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ABSTRACT

Returns to Education across Europe*

Incentives to invest in higher education are affected by both the direct wage effect of human capital investments and the indirect wage effect resulting from lower unemployment risks and shorter spells in unemployment associated with higher educated. We analyse the returns to education in Austria, Germany, Italy, Sweden and the United Kingdom, countries which differ significantly regarding both their education systems and labour market structure. We estimate augmented Mincerian wage equations accounting for the effects of unemployment on individual wages using EU-SILC data. Across countries we find a high variation of the effect of education on unemployment duration. Overall, the returns to education are estimated to be the highest in the UK, and the lowest for Sweden. A wage decrease due to time spent in unemployment results in a decline in the hourly wages in Austria, Germany and Italy.

JEL Classification: H42, I21 and J31
Keywords: EU-SILC, returns to education and unemployment

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1 Introduction

Factors that determine the individual level of education have been of interest to academics but also to politicians (see e.g. Santiago et al., 2008). Education is considered to be a key driver for economic growth (Krueger & Lindahl, 2001). This is one reason, why education became a target in the "EU 2020", a growth strategy developed by the European commission. Aiming at a "smart, sustainable and inclusive economy" (European Comission, 2010a), improving the quality and efficiency of education and training in order to raise educational levels is one of the long-term objectives (European Comission, 2010b). To implement and measure the achievement of this objective, the European Commission sets benchmarks for different indicators, e.g. an upper bound on the share of early school leavers, or a lower bound for the share of 30-34 years old with tertiary educational attainment which should be reached by the year 2020. The EU-member states are thus obliged to implement strategies to increase the educational attainment in their nation.

Investment in education beyond the minimum school leaving age is a decision every person has to make. From an economic perspective, the optimal level of education depends on the returns to education (see e.g. Becker, 1964). Individuals invest in education if the (life-time) returns exceed the cost. As some countries perform better than others with respect to the given benchmarks, in this paper, we compare the private returns to education across selected EU countries to explain cross-country differences in educational attainment. When analysing the different EU-member states we have to take account of differences in their economies. Here it is not only the difference in the wage structures that is of importance, but also differences in unemployment by the level of education. Lower educational attainment is associated with a higher level of unemployment which in turn reduces the wage in new employment relative to the previous one. This indirect wage effect may significantly affect the returns to education (for Germany, see Steiner, 2009). In our analysis we will extend this analysis to several European countries by applying the methodology proposed by Ashenfelter & Ham (1979) and Nickell (1979). Thus, the effect of education on wages is split into a direct effect and into an indirect effect accounting

for the effect of previous unemployment on wages.

Depending on which effect dominates, different policy implications arise. To increase the nations educational attainment if the direct effect of education is the key driver, incentives could e.g. be changed by directly affecting the expected returns. Thus, cost of investment could be lowered by decreasing the time it takes to obtain a certain qualification (i.e. making the education process more efficient) or the returns could be directly affected by varying the tax rate (see e.g. Fossen & Glocker, 2011).

To conduct our analysis, we use the most recent panel wave of the EU Statistics on Income and Living Conditions (EU-SILC) which provides comparable micro data for the member states of the European Union. We estimate separate augmented Mincer-type wage equations for Austria, Germany, Italy, Sweden and UK, countries which differ significantly regarding both their education system and labour market structure. The returns to education are estimated separately by country and also by gender, due to the well-known differences of wages between men and women. Across countries we find following results: First, the direct effect of education on wages is positive and significant for all countries. Second, education has a negative effect on unemployment duration. This effect is the strongest in Germany, and lowest for Swedish men where it is not statistically significant. As a wage decrease due to time spend in unemployment results in a decline in the hourly wages in Germany, Austria and Italy, education also has an indirect effect on wages in these countries.

The paper is structured as follows: First, we provide a short overview over the different institutional characteristics in the different countries. Then we conduct our empirical analysis, describing our estimation strategy in section two, and our data in section three. In section four, we present our estimation results. Section five concludes.

2 Institutional differences across countries

Education is shown to be positively correlated with economic growth (see e.g. Krueger & Lindahl, 2001). This is one reason why European countries agreed to the action plan of the European Commission. The EU 2020 strategy sets different benchmarks in different fields related to the countries economies. In the following we focus on the lower bound for the share of 30-34 years old with tertiary educational attainment, which is set to 40% and should be reached by the year 2020. While some EU countries already reached this benchmark, others face a challenge to obtain this goal. In our analysis, we focus on the following countries: Austria, Germany, Italy, Sweden and the United Kingdom. We have selected these countries because both their education systems and labour market structures differ in interesting ways. While the Austrian and German educational system are broadly similar and differ significantly in terms of enrolment rates in higher education from the other countries considered here, labour market outcomes in the two countries are quite distinct. Whereas Austria's unemployment rate is persistently one of the lowest in the European Union, Germany has one of the highest rates. Italy also features a relatively low enrolment rate in tertiary education, but does not have the system of vocational training prevailing in Austria and Germany which is said to be an important factor contributing to the relatively low levels of youth unemployment in these two countries. While Sweden and the United Kingdom both have relatively high enrolment rates in higher education, its financing differs significantly between these two countries and they also differ markedly in terms of labour market outcomes.

The reasons for the differences in the educational attainment across countries can arise from various sources: First, entrance qualifications to universities and the number of persons obtaining this entrance qualification vary across countries. While in Austria and Germany the share of under 25 year old who graduate from a secondary track that is designed to prepare for direct entry into tertiary-type A education (ISCED 3A) is rather low (17 percent and 42 percent respectively), the numbers are much higher in Italy and Sweden with above 70 percent (see OECD, 2010, p.54). These differences between the

countries mainly arise, because Austria and Germany have an attractive vocational track (ISCED 4). Investments in higher education must pay off especially in those countries where attractive outside options are available, i.e. individuals have the choice to work right away and receive earnings while obtaining a job qualification at the same time which results in higher returns. Prospective students thus will only invest in higher education if the returns from this education is higher than from the vocational track, taking into account the direct costs and forgone earnings.

Having a closer look at the institutional differences, we describe the general educational organisation of the countries in table 1.

[Table 1 about here]

In all the countries covered in our comparative analysis children have to stay in school until they have completed at least 9 school years, usually at the age of 15 (Austria), or are 16 years old (all other countries). In general, by then they have finished lower secondary education. All countries have in common that no tuition fees apply up to that educational level. With the exception of Italy, fees are, if at all, introduced for higher education only. In Italy, starting with upper secondary education, low fees are charged, but can be handled very flexibly by schools and can be adjusted with respect to family income.

A main concern when looking at higher education is that tuition fees may deter prospective students from taking up tertiary education which would also result in a countries lower tertiary educational attainment (see, e.g. Steiner & Wrohlich, 2011). The (tuition) fees for higher education differ substantially across countries. In Sweden, state funded institutions are not allowed to charge any fees. Thus, they are financed through state grants, and students are educated free of charge. In Germany, tuition fees have been introduced in some federal states, but they do not exceed an amount of 500 EUR per semester.

Also in federal states, where no tuition fees have been introduced, students still have

to pay a small amount for administrative costs (approx. 50 EUR per semester). This is similar to Italy. Here, a minimum enrolment fee of 175 EUR is mandatory. Universities themselves can decide about additional tuition fees. In Austria, universities charge an amount of 363 EUR per semester for national students. In the group of countries under consideration the United Kingdom is the country with the highest tuition fees. Students are charged up to 3,500 EUR per year (approx. 1,740 EUR per semester). As Sweden and the UK are the two countries closest to the benchmark, tuition fees themselves do not seem to have a clear impact on the incentives to invest in tertiary education. This could for one be due to the type of student fee scheme in place. While student loans and scholarships are present in each country, the design and repayment conditions for student aid schemes vary. In Austria, Germany and UK a means-tested student aid programs are available. While it is designed as a grant in the UK and in Austria, only half is offered as a grant in Germany. Half of the amount of student aid received must be repaid with a cap at 10,000 EUR. Sweden is the only country, where student aid is not means-tested. Each person who is accepted at a university and is under the age of 54 years, may apply for student aid. The average amount of the grant is about 78 EUR per week.

Another reason that student fees and average enrolment rates across countries do not seem to be correlated might be due to differences in the returns to education across countries. Next to the direct effect of higher wages with a higher level of education, indirect effects like the risk of unemployment might be an incentive for an individual to invest in higher education. Figure 1 plots the unemployment rates by educational level for each country in 2007.

[Figure 1 about here]

It is evident, that there is a negative correlation between the level of education and the unemployment probability. The effect varies strongly by country. While a strong negative relation for Germany, Sweden shows only minor unemployment differences by the level of education.

Bearing the country specific differences described in this section in mind, the following analysis will focus on the returns to education across countries.

3 Empirical Analysis

3.1 Estimation Strategy

We follow the standard human capital approach to the estimation of the returns to education developed by Becker (1964) and Mincer (1974). According this approach an individual invests into a further year of education if this choice maximises the expected present value of the future income streams. More education is associated with higher productivity which results in higher earnings, but also with higher costs due to forgone earnings and direct costs for education.

As previous studies have shown, education has not only a direct effect on the wage, but also affect wages through unemployment, see e.g. Ashenfelter & Ham (1979). A lower level of education is associated with a higher risk of unemployment. Unemployment, i.e. the cumulated sum of experienced years of unemployment, is assumed to result in a wage decrease when new employment is found. Neglecting this relationship would result in a (downward) bias in the returns to education. For Germany, Steiner (2009) has shown that wage reductions due to cumulated experienced unemployment spells significantly affect the returns to education.

Given there is a sufficiently large number of future income periods and assuming that the cost of education can be neglected, the return to education can be explained by the difference of the log wages with s years of schooling compared to the log wages with $s-1$ years. Thus, the returns to education can be estimated by analysing the variation of log hourly wages with respect to the years of education:

$$\log w_i = \beta_1 + \beta_2 age_i + \beta_3 age_i^2 + rS_i + \gamma ue_i + v_i, \quad (1)$$

with w_i measuring the earnings of individual i that depends on the years of education S_i, on individuals age and on the cumulated unemployment duration. To capture the concavity of the earnings profile implied by the standard Mincer-type wage equation we use the individual's age in level and squared terms. In the following analysis, the term unemployment refers to periods when not in employment, such that not only registered unemployment is captured by this variable, but also periods spent out-of-the-labour-force. We also have to assume that both an individual's years of education and unemployment duration can be treated as exogenous in the wage equation.

The returns to education are then simply the derivative of the $\log(wage)$ with respect to the years of education S:

$$\frac{\partial \log w}{\partial S} = r + \gamma \frac{\partial ue}{\partial S} \tag{2}$$

If an individual's level of education is correlated with the duration of unemployment experienced in the past, neglecting the second term on the right-hand side would yield a biased estimate of the return to education. To evaluate the effect of education on an individuals cumulated unemployment duration, we regress the cumulated unemployment spells experienced in the recent past (see the data description below) on years of education as well as further control variables like marital status, number of dependent children in the household and some regional information, i.e. if the individuals lives in a densely populated area or in the case for Germany if the person lives in the eastern part.[1] As there are many individuals who have not experienced unemployment, we estimate a standard censored Tobit model (Tobin, 1958). Based on these results, we can calculate for each individual the cumulated unemployment experience with respect to the individual level of education.

[1] In Germany, we prefer to control for East and West Germany rather than the population density of the area, due to well known structural differences in the labour market.

3.2 Data

To conduct our analysis, we use the scientific use-file of the European Union Statistics on Income and Living Conditions (EU-SILC), which provides data on a cross-sectional and on a longitudinal level. The cross-sectional data covers variables on income, poverty, social exclusion and other living conditions at the time of the survey, whereas the longitudinal data focuses on individual-level changes over time, observed periodically over, typically, a four year period. Our analysis refers to the year 2008, the most recent currently available wave of EU-SILC. Information on the cumulated duration of unemployment is not directly recorded in our data base but can be derived using panel information on individual job histories. Since EU-SILC does not provide this information for Germany, we use information from the national panel, the German Socioeconomic Panel Study (SOEP).

There are a couple of other limitations of EU SILC for our purpose: The first refers to the coding the educational variable into the ISCED-97 scheme[2]. While the ISCED-97 variable usually records detailed information on the type of school at which the degree was obtained, the information of an individual's educational level in the EU-SILC dataset is aggregated to a high level. Figure 2 compares the detailed ISCED categorisation of the education variable as reported by the OECD with the more aggregate information contained in our dataset. While the overall shares of the adult population with a certain degree in the respective ISCED category is comparable, differences in the subgroups is not observable in our data. The high aggregation of the categories is a reason for concerns for our study, because we are trying to establish an international comparison. Even using the detailed ISCED-97 categorisation, this comparison induces some problems. While in a single country analysis this might be true, this assumption is dubious when conducting a cross-country analysis. For illustration let us assume we have a person living in country A that has a vocational education scheme which allows for on-the-job training to obtain a certain job qualification. After high-school graduation, a person decides to do an apprenticeship, such that this persons highest educational level will be ISCED 4.

[2]See table 14 for the definitions of the different ISCED categories.

Now let us assume, that this person lives in country B where this on-the-job qualification track does not exist. To get the same job qualification, this person can only choose the ISCED 5B-Track. Comparing these two countries simply by these categories, would indicate a higher educational level for country B. This problem even intensifies when the categories are aggregated to a higher level, as is in the EU-SILC dataset. It is not possible to distinguish between different subgroups and thus we loose valuable information on the individuals educational attainment.

[Figure 2 about here]

To facilitate the cross country comparison, we use the years of education associated with the respective categories instead of using the ISCED categories. Conditional on each country, we thus assign the average years of education to obtain a certain degree based on the information in table 1.

The second aspect we have to deal with concerns the information on an individual's cumulated duration of unemployment, which is not directly recorded in our dataset. We therefore use the panel structure of EU-SILC to construct a proxy for this variable. Since the panel is available since 2005, we can only calculate this variable over the past four years. However, since past unemployment is likely to have the strongest impact on individual wages if experienced recently, this measure should work quite well. With the exception of the United Kingdom, we also have the retrospective information on "number of years in paid employment". Deducting the sum of this variable and years of education plus the average year at school enrolment from an individual's age we construct a measure of "cumulated years not spent in paid employment" which we include as a robustness check in an alternative specification of the wage equation.

Another issue concerns the measurement of the earnings variable. For all of the countries the variable "employee cash or near cash income" is available which reflects gross income per year. However, between the countries the collected information slightly varies (see table 2). Additional information on net income was collected for all countries except

the United Kingdom. Here, we use the information on gross income to calculate the respective net income by applying the tax-schedule (see table 15 for the marginal rates). We conduct our estimation both for gross and net income. Comparing the results provides insights how countries' returns differ due to their tax schedule. Since we also have information on hours usually worked during a week, we construct a variable reflecting the earnings per hour which we use as dependent variable.

[Table 2 about here]

4 Estimation Results

We conduct our estimation of the returns to education in two different steps. First, we estimate the effect of education on the cumulated duration of previous unemployment. In the second step, we estimate the returns to education, taking into account the effect of cumulated unemployment, measured by the cumulated months not worked during the last four years, on individual wages. Furthermore, we conduct a robustness check by using the time not spent in paid employment as an alternative measure of unemployment experience.

4.1 Effect of education on previous unemployment

We first report the effect of education on the experienced unemployment duration in table 3 and 4 in the appendix. The results show, that another year of education is associated with a reduction in the cumulated unemployment duration. This effect is significant for all countries and genders, with the exception for Swedish men for whom the estimated coefficient is not statistically significant. This finding might result from a low level as well as a low variance of cumulated unemployment in the Swedish sample (see table 11). As the coefficients in a tobit model do not directly translate into marginal effects, table 5 and 6 in the appendix report the estimated changes in the probability to have experienced

at least one month of unemployment during the last four years, as well as the expected (unconditional) duration of the cumulated unemployment spell with respect to years of education. The values are calculated with the covariates set to the European average for men and women respectively which can be found in table 13.[3] The probability to experience a positive spell of unemployment reduces by up to 23 percentages point, when comparing someone with 16 years of education (university level) to someone with only nine years of education (basic education) ceteris paribus. The highest decrease is observable for German and Austrian men, and the lowest for Swedish men and women.

Not only the incident rate decrease with higher education, but also the unconditional expected length of the cumulated unemployment. For German men the decrease in the expected unemployment duration is the highest with six months, and the lowest for Swedish women.[4]

4.2 Returns to education

The results from this first step confirm that the level of education affects the expected cumulated unemployment duration. The extend on how the level of education and the expected cumulated unemployment duration affect hourly wages is reported in table 7. An additional year of schooling exerts both a direct effect on hourly wages and an indirect effect through the cumulated duration of unemployment. In addition to these two effects, in the following table we also report their combined effect calculated with the covariates set to the European average.

[Table 7 about here]

The returns to education are positive and significant for men. Comparing the gross returns to education across countries, the UK has on average the highest returns to education

[3]Since the mean is set to the European average, the reported incidences and unemployment durations are not representative for the chosen country, they rather pick up the effects for an "artificially created" person who we use to compare the different countries. For country specific means see table 13 and table 12.

[4]The effects are even smaller for Swedish men where the coefficient was estimated not to be significant.

with an increase in the hourly wages by 9 percent with an additional year of education. Sweden has the lowest gross returns to education with 4 percent. The effect of the expected cumulated unemployment duration is negative, but not statistically significant for Sweden and the UK. Although the level of schooling has a significant effect on the cumulated unemployment duration in the UK, the expected cumulated unemployment duration itself has not a significant effect on wages. The indirect effect of education on wages through the channel of the cumulated unemployment duration is the highest for Germany. Here, disregarding the effects would severely underestimate the returns to education.

Focussing on the net returns, the ordering across countries found for gross returns remains. A slight change occurs when comparing Austria and Germany. While Austria has slightly higher gross returns (7.2 percent compared to 7 percent), Germany has with 6 percent 0.2 percentage points higher net returns. Looking how the returns to education change when comparing gross and net hourly wages, the UK has, on average, the highest reduction, i.e. by roughly 2 percentage points. In Austria, Italy and Germany, the respective net returns are approx. one percentage point lower than the gross returns. Sweden shows the smallest change with 0.7 percentage points. Interpreting this difference between gross and net returns as the "social return to education", the UK benefits the most from a high level of education in the population.

For women we estimate significant positive returns to education as well. As for men, the cumulated unemployment duration is significant for Austria, Germany and Italy. The combined gross as well as the net returns to education is highest for UK and Austrian women with 9 percent (and 7 percent when considering the net returns). As for men, Swedish women are estimated to have the lowest returns with respect to education.

Comparing the returns of education by gender across countries, we find that there are no significant gender differences in the UK. While the returns are slightly lower for women in Germany and Sweden than for their male, the opposite is true for Austria and Italy.

We find similar results in our robustness checks where we use the cumulated time not worked during the lifetime. The results are reported in tables 8 to 10 in the appendix.

5 Conclusion

In this paper we compare the returns to education across five European countries (Austria, Germany, Italy, Sweden, and the United Kingdom) which differ significantly with respect to both education systems and labour market structures. We apply an augmented Mincerian wage equation, splitting the effect of education into a direct effect and into an indirect effect by accounting for the cumulated duration of previous unemployment. Across countries we find a high variation not only in the returns to education, but also of the effect of education on unemployment duration. While there is a strong effect for Germany, the effect is not significant for Swedish men. Previous unemployment reduces wages in Austria, Germany and Italy.

Our findings for the direct effect of education on wages are comparable to those found in previous studies. While the UK exhibits the highest returns to education, Sweden has only very low returns to education. This finding is puzzling with respect to the share of university graduates in the respective countries. If the returns would be the only determinant in the decision to pursue higher education, Sweden would not be expected to have such a high share of university graduates. However, other factors also affect enrolment in higher education. For one, Sweden as well as the UK have a higher share of individuals who are eligible to enter tertiary education. As for the individuals who faced the decision to invest into another year of education, entrance barriers in form of tuition fees may have an impact. While the costs of education in the analysed countries are relatively small when compared to the lifetime income, they might still have an impact at the time the decision is made. The different countries seem to react with different policies in order to maintain high graduation rates.

While the UK has high returns to education, tuition fees are also more common

than in the other countries considered here, whereas Sweden with rather low returns follows a different strategy with a very generous student aid scheme. With respect to the benchmarks set in the EU 2020 strategy, both policies seem to work. However, it seems premature to draw policy conclusions from these observations for countries with quite different educational and vocational systems in place. For example, for part of youth with a qualifying secondary education the vocational training systems of Austria and Germany might be more attractive than enrolment into university. If apprenticeship systems providing high-quality vocational training exist, as it used to be the case in Austria and Germany, there is less need to reach the politically set benchmark of tertiary educational attainment.

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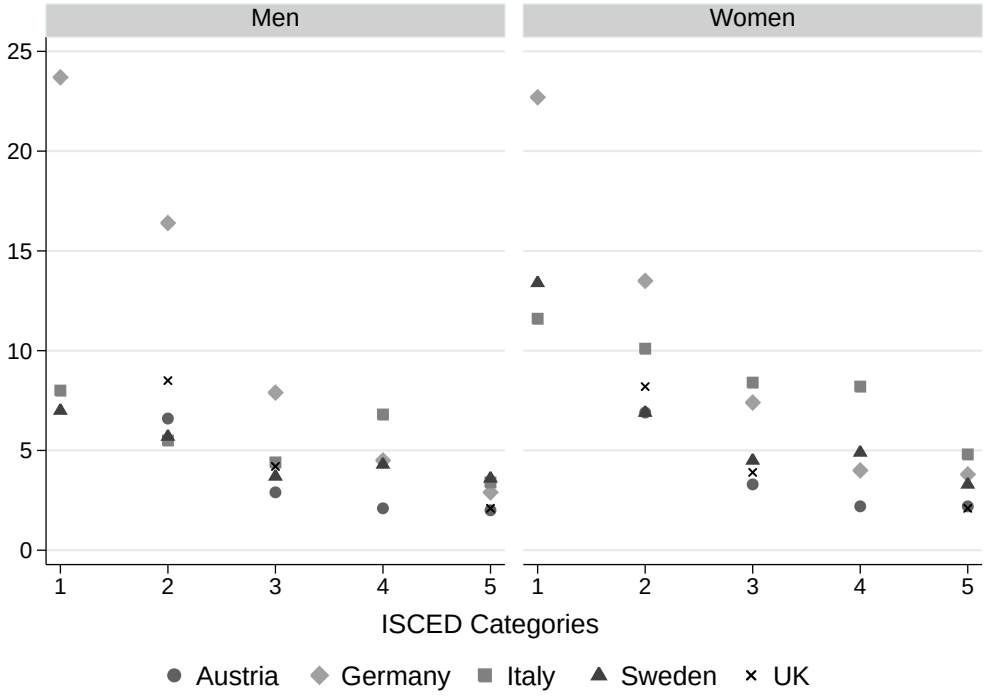
A Figures

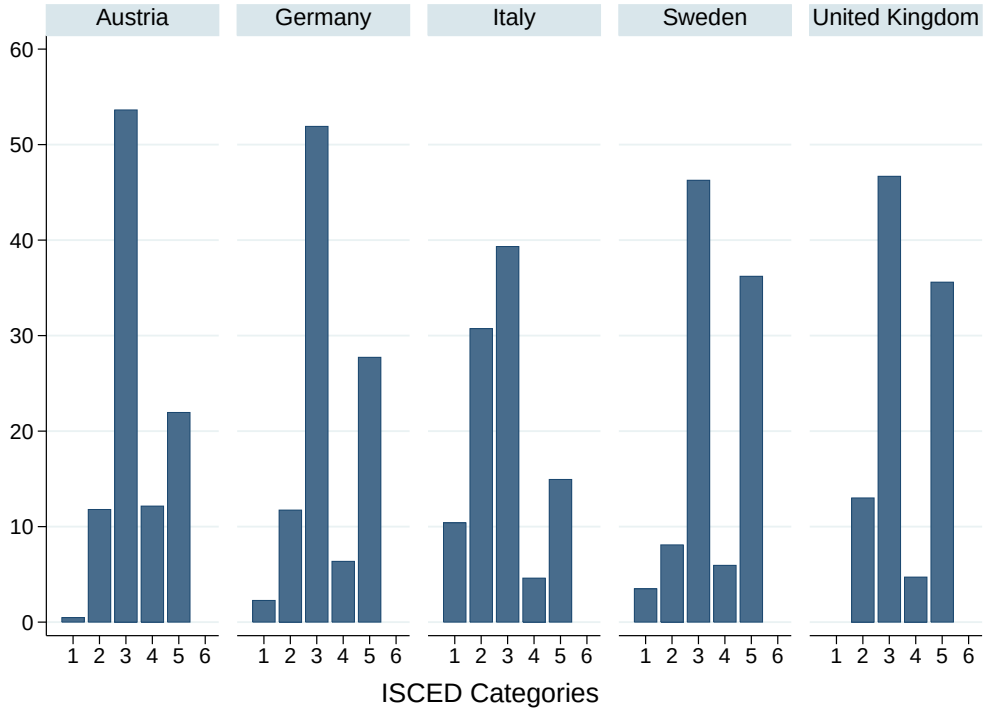
Figure 1: Unemployment Rate by educational attainment



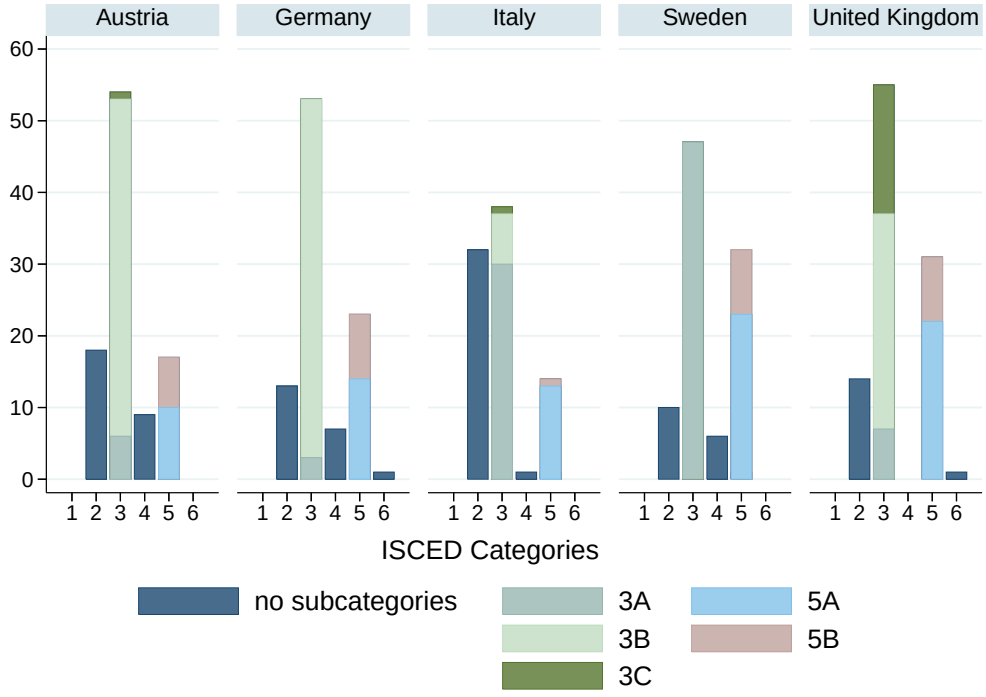
Source: OECD Education at Glance (2010)

Figure 2: Share of adult population with a certain level of education- Comparing EU-SILC with OECD Data

(a) EU-SILC



(b) OECD



Note: Distribution of the 25-64 year-old population, by highest level of education attained
Source: (a) EU-SILC 2008, own calculations; (b) OECD Education at Glance (2010), Indicator A1: To what level have adults studied?

Figure 3: Predicted log(wages) varying with education - Men

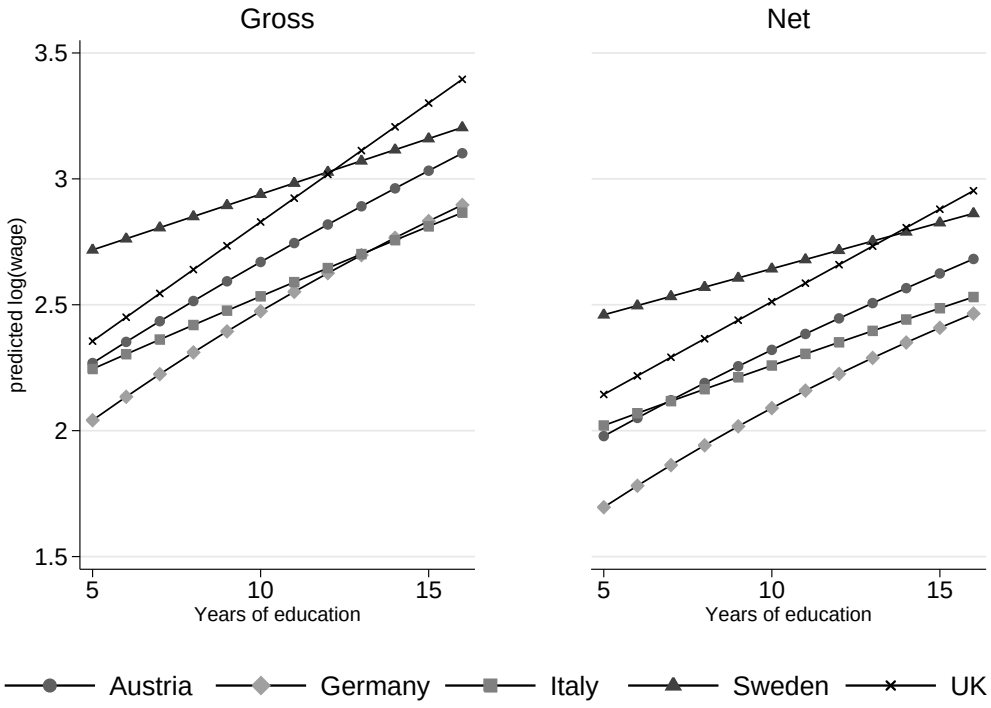
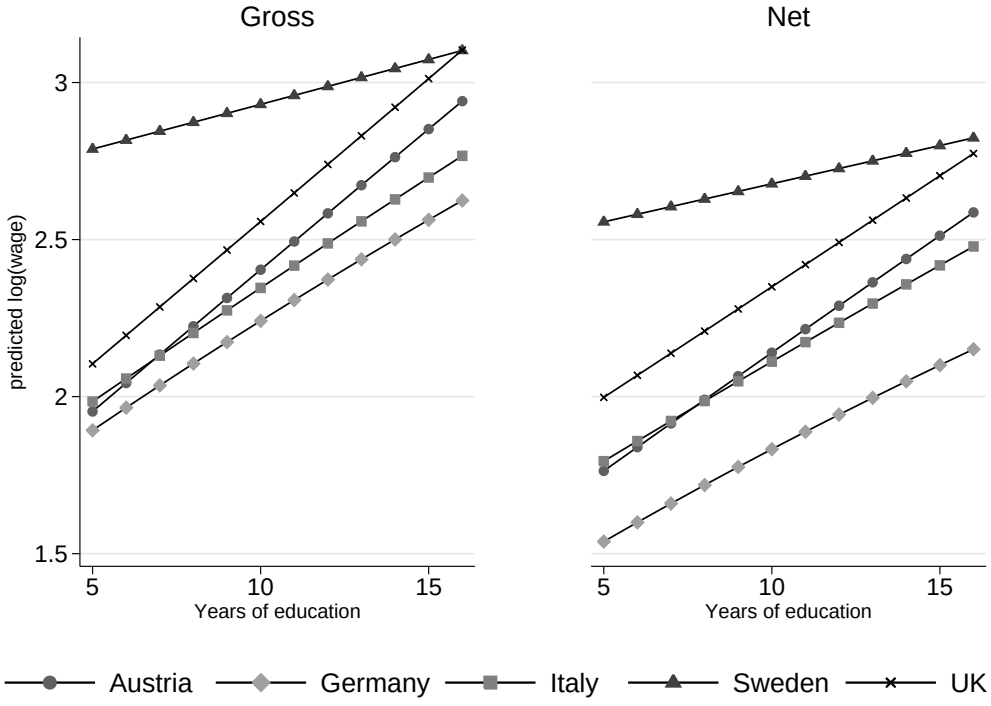


Figure 4: Predicted log(wages) varying with education - Women



B Tables

Table 1: Institutional characteristics in the different countries

	Austria	Germany	Italy	Sweden	United Kingdom
Compulsory school age	6–15	6–16	6–16	7–16	5–16
Average age when finished:					
pre-school: ISCED 0	6	6–7	6	7	5
primary: ISCED 1	10	10	11	13	11
lower secondary: ISCED 2	14	16	14	16	14
upper secondary: ISECD 3	18–19	18–19	19	19	17–18
post secondary, non tertiary: ISCED 4	19–20	21–22	21	21	(*)
tertiary: ISCED 5	21–24	22–25	22–25	21–24	20–23
ISCED 5					
Tuition Fees in EUR/semester:	363	≤ 500	≥ 175	-	$\leq \sim 291$
Student Aid :					
Means-tested:	yes	yes	-	no	yes
Max. amount (in EUR/month):	679	670		312	285
Repayment:	non-repayable when successfully finished	max. 10,000 EUR			non-repayable

In no country tuition fees apply during compulsory education (if not private school)
* Access Courses (Further/higher education) usually at age 18–19
Source: European Comission (2010c,d,e,f,g)

Table 2: Definition of gross and net income in the EU-SILC Dataset

Austria	gross income	net income
Germany[1]	gross income	net income
Italy	net of tax on income at source and social contributions	net income
Sweden	net of tax on social contributions	net income
United Kingdom	gross	-

[1] Information from the GSOEP

Table 3: Tobit - Men

	Austria	Germany	Italy	Sweden	UK
Yrs. of educ.	−2.338**	−3.041**	−1.615**	0.002	−2.055**
	(0.387)	(0.268)	(0.153)	(0.292)	(0.395)
kids	4.959**	2.622	−0.642	0.975	−4.439*
	(1.761)	(1.786)	(1.410)	(1.757)	(2.226)
city1	3.878*		−1.465	−0.276	2.644
	(1.591)		(1.157)	(1.851)	(2.258)
married	−6.413**	−13.270**	−13.522**	−5.244**	−2.869
	(1.884)	(1.798)	(1.426)	(1.639)	(2.099)
age	−0.684	−3.102**	−2.395**	0.175	−0.173
	(0.769)	(0.610)	(0.555)	(0.668)	(0.773)
age squared	0.009	0.037**	0.025**	−0.003	0.000
	(0.009)	(0.007)	(0.007)	(0.008)	(0.009)
east		18.096**			
		(1.482)			
_cons	21.914	88.402**	56.732**	−17.725	3.322
	(16.589)	(12.916)	(11.353)	(14.535)	(17.303)
sigma					
_cons	20.400**	30.241**	28.738**	16.180**	23.496**
	(1.142)	(0.758)	(0.616)	(1.144)	(1.456)
N	1622	3587	5512	1168	2018

Robust standard errors in parentheses
Significance-level: ∗ : 5% ∗∗ : 1%

Table 4: Tobit - Women

	Austria	Germany	Italy	Sweden	UK
Yrs. of educ.	−1.066**	−2.205**	−1.648**	−0.963**	−1.172**
	(0.308)	(0.258)	(0.130)	(0.326)	(0.260)
kids	16.711**	8.696**	5.409**	1.798	10.187**
	(1.712)	(1.645)	(1.044)	(2.152)	(1.451)
city1	0.627		−3.771**	−0.897	−0.148
	(1.579)		(0.974)	(2.357)	(1.519)
married	1.937	−14.472**	−0.588	−3.796*	−1.588
	(1.596)	(1.553)	(1.049)	(1.875)	(1.361)
age	−3.595**	−2.548**	−1.731**	−2.360**	−0.449
	(0.821)	(0.607)	(0.495)	(0.815)	(0.558)
age squared	0.036**	0.031**	0.011	0.021*	0.002
	(0.010)	(0.007)	(0.006)	(0.009)	(0.006)
east		17.983**			
		(1.532)			
_cons	75.685**	60.022**	59.298**	52.477**	7.831
	(16.090)	(12.725)	(9.890)	(17.350)	(12.056)
sigma					
_cons	21.704**	30.931**	24.821**	19.950**	21.139**
	(0.783)	(0.726)	(0.467)	(1.391)	(0.909)
N	1445	3751	4642	1232	2276

Robust standard errors in parentheses
Significance-level: ∗ : 5% ∗∗ : 1%

Table 5: Changes in unemployment duration with varying education - Men

	Austria	Germany	Italy	Sweden	UK
EU-Mean					
Probability	0.151**	0.257**	0.136**	0.116**	0.083**
	(0.013)	(0.013)	(0.007)	(0.016)	(0.011)
Duration	1.595**	4.670**	1.973**	0.918**	0.885**
	(0.176)	(0.320)	(0.125)	(0.163)	(0.146)
With 9 years of education					
Probability	0.283**	0.401**	0.191**	0.116**	0.150**
	(0.027)	(0.027)	(0.008)	(0.023)	(0.019)
Duration	3.595**	8.661**	3.026**	0.917**	1.826**
	(0.473)	(0.817)	(0.165)	(0.230)	(0.317)
With 10 years of education					
Probability	0.246**	0.363**	0.176**	0.116**	0.131**
	(0.021)	(0.023)	(0.008)	(0.021)	(0.016)
Duration	2.977**	7.499**	2.729**	0.917**	1.538**
	(0.348)	(0.658)	(0.148)	(0.207)	(0.252)
With 12 years of education					
Probability	0.180**	0.291**	0.149**	0.116**	0.097**
	(0.014)	(0.016)	(0.007)	(0.017)	(0.012)
Duration	1.986**	5.515**	2.206**	0.918**	1.073**
	(0.204)	(0.410)	(0.129)	(0.172)	(0.170)
With 16 years of education					
Probability	0.085**	0.170**	0.103**	0.116**	0.050**
	(0.013)	(0.009)	(0.007)	(0.017)	(0.010)
Duration	0.790**	2.750**	1.402**	0.919**	0.487**
	(0.152)	(0.180)	(0.122)	(0.175)	(0.110)

Table 6: Changes in unemployment duration with varying education - Women

	Austria	Germany	Italy	Sweden	UK
EU-Mean					
Probability	0.206**	0.238**	0.245**	0.103**	0.160**
	(0.015)	(0.012)	(0.009)	(0.014)	(0.013)
Duration	2.515**	4.330**	3.596**	0.975**	1.787**
	(0.238)	(0.273)	(0.180)	(0.169)	(0.188)
With 9 years of education					
Probability	0.274**	0.348**	0.347**	0.147**	0.229**
	(0.025)	(0.024)	(0.012)	(0.025)	(0.020)
Duration	3.665**	7.229**	5.786**	1.514**	2.809**
	(0.449)	(0.683)	(0.270)	(0.322)	(0.338)
With 10 years of education					
Probability	0.258**	0.322**	0.323**	0.136**	0.212**
	(0.021)	(0.021)	(0.011)	(0.021)	(0.017)
Duration	3.381**	6.491**	5.233**	1.378**	2.551**
	(0.370)	(0.563)	(0.236)	(0.272)	(0.283)
With 12 years of education					
Probability	0.228**	0.273**	0.277**	0.116**	0.182**
	(0.016)	(0.015)	(0.009)	(0.016)	(0.014)
Duration	2.864**	5.180**	4.245**	1.135**	2.089**
	(0.265)	(0.372)	(0.193)	(0.199)	(0.211)
With 16 years of education					
Probability	0.173**	0.187**	0.196**	0.083**	0.129**
	(0.017)	(0.009)	(0.010)	(0.014)	(0.014)
Duration	2.013**	3.167**	2.695**	0.754**	1.366**
	(0.258)	(0.194)	(0.175)	(0.151)	(0.185)

Table 7: Returns to education

	Austria	Germany	Italy	Sweden	UK
Men					
Gross Returns					
Yrs. of educ.	0.065**	0.050**	0.051**	0.044**	0.094**
	(0.005)	(0.005)	(0.002)	(0.005)	(0.004)
Cum. unempl.	−0.019**	−0.027**	−0.019**	−0.013	−0.001
	(0.005)	(0.002)	(0.002)	(0.008)	(0.008)
age	0.029*	0.056**	0.042**	0.016	0.073**
	(0.014)	(0.008)	(0.006)	(0.012)	(0.010)
age squared	−0.000	−0.001**	−0.000**	−0.000	−0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	1.225**	0.652**	0.794**	2.024**	0.161
	(0.309)	(0.196)	(0.130)	(0.259)	(0.212)
N	1526	3118	4877	1088	1985
Combined effect	0.072	0.070	0.055	0.044	0.094
Net returns					
Yrs. of educ.	0.053**	0.042**	0.041**	0.037**	0.073**
	(0.005)	(0.004)	(0.002)	(0.004)	(0.004)
Cum. unempl.	−0.013**	−0.024**	−0.014**	−0.008	0.006
	(0.004)	(0.002)	(0.002)	(0.007)	(0.008)
age	0.020	0.056**	0.041**	0.008	0.049**
	(0.013)	(0.008)	(0.005)	(0.011)	(0.008)
age squared	−0.000	−0.001**	−0.000**	−0.000	−0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	1.198**	0.365*	0.678**	2.019**	0.610**
	(0.282)	(0.182)	(0.116)	(0.235)	(0.183)
N	1526	3118	4877	1088	1985
Combined effect	0.058	0.060	0.044	0.037	0.072
Women					
Gross Returns					
Yrs. of educ.	0.087**	0.053**	0.066**	0.029**	0.092**
	(0.005)	(0.005)	(0.002)	(0.007)	(0.004)
Cum. unempl.	−0.009**	−0.019**	−0.011**	0.002	0.003
	(0.002)	(0.002)	(0.002)	(0.011)	(0.004)
age	0.033*	0.035**	0.010	0.092**	0.036**
	(0.014)	(0.008)	(0.008)	(0.018)	(0.010)
age squared	−0.000	−0.000**	0.000	−0.001**	−0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	0.693*	0.938**	1.213**	0.416	0.826**
	(0.301)	(0.184)	(0.165)	(0.441)	(0.217)
N	1305	2784	3891	1158	2217
Combined effect	0.089	0.063	0.070	0.029	0.091
Net returns					
Yrs. of educ.	0.072**	0.043**	0.057**	0.025**	0.071**
	(0.005)	(0.004)	(0.002)	(0.007)	(0.004)
Cum. unempl.	−0.006**	−0.014**	−0.008**	0.004	0.009*
	(0.002)	(0.002)	(0.002)	(0.011)	(0.004)
age	0.032*	0.021**	0.013	0.088**	0.028**
	(0.013)	(0.007)	(0.007)	(0.017)	(0.009)
age squared	−0.000	−0.000**	−0.000	−0.001**	−0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
_cons	0.604*	0.951**	1.052**	0.306	0.992**
	(0.271)	(0.167)	(0.154)	(0.435)	(0.196)
N	1305	2784	3891	1158	2217
Combined effect	0.074	0.050	0.060	0.024	0.070

Robust standard errors in parentheses

Significance-level: * : 5% ** : 1%

Table 8: Tobit Men - Robustness-Checks

	Austria	Germany	Italy	Sweden
Yrs. of educ.	−0.550**	−0.784**	−0.353**	0.309**
	(0.097)	(0.034)	(0.025)	(0.041)
kids	−0.051	0.567**	0.268	−0.047
	(0.537)	(0.215)	(0.220)	(0.269)
city1	1.177*		−0.239	−0.099
	(0.471)		(0.184)	(0.282)
married	−0.913	−1.862**	−0.920**	−0.282
	(0.546)	(0.221)	(0.233)	(0.244)
age	0.249	−0.065	−0.151	0.427**
	(0.233)	(0.081)	(0.090)	(0.104)
age squared	−0.002	0.001	0.003*	−0.005**
	(0.003)	(0.001)	(0.001)	(0.001)
east		0.471*		
		(0.199)		
_cons	−4.949	15.921**	7.979**	−12.464**
	(5.033)	(1.774)	(1.870)	(2.257)
sigma				
_cons	6.868**	4.892**	6.090**	3.619**
	(0.270)	(0.074)	(0.080)	(0.100)
N	1618	3587	5416	1145

Robust standard errors in parentheses

Significance-level: * : 5% ** : 1%

Table 9: Tobit Women - Robustness-Checks

	Austria	Germany	Italy	Sweden
Yrs. of educ.	-0.614^{**}	-1.278^{**}	-0.558^{**}	-0.094
	(0.088)	(0.044)	(0.030)	(0.052)
kids	2.786^{**}	3.367^{**}	0.388	0.292
	(0.500)	(0.265)	(0.239)	(0.374)
city1	-0.895^{*}		-0.439^{*}	0.386
	(0.453)		(0.212)	(0.376)
married	1.789^{**}	0.883^{**}	-0.052	-0.009
	(0.451)	(0.252)	(0.231)	(0.307)
age	-0.097	0.237^{*}	0.353^{**}	0.006
	(0.246)	(0.105)	(0.108)	(0.130)
age suqared	0.005	0.001	-0.003^{*}	0.001
	(0.003)	(0.001)	(0.001)	(0.001)
east		-2.402^{**}		
		(0.254)		
_cons	2.831	13.006^{**}	-0.372	0.661
	(5.215)	(2.294)	(2.219)	(2.894)
sigma				
_cons	7.391^{**}	6.615^{**}	6.428^{**}	4.934^{**}
	(0.193)	(0.085)	(0.089)	(0.126)
N	1440	3751	4517	1211

Robust standard errors in parentheses

Significance-level: $*$: 5% $**$: 1%

Table 10: Returns to education - Robustness-Checks

	Austria	Germany	Italy	Sweden
Men				
Gross Returns				
Yrs. of educ.	0.065**	0.062**	0.051**	0.048**
	(0.005)	(0.005)	(0.002)	(0.005)
Cum. unempl.	−0.039**	0.009**	−0.012**	−0.016*
	(0.006)	(0.003)	(0.002)	(0.008)
age	0.030*	0.066**	0.043**	0.022
	(0.014)	(0.008)	(0.006)	(0.013)
age squared	−0.000	−0.001**	−0.000**	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	1.177**	0.157	0.771**	1.865**
	(0.306)	(0.195)	(0.131)	(0.270)
N	1526	3118	4877	1069
Combined effect	0.071	0.056	0.053	0.045
Net returns				
Yrs. of educ.	0.053**	0.052**	0.041**	0.039**
	(0.005)	(0.004)	(0.002)	(0.005)
Cum. unempl.	−0.029**	0.008**	−0.009**	−0.013*
	(0.005)	(0.002)	(0.001)	(0.007)
age	0.022	0.064**	0.042**	0.012
	(0.013)	(0.008)	(0.005)	(0.012)
age squared	−0.000	−0.001**	−0.000**	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	1.163**	−0.068	0.661**	1.900**
	(0.280)	(0.181)	(0.117)	(0.244)
N	1526	3118	4877	1069
Combined effect	0.058	0.047	0.043	0.037
Women				
Gross Returns				
Yrs. of educ.	0.082**	0.043**	0.063**	0.028**
	(0.006)	(0.005)	(0.002)	(0.008)
Cum. unempl.	−0.017**	−0.010**	−0.013**	−0.013*
	(0.003)	(0.002)	(0.002)	(0.006)
age	0.033*	0.041**	0.015	0.096**
	(0.015)	(0.008)	(0.008)	(0.018)
age squared	−0.000	−0.000**	0.000	−0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	0.680*	0.946**	1.111**	0.348
	(0.308)	(0.189)	(0.166)	(0.446)
N	1305	2784	3891	1141
Combined	0.088	0.056	0.068	0.029
Net returns				
Yrs. of educ.	0.069**	0.035**	0.055**	0.024**
	(0.005)	(0.004)	(0.002)	(0.007)
Cum. unempl.	−0.011**	−0.008**	−0.010**	−0.012
	(0.003)	(0.001)	(0.002)	(0.006)
age	0.032*	0.026**	0.016*	0.092**
	(0.013)	(0.007)	(0.007)	(0.018)
age squared	−0.000	−0.000**	−0.000	−0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	0.602*	0.959**	0.982**	0.245
	(0.276)	(0.170)	(0.156)	(0.440)
N	1305	2784	3891	1141
Combined	0.073	0.044	0.059	0.025

Robust standard errors in parentheses
Significance-level: ∗ : 5% ∗∗ : 1%

Table 11: Descriptive statistics by country (Men)

	Austria		Germany		Italy		Sweden		UK	
	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
Whole Sample:										
Employed	0.950	0.218	0.949	0.219	0.906	0.292	0.960	0.197	0.963	0.190
Yrs. educ.	13.048	2.368	15.766	2.419	11.281	3.581	13.388	2.945	12.637	2.636
Age	42.589	8.843	44.967	9.737	42.065	9.348	43.111	10.511	45.092	10.280
Number of children	0.453	0.498	0.363	0.481	0.391	0.488	0.451	0.498	0.413	0.492
Living in a densely pop. Area	0.314	0.464	.	.	0.362	0.481	0.213	0.410	0.768	0.422
Married	0.672	0.470	0.700	0.458	0.648	0.478	0.519	0.500	0.676	0.468
Cumulated experienced unemployment spells over										
last 4 years (in month)	1.832	5.967	4.306	11.014	3.399	8.898	1.028	3.719	1.130	4.844
lifetime (in yrs)	1.006	2.743	2.707	4.517	3.565	4.391	1.935	2.725	.	.
Working sample:										
log(hourly wage) gross	2.872	0.503	2.807	0.518	2.577	0.475	3.075	0.485	3.013	0.567
log(hourly wage) net	2.494	0.444	2.376	0.480	2.289	0.412	2.762	0.432	2.666	0.474
Yrs. educ.	13.111	2.350	15.891	2.249	11.381	3.510	13.434	2.938	12.699	2.634
Age	42.370	8.763	44.499	9.416	42.363	9.206	42.907	10.538	45.094	10.228
Number of children	0.459	0.499	0.380	0.486	0.404	0.491	0.453	0.498	0.419	0.493
Living in a densely pop. Area	0.307	0.462	.	.	0.361	0.480	0.217	0.412	0.770	0.421
Married	0.681	0.466	0.717	0.451	0.675	0.468	0.527	0.500	0.682	0.466
Cumulated experienced unemployment spells over										
last 4 years (in month)	0.895	3.352	1.541	5.328	1.165	4.330	0.513	2.233	0.438	2.426
lifetime (in yrs)	0.760	2.119	2.087	3.833	3.253	4.005	1.836	2.583	.	.

Table 12: Descriptive statistics by country (Women)

	Austria		Germany		Italy		Sweden		UK	
	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
Whole Sample:										
Employed	0.934	0.249	0.938	0.241	0.871	0.336	0.963	0.190	0.977	0.149
Yrs. educ.	12.824	2.476	15.576	2.530	12.328	3.463	13.961	2.905	12.738	2.657
Age	42.425	8.352	44.293	9.560	41.152	8.995	44.368	10.633	44.446	9.938
Number of children	0.409	0.492	0.366	0.482	0.406	0.491	0.438	0.496	0.421	0.494
Living in a densely pop. Area	0.342	0.474	.	.	0.361	0.480	0.197	0.398	0.756	0.430
Married	0.597	0.491	0.676	0.468	0.624	0.484	0.526	0.500	0.623	0.485
Cumulated experienced unemployment spells over										
last 4 years (in month)	4.318	9.128	4.508	11.214	5.653	10.909	1.433	4.998	2.205	6.423
lifetime (in yrs)	3.892	5.415	8.059	7.779	4.203	5.035	2.871	3.881	.	.
Working sample:										
log(hourly wage) gross	2.641	0.512	2.565	0.475	2.510	0.517	2.952	0.698	2.771	0.577
log(hourly wage) net	2.334	0.453	2.106	0.420	2.251	0.468	2.684	0.681	2.515	0.511
Yrs. educ.	12.893	2.414	15.833	2.286	12.479	3.397	14.047	2.869	12.779	2.651
Age	42.708	8.242	44.239	9.301	41.819	8.944	44.453	10.588	44.323	9.839
Number of children	0.395	0.489	0.316	0.465	0.395	0.489	0.442	0.497	0.420	0.494
Living in a densely pop. Area	0.333	0.472	.	.	0.370	0.483	0.193	0.394	0.755	0.430
Married	0.601	0.490	0.659	0.474	0.637	0.481	0.534	0.499	0.627	0.484
Cumulated experienced unemployment spells over										
last 4 years (in month)	3.041	7.569	1.570	5.679	2.458	6.211	0.905	3.503	1.535	4.877
lifetime (in yrs)	3.697	5.344	6.632	7.017	3.827	4.648	2.805	3.842	.	.

Table 13: Descriptives by country

	Men		Women	
	mean	sd	mean	sd
Whole Sample:				
Employed	0.935	0.246	0.923	0.266
Yrs. educ.	13.016	3.483	13.511	3.234
Age	43.410	9.731	43.039	9.535
Number of children	0.400	0.490	0.401	0.490
Living in a densely pop. Area	0.417	0.493	0.431	0.495
Married	0.657	0.475	0.627	0.484
Cumulated experienced unemployment spells over				
last 4 years (in month)	2.913	8.522	4.198	9.847
lifetime (in yrs)	2.793	4.200	5.339	6.390
Working sample:				
log(hourly wage) gross	2.781	0.537	2.635	0.558
log(hourly wage) net	2.436	0.475	2.321	0.523
Yrs. educ.	13.092	3.411	13.567	3.158
Age	43.370	9.563	43.272	9.385
Number of children	0.411	0.492	0.385	0.487
Living in a densely pop. Area	0.419	0.493	0.438	0.496
Married	0.675	0.469	0.626	0.484
Cumulated experienced unemployment spells over				
last 4 years (in month)	1.054	4.142	1.969	5.831
lifetime (in yrs)	2.407	3.717	4.537	5.675

Table 14: ISCED 97-Categories

ISCED 0	Pre-primary education
ISCED 1	Primary education or first stage of basic education
ISCED 2	Lower secondary or second stage of basic education
ISCED 2A:	programmes designed for direct access to level 3 in a sequence which would ultimately lead to tertiary education, i.e. entrance to ISCED 3A or 3B
ISCED 2B:	programmes designed for direct access to level 3C
ISCED 2C:	programmes primarily designed for direct access to the labour market at the end of this level (sometimes referred to as 'terminal' programmes)
ISCED 3	(Upper) secondary education
ISCED 3A:	programmes at level 3, designed to provide direct access to ISCED 5A
ISCED 3B:	programmes at level 3 designed to provide direct access to ISCED 5B
ISCED 3C:	programmes at level 3 not designed to lead directly to ISCED 5A or 5B
ISCED 4	Post-secondary non-tertiary education
ISCED 4A:	programmes that prepare for entry to ISCED 5
ISCED 4B:	programmes not giving access to level 5 (primarily designed for direct labour market entry)
ISCED 5	First stage of tertiary education
ISCED 5A:	tertiary programmes that are largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programmes and profession with high skills requirements
ISCED 5B:	tertiary programmes that are practically oriented/occupationally specific and is mainly designed for participants to acquire the practical skills, and know-how needed for employment in a particular occupation or trade or class of occupations or trades - the successful completion of which usually provides the participants with a labour-market relevant qualification
ISCED 6	Second stage of tertiary education (leading to an advanced research qualification)

Source: UNESCO (2006)

Table 15: UK Tax Schedule 2008

Marginal tax rate	Income threshold
0	<6035 GBP
20	6035 − 34800 GBP
40	>34800 GBP

Source: OECD (2008), p. 437