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Working Paper

The consumption value of higher education

CESifo Working Paper, No. 2871

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Alstadsæter, Annette; Sievertsen, Hans Henrik (2009) : The consumption value of higher education, CESifo Working Paper, No. 2871, Center for Economic Studies and ifo Institute (CESifo), Munich

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The Consumption Value of Higher Education

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CESIFO WORKING PAPER NO. 2871
CATEGORY 5: ECONOMICS OF EDUCATION
DECEMBER 2009

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The Consumption Value of Higher Education

Abstract

The consumption value of higher education is an important factor behind the individual's educational choice. We provide a comprehensive literature survey, and define the consumption value as the private, intended, non-pecuniary return to higher education. We provide new empirical evidence for the willingness to pay for the consumption value of a particular type of higher education. Even when controlling for ability selection, we find on US data that Liberal Arts graduates were willing to forego 46 pct. of their potential income in order to enjoy the consumption value of this educational type.

JEL Code: J24, J31, J33, I21, H89.

Keywords: educational choice, type of education, non-pecuniary return, willingness to pay, consumption value of education.

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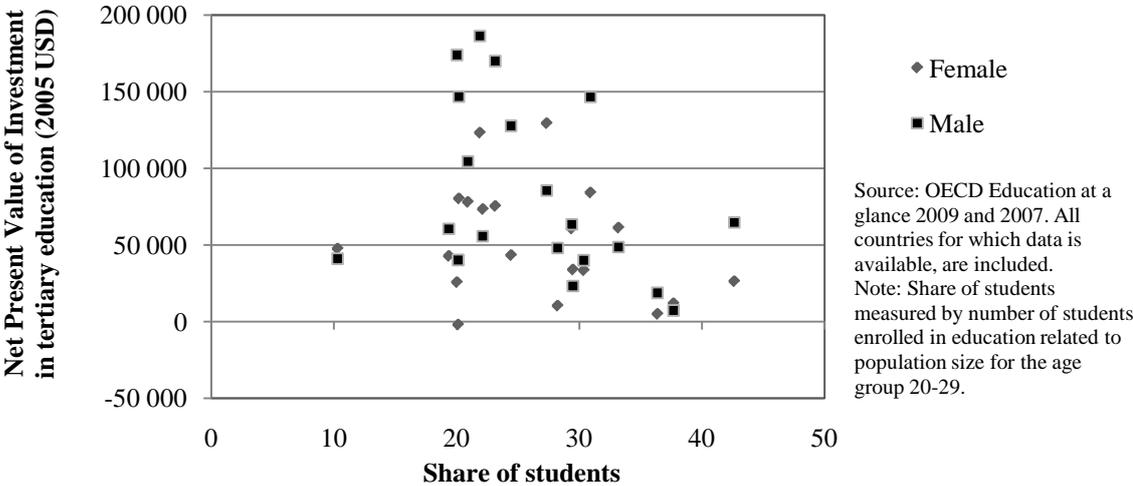
We thank René L. Frey, Reiner Eichenberger, and Bruno S. Frey for their comments and suggestions that inspired us to write this paper. We also thank the Faculty of Medicine, University of Oslo, for funding.

1. Introduction

What motivates an individual’s choice of higher education? The outcome of this decision has on aggregate level great implications for the society, as the educational choice of today’s young generation determines the skill composition of the future labor force. The established view is to consider higher education as a financial investment that generates a pecuniary return in the future.⁴ For example, the OECD recently stated that “*Economic returns to education are a key driver for individuals’ decisions to invest time and money in education beyond compulsory schooling.*” (OECD 2009, p. 154).

However, the observed patterns in higher education do not support this view of the financial return being the main motivation for the choice of higher education. If this was the case, demand for higher education should be higher in countries with higher returns, *ceteris paribus*. But we observe high educational levels in countries with low wage returns, as clearly seen in figure 1.

Figure 1: *Enrolment into tertiary education and financial return (2005)*



Other institutional settings might explain why there is no relationship between financial return to education and demand for education, such as admission barriers. But this does not explain the very low tax-graduation elasticity found by Oliveira Martins et al. (2007): a five percentage point reduction in the marginal tax rate would only increase the

⁴ Prior to the human capital revolution in the 1960ies, education was considered to be a cultural good. One shortcoming of this framework was that it ignored the fact that pursuing education actually increases the productivity of the individual and his wages in the next period. Schultz (1960) and Becker (1964) introduced the theory of human capital, where education is an investment that increases the individual’s wage in the next period. During the 1970ies much attention was given to the discussion on whether education was in fact investment or consumption (Aarrestad, 1972, Schaafsma, 1976, Kodde and Ritzen, 1984).

graduation ratio by 0.3 pct. on average.⁵ This should be considerably higher if education was a pure financial investment. We do not argue that the financial return is not an important factor for the educational decision, but we argue that it is not the sole decisive factor. As Stoikov (1977) notes, conventional treatment of individual's incentive to invest in education has a tendency to forget that education also is a consumption good. The consumption motive for the educational choice can be integrated in the investment view by allowing the educational investment to generate both pecuniary and non-pecuniary returns. And lately, there is increasing interest in the consumption motive for the educational choice, as we show in section 2.

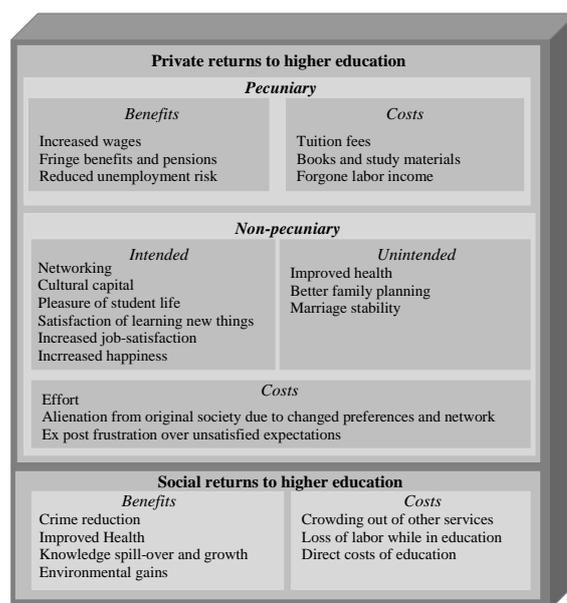
The present paper is to our knowledge the first to give a comprehensive overview of the literature on non-pecuniary return to higher education. In the next section we classify different returns to education, both benefits and costs, and we *define the consumption value of higher education as the private, intended, non-pecuniary return to education*. In section 3 we summarize existing empirical evidence on the existence of a consumption motivation behind the educational choice, both regarding educational level and type. We also provide new evidence on a substantial willingness to pay for the consumption value of particular types of higher education, based on US data. When controlling for ability selection, we find that Liberal Arts graduates were willing to forego 46 pct. of their potential income in order to enjoy the consumption value of this educational type. This strong emphasis on the consumption value of education as a motivation for the choice of educational type in a country like the US, with high wage differentials and a small social security system implies that the consumption value might be the dominant factor behind the choice of higher education in countries with low wage differentials and generous social security systems. We discuss this in more detail in section 4.

2. Returns to higher education

The individual's choice of whether to invest in education is a result of an outweighing of the negative (costs) and positive (benefits) returns. These returns may be both pecuniary and non-pecuniary and may occur both during and after attending higher education. The individual's preferences determine how these factors are valued. Figure 2 gives a systematic overview of these different aspects of the return to higher education, which are discussed in detail in the following section.

⁵ The graduation rate is defined as the number of graduates in tertiary education compared to the potential graduates.

Figure 2: The private and social returns to higher education.



2.1 Private pecuniary returns to higher education

By acquiring higher education the individual increases his future wage when entering the labor force; this comes from two channels: (1) according to the human capital view of education, this is because higher education increases the skill level of the individual and raises his productivity in the labor force, which correspondingly leads to a higher wage (Becker, 1964). (2) According to the signaling view, in a labor market with asymmetric information higher education acts as a signal to employers of high ability, which makes it easier for the individual to acquire a high paid job (Spence, 1974). There has been a vast amount of research on the effect of educational length on earnings. The return to an additional year of schooling is typically found to be between 6 and 12 pct; lower for egalitarian countries such as Scandinavian countries and higher in UK, Ireland and US (see Card, 2001 and Trostel, Walker and Woolley, 2002).

In addition to the direct monetary return to education there is some indication that individuals with higher education enjoy more job related fringe benefits such as health insurance, pensions and subsidized food on the workplace, which can be seen as substitutes to a wage increase (Duncan, 1976).⁶

As stated by Bishop (1994), higher education can reduce the risk for unemployment. This may be by increasing flexibility in the job market, due to a high general knowledge level

⁶ Duncan (1976) defines fringe benefits as non-pecuniary. We classify fringe benefits as pecuniary returns to higher education, as they are part of the employer's compensation for the employee's work effort. This compensation could easily be replaced by increased wage.

and an improved ability to acquire new knowledge. In addition, higher education increases cross-country mobility (Schwartz, 1976). The educational process can also provide the individual with networks that can increase possibilities for future employment and earnings.

The return to higher education depends on type of education, as well as on level. As shown by Walker and Zhu (2003) and Arcidiacono (2004), the wage return to higher education differs substantially across different college majors. Different educational types generate varying future income risks, measured by the variance of wage return (Christiansen et al., 2007). The expected future monetary return is likely to depend on the current wage of individuals with that same educational type. Cunha and Heckman (2007) estimate ex ante and ex post earnings distributions of college graduates and determine the fraction that is due to heterogeneity and the fraction that is due to uncertainty. Alstadsæter (2009) shows that there can be substantial differences between expected (ex ante) and actual (ex post) relative wage return to an educational type.

Finally, there are pecuniary costs of higher education. The direct costs, such as tuition fees, expenses for books and other study material are observed, while foregone labor income during the educational process is counterfactual and has to be estimated.

2.2 Private, non-pecuniary returns to education

The individual's preferences are not necessarily constant over his lifetime. They are influenced and shaped by the surroundings. New information, learning, experience, innovation and human interactions affect the individual and might induce a shift in preferences over time. The educational process might thus change the individual's preferences such that the individual's ex post preferences differ from the ex ante preferences. For example going to the opera might not have been enjoyable before the education, but after receiving higher education it might. These changes in preferences are ex ante unforeseen. They do not serve as a motivation behind the individual's educational choice, and should thus not be included in the ex ante consumption value of education, even though they are non-pecuniary returns to the education. We thus distinguish between intended and unintended non-pecuniary returns to higher education.

Intended non-pecuniary benefits

Higher education can generate substantial non-pecuniary returns to the individual, both during the educational process, and after its completion. These can serve as a motive for the

individuals' educational choice, and different individuals will value these factors differently, depending on their preferences.

For many students the joy of learning serves as an important non-pecuniary return to higher education. This we can define as intrinsic motivation, when individuals do things just because they enjoy doing them, as discussed by Frey (1997). The intrinsic motivation to know is widely discussed within the psychology literature, see for instance Vallerand et al. (1992). In addition to the joy of learning new things, life as a student involves a range of activities that can give direct utility to the individual. These activities involve participating in sport events, parties, dating, meeting new people, moving to a new city or country, and experiencing campus life and participating in student activities (Nerdrum, 1999, Alstadsæter 2009). Being a student in some sense also postpones adulthood, which may increase total utility dependent on the individual's preferences (Ohles, 1968).

During the educational process the individual can acquire a broad network, both locally and globally, that can provide direct utility through friendships, marriage, and wider horizons, both during the educational process and after.⁷ This can be defined as cultural capital (Bourdieu, 1973). Especially for some types of higher education there is an increase in social status from acquiring the education, which some individuals value highly and internalize as part of their identity (Dolton et al., 1989, Akerlof and Kranton, 2003, and Bishop 2006). In the previous section we discussed how higher education would reduce the future income risk. If the individual is risk averse, this reduced risk would in itself provide utility (Christiansen et al., 2007).

Higher education also generates a certain consumption value after its completion, through status (Dolton et al. 1989), possibilities for interesting and challenging jobs (Weisbrod, 1962), and through performing what the individual considers important social tasks (Barnabou and Tirole, 2003).

After its completion, higher education provides the individual with utility through the possibility of getting an interesting and challenging job with good working conditions (Duncan, 1976). This increases job-satisfaction and overall well-being (Gardner and Oswald, 2002). Job-satisfaction and happiness as non-pecuniary return to education and especially work has received increasing attention lately (see for example Bjørnskov (2003), Benz (2005) and Kenny (2006)). Frey and Stutzer (2000, 2002) state that people with higher education report higher happiness.

⁷ Furthermore, networks can give the individual access to jobs and increase possibilities of employment and earnings, as we discussed in the previous section.

Unintended non-pecuniary benefits

The change in preferences that follows from being exposed to new environments, culture, individuals, knowledge results in other types of non-pecuniary returns, which are unforeseen by the individual at the time of the educational choice. Such unforeseen returns are increase productivity in household production and lead to more efficient household consumption (Michael 1972, Heckman, 1976, Vila, 2000).

The change in preferences during the educational process induces the individual to change lifestyle. This results in several positive effects, such as improved health, better family planning, and marriage stability, which we will discuss in more detail in the following section on social returns to higher education. These returns are by-products of the educational process and did not serve as a motive for the individual at the time of the educational choice.

Non-pecuniary costs

There are also non-pecuniary costs of higher education, and as the returns, they are individual specific. Here we do not distinguish between intended and unintended non-pecuniary costs.

The educational process requires effort by the student, and these effort costs are often assumed to depend negatively on an individual's ability (Alstadsæter, Kolm and Larsen, 2008). There can also be substantial stress and insecurity in the educational process, in relation to deadlines and exams.

As we have discussed earlier, the educational process might change the individual's preferences. This, in combination with new networks, can lead to a kind of alienation from the individual's home community and family. In addition, higher education may lead to some kind of forced urbanization as the individual might have to live in urban areas in order to get a job where he can apply the skills he acquired during the educational process.

Higher education increases the range of potential future jobs available to the individual, and also leads to an expectation of higher future wage. But as argued by Ferrante (2009), the individuals' socio-economic aspirations will be upward biased when based on the statistical distribution of earnings, which typically is right skewed, as individuals tend to overrate their own abilities. This can then lead to ex post frustration from unfulfilled expectations regarding the individual's actual return to the educational process.

2.3 Social return to higher education

There is a rich literature on both the pecuniary and non-pecuniary social returns of education.

Education and health is often found to be positively related (Becker, 1993, Lleras-Muney, 2005, Grossman, 2005). In particular there seems to be a negative effect from education on drinking (Sander, 1999) and smoking (Miranda and Bratti, 2009). A higher educational level is often related to better family planning (Angrist and Lavy, 1996). Furthermore higher education is found to be related to less crime, and a common result is that education has a causal negative effect on incarceration, as shown by Lochner and Moretti (2004). There is also a general perception that higher education fosters good citizens, measured in charitable work, political participation, and voting, as demonstrated by Milligan, Moretti and Oreopoulos (2004) and Perna (2000).

While these factors are both pecuniary (better health and more safety involves less costs for the government) and non-pecuniary (better well being), Lucas (1988), Romer (1990) and Acemoglu and Angrist (2000) found that education also has a more direct pecuniary effect by promoting technological change and enhancing economic growth.

There are also social costs of higher education. The educational sector occupies a large share of resources in the societies. In the OECD tertiary education alone constitutes 1.9 pct. (OECD, 2009) of combined GDP. Especially in countries with public provision of higher education at low or no direct costs for the students this means an increased tax level and a crowding out of the provision of other public services. This in turn implies redistribution from tax payers to the students. An additional social cost is the withdrawal for students from the labor force for the duration of the education, as emphasized by Bowles (1967).

2.4 Definition: *Consumption Value of Higher Education*

Based on the discussion above, we will now define the consumption value of higher education. These are the non-pecuniary return that the individual is willing to pay for, measured in foregone future labor income, at the time of the educational choice. This means that we exclude unintended returns that follow from changed preferences during the educational process. We also exclude social returns, as it is unlikely for students to have private willingness to pay for future aggregate crime reduction and growth effects when making his educational choice. The consumption value of a particular type of education can be both positive and negative, depending on the individual's preferences. If the benefits dominate the costs, higher education is a consumption good; vice versa it is a consumption bad. By only concentrating higher education, we rule out compulsory schooling, in which investment is determined by schooling laws and not by individual choice. We now define the consumption value of higher education:

Definition 1:

The consumption value of higher education \equiv ***the private, intended, non-pecuniary returns to higher education***

These are the non-pecuniary returns that the individual is willing to pay for at the time of the educational choice, by forgoing the financial return they could have achieved by choosing an educational type that generates a higher future wage return.

3. Empirical evidence of a consumption value

Higher education generates pecuniary return after its completion, but non-pecuniary return both during the education and after its completion. We can make a theoretical distinction between during and after returns, but when estimating the individual's willingness to pay for the consumption value of education, this distinction is not possible. It is not straightforward how a consumption value of higher education can be measured. To get an idea of the strengths and weaknesses of different approaches we briefly review the scarce empirical literature on this issue. Then we present new evidence on the existence of a considerable willingness to pay for the consumption value of particular types of higher education amongst US college graduates.

3.1 The empirical literature on the consumption value of education

Lazear (1977) assumes that all individuals maximize utility when choosing the optimal educational length. If the utility maximizing level is longer than the wealth maximizing level, education itself must be a good. His results show that for up to 17 years of schooling education is a bad, where after it is a good.⁸

Oosterbeek and Webbink (1995) test different theoretical models of motivation for higher education enrolment on Dutch data. They test the models empirically in two years and find that a pure financial model is rejected in one year, while an integrated model of education as investment and consumption based on Kodde and Ritzen (1984) is accepted in both years. Oosterbeek and van Ophem (2000) use a Dutch survey to estimate a Cobb-Douglas utility function and find a positive schooling preference.

Carneiro, Hansen, and Heckman (2003) estimate the counterfactual earnings (a treatment effect) of college education. They include non-pecuniary returns to education in the

⁸ Another approach was taken by Gulasson (1989), who uses the U.S. army draft to provide a measure of "one" aspect of the consumption value of higher education, namely the possibility for avoiding the draft while in college. He measures to what extent the demand for education increases, when the likelihood of being drafted increases. In our opinion the finding of Gulasson is not useful in general. It only shows how much schooling is worth in respect to avoid drafting.

individuals' utility function and find that there is a consumption component, even after controlling for uncertainty. It should be emphasized, that finding a consumption value is not the main objective of their study, but is a sub result of their analysis.

Another approach, taken by Christiansen et al. (2007), is to study the risk-return trade-off of different types of educational types. They identify which educational types are efficient investment assets, in the sense that the income risk is compensated by a higher wage return, and which educational types are inefficient investment assets and thus seem to be chosen out of consumption motives.

All the above mentioned papers have only considered higher education as a homogenous good. When trying to document the existence of consumption value of education and estimating the willingness to for it in different types of higher education, the problem of ability sorting arises. In principle, one could compare the wage return to two different educational types in a compensating differentials framework and conclude that the type with the lower wage return has the higher consumption value. But individuals have different innate ability, and wage differentials across different educational types could merely reflect that high-ability individuals sort into the educational types generating the higher wage return.

In a dynamic setting of college choice Arcidiacono (2004) finds that ability sorting cannot explain the variation in wage premiums across different types of majors amongst college graduates. He concludes that sorting is due to differences in preference and not because of a difference in ability.

While controlling for ability, Alstadsæter (2009) documents that high-ability individuals who attended Teachers' College in Norway during the 1960's could have increased their life-time income substantially by choosing an alternative educational type. The ex post price for this consumption value of Teacher's College turned out to be even higher than the estimated ex ante willingness to pay for it.

3.2 New evidence based on US data

One way to measure whether education has a consumption value is to compare the difference in lifetime earnings of actual and counterfactual educations as done by Alstadsæter (2004). The rational individual with perfect foresight will choose the educational type with the highest expected utility. If education is a pure financial investment, the utility maximizing educational type is the same as the wealth maximizing. If we observe that the agent chooses an educational type different from the wealth maximizing, education must have a consumption value. This is in line with the approach taken by Lazear (1977) on the individuals' chosen

levels of education. However, our econometric methodology is different to previous approaches and more in line with Berger (1988) who pursues a different question.

Data and methodology

We use the US representative sample from the National Longitudinal Survey of Youth 1979 (NLSY79) with rich information on each individual. The initial dataset consists of 6,111 individuals. We only consider college graduates who graduated before 1988. Our final dataset consists of 740 individuals. The individuals were interviewed annually from 1979 to 1994 and every other year from then. We classify the various types of college majors into five types: Science (16 pct.), Liberal Arts (28 pct.), Business & Law (28 pct.), Education & Nursing (18 pct.), and Engineering (8 pct.).⁹ We use information on potential annual earnings, which we adjust to 2005-level using the consumer price index. For estimation we use information on the individuals' socio-economic background, individual characteristics, high school subjects, and eight ability measures, as displayed in table A.2. A special feature of the data is that we can extract information on actual experience as number of weeks worked per year. This implies that we can avoid the problems known from the Mincerian specification where experience typically is measured by age minus graduation year (Mincer 1974). In our setting we then avoid the problem of individuals leaving the labor force for periods, in which the Mincerian specification would overestimate their experience. A full list of variables used is presented in table A2 in the appendix.

For each type of major we want to estimate an earnings function in order to be able to predict earnings. The idea of self-selection (Roy, 1951, Willis and Rosen, 1978) implies that individuals choose an education or occupation that suits them well. Even if a farmer were treated with the same education as the lawyer, he would probably not be as good a lawyer as the lawyer, and vice versa.

We control for selection by applying the methodology of polychotomous choice selection models introduced by Lee (1983). The intuition is to generate a variable that controls for selection. The theory of selection implies that the individuals self-select into educations or occupations for which they have a special talent. If we were able to observe this special talent, we could include directly this in our equation, but this is unfortunately not the case. We can however use the fact that the theory also implies, that an agent with a greater likelihood of choosing an education also will have a higher talent for this educational type, *ceteris paribus*. If we can predict how likely it is that an individual chooses a specific education, we can use

⁹ See table A1 in the appendix for a detailed description of the college major classification.

this to control for selection. The greater the likelihood, the greater is the individual's special talent. We therefore first predict the likelihood of choosing the different educational types. This likelihood should control for selection. Our estimation strategy is similar to Berger (1988) and we estimate the following earnings equation with OLS, for each college major type:

$$y_{ijt} = \mathbf{X}_i \boldsymbol{\beta}_j + \alpha_0 t + \alpha_1 t^2 - \delta_j \hat{\lambda}_{ij} + \mu_{ijt}, \quad (1)$$

where y_{ijt} is the log of the annual earnings for individual i with the education j and actual experience t . These earnings depend on individual characteristics which we include in a vector \mathbf{X}_i and experience t and the selection term $\hat{\lambda}_{ij}$ which is generated in a first step mixed logit estimation of the college choice:

$$\lambda_{ij} = -\frac{\phi[\Phi^{-1}(P_{ij})]}{P_{ij}}, \quad (2)$$

where ϕ is the standard normal density function.

We can summarize our estimation procedure as:

- I. We estimate P_{ij} with a mixed logit model using data on individual characteristics, ability scores, financial information and high school subjects. Using the estimated P_{ij} we form $\hat{\lambda}_{ij}$.
- II. Using $\hat{\lambda}_{ij}$ from the first stage and individual characteristics, a composite ability score as well as experience, we estimate equation (1) with OLS.

Note that if $\delta_j < 0$, then ρ_j must be positive, in other words $\delta_j < 0$ implies positive selection, so that individuals who are likely to choose education j receive higher earnings with this education, than if a random individual was treated with the same education. See the technical appendix for a more detailed description of the estimation procedure.

Results

Selected estimation coefficients from the OLS estimation of (1) are presented in table 1 below. We have evidence for positive selection for both Science and Education & Nursing, which means that these graduates' abilities correlate well with the required skills in these professions and that they have a higher wage return to education than if a random individual was to acquire these types of education. There is no evidence of selection in Engineering and Business school & Law, while on the contrary there is negative selection for Liberal Arts.

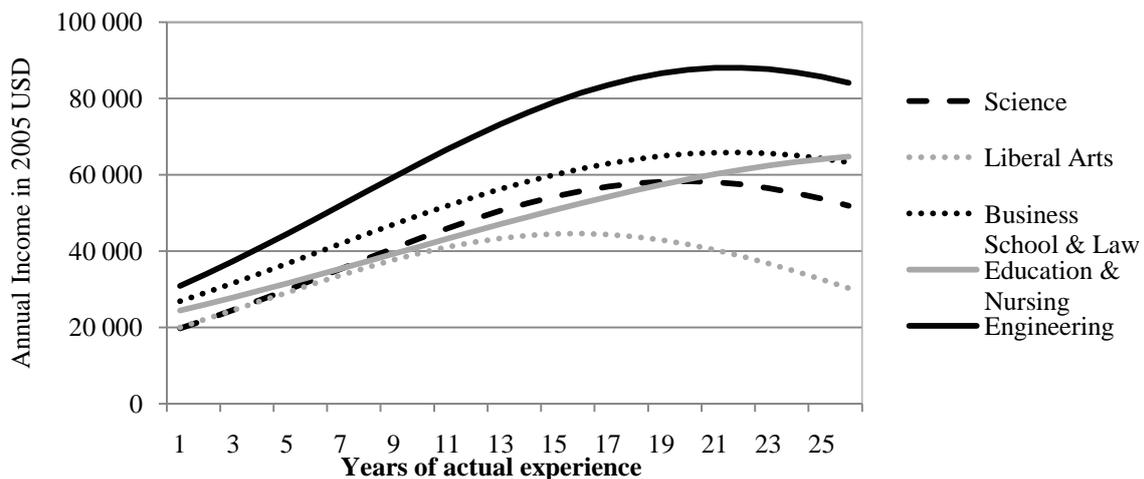
Table 1: *Earning functions, OLS*

	Science	Liberal Arts	Business School & Law	Education & Nursing	Engineering
Experience	0.12*** (0.01)	0.12*** (0.01)	0.09*** (0.01)	0.07*** (0.01)	0.11*** (0.02)
Experience sq	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Male	0.40*** (0.04)	0.38*** (0.03)	0.40*** (0.03)	0.35*** (0.05)	0.28*** (0.08)
White	-0.02 (0.10)	-0.05 (0.05)	-0.03 (0.04)	-0.18*** (0.04)	0.37** (0.15)
Selection	-0.25*** (0.07)	0.23*** (0.05)	-0.06 (0.06)	-0.14** (0.06)	0.04 (0.04)
Children	0.05*** (0.02)	-0.11*** (0.02)	-0.06*** (0.01)	-0.04** (0.02)	-0.00 (0.01)
Constant	10.08*** (0.18)	9.39*** (0.09)	9.75*** (0.12)	9.76*** (0.09)	9.72*** (0.17)
Observations	1439	2681	2784	1814	809

Note: ***, ** denotes significance on respectively a 10, 5 and 1 pct level.
Bootstrap standard errors in parenthesis.

Even after we have controlling for selection there are substantial differences in the wage returns to the different majors. Using a representative individual¹⁰ we can predict the earning profiles using the estimated coefficients. We see from figure 3 that the earning profiles differ substantially over educational type. Engineering graduates have the highest annual income for all levels of experience, while Liberal Arts graduates have the lowest.

Figure 3: *Predicted earning profiles*



Predicting present values

Recall that we use actual experience in estimating the returns to education. In order to be able to compare the returns, we predict earnings by using the same amount of experience for all individuals. Using actual experience provides us with coefficients on how the earnings depend on experience measured in years, which we use to predict earnings for up to 26 years of experience. The reason for why we only predict for 26 years is that we don't have any observations with more than this amount of education and we want to avoid out of sample

¹⁰ The representative individual is defined by the mean of all explanatory variables.

prediction. The choice of discount rate does not affect the relative return; we apply a rate of 4 pct. in our calculations of present values.

For each college major type we calculate the average present value of the income from the first 26 years of work experience and compare this with the highest alternative income. The results are shown in table 2. It is seen that Liberal Arts and Education & Nursing graduates have the lowest present value and sacrifice 46 and 34 pct. of their potential income.

Table 2: Actual earnings compared to potential earnings

	Science	Liberal Arts	Business School & Law	Education & Nursing	Engineering
Actual earnings	879.118 (207.546)	632.324 (159.867)	942.177 (211.569)	740.676 (150.191)	1.237.441,00 (144.857)
Highest potential earnings	1.180.683 180.481	1.177.440 186.767	1.184.821 192.105	1.137.466 182.935	1.245.325 142.293
Difference in earnings	301.745 (145.184)	545.116 (130.783)	242.644 (167.398)	396.790 (187.831)	7.885 (25.683)
Difference in earnings (pct.)	16 (12)	46 (9)	20 (13)	34 (13)	1 (2)
Fraction that maximized income	3	0	7	2	89
Standard deviations in parenthesis. Earnings are in 2005 USD.					

We conclude that Liberal Arts and Education & Nursing graduates sacrifice a substantial part of their lifetime earnings in order to attend their desired type education, even when we control for ability selection. The same is the case for Business School & Law and Science graduates. Following Alstadsæter (2009), we define these as educational types with high consumption value, as they attract high-skilled individuals even at a low wage return. These individuals could have chosen educations with higher wage returns, but instead chose to forego these potential wage returns in order to enjoy the consumption value of their preferred educational type.

It is not possible to determine whether the consumption value on average varies over educational type. It is also possible that the consumption value varies as much over individuals as over type. An educational type might be a positive consumption good for one individual, while it is a bad for another individual.

4. Discussion

The wage return to higher education cannot explain the observed educational patterns across countries. As we showed in figure 1 there seems to be no positive correlation between the wage premium to tertiary education and enrolment. We argue that the consumption value of higher education is an important factor behind the individual's educational choice. The willingness to pay for the consumption value of education can vary across individuals and

countries, depending on individual preferences, pecuniary and non-pecuniary returns to education, and future income uncertainty. We will now discuss this in more detail.

Taxes reduce the price of education as a consumption good, measured in foregone labor income, but they also reduce the overall income level of the individual.¹¹ The substitution effect induces the individual to consume more education and to shift into educational types with higher consumption value, as pointed out by Alstadsæter, Kolm, and Larsen (2008). It is more likely that this substitution effect dominates the income effect in countries with a generous social security system that provides a given minimum income for all citizens. If health services are more or less free, and the state also provides a generous disability, unemployment and old age benefit system, each individual's income uncertainty by choosing an educational type that generates a low wage return is reduced. These countries often also provide higher education at no costs for the individual. We would thus expect students in egalitarian countries to put more emphasis on the consumption value of education when making their educational choice.

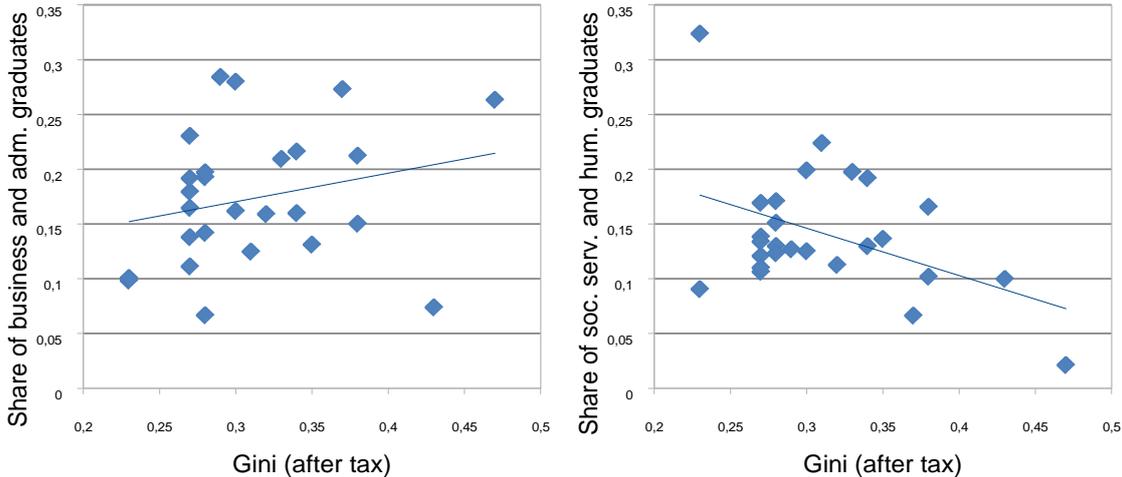
There is a negative correlation between the generosity of the social security system in a country and the degree of wage dispersion, as documented by Barth and Moene (2009). The Scandinavian countries have the most generous social security systems, twice as generous as the US, and they also have the most compressed wage systems. At the other extreme, the US has among the least generous social security systems in the study, but by far the greatest wage dispersion. In the same paper, Barth and Moene also document a clear negative correlation between a generous social security system and the wage return to higher education; the wage premium to tertiary education in the Scandinavian countries is 2-4 pct., while this wage premium in the US is around 8 pct.

In most countries, Business School generates a high wage return compared to Humanities and Social Sciences, as documented by Arcidiacono (2004) on US data. As we see in figure 4 below, there is a negative relationship between the share of graduates in social science & humanities and income inequality in the OECD, measured by the after-tax gini coefficient. This seems to confirm our previous hypothesis, that individuals in egalitarian countries put more emphasis on the consumption value when making their educational choice.

¹¹ Heckman (1976) is one of the first to theoretically recognize the importance of nonmarket benefits of education for tax policy. He concludes that a proportional tax rate distorts the decision between investment in physical and human capital. This distortion increases, when education has non-market benefits. Nielsen and Sørensen (1997) show that the Scandinavian dual income tax system (with a proportional tax on capital income and a progressive tax on labor income) is efficient regarding investments in financial vs. human capital. In their setting education has no consumption value, but Alstadsæter (2003) shows that these arguments are even stronger when education has a consumption value. Judd (2001) shows that the optimal long run tax of human capital is non-zero if education has a consumption value. Bovenberg and Jacobs (2005) demonstrate that the optimal marginal tax rate is higher when education has a consumption value and Dur and Glazer (2008) show that means-tested student grants / tuition fees can be reasoned for efficiency reasons when education is also consumption good.

Low wage differentials and high taxes reduce the price of the consumption value of the Humanities and Social Science educational type, measured in foregone labor income by not choosing Business School, which here represents the educational type generating the higher wage return. We already stated that countries with low wage differentials tend to have generous social security systems, and this further removes the risk of choosing educational type based on preferences rather than financial return. In case of illness or unemployment the basic needs will be met by the social security system. This does not mean, however, that business school has a low consumption value; it could well be that the individuals attending business school prefer this educational type, and in addition receives a high wage return.

Figure 4: Demand for different types of higher education in the OECD vs. inequality.



In section 3 of this paper, we document a substantial willingness to pay for the consumption value of a particular type of education even in the US. When controlling for ability selection, we find that Liberal Arts graduates were willing to forego 46 pct. of their potential income in order to enjoy the consumption value of this educational type. The great importance of the consumption value of education as a motivation for the choice of educational type in a country with high wage differentials and a small social security system implies that the consumption value might be the dominant factor behind the choice of higher education in countries with low wage differentials and generous social security systems.

Nearly 2 pct. of the combined GDP in the OECD is spent on higher education, and the share of public provision varies across countries.¹² Much of the rationale for a public provision of higher education has been to enhance growth, but the focus has been on the level of higher education, instead of its composition. By providing higher public education free of charge to the students the government removes liquidity constraints for many individuals and

¹² OECD: Education at a Glance 2009.

enables a higher participation rate in higher education. But it also to some extent subsidizes private consumption of education. The individuals are not faced with the actual costs of the education, and might thus acquire too much education from a social point of view. A compressed wage structure in egalitarian societies also reduces the price of the consumption value of many educational types, measured in foregone wage income. This can contribute to a skill mismatch in the society, that individuals to a lesser extent acquire the types of educations that are desired from a social planner's point of view. This implies redistribution from other groups in the society, as and much tax revenue is spent on financing the students' direct consumption of education instead being spent on providing other types of public services.

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Appendix

Table A.1: College major type classifications

Major Category	Fields of Study
Science	Architecture and Environmental Design, Biological Sciences, Computer and Information Sciences, Mathematics, Military Sciences, Physical Sciences
Liberal Arts	Area Studies, Communications, Fine and Applied Arts, Letters, Library Science, Psychology, Public Affairs and Services, Health Professions (not nursing), Home Economics, Social Sciences (not economics), Theology, Foreign Languages
Business School & Law	Business and Management, Law, Economics
Education & Nursing	Education, Nursing
Engineering	Engineering

Table A.2: List of variables

Variable	Description	Mixed Logit	Earnings
afqt	Afqt score.	*	*
asvab1	Relative score in asvab, general science (0-100).	*	*
asvab2	Relative score in asvab, arithmetic reasoning (0-100).	*	*
asvab3	Relative score in asvab, word knowledge (0-100).	*	*
asvab4	Relative score in asvab, paragraph comparison (0-100).	*	*
asvab5	Relative score in asvab, numerical operations (0-100).	*	*
asvab6	Relative score in asvab, coding speed (0-100).	*	*
asvab7	Relative score in asvab, auto and shop info (0-100).		
asvab8	Relative score in asvab, mathematics knowledge (0-100).	*	*
asvab9	Relative score in asvab, electronics info (0-100).		
birth	The year of birth.		
children	The number of children, measured in year 2006.		*
dadcollege	Whether the father obtained a college degree, 1=college.	*	
dadhighdeg	Whether the father obtained a degree higher than a college, 1=higher	*	
exp	The mincerian experience, year since graduation.		
expsq	The square of exp.		
femaleman	Whether the head female was a manager when the individual was 14, 1=manager.	*	
femaleprof	1=professional.	*	
lnincome	The log of potential yearly income.		*
loan	Whether the individual received any loans during college, 1=loan	*	
male	The gender, 1=male.	*	*
maleman	Whether the head male was a manager when the individual was 14, 1=manager.	*	
maleprof	1=professional.	*	
master	Whether the individual received a master degree, 1=master.		*
momcollege	Whether the mother obtained a college degree, 1=college.		
momhighdeg	Whether the mother obtained a degree higher than a college degree, 1=higher.		
higha	Number of high school subjects related to arts.	*	
highb	Number of high school subjects related to business.	*	
highl	Number of high school subjects related to languages.	*	
highs	Number of high school subjects related to science.	*	
public	Whether the individual went to public school from grade 1-12, 1=public	*	
pv	Present value of majors. Calculated with an interest rate of 3 pct.	*	
siblings	Number of siblings.		
smsa	Whether lived in SMSA, SMSA=1.	*	*
south	Whether lived in the south, 1=south.	*	*
tenure	Weeks out of 52 worked in that calendar year.		*
tenuresq	The square of tenure.		*
urban	Whether lived in urban area, 1=urban.	*	*
year	The calendar year.	*	*
yeardeg	The year of graduation.		
* denotes whether the variable was included. Some variables were included indirectly.			
Note: Some variables are only used indirectly in the creation of other variables and are therefore included as well.			

Technical appendix

Let the log of the annual earnings for individual i with the education j and experience t be y_{ijt} . These earnings depend on individual characteristics which we include in a vector X_i and experience t . The equation thus has the form:

$$y_{ijt} = X_i\beta_j + \alpha_0 t + \alpha_1 t^2 + \epsilon_{ijt} \quad (A1)$$

where ϵ_{ijt} is an error term. Earnings are only observed for individuals who actually studied education j . The concept of *selection* implies that OLS estimation of (A1) on this truncated sample will be inconsistent if the choice of major is correlated with the earnings from that major (Roy 1951). In other words, an individual could choose an educational type that he is more talented for and thus receive a higher financial return than if a random individual acquired this type of education.

To handle the problem of selection we estimate earnings using a polychotomous choice selection model. We can separate the error term in (A1) into two components $\epsilon_{ijt} = \mu_{ijt} + \varepsilon_{ij}$ where μ_{ijt} is assumed to have zero expectation and ε_{ij} is the expected value of ϵ_{ijt} given education j is chosen. This expectation can be shown to be $\varepsilon_{ij} = -\sigma_j \rho_j \frac{\phi[\Phi^{-1}(P_{ij})]}{P_{ij}}$, where P_{ij} is the probability that individual i chooses education j , and σ_j is the standard deviation of ε_{ij} , ρ_j the correlation between the earnings and a the college choice. The term: $\lambda_{ij} = -\frac{\phi[\Phi^{-1}(P_{ij})]}{P_{ij}}$ can be estimated with a mixed logit model. From the data we have information about the individuals' high school subjects, their score in eight different ability tests, whether they had student loans and standard background variables such as sex, race and parents educational history. Furthermore we can calculate average earnings for each major type. We use this information to estimate P_{ij} for all individuals with a maximum likelihood estimation of a mixed logit model. We can then rewrite equation (A1) to:

$$y_{ijt} = \mathbf{X}_i\boldsymbol{\beta}_j + \alpha_0 t + \alpha_1 t^2 - \delta_j \hat{\lambda}_{ij} + \mu_{ijt} \quad , \quad (A2)$$

which as shown by Lee (1983) can be estimated consistently with OLS.

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