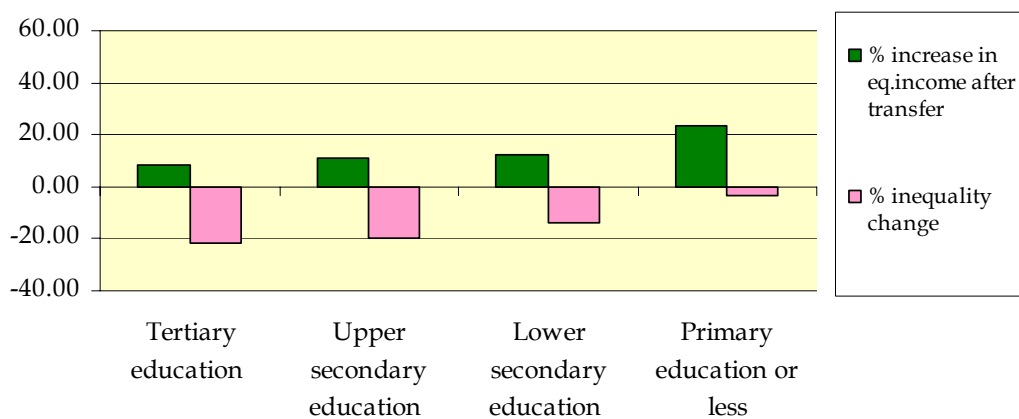
Source: our elaboration using FRS 2003/04 data

**Figure 5.11b: Distributional effect by hoh socio-economic status**



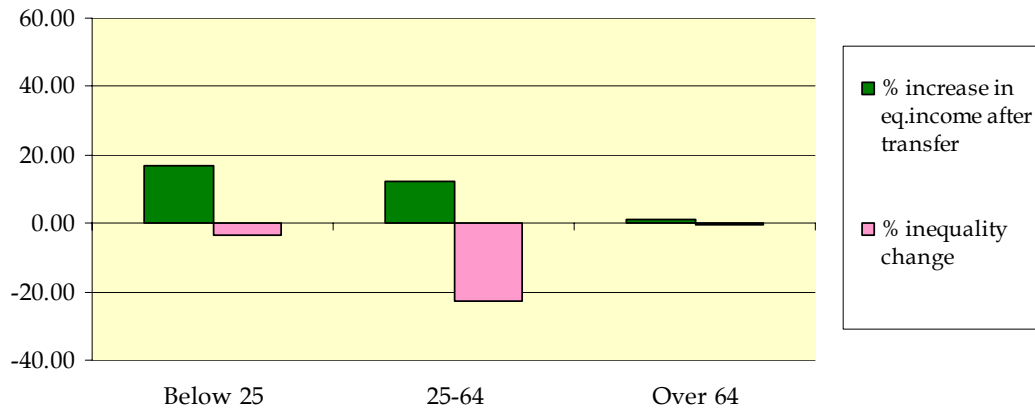
Source: our elaboration using FRS 2003/04 data

**Figure 5.11c: Distributional effect by hoh educational level**



Source: our elaboration using FRS 2003/04 data

**Figure 5.11d: Distributional effect by hoh age**



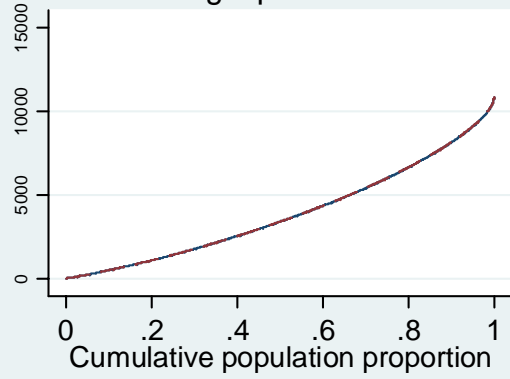
*Source: our elaboration using FRS 2003/04 data*

Within group inequality seems much more relevant than between group inequality in determining the overall inequality level. The percentage contribution to aggregate inequality for different groups does not change much after the public education transfer across head of household socioeconomic groups and educational levels. Quite a reduction in percentage contribution to inequality is instead observed for households types more likely to have children in education like those with heads aged between 25 and 64, and couples with children up to 18 years old.

The Generalised Lorenz curves presented below for the baseline and the post-transfer distributions by household types<sup>30</sup> show a welfare dominance of the post transfer distribution for couples with children, lone parents and “other” households (probably including students living in private accommodation) while the same does not hold for pensioners and single adults.

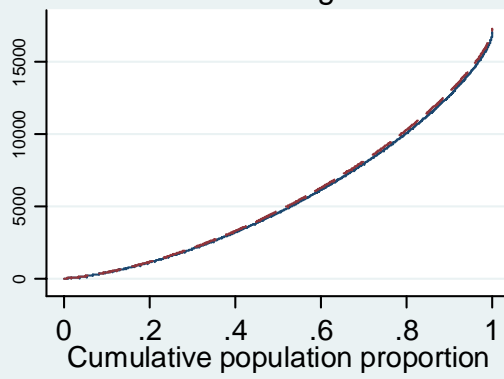
<sup>30</sup> Each curve refers to the distribution for the particular household type displayed in the subtitle only.

Generalised Lorenz Curve  
single pensioner



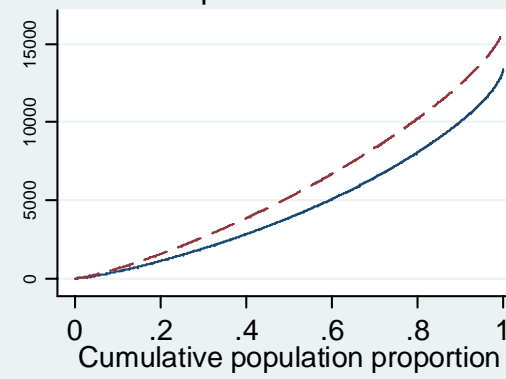
— GLorenz(pre) - - GLorenz(pos)

Generalised Lorenz Curve  
adult single



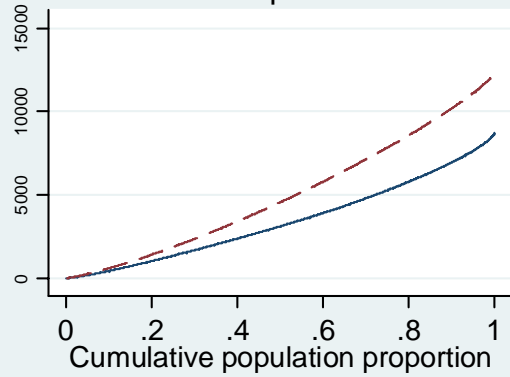
— GLorenz(pre) - - GLorenz(pos)

Generalised Lorenz Curve  
couple with children



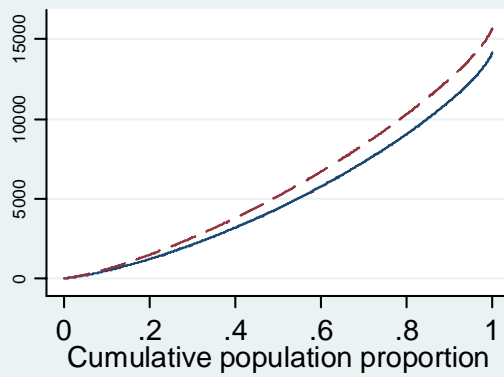
— GLorenz(pre) - - GLorenz(post)

Generalised Lorenz Curve  
lone parent



— GLorenz(pre) - - GLorenz(pos)

Generalised Lorenz Curve  
other

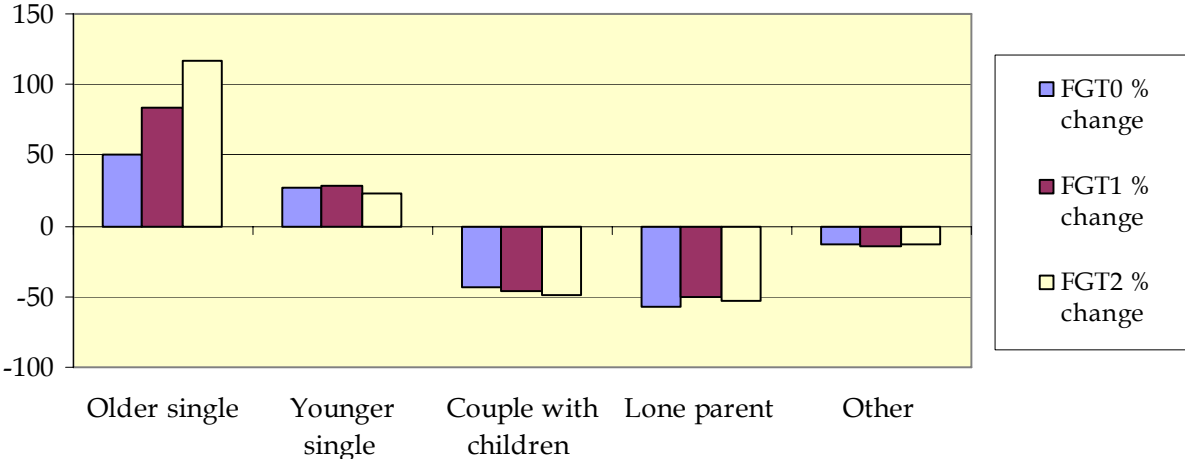


— GLorenz(pre) - - GLorenz(post)

Also poverty reduction (see Figures 5.12a-5.12d) is mainly concentrated in these categories while poverty might instead increase for households unlikely to have any member in education, as pensioners. Poverty reduction is higher for white collar workers and unemployed than the other head of household socio-economic categories. In terms of the education level of the household head, the FGT0 index signals a poverty reduction for “higher”, “upper secondary” and “primary or less” levels, but not for “lower secondary” level both in 2000/01 and in 2003/04. The more poverty adverse FGT1 and FGT2 indices point out mainly a poverty reduction for tertiary, upper secondary and primary head education level.

Again as expected, the relative contribution to aggregate poverty is significantly decreased for “25 to 64 years old head”, lone parent and “couples with children aged less than 19” households.

**Figure 5.12a: Poverty change by household type**



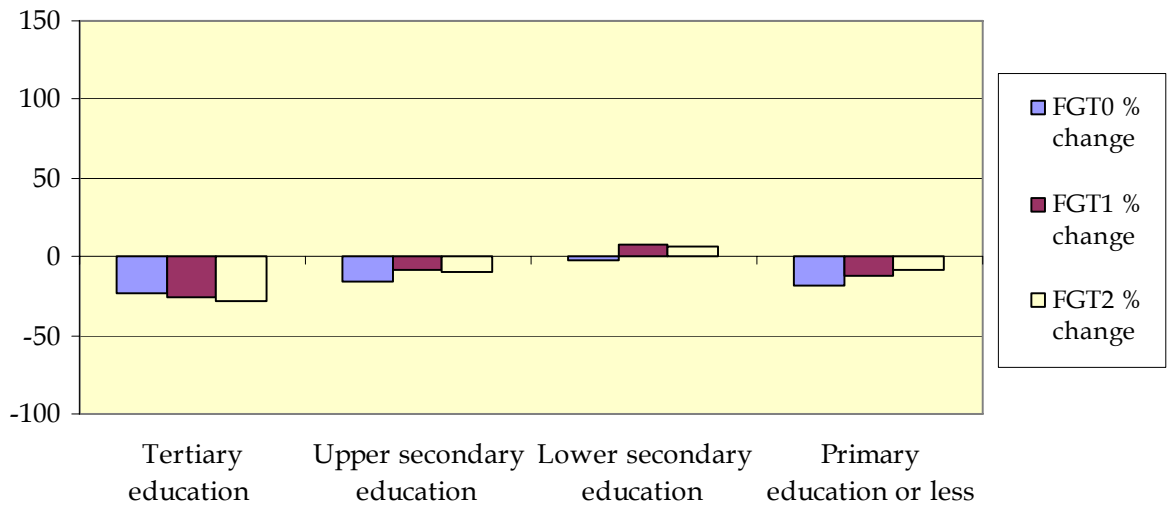
Source: our elaboration using FRS 2003/04 data

**Figure 5.12b: Poverty change by hoh socioeconomic status**



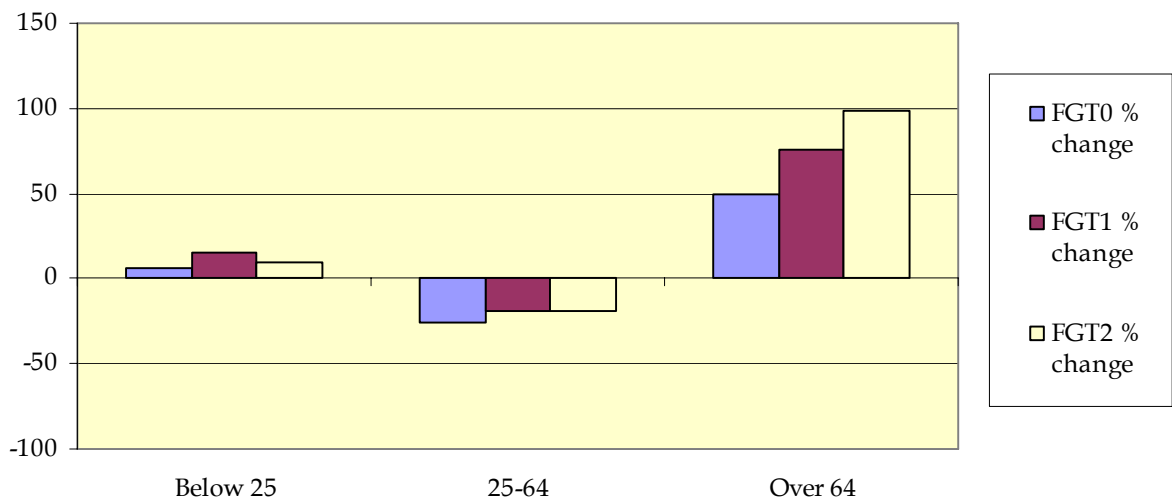
Source: our elaboration using FRS 2003/04 data

**Figure 5.12c: Poverty change by hoh educational level**



Source: our elaboration using FRS 2003/04 data

**Figure 5.12d: Poverty change by hoh age**



Source: our elaboration using FRS 2003/04 data

#### 5.4 Sensitivity analysis

Poverty and inequality indices have also been calculated for alternative scenarios, to investigate the sensitivity of the results to different sets of assumptions.

Since compulsory education transfers might have a different nature than non compulsory education (for example to the extent that compulsory education is seen as a “need” rather than a form of consumption) the analyses have been performed assigning the public education transfer only to students beyond the compulsory schooling age of 16 years old.<sup>31</sup> Inequality and poverty reductions happen to a much

<sup>31</sup> 16 years old has been assumed as the cut-off age even though students might remain in schooling only shortly after their 16 birthday just to complete the GCSE examination. As we do not observe the student date of birth in our data we cannot distinguish such cases.

lower extent in this scenario as no change is observed for primary and special schools and a much lower inequality and poverty reduction at the secondary level.

Another sensitivity analysis concerns the role of tertiary education students living away from their parental home, who might result as “poor” even if coming from middle to high income background.<sup>32</sup> Anyway, looking at the disposable income distribution across deciles for both those living in the parental home and those not living there, this seems not to be the case in our data.<sup>33</sup> In this respect it is very important to note that a relevant proportion<sup>34</sup> of university students having left parental home live in university accommodation, not represented in the analysed surveys. Therefore, our sample of tertiary education students living away from parental home cannot be considered representative of the whole population in tertiary education. The exclusion of tertiary education students living away from parental home brings to smaller poverty and inequality reductions at the higher education level. Nevertheless the proportional change at other educational levels and after public transfer at all levels have been accounted for is not that sensitive to their exclusion.

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<sup>32</sup> Our data do not allow us to identify the socio-economic background of tertiary education students living away from the parental home as no information on the parents socioeconomic status is available.

<sup>33</sup> Our income definition includes also maintenance grants received by parents or relatives.

<sup>34</sup> At the national level it is estimated that approximately half of the higher education institutions students live in shared private households, one quarter occupy university accommodation and most of the remaining students live in the parental home.

## 6 Conclusions

Public expenditure on education in the United Kingdom in 2000 and 2003 has a significant affect on households' command over resources. The amount of public transfer that households receive decreases gradually across income deciles, the consequent percentage increase in disposable income falling sharply. The inequality reducing effect of the education expenditure results also in an income share increase for the first six income deciles. The decrease in inequality seems to be particularly striking as a consequence of primary and secondary schooling transfers. In fact, considering the average education transfer per capita, primary and secondary levels of schooling appear to receive more in all income deciles. These results are clearly related to the distribution of public education beneficiaries across deciles; for all educational levels, the number of students is observed to generally decrease from the bottom to the top decile. This is especially true for primary and secondary education, while the distribution of further and higher education students is more even across income deciles. Also, participation in public education is observed to decrease gradually as income rises especially at the primary and secondary levels.

The proportion of relatively poor people in the population is decreases as well, as a consequence of the educational transfers, with some exception when the higher education levels are considered in isolation.

As expected, both poverty and inequality reductions mainly affect households containing children and especially those more at risk of experiencing economic disadvantage: as lone parents, those where the head has a low level of education or is unemployed. The decrease in both poverty and inequality happens to a lesser extent when the education transfer is imputed to only students in non -compulsory education. The exclusion of tertiary education students living away from parental home does not alter significantly the overall results.

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Welsh Assembly Government website, [www.learning.wales.gov.uk](http://www.learning.wales.gov.uk)

Department of Education (Northern Ireland) website, [www.deni.gov.uk](http://www.deni.gov.uk)

Department for Employment and Learning website, [www.delni.gov.uk](http://www.delni.gov.uk)

## APPENDIX 1 - DISTRIBUTIONAL ANALYSIS TABLES

TABLE C1.a : 2000/2001, Family Expenditure Survey data  
Population ranked according to the baseline distribution of equivalised disposable income

Decile	Population share of beneficiaries <sup>35</sup>						% Potential beneficiaries <sup>36</sup>			
	Primary	Secondary	Special	Further	Higher	All levels	Primary	Secondary	Tertiary	All levels
1	15.35	13.07	5.25	10.34	12.04	13.13	96.07	67.71	47.22	76.54
2	10.90	11.16	36.84	9.31	7.44	9.88	93.11	63.34	37.73	70.27
3	10.85	11.00	12.59	6.56	9.88	10.54	91.94	64.25	44.95	71.34
4	12.78	14.34	16.28	7.54	9.74	11.90	89.08	62.70	43.56	69.86
5	12.66	11.75	17.66	11.59	7.14	11.27	94.24	55.45	33.33	65.49
6	12.19	11.03	3.37	10.85	12.00	11.44	89.51	66.00	45.79	71.98
7	7.92	9.34	3.97	13.71	11.94	9.32	87.85	55.82	47.15	63.11
8	7.22	6.83	4.04	13.14	13.12	9.18	89.28	46.95	36.98	56.88
9	5.06	7.02	-	10.94	6.29	7.04	81.25	58.57	27.5	54.21
10 (top)	5.08	4.46	-	6.02	10.41	6.30	68.90	46.78	36.78	52.38
All	100.0	100.0	100.0	100.0	100.0	100.0	89.91	59.90	40.26	66.81

*Source: our calculations using Family Expenditure Survey 2000/01 data*

<sup>34</sup> It shows how students participating in each education level are distributed across deciles

<sup>35</sup> It shows the ratio of actual students/potential education beneficiaries (further detail about the definition of potential beneficiaries are reported in Appendix 2)

TABLE C1.b , 2003/2004, Family Resources Survey data  
Population ranked according to the baseline distribution of equivalised disposable income

Decile	Population share of beneficiaries						% Potential beneficiaries			
	Primary	Secondary	Special	Further	Higher	All levels	Primary <sup>37</sup>	Secondary	Tertiary	All levels
1	9.03	10.80	9.05	10.18	8.50	9.10	74.92	56.98	45.93	59.91
2	14.28	14.45	14.98	13.01	7.46	11.74	77.48	69.61	43.22	68.63
3	14.40	12.40	17.19	10.73	6.97	11.30	77.93	67.14	46.41	68.74
4	12.05	13.01	12.93	12.02	8.50	11.14	77.16	66.35	61.5	69.64
5	12.41	11.16	17.83	10.01	10.42	11.23	80.94	62.48	51.61	67.38
6	10.28	9.89	7.62	9.15	10.42	10.21	80.38	61.21	44.74	63.98
7	9.27	9.57	3.89	11.10	12.10	10.32	78.71	58.83	43.64	61.11
8	7.19	7.91	4.95	9.37	11.65	9.29	70.67	57.47	34.41	54.36
9	6.57	6.29	4.17	8.32	12.42	8.72	72.25	54.57	34.74	54.16
10(top)	4.51	4.51	7.39	6.10	11.55	6.94	56.52	51.64	41.41	50.51
All	100.0	100.0	100.0	100.0	100.0	100.0	76.06	61.86	44.32	63.11

Source: our calculations using Family Resources Survey 2003/04 data

<sup>36</sup>Discrepancies between the two surveys in the number of primary education beneficiaries are driven by the use of different dataset, reporting different education level classification variables

TABLE C2.a , 2000/2001, Family Expenditure Survey

Decile	Income share		% Increase in disposable income <sup>38</sup>						Mean transfer per capita <sup>39</sup>					
	Baseline <sup>40</sup>	After transfer <sup>41</sup>	Prim	Sec	Special	Further	Higher	All levels	Prim	Sec	Special	Further	Higher	All levels
1	2.53	3.04	20.22	16.90	00.59	02.16	05.62	45.52	457.45	382.35	13.56	48.90	127.27	1029.55
2	4.16	4.72	07.95	08.48	03.14	01.02	01.70	22.3	298.85	318.50	117.97	38.67	64.02	838.03
3	5.53	5.96	05.78	06.13	00.84	00.69	01.87	15.33	285.27	302.22	41.58	34.08	92.61	755.78
4	6.70	7.15	05.33	06.18	00.86	00.64	01.33	14.37	312.96	362.72	50.62	37.93	78.22	842.46
5	7.87	8.23	04.18	04.38	00.54	00.71	00.66	10.50	288.27	301.93	37.74	49.49	45.63	723.08
6	9.18	9.38	04.02	04.07	00.18	00.66	00.97	09.92	318.77	321.99	14.66	52.86	76.95	785.25
7	10.66	10.63	02.13	03.09	00.16	00.75	00.91	07.06	202.53	292.61	15.52	71.24	86.42	668.34
8	12.45	12.24	01.90	01.81	00.14	00.49	00.91	05.26	210.79	200.65	15.89	54.72	101.15	583.21
9	15.20	14.56	00.94	01.52	-	00.35	00.32	03.14	131.44	213.54	-	49.47	45.48	439.95
10	25.71	24.08	00.61	00.59	-	00.15	00.26	01.62	145.90	140.23	-	35.74	61.37	383.25
All	100.0	100.0	03.14	03.34	00.37	00.54	00.91	08.31	270.47	287.84	32.02	47.11	78.65	716.12

Source: our calculations using Family Expenditure Survey 2000/01 data

<sup>37</sup> total transfers / total disposable income (per decile and education level)

<sup>38</sup> total transfers / total number of individuals (per decile and education level); £ per year

<sup>39</sup> Baseline distribution (equivalised disposable income)

<sup>40</sup> Distribution of equivalised (disposable income per capita + public education transfers)

TABLE C2.b , 2003/2004, Family Resources Survey

Decile	Income share		% Increase in disposable income						Mean transfer per capita					
	Baseline	After transfer <sup>42</sup>	Prim	Sec	Special	Further	Higher	All levels	Prim	Sec	Special	Further	Higher	All levels
1	3.03	3.18	8.64	11.82	0.76	1.78	5.64	28.66	257.90	352.54	22.72	53.10	168.42	854.69
2	4.73	5.06	10.79	11.65	0.75	1.60	2.56	27.36	457.34	493.66	31.80	67.87	108.73	1159.40
3	5.69	6.22	8.26	7.44	1.02	1.05	2.02	19.80	428.84	386.15	52.95	54.89	105.02	1027.87
4	6.63	7.25	5.67	6.81	0.56	1.15	2.39	16.60	348.14	418.23	34.38	71.07	147.03	1018.86
5	7.70	8.24	5.19	5.19	0.62	0.76	2.21	13.98	366.89	366.76	44.08	54.11	156.16	988.02
6	8.93	9.27	3.87	3.87	0.30	0.66	2.01	10.72	319.46	319.39	24.87	54.97	165.97	884.67
7	10.42	10.53	2.88	3.25	0.08	0.56	1.88	8.67	277.72	313.30	8.45	53.99	181.00	834.48
8	12.26	12.08	2.00	2.51	0.09	0.48	1.53	6.63	226.92	284.15	11.19	54.64	174.14	751.06
9	15.08	14.48	1.58	1.56	0.08	0.33	1.32	4.89	223.34	220.36	11.40	47.11	185.92	688.14
10	25.52	23.69	3.48	3.78	0.29	0.62	1.74	9.93	147.40	172.64	16.88	38.84	187.56	563.34
All	100.00	100.00	0.20	.23	.61	.15	.08	.18	311.70	338.83	26.58	55.54	156.28	888.95

Source: our calculations using Family Resources Survey 2003/04 data

Table E1.a 2000/01: inequality by household characteristics

Characteristic of household or household head	Pop share	Mean equivalent income			Inequality			%contribution to aggregate inequality	
		Relative to national mean			GE(0)			After educational transfer	
		Baseline	After educational transfer	%increase	Baseline	After educational transfer	%increase	Baseline	After educational transfer
Household type									
Older single persons or couples (at least one 65+)	14.46	0.75	0.69	0.01	0.16	0.16	0.03	11.21	13.78
Younger single persons or couples (none 65+)	25.07	1.24	1.15	0.67	0.21	0.21	-2.46	26.20	31.38
Couple with children up to 18 (no other HH members)	33.82	0.99	1.06	16.08	0.19	0.13	-31.29	31.70	26.75
Mono-parental household	6.44	0.55	0.70	38.36	0.20	0.12	-36.53	6.15	4.80
Other household types	20.20	1.04	1.04	8.35	0.15	0.12	-20.76	14.40	14.02
<i>% Within groups inequality</i>					0.18	0.15	-17.62	0.00	0.00
<i>% Between groups inequality</i>					0.02	0.02	-26.86	0.00	0.00
Socioeconomic group of HH head									
Blue collar worker	26.23	0.85	0.88	12.18	0.12	0.08	-28.29	15.11	13.31
White collar worker	32.72	1.36	1.34	7.15	0.13	0.10	-20.56	21.11	20.59
Self-employed	10.15	1.27	1.27	8.25	0.29	0.22	-23.32	14.47	13.62
Unemployed	0.13	0.35	0.52	61.06	0.08	0.04	-49.91	0.05	0.03
Pensioner	16.48	0.72	0.66	0.42	0.13	0.13	-0.81	10.72	13.06
Other	14.29	0.58	0.64	20.05	0.20	0.14	-29.54	14.25	12.33
<i>% Within groups inequality</i>					0.15	0.12	-21.54	0.00	0.00
<i>% Between groups inequality</i>					0.05	0.05	-9.33	0.00	0.00
Educational level of HH head									
Tertiary education	18.35	1.48	1.44	5.77	0.18	0.15	-16.00	16.39	16.91
Upper secondary education	17.53	1.12	1.12	9.07	0.20	0.15	-23.38	16.92	15.92
Lower secondary education	63.34	0.83	0.84	9.78	0.17	0.14	-18.81	52.22	52.07
Primary education or less	0.78	0.58	0.79	46.45	0.19	0.13	-30.00	0.72	0.62
<i>% Within groups inequality</i>					0.18	0.14	-19.26	0.00	0.00
<i>% Between groups inequality</i>					0.03	0.02	-14.18	0.00	0.00
Age of HH member									
Below 25	3.16	0.68	0.73	16.55	0.23	0.16	-27.66	3.49	3.10
25-64	79.93	1.06	1.07	9.75	0.20	0.15	-24.07	79.63	74.26
Over 64	16.92	0.76	0.70	0.54	0.15	0.14	-1.22	12.10	14.68
<i>% Within groups inequality</i>					0.19	0.15	-21.29	0.00	0.00
<i>% Between groups inequality</i>					0.01	0.01	35.69	0.00	0.00
ALL	100	1.00	1.00	8.72	0.20	0.17	-18.57	100.00	100.00

Source: our calculations using Family Expenditure Survey 2000/1 data

Table E1.b FRS 2003/04 : inequality by household characteristics

Characteristic of household or household head	Pop share	Mean equivalent income			Inequality			%contribution to aggregate inequality	
		Relative to national mean			GE(0)			After educational transfer	
		Baseline	After educational transfer	%increase	Baseline	After educational transfer	%increase	Baseline	After educational transfer
Household type									
Older single persons or couples (at least one 65+)	14.52	0.79	0.71	0.31	0.14	0.14	0.53	10.62	12.79
Younger single persons or couples (none 65+)	25.59	1.24	1.14	1.65	0.23	0.22	-3.44	31.85	36.83
Couple with children up to 18 (no other HH members)	31.57	0.97	1.05	19.49	0.18	0.12	-30.80	29.75	24.66
Mono-parental household	7.52	0.63	0.81	41.98	0.09	0.07	-23.00	3.44	3.17
Other household types	20.80	1.03	1.03	10.85	0.14	0.11	-16.73	15.11	15.07
<i>% Within groups inequality</i>					0.17	0.14	-14.89		0.00
<i>% Between groups inequality</i>					0.02	0.01	-32.36		0.00
Socioeconomic group of HH head									
Blue collar worker	25.81	0.82	0.86	15.96	0.11	0.09	-22.51	15.58	14.46
White collar worker	34.63	1.31	1.28	8.92	0.16	0.13	-20.42	29.64	28.25
Self-employed	8.09	1.34	1.32	8.81	0.25	0.21	-18.56	12.64	12.33
Unemployed	4.19	0.51	0.63	35.76	0.13	0.13	-1.68	0.84	0.99
Pensioner	7.26	0.75	0.69	0.95	0.11	0.11	-0.22	9.39	11.23
Other	12.74	0.64	0.72	24.60	0.14	0.12	-15.45	9.42	9.53
<i>% Within groups inequality</i>					0.14	0.12	-17.28		0.00
<i>% Between groups inequality</i>					0.04	0.04	-13.83		0.00
Educational level of HH head									
Tertiary education	21.67	1.39	1.36	8.56	0.22	0.18	-21.40	26.03	24.50
Upper secondary education	17.71	1.09	1.09	10.97	0.17	0.14	-19.59	16.02	15.42
Lower secondary education	60.46	0.84	0.85	12.15	0.14	0.12	-13.80	45.29	46.76
Primary education or less	0.15	0.71	0.79	23.42	0.31	0.30	-3.36	0.25	0.29
<i>% Within groups inequality</i>			0.00		0.16	0.14	-17.09		0.00
<i>% Between groups inequality</i>					0.02	0.02	-12.40		0.00
Age of HH member									
Below 25	3.89	0.78	0.83	16.70	0.15	0.15	-3.36	3.17	3.67
25-64	79.3	1.05	1.07	12.22	0.19	0.15	-22.57	82.18	76.21
Over 64	16.8	0.79	0.72	0.92	0.12	0.12	-0.29	11.20	13.37
<i>% Within groups inequality</i>					0.18	0.14	-19.35		0.00
<i>% Between groups inequality</i>					0.01	0.01	63.08		0.00
ALL	100	1	1	10.86	0.19	0.16	-16.51	100.00	100.00

Source: our calculations using Family Resources Survey 2003/4 data

Table E2.a

## 2000/01, poverty by household characteristics

Characteristic of household or household head	Pop share	FGTO			%contribution to aggregate poverty			FGT1			%contribution to aggregate poverty			FGT2			%contribution to aggregate poverty	
		Baseline	After educational transfer	% change	Baseline	After educational transfer	% change	Baseline	After educational transfer	% change	Baseline	After educational transfer	% change	Baseline	After educational transfer	% change	Baseline	After educational transfer
Household type																		
Older single persons or couples (at least one 65+)	14.46	0.357	0.460	28.922	0.242	0.336	0.086	0.122	41.722	0.186	0.338	0.028	0.044	56.828	0.139	0.307		
Younger single persons or couples (none 65+)	25.07	0.142	0.170	19.844	0.167	0.216	0.051	0.059	17.208	0.189	0.284	0.025	0.030	19.582	0.214	0.359		
Couple with children up to 18 (no other HH members)	33.82	0.180	0.120	-33.254	0.285	0.205	0.057	0.025	-55.595	0.286	0.163	0.026	0.009	-66.239	0.299	0.142		
Mono-parental household	6.44	0.586	0.387	-33.954	0.177	0.126	0.233	0.098	-58.000	0.224	0.121	0.108	0.036	-66.904	0.238	0.111		
Other household types	20.20	0.136	0.116	-14.424	0.128	0.118	0.038	0.025	-34.910	0.114	0.095	0.016	0.008	-47.571	0.110	0.081		
Socioeconomic group of HH head																		
Blue collar worker	26.23	0.172	0.133	-22.557	0.212	0.176	0.053	0.034	-34.685	0.207	0.173	0.024	0.015	-38.516	0.216	0.186		
White collar worker	32.72	0.041	0.037	-10.511	0.063	0.061	0.013	0.008	-37.604	0.065	0.052	0.006	0.003	-45.238	0.071	0.054		
Self-employed	10.15	0.147	0.122	-17.220	0.070	0.062	0.050	0.027	-46.316	0.076	0.052	0.026	0.010	-61.782	0.089	0.048		
Unemployed	0.13	0.700	0.560	-20.056	0.004	0.004	0.353	0.103	-70.896	0.007	0.003	0.178	0.042	-76.669	0.008	0.003		
Pensioner	16.48	0.358	0.453	26.625	0.277	0.377	0.086	0.120	39.302	0.212	0.378	0.028	0.043	54.283	0.156	0.339		
Other	14.29	0.558	0.444	-20.471	0.374	0.320	0.203	0.125	-38.266	0.433	0.342	0.094	0.054	-42.808	0.460	0.370		
Educational level of HH head																		
Tertiary education	18.35	0.077	0.072	-6.328	0.067	0.067	0.027	0.019	-28.929	0.075	0.068	0.013	0.008	-36.302	0.083	0.075		
Upper secondary education	17.53	0.163	0.120	-25.973	0.134	0.107	0.051	0.031	-39.440	0.135	0.105	0.024	0.013	-45.984	0.141	0.107		
Lower secondary education	63.34	0.263	0.255	-3.014	0.782	0.816	0.081	0.067	-17.242	0.769	0.814	0.035	0.026	-23.841	0.750	0.802		
Primary education or less	0.78	0.482	0.273	-43.302	0.018	0.011	0.185	0.089	-52.225	0.022	0.013	0.096	0.042	-56.287	0.026	0.016		
Age of HH member																		
Below 25	3.16	0.433	0.350	-19.093	0.064	0.056	0.177	0.120	-32.026	0.083	0.073	0.090	0.058	-35.439	0.098	0.089		
25-64	79.93	0.178	0.143	-19.541	0.666	0.576	0.060	0.037	-38.077	0.713	0.565	0.027	0.015	-44.246	0.753	0.590		
Over 64	16.92	0.340	0.431	26.793	0.270	0.368	0.081	0.112	38.960	0.204	0.363	0.026	0.039	53.124	0.149	0.322		
ALL	100	0.213	0.198	-7.015	1.000	1.000	0.067	0.052	-21.873	1.000	1.000	0.029	0.021	-28.841	1.000	1.000		

Source: our calculations using Family Expenditure Survey 2000/01 data

Table E2.b

## 2003/04, poverty by household characteristics

Characteristic of household or household head Household type	Pop share	FGTO After educational transfer			%contribution to aggregate poverty After educational transfer			FGT1 After educational transfer			%contribution to aggregate poverty After educational transfer			FGT2 After educational transfer			%contribution to aggregate poverty After educational transfer	
		Baseline	After educational transfer	% change	Baseline	After educational transfer	% change	Baseline	After educational transfer	% change	Baseline	After educational transfer	% change	Baseline	After educational transfer	% change	Baseline	After educational transfer
Older single persons or couples (at least one 65+)	14.52	0.250	0.376	50.416	0.212	0.341	0.045	0.082	83.270	0.159	0.293	0.012	0.025	117.173	0.097	0.218		
Younger single persons or couples (none 65+)	25.59	0.140	0.177	26.760	0.208	0.283	0.044	0.056	28.026	0.275	0.354	0.022	0.028	22.816	0.333	0.423		
Couple with children up to 18 (no other HH members)	31.57	0.155	0.087	-43.454	0.285	0.172	0.039	0.021	-46.629	0.302	0.162	0.018	0.009	-49.013	0.324	0.171		
Mono-parental household	7.52	0.338	0.143	-57.575	0.148	0.067	0.055	0.027	-50.482	0.101	0.050	0.019	0.009	-52.728	0.081	0.039		
Other household types	20.80	0.121	0.106	-12.578	0.147	0.138	0.032	0.028	-14.335	0.163	0.141	0.014	0.012	-13.236	0.166	0.149		
Socioeconomic group of HH head																		
Blue collar worker	25.81	0.160	0.131	-17.716	0.240	0.211	0.042	0.035	-16.006	0.265	0.224	0.019	0.016	-16.528	0.287	0.248		
White collar worker	34.63	0.063	0.054	-14.640	0.127	0.116	0.021	0.017	-18.051	0.176	0.145	0.012	0.009	-18.891	0.232	0.194		
Self-employed	8.09	0.100	0.088	-12.327	0.054	0.051	0.028	0.022	-21.045	0.063	0.050	0.013	0.009	-29.163	0.070	0.052		
Unemployed	4.19	0.592	0.365	-38.404	0.041	0.027	0.137	0.118	-14.415	0.040	0.034	0.060	0.054	-10.326	0.041	0.038		
Pensioner	7.26	0.245	0.363	48.221	0.233	0.370	0.046	0.080	74.360	0.182	0.319	0.013	0.025	97.762	0.118	0.242		
Other	12.74	0.410	0.284	-30.809	0.305	0.225	0.088	0.073	-17.432	0.274	0.228	0.034	0.030	-13.210	0.252	0.226		
Educational level of HH head																		
Tertiary education	21.67	0.103	0.080	-22.849	0.131	0.108	0.032	0.024	-25.815	0.170	0.127	0.016	0.012	-27.833	0.204	0.152		
Upper secondary education	17.71	0.123	0.103	-16.249	0.127	0.113	0.030	0.028	-8.167	0.130	0.120	0.014	0.012	-10.131	0.141	0.131		
Lower secondary education	60.46	0.210	0.206	-1.874	0.739	0.776	0.047	0.050	7.126	0.694	0.748	0.018	0.020	5.841	0.647	0.709		
Primary education or less	0.15	0.367	0.298	-18.864	0.003	0.003	0.145	0.127	-12.529	0.005	0.005	0.089	0.081	-8.988	0.008	0.007		
Age of HH member																		
Below 25	3.89	0.282	0.298	5.776	0.064	0.072	0.066	0.076	14.858	0.063	0.073	0.029	0.031	9.514	0.065	0.073		
25-64	79.3	0.153	0.114	-25.717	0.708	0.563	0.039	0.032	-19.501	0.761	0.616	0.018	0.015	-18.502	0.822	0.693		
Over 64	16.8	0.233	0.348	49.785	0.228	0.365	0.043	0.075	75.489	0.176	0.311	0.012	0.023	98.291	0.114	0.234		
ALL	100	0.171	0.160	-6.496	1.000	1.000	0.041	0.041	-0.562	1.000	1.000	0.017	0.017	-3.360	1.000	1.000		

Source: our calculations using Family Resources Survey 2000/01 data

## APPENDIX 2- NOTES ON SURVEY DATA ANALYSIS

### Household disposable income

Household disposable income is available as variable in FES 2000/01 while for FRS 2003/04 we derive household disposable income using POLIMOD<sup>43</sup>. Household weights are supplied in both surveys

### Potential beneficiaries

Legal entry and exit from compulsory schooling are needed to identify potential beneficiaries of public education. In UK the legal entry is the start of term after the 5<sup>th</sup> birthday (31 Aug, 31 December, 31 March) and the legal exit is the last Friday in June of the school year in which students turn 16 years old. As in both FES and FRS date of birth is not reported, we need to make assumptions about being in compulsory schooling. We assume compulsory schooling starts at age 5 and ends at age 16 in all the country except Northern Ireland where compulsory schooling starts at 4.

Potential beneficiaries are defined according to age in three non mutually exclusive<sup>44</sup> categories:

potential in primary	age $\geq$ 4 & age $\leq$ 11
potential in secondary	age $\geq$ 11 & age $\leq$ 19
potential in tertiary	age $\geq$ 19 & age $\leq$ 25

Upper limit for age of potential beneficiaries is assumed to be 25 (these leaves out approximately a 12% of students).

### Education level

In defining the education level, some cases where age was in clear conflict with reported level of education were reclassified according to age. Eg: Pupils age 7,8,9,10 were reclassified in *primary* if reported *secondary* (32 cases in FES; 68 in FRS) ;students aged 12,13,14,15 were reclassified as *secondary* if reporting *primary* (7 case in FES, 70 in FRS; also 1 case reporting *university*); 24 children aged 6 - 10 reporting nursery were recoded as *primary*).

Students aged 11 are accepted in the reported education level (since it could be primary or secondary). In FES 1 case aged $>$ 20 in *secondary* has been recoded in *further*. No upper limit to age for people in *further* and *higher* education.

Pupils reporting to attend middle schools have been re-allocated to primary or secondary schooling according to their age. Private education students, when identifiable, have not been allocated any education transfer.

In FES we observe only full-time students (assuming that all children aged below 16 are full time. Questions about education for people aged above 16 relate only to full time education).

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<sup>43</sup> Microsimulation model built by Holly Sutherland for the United Kingdom tax-benefit system.

<sup>44</sup> As there is not an unique age of transfer from primary to secondary schooling and from secondary to tertiary, the use of mutually exclusive categories would have caused misclassification of students in education levels.

Some assumptions need to be made using FRS 2003/04 data, which uses a more detailed set of educational categories:

1. All adults in education are assumed in public education (as not specified)
2. Open university and open college are assumed part-time unless employment status is "student" (then recoded as full time)
3. For categories where part or full time reported, accept as reported even if in conflict with employment status variable
4. "Sandwich courses" classified as higher education ; "training for qualification" classified as further education , open college and open uni assumed higher
5. Other correspondence course or self/open learning course left out of the analysis

### **Residence of students**

Both surveys include in the sample tertiary education students living in shared houses and in separate households from their parents, but not students living in halls of residence. For students living away from home no information on parents is recorded.

### APPENDIX 3 - Number of students in education for each level: Survey Data and Administrative Totals

2003/04	<b>FRS weighted totals</b> <i>thousands</i>	FRS weighted proportions (%)	FRS unweighted proportions(%)	administrative proportions(%)	<b>administrative totals</b> <i>thousands</i>
primary	4591	36.4	39.6	29.5	4796
secondary	3948	31.3	33.1	24.7	4013
special	97	0.7	0.8	0.6	103
further <sup>45</sup>	776	6.1	5.8	29.9	4850
higher	3170	25.1	20.5	15.0	2446
all	12584	100	100	100	16208
2000/01	<b>FES<sup>46</sup> weighted totals</b> <i>thousands</i>	FES weighted proportions(%)	FES unweighted proportions(%)	administrative proportions(%)	<b>administrative totals</b> <i>thousands</i>
primary	5605	47.6	49.4	28.1	4413
secondary	3790	32.2	34.0	25.0	3916
special	130	1.1	1.2	0.6	107
further	767	6.5	5.5	31.8	4989
higher <sup>47</sup>	1471	12.5	9.6	14.2	2239
all	11763	100	100	100	15664

<sup>44</sup>The lower number of students in further education in the survey totals is probably due to the exclusion of long-life learning and other adult courses (both for FES and FRS survey data). These students are included in the administrative figure.

<sup>45</sup> FES data report only full time students, while administrative totals include both full time and part time students.

<sup>46</sup> The lower number of students in higher education in FES totals might depend on the exclusion of students living in halls of residence who are included instead in the administrative figure.