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## THE PRIVATE RETURNS TO TERTIARY EDUCATION IN ITALY AND IN EUROPE\*

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In this paper we use the EU-SILC data 2005 to estimate the private rates of return to higher education in 22 European countries. By implementing a Heckman selection model and an instrumental variables estimator we study the effects of schooling on employment and wages and compare them across European countries. Our results show a great deal of heterogeneity in the rate-of-return estimates across countries. Although a clear grouping of countries does not emerges, we observe that the returns to tertiary education appear generally high for Eastern countries and low for Nordic countries whereas the Mediterranean and Continental European countries mostly exhibit an intermediate position.

*JEL Classification:* I23, I24.

*Keywords:* Higher Education, Education and Inequality.

### 1. INTRODUCTION

This paper estimates the private returns to tertiary education in Italy and in 21 other European countries using EU-SILC 2005 microdata. The returns to education are expressed both in terms of income and employment premia.

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The returns to tertiary education are the main driving forces explaining the private investment in education: in equilibrium the private returns to education should correspond to the private cost (both direct and opportunity cost) of acquiring education. Hence assessing returns to education may help evaluating different (tertiary) education systems from the point of view of the incentive they offer to private investment in education.

On the other hand the returns to education are endogenously determined by demand and supply factors: we suggest some explanations of the return differentials among European countries by analyzing the potential association between returns to education and some country specific characteristics, also distinguishing between market and institutional explaining factors. We are perfectly aware that we cannot go beyond suggested correlations, given the limited number of cases in this cross-country analysis. Nevertheless some theoretical expectations can be confronted with the data. These results may be a key input for policymakers interested in enhancing the endowment of human capital through an increase in educational attainments.

To evaluate returns to education we estimate an income function in which individuals' (net) incomes depend on years of schooling and other individuals' characteristics like age and gender. This procedure typically presents two major problems, the first due to self-selection into the labour market and the second caused by endogeneity of school levels, which could determine a bias both in the estimation of the income and employment equation. To address these problems we propose a two-stage selection model - i.e. determining the probability of employment at the first stage and the income for those employed at the second stage - and an instrumental variable estimator which exploits the information about parental education as an instrument for tertiary education.

Our results show a great deal of heterogeneity in the rate-of-return estimates across countries. The return in terms of income goes from 0,21 for Germany to 0,86 for the UK with an average value of 0,5. The income premia are particularly high among Eastern countries and in some Mediterranean countries like Portugal and Spain, but not for Greece and Italy that occupy an intermediate position. Among continental countries, France shows the highest returns, while Nordic countries register medium-low returns to tertiary education.

The occupational premia instead ranges from 0,32 for Luxemburg to 1,32 for the South of Italy with an average value of 0,72. Mediterranean countries occupy intermediate positions in terms of occupational premia with returns generally higher than Continental countries. The highest returns are observed in Eastern countries.

When analyzing the Italian case, we also consider regional differences, comparing returns to education among three macro-areas, the North, the Centre and the South of Italy. The three macro-regions behave very differently among them and have different patterns in the income and occupation premia. In terms of employment effect, the value for the Northern regions is in line with countries like Germany and Finland whereas the South macro region is more in line with Eastern Europe countries. Looking at the income return, this is lower in the South than in the North and the Centre of Italy. The South of Italy has the highest return in terms of employment premium but among the lowest in terms of wage premium. These results for Italy differ substantially from the results in Ciccone *et al.* (2006) where estimating a Mincerian log wage equation by OLS, they find a wage premium higher in the South than in the North.

In summary, although a clear grouping of countries does not emerge, we observe the following general patterns: the returns to tertiary education appear generally high for Eastern countries and generally low for Nordic countries. As for the Mediterranean and the Continental European countries, the picture is mixed, even if most of them exhibit an intermediate position.

It is difficult to explain much of this cross-country variation. However, we find tenuous evidence that the variation in occupational premia is related to market factors such as the proportion of high skill workers over total workers; while the income premia differentials could be more related to non-market explanations such as labour market institutions and public redistribution. Finally, we find a positive correlation between income premia and Gini inequality in the income distribution.

Our results are partly in line, and partly new with respect to the (few) previous works that have analyzed the return to education on a comparative basis (see, in particular, Boarini and Strauss, 2008; Psacharopoulos, 1994; Psacharopoulos and Patrinos, 2004; Strauss and de la Maissoneuve, 2007; Trostel *et al.* 2002, among others). A common feature of the existing contributions - also confirmed by our analysis - is the evidence of strong cross-country differences in income and occupational premia to tertiary education. Boarini and Strauss (2008) estimate both employment and wage premia associated to tertiary education using a sample of 21 OECD countries. In order to compute occupational premia they implement a Heckman's two steps approach controlling for self-selection in labour market participation whereas the wage premium is estimated by a Mincerian wage equation. As for employment premia their figures are similar to what found in our analysis: Mediterranean countries are ranked higher than Continental European countries. Instead, differently from our study, they find income returns to be higher in Continental European countries than in the Mediterranean area.

As for income premia our results are more in accordance with Trostel et al. (2002). Those authors calculate returns to education in 28 countries, between mid-'80s and mid-'90s, by estimating a wage equation using OLS and IV and find that returns to education are low in Nordic countries and high in Eastern European countries.

The rest of the paper is organized as follows. Section 2 presents the data and some descriptive statistics; in Section 3 we introduce the methodology and present the results of our analysis; Section 4 concludes.

## 2. DATA ANALYSIS

We use data from the 2005 wave of the European Survey on Income and Living conditions (EU-SILC) which is annually conducted by the national Central Statistics Offices (CSOs) in order to obtain information on the income and living conditions of different households types. The survey contains information on a large number of individual and household characteristics. Representative random samples of households throughout a large number of European countries are approached to provide the required information. We consider 22 countries and 3 macro regions in our analysis, namely Austria (AT), Belgium (BE), Germany (DE), Denmark (DK), Estonia (EE), Spain (ES), Finland (FI), France (FR), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Luxembourg (LU), Latvia (LV), Lithuania (LT), the Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Sweden (SE), Slovakia (SK), Slovenia (SI) and the United Kingdom (UK)<sup>1</sup>; North (ITN), Center (ITC) and South (ITS) of Italy.

Differently from other sources of data EU-SILC provides a common data source with comparable individual and household level micro-data on income and living conditions in the EU countries, allowing for significant improvements in the comparability of country-specific measures. Income variable is defined as post-tax individual total income which is available for 17 out of 22 countries under analysis, for the remaining ones we derived net income information from gross income by imputing the tax rate in 2004<sup>2</sup>. Note that in the figures that follow countries where only information on gross income is available are denoted in red and macro regions in yellow. We al-

<sup>1</sup> For data shortage we could not consider Czech Republic and Cyprus in our analysis. We also drop Iceland from the sample as there are some coding problems in the education variable that in the last release of the data have not been sorted yet.

<sup>2</sup> Tables 3-7 in the Appendix show the progressive tax rate used for the conversion. As for Slovakia we imputed a flat tax rate of 19% (source: <http://finance.gov.sk/>).

so consider some additional individual characteristics such as gender, age, employment and marital status.

We restrict the sample to individuals working full-time or part-time, unemployed, those fulfilling domestic tasks and care responsibilities aged between 25 and 65<sup>3</sup>.

Tables 1 and 2 show descriptive statistics. In our sample the percentage of individuals with a primary school degree is rather low across countries

TABLE 1 – *Summary statistics on educational attainments*

	M	F	T	M	F	T	M	F	T
AT	0,24	0,74	0,5	76,63	83,84	80,38	23,14	15,42	19,12
BE	8,85	9,77	9,32	53,66	50,48	52,05	37,49	39,74	38,63
DE	0,65	0,69	0,67	51,95	65,34	59,36	47,4	33,98	39,97
DK	0,2	0,16	0,18	69,53	63,69	66,65	30,27	36,16	33,17
EE	0,96	0,79	0,87	79,46	65,66	72,04	19,58	33,55	27,1
ES	27,63	30,87	29,3	46,02	42,61	44,27	26,35	26,52	26,44
FI	12,69	10,08	11,4	54,46	48,97	51,75	32,85	40,95	36,85
FR	7,86	10,35	9,13	62,71	58,33	60,48	29,43	31,32	30,39
GR	30,98	35,77	33,46	48,81	44,27	46,46	20,21	19,96	20,08
HU	1,36	2,29	1,84	82,67	80,29	81,43	15,97	17,42	16,72
IE	20,78	17,89	19,25	50,56	53,6	52,17	28,66	28,51	28,58
IT	17,27	11,23	14,35	70	76,27	73,03	12,73	12,5	12,62
ITN	14,55	9,68	12,19	73,26	77,49	75,31	12,19	12,83	12,5
ITC	14,61	9,1	11,95	70,96	77,53	74,14	14,42	13,37	13,91
ITS	23,52	15,52	19,68	64,76	73,33	68,87	11,71	11,15	11,44
LT	1,79	1,99	1,9	78,48	69,55	73,6	19,73	28,46	24,5
LU	21,92	27,37	24,69	48,04	45,9	46,95	30,04	26,74	28,36
LV	15,5	11,99	13,57	69,9	64,12	66,72	14,6	23,89	19,71
NL	4,46	5,32	4,88	59,67	64,39	61,98	35,86	30,29	33,13
NO	0,16	0,54	0,34	66,08	60,99	63,6	33,76	38,48	36,06
PL	13,82	15,43	14,66	72,19	65,76	68,84	13,98	18,81	16,5
PT	61,73	59,57	60,63	28,3	25,66	26,96	9,97	14,77	12,41
SE	5,12	4,07	4,6	67,36	58,45	62,92	27,51	37,49	32,48
SI	17,07	25,28	21,2	72,31	61,85	67,06	10,61	12,87	11,74
SK	0,05	0,09	0,07	81,86	81,96	81,91	18,08	17,95	18,01
UK	0	0	0	63,51	63,14	63,31	36,49	36,86	36,69
Total	11,81	13,26	12,56	64,55	61,81	63,14	23,64	24,93	24,3

Notes: Percentage of individuals by educational attainments and gender. Source: Authors' calculations on EU SILC Data.

<sup>3</sup> We exclude individuals in retirement, pupils, students, those in an unpaid work experience, permanently disable and/or unfit to work, those in compulsory military community or service and other inactive person.





(continua)

Country	Employed	Employed by Educational Level		Income	Income by Educational Level			
		M	F		T	M	F	T
LT	84.60	56.82	81.49	94.46	2.309	424	1.815	3.950
LU	76.01	62.87	75.36	88.10	2543,89	786,47	2038,43	3193,11
					25.784	12.928	22.990	42.076
LV	82.64	68.93	82.51	90.33	30384,49	25235,74	22860,93	37857,62
					2.215	906	1.947	4.024
NL	81.56	60.98	77.37	92.38	2975,72	1273,03	2229,34	4725,33
					15.000	9.130	12.495	20.695
NO	92.98	54.17	92.11	96.47	12647,21	9346,99	9667,46	15817,67
					20.914	7.820	18.932	25.014
PL	77.11	60.03	76.25	92.78	13254,48	9530,45	10406,91	16305,83
					2.414	848	2.166	4.839
PT	81.01	76.76	88.43	94.80	3261,83	1595,53	2535,17	5206,51
					7.627	5.128	9.367	19.093
SE	92.92	82.67	93.13	94.15	12222,59	7319,97	12839,25	21841,42
					17.611	12.889	16.439	20.772
SI	83.89	66.09	86.82	94.53	11761,11	8172,07	9743,85	14492,46
					7.249	3.847	7.120	14.376
SK	88.16	.	86.51	95.38	6587,47	3887,24	5488,83	9921,05
					2.520	-	2.211	3.939
UK	87.06	.	84.01	92.09	3068,73	-	2537,81	4533,27
					21.035	-	16.752	28.429
Total	81.50	62.76	81.51	91.08	43544,05	-	20339,97	66118,48
					11.942	5.918	10.311	19.443
					19639,46	9905,27	12203,08	26545,55

Notes: Percentage of employed by educational level; median income and median income by educational attainments. Standard deviation in brackets. Source: Authors' calculations on EU SILC Data.



and equal to zero for Slovakia and the United Kingdom. On average the majority of individuals has at least a lower or higher secondary school degree while graduates constitute 24% of the sample. Most of the Eastern European countries in our sample show a percentage of graduates below the average, this is also the case of Mediterranean countries like Italy, Greece and Portugal.

There are substantial differences in employment rates between individuals with different educational attainments. On average, employment rates rise with educational attainment. With few exceptions represented by Sweden, Norway, Portugal and Finland, the employment rate for graduates of tertiary education is markedly higher than the rate for upper secondary education. As for the gender composition, the difference between the employment rate of men and women is wider among less educated individuals and decreases significantly at successively higher levels of educational attainments. Finally data on the distribution of mean income show a great variability across countries but, overall, they confirm a positive relationship between income and educational attainments. Those figures are generally in line with the OECD indicators on individuals' educational attainments and their labour market performance (OECD, 2008).

### 3. ESTIMATES OF THE PRIVATE RATE OF RETURN OF TERTIARY EDUCATION

In this section we estimate the private rate of return to tertiary education in terms of income and employment opportunities.

The two methods commonly used in the literature to evaluate returns to education are the computation of the internal rate of return (see Psacharopoulos, 1981 among others) and the estimation of the Mincerian wage equation (see Heckman, Lochner and Todd, 2003). The first assesses the profitability related to an additional year of education given the costs and benefits related to it, while the second estimates empirically an earning function in which individuals' wages essentially depend on years of schooling and other individuals' characteristics like expertise, age and gender. Only under very restrictive assumptions the two methods might give the same results. In this paper we follow the second approach and estimate an income equation where log of individual income depends on education, gender, age and type of contract.

As acknowledged in the literature a couple of methodological issues might rise: (i) the sample of wage earners may be a non-random selection of the overall working age sample due to sample-selection bias (see Heckman, 1979 and 1980) and (ii) the education variable could be endogenous (see Card, 1999) mostly due to ability bias, i.e. the most capable individuals nor-

mally earn high income and reach high level of education. The first issue may bias the marginal effect of education on the income regression whereas the second problem may influence the effect of educational attainment on both the income regression and the probability of employment.

In order to avoid these problems we propose a two-stage selection model - i.e. determining the probability of employment at the first stage and the income for those employed at the second stage - and an instrumental variable estimator. Hence the model we estimate is

$$e_i = \eta_0 + \sum_{j=1}^k \eta_j x_{ij} + \eta_p pri\_edu + \eta_t ter\_edu + \eta_m marital_i + u_i$$

$$y_i = \beta_0 + \sum_{j=1}^k \beta_j x_{ij} + \beta_p pri\_edu + \beta_t ter\_edu + \beta_{pt} part\_time + \gamma \lambda_i + \varepsilon_i$$

where  $e$  is a binary variable equal to one when an individual is employed part-time or full-time and zero otherwise and  $y$  is the logarithm of individual net income,  $x_i$  are standard demographic (gender dummy, age and age squared)<sup>4</sup>,  $pri\_edu$  is a dummy for those who have attained pre-primary or primary level of education (ISCED 0/1),  $ter\_edu$  is a dummy for individuals holding a tertiary degree (ISCED 5/6) and  $part\_time$  is a dummy that denotes those with a part-time contract and  $u$  and  $\varepsilon$  are white noise. The income premium is estimated by using the Heckman two steps approach and in equation (2)  $\lambda$  is the inverted Mill's ratio that estimates the individual's propensity to participate in the labour market. According to the literature we consider marital status as an excluding restriction to identify self-selection into the labour market. (see Boarini and Strauss, 2011; Ciccone *et al.*, 2006 among others<sup>5</sup>.)

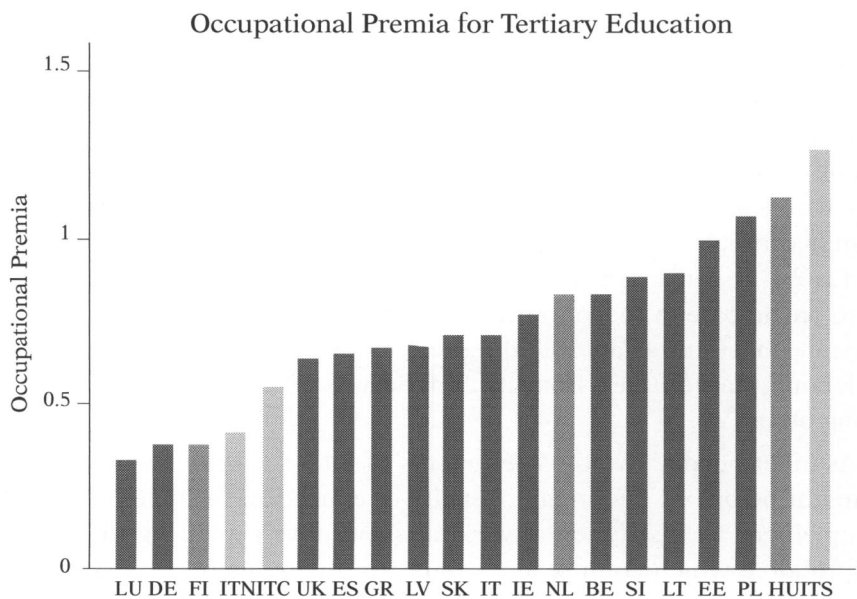
As mentioned above the coefficients of interest for our analysis ( $\eta_t$  and  $\beta_t$ ) might be biased due to endogeneity of education variables. We therefore implement an instrumental variable procedure exploiting the 2005 EU-SILC module which comprehends data for attributes of each respondent's parents during childhood period in the age 14-16. Following Ashenfelter and Zimmerman (1997), Trostel *et al.* (2002) and Ciccone *et al.*, 2006 among

<sup>4</sup> In previous versions of the paper other demographics, such as experience, were considered when available. In this version, in order to facilitate comparison, we choose to consider only the set of control variables common to all countries.

<sup>5</sup> In previous versions of the paper we also included housing tenure, household size, number of children, number of rooms and urbanicity as excluding restrictions obtaining qualitatively similar results.

others, we use the parental education as an instrument for tertiary education dummy (*ter\_edu*)<sup>6</sup>. Our choice has been driven by data availability in the whole sample under analysis although we acknowledge that instrumenting with parental education is questionable on the grounds that it affects child wage and might still be correlated with  $\varepsilon_i$ . Institutional feature of schooling system that affects the schooling decision while not affecting wage have also been proposed in the literature - see Angrist and Krueger (1991) and Card (1995) among others - but again they are not considered here because of data availability. Table 8 in the Appendix shows a comparison between IV and OLS estimates of occupational and income premia of tertiary education. In

FIGURE 1 - Occupational premia for tertiary education, estimates of  $\eta_i$  when significant at 5%.



Notes: The figure shows estimates of occupational premia when significant for the following countries and macro regions: Belgium (BE), Germany (DE), Estonia (EE), Spain (ES), Finland (FI),Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), North of Italy (ITN), Centre of Italy (ITC), South of Italy (ITS), Luxembourg (LU), Latvia (LV), Lithuania (LT), the Netherlands (NL),Poland (PL), Slovakia (SK), Slovenia (SI) and the United Kingdom (UK) . Yellow and red outline macro regions and countries where only information on gross income is available, respectively. Source: Authors' elaboration on EU SILC Data.

<sup>6</sup> Parental education is measured by the highest educational attainment in the couple of parents.

accordance with the literature we notice that the IV estimates are generally higher than the OLS ones. Moreover, although when performing the IV estimates some coefficients lose their significance - especially in the employment equation - we ought to notice that the ranking among countries is generally preserved.

In sum, the estimated coefficients  $\hat{\eta}_i$  and  $\hat{\beta}_i$  represent instrumental variable estimates of the private return to tertiary education in terms of employability and income respectively, where the estimates of the latter take into account selection in the labour market.

We start evaluating the relationship between tertiary education and employment (see Figure 1).

The occupational premium ranges from 0,32 for Luxemburg to 1,32 for the South of Italy with an average value of 0,72. By ranking countries in an increasing way, we notice that Mediterranean countries occupy intermediate positions in terms of occupational premium and perform better than Finland with 0.38 (the only Nordic country where the occupational premium is significant) and Continental countries with the exception of the Netherlands, Belgium and Ireland. The highest returns are instead observed in Eastern countries where the occupational premium is on average 0.92.

Figure 2 shows the income premium for tertiary education.

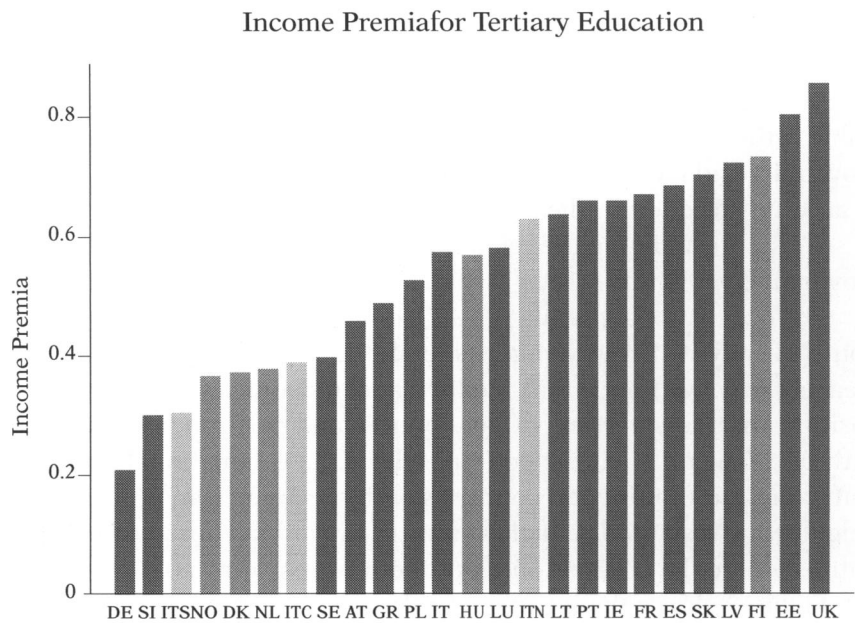
The return in terms of income goes from 0,21 for Germany to 0,86 for the UK with an average value of 0,5. The income premium is particularly high and significant among Eastern countries (Estonia, Latvia and Slovakia) except for Lithuania. The wage premium turns out to be pretty high in Mediterranean countries like Portugal and Spain, but not for Greece and Italy that occupy an intermediate position<sup>7</sup>. Among continental countries, France shows the highest returns, while Nordic countries register medium-low returns to tertiary education.

Interestingly the Italian case is quite peculiar as the three macro-regions behave very differently among them and have different patterns in the income and occupation premium. In terms of employment effect, the value for the North macro region (0,41) is in line with countries like Germany and Finland whereas the South macro region - which has the highest occupational premium (1,26) in the sample - is more in line with Eastern Europe countries.

Looking at the income return, again the macro regions show a certain degree of heterogeneity: the income premium for tertiary education are lower

<sup>7</sup> These results are similar to those of Boarini and Strauss (2007) who confirm the evidence of an intermediate position for Italy.

FIGURE 2 - *Income premia for tertiary education, estimates of  $\beta_i$  when significant at 5%*



Notes: The figure shows estimates of income premia when significant for the following countries and macro regions: Austria (AT), Germany (DE), Denmark (DK), Estonia (EE), Spain (ES), Finland (FI), France (FR), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), North of Italy (ITN), Centre of Italy (ITC), South of Italy (ITS), Luxembourg (LU), Latvia (LV), Lithuania (LT), the Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Sweden (SE), Slovakia (SK), Slovenia (SI) and the United Kingdom (UK). Yellow and red outline macro regions and countries where only information on gross income is available, respectively. Source: Authors' elaboration on EU SILC Data.

in the South (0,31) than in the North and Centre of Italy (0,62 and 0,39 respectively). These results for Italy differ substantially from the results in Ciccone *et al.* (2006) where a Mincerian log wage equation – with primary education as a baseline category – is estimated by OLS not controlling for selection. Using data from both the Survey of Income and Wealth (Bank of Italy) 1997-2000 and the Labour Income Survey 2000-2001, these authors find return to university education to be higher in the South than in the North of Italy. We note in passing that by using the same specification, i.e. *pri\_edu* as base category we find the same pattern obtained by Ciccone *et al.* (2006): i.e., returns to tertiary education are higher in the South (1.31) than in the North (1.24). When comparing income of individuals with tertiary education with those with primary education the difference is more relevant

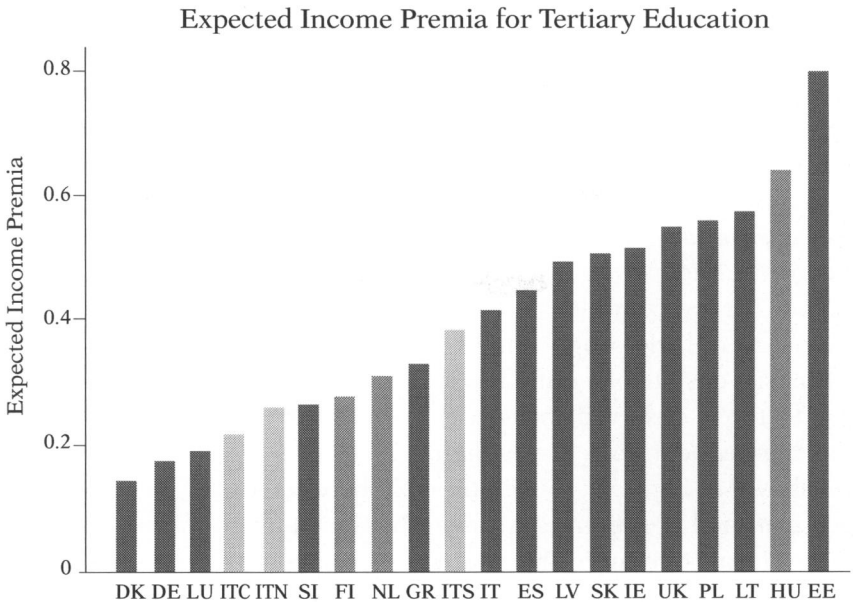


in the South than in the North of Italy. On the other hand the income differential between individuals with secondary education and those with tertiary education is higher in the North than in the South.

Notice in particular the different picture that emerges for the South of Italy when looking at the income or the occupational premia: it has the highest return in terms of employment premium but among the lowest in terms of wage premium.

In the next figure we consider a summary measure of the return to education, computed as the product of income and occupational premia. The ranking in terms of expected income premia confirms a low premium for Nordic countries (0.27 for Finland), high premia for eastern countries (on average 0.55) and an intermediate position for Mediterranean and continental European countries. In the Italian case, looking at the position of the South – with 0.38 –, clearly the high employment premium dominates the

FIGURE 3 - *Expected Income Premia for Tertiary Education*



Notes: The figure shows the expected income premia for the following countries and macro regions: Belgium (BE), Germany (DE), Estonia (EE), Spain (ES), Finland (FI), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), North of Italy (ITN), Centre of Italy (ITC), South of Italy (ITS), Luxembourg (LU), Latvia (LV), Lithuania (LT), the Netherlands (NL), Poland (PL), Slovakia (SK), Slovenia (SI) and the United Kingdom (UK). Yellow and red outline macro regions and countries where only information on gross income is available, respectively. Source: Authors' elaboration on EU SILC Data.

effect of the low income premium, hence drives the position of the South which is intermediate with respect to the European context but higher than the Centre and North of Italy – with 0.22 and 0.26 respectively –.

It is difficult to explain the cross-country variation reported above. Certainly an exploration of the causal determinants of the different returns to education in European countries is beyond the scope of the present paper. However, we could consider some simple suggestive explanations, by distinguishing between market and non-market factors.

Among the market explanations, differences in the skill endowment across countries could be a possible driving factor. The idea is that a lower supply of high skilled workers could be associated to a higher labour market reward and, hence, to higher income returns to tertiary education. Hence we analyze the relationship between the income and the occupational premia estimated above and the skill endowment, measured by the ratio between the percentage of graduates on total population and the percentage of individuals with secondary school degree.

Figure 4 can help to verify if relatively low proportions of graduates, with respect to individuals with secondary school degree, are associated to higher income premium for tertiary education.

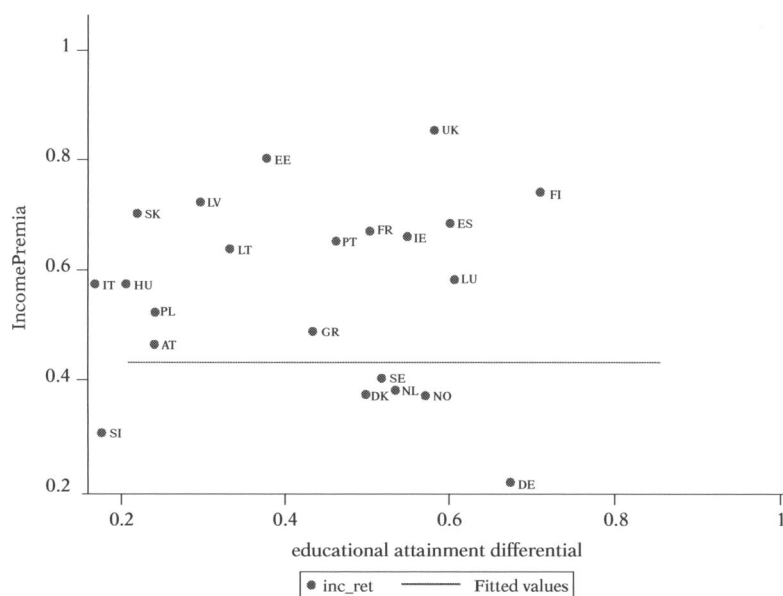
Unfortunately, the pattern is not unambiguous. For countries like Germany or Slovakia, the classical “demand-supply” hypothesis is confirmed. Namely, in Germany, where there are not big differences in the proportion of high skilled workers with respect to the low skilled, the income premium is not really marked; while in Slovakia, where graduates are less than one third of individuals with secondary school degree, the income return for tertiary education is higher. However, the pattern is not the same in all countries. The UK, for example, shows the highest income premium for tertiary education even if the proportion of graduates is quite high. On the opposite, in Austria, despite of a quite low skill endowment, the income returns are similar to those observed in Sweden, where the proportion of individuals with tertiary education is pretty high.

As shown in Figure 5, the relationship between the skill endowment and the occupational premium is stronger. In almost all countries but Belgium, returns in terms of employability are higher in countries where the proportion of graduates with respect to individuals with secondary school degree is lower. Also the position of Nordic countries could be due to their strictly regulated labour market but also to their skill endowments, intended as the portion of individuals with tertiary school degree.

In Figure 6 we analyze the relationship between income and occupational premia, which can help to verify if a relatively low availability of high skilled workers brings to a higher labour cost and/or to an increase in the



FIGURE 4 - Skill Endowment and Wage Premium



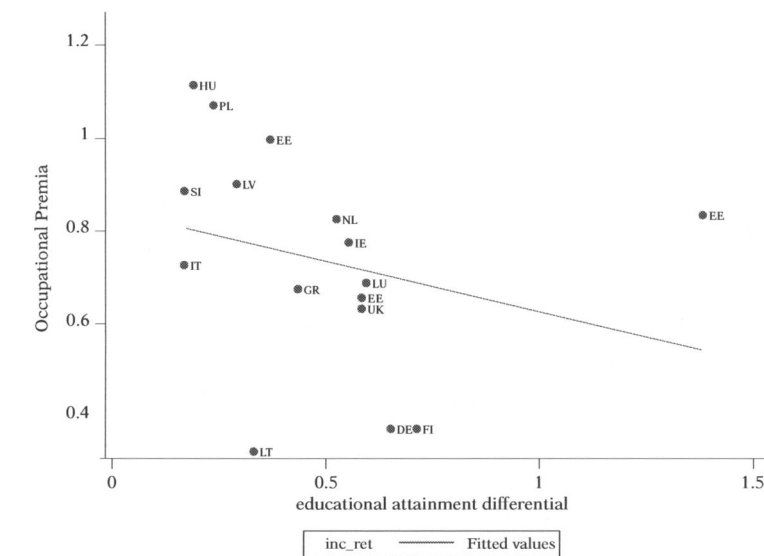
Notes: The figure shows the correlation between skill endowment and wage premia for the following countries and macro regions: Belgium (BE), Germany (DE), Estonia (EE), Spain (ES), Finland (FI), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), North of Italy (ITN), Centre of Italy (ITC), South of Italy (ITS), Luxembourg (LU), Latvia (LV), Lithuania (LT), the Netherlands (NL), Poland (PL), Slovakia (SK), Slovenia (SI) and the United Kingdom (UK) Source: Authors' elaboration on EU SILC Data.

demand for skilled workers, i.e. if it implies a higher return in terms of income or employability, or in both.

On average, in Mediterranean and Nordic countries income returns are higher than the occupational premia, but there are some exceptions, like Belgium that shows the lowest income return to tertiary education but has a quite high occupational premium. As for the Eastern countries, in some of them, like Hungary and Slovakia, high returns in income come with high returns in employability, while in other a higher occupational premium comes with relatively low returns in income (Slovakia) or *viceversa* (Estonia).

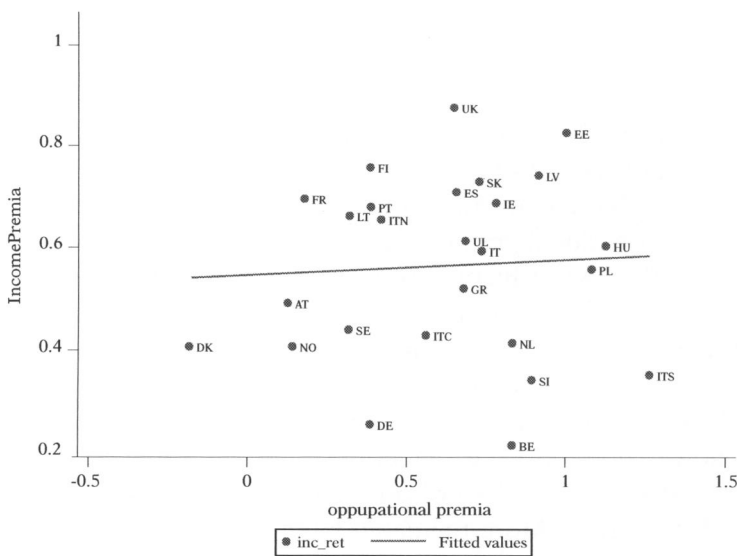
Turning now to non-market explanations, the labour market institutions as well as the redistributive effect of public intervention could help explaining returns differentials. More regulated labour markets and strong redistributive policies generate a more equal income distribution and could therefore be related to lower income premia. These factors could explain the low income return to education we observe in Nordic countries and the high return observed in Anglo Saxon countries and Eastern countries. On the con-

FIGURE 5 - Skill Endowment and Occupational Premium

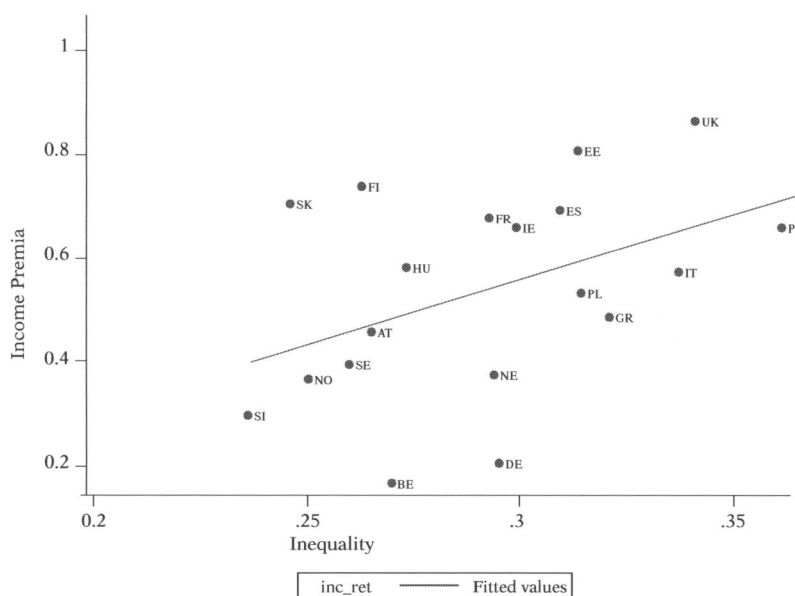


Notes: The figure shows the correlation between skill endowment and occupational premia for the following countries and macro regions: Belgium (BE), Germany (DE), Estonia (EE), Spain (ES), Finland (FI),Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), North of Italy (ITN), Centre of Italy (ITC), South of Italy (ITS), Luxembourg (LU), Latvia (LV), Lithuania (LT), the Netherlands (NL),Poland (PL), Slovakia (SK), Slovenia (SI) and the United Kingdom (UK) Source: Authors' elaboration on EU SILC Data.

FIGURE 6 - Income and Occupational Premia



Notes: The figure shows the correlation between income and occupational premia for the following countries and macro regions: Belgium (BE), Germany (DE), Estonia (EE), Spain (ES), Finland (FI),Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), North of Italy (ITN), Centre of Italy (ITC), South of Italy (ITS), Luxembourg (LU), Latvia (LV), Lithuania (LT), the Netherlands (NL),Poland (PL), Slovakia (SK), Slovenia (SI) and the United Kingdom (UK) Source: Authors' elaboration on EU SILC Data.

FIGURE 7 - *Income Premia and Income Inequality*

*Notes:* The figure shows estimates the correlation between income premia and income inequality for the following countries: Austria (AT), Germany (DE), Denmark (DK), Estonia (EE), Spain (ES), Finland (FI), France (FR), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Luxembourg (LU), the Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Sweden (SE), Slovakia (SK), Slovenia (SI) and the United Kingdom (UK). Income Inequality is measured by OECD Gini coefficient. Source: authors' elaboration on EU SILC data and OECD

sideration that overall income inequality is related to (and determined by) less regulated labour market and weak redistributive effects of public intervention, we plot in Figure 7 the Gini income inequality index against the income premium: a positive pattern emerges, giving support to the explanation given above.

#### 4. CONCLUDING REMARKS

In this paper we have estimated the private returns to tertiary education in Italy and in other 21 European countries using EU-SILC 2005 microdata. The returns to education are expressed both in terms of income and employment premia. Our results show a great deal of heterogeneity in the rate-of-return estimates across countries. The following pattern emerges both for income and employment education premia: the returns to tertiary education appear generally high for Eastern countries and generally low for Nordic co-

untries. As for the Mediterranean and the Continental European countries, the picture is mixed even if most of them show an intermediate position.

We propose the following suggestive explanations: in terms of market based factors we show that the endowment of high skill workers over total workers is more robust in explaining the occupational premium rather than the income premia. On the other hand, we infer that non-market factors such as regulated labour market and strong public redistribution could explain the income premia differentials.

In Italy, contrary to previous studies, we find in the Southern regions a stronger employment return but a lower income premium than in the other Italian macro regions. As within the same country the non-market explanations are homogeneous by definition, the relative scarcity of human capital in the South should determine a higher income return of education in these regions. We show that this is not the case. Perhaps, the reasons for the low return to education in the South of Italy could be originated by some opaque features of the local labour market. On the other hand, considering that in equilibrium the private return of education should correspond to the cost (both direct and indirect) of acquiring education, this evidence is also consistent with the lower opportunity cost of acquiring education in the South, due to higher unemployment.

As the income return to higher education is among the most powerful drivers of the individual investment decision in education, this evidence should be a key input for policymakers who want to bolster the region endowment of human capital, thereby contributing to economic growth of the area.

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## APPENDIX

Table 3: *Tax rate in Denmark*

Taxable Income in Euro	Tax Rate
0 - 3250	0
32501 - 6500	13.3
65001 - 9750	19.2
97501 - 13000	24.1
130001-16250	27.6
162501-19500	28.7
19501 - 26000	30.4
26001 - 32500	32.7
325001 - 39000	34.5
39001 - 45500	36.2
45501 - 52000	38.9
52001 - 65000	42.3
65001 - 97500	48.4
97501 - 130000	53
130001	59.2

Source: [www.skm.dk](http://www.skm.dk).

Table 4: *Tax rate in Finland*

Taxable Income in Euro	Tax Rate
12200 - 17000	9
17001 - 20000	14
20001 - 32800	19.5
32801 - 58200	25
58201	32.5

Source: [www.vero.fi](http://www.vero.fi)

Table 5: *Tax rate in Hungary*

Taxable Income in Euro	Tax Rate
1- 5960	18
5961	38

Source: [www.worldwide-tax.com](http://www.worldwide-tax.com)

Table 6: *Tax rate in Netherlands*

Taxable Income in Euro	Tax Rate
1 - 16265	0
16266 - 29543	7.95
29544 - 50652	42
50653	52

Source: OECD

Table 7: Tax rate in Norway

Taxable Income in Euro	Tax Rate
0	0.0
29600 - 43022	25.0
43023 - 65999	7.8
66000 - 102580	35.8
102581 - 185160	27.1
185161 - 380999	35.8
381000 - 799999	47.8
800000	51.3

Source: [www.Taxnorway.no](http://www.Taxnorway.no)



Table 8: *Comparison between OLS and IV estimates of Occupational and Income Premia for tertiary education*

Equation OLS	y IV	y OLS	e IV	e
AT	0,288	0,46	0,351	-
BE	0,22	-	0,64	0,835
DE	0,215	0,21	0,394	0,379
DK	0,272	0,37	0,157	-
EE	0,367	0,8	0,441	0,996
ES	0,312	0,69	0,573	0,653
FI	0,425	0,74	0,286	0,379
FR	0,455	0,67	0,296	-
GR	0,272	0,49	0,626	0,676
HU	0,499	0,57	0,785	1,12
IE	0,401	0,66	0,669	0,779
IT	0,336	0,57	0,543	0,725
ITN	0,337	0,63	0,477	0,41
ITC	0,291	0,39	0,525	0,56
ITS	0,408	0,31	0,774	1,26
LT	0,406	0,64	0,756	0,902
LU	0,37	0,58	0,482	0,324
LV	0,46	0,72	0,397	0,685
NL	0,286	0,38	0,627	0,827
NO	0,253	0,37	0,37	0,457
PL	0,439	0,53	0,906	1,07
PT	0,518	0,65	0,533	-
SE	0,24	0,4	0,137	-
SI	0,481	0,3	0,62	0,889
SK	0,403	0,7	0,621	0,723
UK	0,411	0,86	0,505	0,642

Notes: The table shows significant coefficients of tertiary education dummy by IV and OLS estimators; y denotes the income equation and e the employment equation. Source: Authors' calculations on EU SILC Data.