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## Measuring the consumption value of higher education

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# Measuring the Consumption Value of Higher Education

Annette Alstadsæter

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# Measuring the Consumption Value of Higher Education

## Abstract

This paper argues that the consumption value of education is an important motivation for the educational choice. While controlling for ability, we document that individuals are willing to forego substantial future wage returns in order to acquire a particular type of higher education. We document that the individuals who attended Teachers' College in Norway during the 1960's had an ex ante willingness to pay for the consumption value of this educational type of at least 34% of the present value of expected potential lifetime income. The ex post price for this consumption value turned out to be 39% of their potential lifetime income.

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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# 1. Introduction

The young individuals' educational choices determine the future skill level in a country. Just as important as the choice of educational level is the choice of educational type, which determines the future skill composition and also production possibilities. It is therefore important to understand what motivates the individuals' educational decisions. We observe high educational levels in countries with small or modest wage returns to education, as is seen in table 1 in the appendix. There are also significant differences in wages across different educational types, as documented by Daymont and Andrisiani (1984), James et al. (1989), Loury and Garman (1995), and Walker and Zhu (2003). In spite of this, many individuals choose to acquire high levels of education and major in educational directions that generate low wage returns. This seemingly is a puzzle under the human capital view of education as an investment, where future wages are considered the main motivation for the educational choice. But, the future wage return to education depends positively on abilities, and effort costs of completing the education depends negatively on abilities. One might thus claim that the reason why individuals choose different levels and types of education is different abilities. A well functioning labor market pays an individual wages according to his productivity, and wage differentials across different educational types merely reflects that high-ability individuals sort into the educational types generating the higher wage return. Nevertheless, Arcidiacono (2004) finds large differences in wage returns to different college majors, even after controlling for ability sorting. He concludes that preferences for different educational types dominate the high ability individual's choice of major. In the present paper I concentrate on the consumption value of education as a motivation behind the individual's educational choice.

The consumption value of education consists among other things of the joy of learning new things, meeting new people, moving to a new city, and participating in campus and student activities. In addition, there often is an increase in status or self-image that comes from being a student of particular fields (Akerlof and Kranton, 2002). 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, or rather a calling.<sup>3</sup> The

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<sup>3</sup> The latter is known as intrinsic motivation in a related strand of literature, where the main focus is on the motivations for doing a particular task or choosing a particular job, as well as on performance and teaching behaviour, see for instance Barnabou and Tirole (2003).

consumption value of different types of education varies across individuals, as it depends on individual preferences. It is not always straightforward to distinguish between investment motives and consumption motives. Higher education reduces the risk for unemployment (Bishop, 1994), and different educational types generate varying future income risks, measured by the variance of wage return (Christiansen et al., 2007). The reduced income risk that follows from choosing a particular type of education would normally be counted as an investment motive, as it directly affects the wage return to education. But if the individual is risk averse and derives direct utility from reduced risk, this could also be counted as a consumption motive.

Increasing attention is given to the consumption value of education in the economic literature. Schaafsma (1976), Lazaer (1977), Kodde and Ritzen (1984), and Gullason (1989) all argued that the consumption motive is important for the individual's educational decision. More recent, Osterbeek and Webbink (1995) and Oosterbeek and van Ophem (2000) find that young individuals invest too much in education compared with what is optimal from the human capital theory. Heckman et al. (1999) find that high-ability individuals enjoy positive consumption value of college. Carneiro et al. (2003) argue that a large part of the return to college is non-pecuniary, as does Arcidiacono (2004) when estimating the return to different types of college major.<sup>4</sup>

The present paper argues that the consumption motive is an important determinant for an individual's choice of educational type. It adds to the literature by providing a discussion of the concept of the consumption value of education, and by providing a rough estimate for the willingness to pay for the consumption value of one particular type of education in a compensating differentials framework. In doing so, one cannot merely compare different rates of wage return to different types of higher education (as for instance provided by the OECD in the "Education at a glance" publications), since part of the wage differentials across educational types is due to ability sorting. The present paper controls for innate ability level, and still documents substantial differences in wage return across educational types. An important point is also that as wage returns to different educational types differ over time, one cannot use the actual wage returns of the graduates when estimating their willingness to pay for the consumption value of education. It is the expected wage differentials at the time of the educational choice that matter, as they constitute the information available to the individual at

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<sup>4</sup> There is also a growing theoretical literature on tax effects on the educational choice in the presence of non-pecuniary returns to education, as is seen in Alstadsæter (2003) and Bovenberg and Jacobs (2005) on the choice of educational level, in Dur and Glazer (2008) on tuition fees and college attendance, and in Alstadsæter, Larsen and Kolm (2008) on the choice of higher educational type.

the time of the educational choice. This paper provides estimates for the wage differential at the time of the educational choice, as well as the actual wage differential experienced by the individuals.

I document that individuals who attended Teacher's College in Norway during the 1960's paid a high price for the joy of attending this type of higher education. The benchmark education generated a substantially higher wage return, and required the same average grade level from High School for admittance, such that I to some extent control for ability. Both the ex ante and ex post prices are calculated. The Teacher's College graduates' minimum willingness to pay for the consumption value of Teacher's College at the time of the educational choice was 34% of the present value of their potential lifetime income. There is considerable uncertainty associated with the educational choice, and the individuals make their choices based on expectations. It turned out that the actual price the Teacher's College graduates ended up paying for the consumption value of Teacher's College was 39% of the present value of their potential lifetime income. These calculated differences in present values depend on the chosen discount rate, as the wage differential between the two group increases over time. Thus, a higher discount rate puts less emphasis on future earnings, and this reduces the differences in the present value of future income at the time of the educational choice. The goal of the paper is not to find the exact size of the willingness to pay for the consumption value of Teacher's College, but rather to emphasize that the consumption value of education can be a dominant factor behind the individual's choice of educational type, and to propose one method for measuring this.

Section 2 argues that Business School can be considered a benchmark for the wage potential for the Norwegian Teacher's College graduates during the 1960's. The data and method are presented in section 3, and the ex ante and ex post prices of the consumption value of Teacher's College are estimated in sections 4 and 5. Section 6 concludes and discusses other methods for measuring the consumption value of education.

## **2. Teachers' College vs. Business School during the 1960's**

During the 1960's, the same average grade level from High School was required for admission to Business School and Teacher's College in Norway, even though the wage return to Business School was superior to that to Teacher's College, as pointed out by Aarrestad (1969, 1972). It is remarkable that teaching was such a popular profession, given that teachers had modest salaries compared with many other jobs available to skilled individuals. We thus

define teachers' college during the 1960's as an educational type with a high consumption value, as it attracts high-skilled individuals even though it generated a low wage return.

Even though the Teacher's College graduates could have attended Business School and received a higher wage return, they still chose to attend Teacher's College. Hence they were willing to forgo future wages in order to enjoy the consumption value of Teacher's College. They could have chosen other fields of study as well, but Business School is chosen as a benchmark because it has about the same admission requirements, but very different wage return.

## **2.1 Admission requirements for Teachers' College and Business School during the 1960's.**

It is a general perception that during the 1960's it was just as difficult to be admitted to Teacher's College as to Business School in Norway. Aarrestad (1969) states on page 69: "The demand for Teacher's College education far exceeds the supply. The minimum requirement for admission has the last years been above 60 grade points (from High School)." Also, on page 75 he states: "The admission requirements for the Norwegian School of Economics and Business Administration are not quite clear. With maximum awarded additional points, it is today possible to be admitted with about 60 grade points from High School." Admission depended on average grade points at graduation from High School. But additional competition points were awarded for previous education and work experience, and for extracurricular activities, and the guidelines for awarding additional points varied across institutions.

Admission to Norwegian School of Economics and Business Administration was administrated by the school's own admission board. Similarly, the admission to the 14 teacher colleges throughout the country was traditionally administrated by the colleges themselves. But complaints were addressed by the central Teacher Education Council. From 1967 and onward this council administrated all admission to Norwegian teacher colleges. There are no public statistics on the admission requirements for the various schools, but sporadic information on admission to Teachers' College and Norwegian School of Economics and Business Administration exist in the National Archive and in the archives of Norwegian School of Economics and Business Administration, respectively. This information is displayed in table 2 in the appendix.

## 2.2 Differences in the two educational types.

Even though the cut-off level of average grades from High School is about the same for the two educational types, this does not mean that the distribution of ability, or more specifically, average grades, is the same for the two groups. Teachers mostly get the same wage independent of performance, while wages are more individual specific in the private sector. Hence the wage incentive to choose Business School is higher the more skilled the individual is.

Also, there were considerably fewer students admitted to Business School than to Teachers' College, which means that not all teacher students could have been admitted to Business School. Still, a substantial number of the top teacher students would have been admitted to Business School, had they applied.

Teacher's College covers a wide range of subjects, whereas some are optional, such that the student to some extent can choose his major. Teacher's College qualifies for teaching in both elementary school and junior High School. Most teachers' college graduates were employed in the public sector, where the employer had monopsony power and individual wage negotiations were as good as non-existing. Business School also covers a wide range of subjects, whereas some are optimal. The majority of Business School graduates were employed in the private sector, with a more flexible wage structure and with the possibility for individual wage negotiations.

There were no tuition fees to pay, but the students still had to finance their living expenses. The existence of publicly provided and subsidized student loans available to all students eliminates, or at least reduces, the liquidity constraints that might otherwise be present. During most of the 1960's, Teacher's College had a two-year duration, while Business School had a three-year duration. The major cost of acquiring higher education, namely forgone labor income, is thus higher for Business School graduates. Therefore part of the wage gap between the two educational types is compensation for the higher investment costs of Business School.

Only annual earnings are available in the data. We might expect that some of the wage return to Business School is due to longer working hours. Thus, part of the wage gap might be due to differences in hours worked. This would reduce the price on the consumption value of Teachers' College, measured in foregone earnings by not choosing Business School.

But, as we will see in the following section, the wage differentials between these two educational types are huge, both *ex ante* and *ex post*. So even if some of the differentials are



due to the factors discussed above, the results still document great willingness to pay for the consumption value of a particular type of higher education.

### 3. Data and methodology

Three rich data sets are utilized to measure the consumption value of Teacher's College. The 1970 Household Census covers all Norwegian households and individuals and contains information on among other things gross income, sex, age, marital status, type and level of education, and personal income. The Earnings Register covers all Norwegian adults and contains gross individual earnings based on pension rights earned over the period 1967-2000. The Core Administrative Register contains information on all Norwegians in the years 1986-2000. It contains information on birth year, sex, and type and length of highest completed education. Only men are considered, as few women attended Business School during the 1960's.

#### 3.1 Methodology

Apply the compensating differentials model of Rosen (1986) to measure one particular individual's valuation of the consumption value of Teacher's College ( $T$ ) when Business School ( $B$ ) is used as benchmark. The individual maximizes his utility  $U$ , which depends positively on both ordinary consumption, measured by wage  $w$ , and the individual specific consumption value of education,  $e$ , such that  $U=u(w_i, e_i)$ ,  $i=T, B$ . This is a one-period model, but  $w_i$  and  $e_i$  can be viewed as present values of lifetime income and consumption value of the respective educational types.

Now consider an individual who has a higher consumption value of Teacher's College, such that  $e_T > e_B$ . Let  $w_B^*$  be the wage return to Business School that the individual requires in order to be indifferent between the two educational types when Teacher's College generates the market wage return  $w_T$ . Now define the difference  $D = w_B^* - w_T$  as the individual compensating wage differential required to make the individual indifferent between the two educational types. Thus  $D$  is the individual's willingness to pay for the consumption value of Teacher's College. Let  $W = w_B - w_T$  be the market compensating wage differential, defined as the difference in the market wage returns to Business School and Teacher's College. The individual attends Teacher's College if  $D > W$ , since the market wage premium to Business School does not compensate him for the foregone consumption value by not choosing Teacher's College.

The market compensating wage differential is the market price of the consumption value of Teacher's College, and it is available to all individuals. The individual compensating wage differential varies across individuals, and this ensures the existence of economic rent in the labour market. Most individuals who attend Business School receive an economic rent of the size  $W-D$ . The marginal individual earns no economic rent, while most individuals who choose Teacher's College also receive an economic rent, since their willingness to pay for the consumption value of Teacher's College is higher than the actual price demanded by the market in the form of the market compensating wage differential. The conclusion from this is that *the market compensating wage differential serves as a lower bound on the willingness to pay for the consumption value of Teacher's College among the individuals choosing it.*

The market compensating wage differential  $W$  is above defined in the absence of taxes. Income taxes would reduce the net market compensating wage differential. The consumption value of education is a tax free return to human capital investments.

### **3.2 Selection problems**

Individuals differ both in over-all ability level and in multi-dimensional ability. If high-ability individuals to a greater extent choose Business School, the wage return to this educational type is higher than other individuals would get. This tends to overstate the market compensating wage differential and also the willingness to pay for the consumption value of Teacher's College. Also, if individuals select into the educational type for which they have a comparative advantage, Willis and Rosen (1979) emphasize that there will be unobserved heterogeneity. This means that a good teacher would not necessarily have made a business leader, and that the individuals maximize their income and utility according to their abilities and preferences. This is in contrast to the one-factor-ability-as-IQ literature that says that the best teachers would also have made the best business leaders.

Two approaches to solve the first selection problem are the growing identical-twin study literature (Ashenfelter and Rouse, 1998) and changes in compulsory school laws (Acemoglu and Angrist, 2000). The present paper proposes an alternative approach. The identification strategy is to compare individuals with approximately the same average grade level at High School graduation, but who choose different types of higher education. Average minimum grade level for admittance is here used as a proxy for ability level of the students, as previously discussed in section 2. The individuals who attended Teacher's College during the 1960's could have attended Business School and experienced a much higher wage return.

Thus the wage return to Business School is the benchmark for their potential future wage return. This does not mean that Business School has a low or negative consumption value for the individuals actually choosing to attend Business School. Here we only consider the consumption value of Teacher's College for the individuals choosing this type of education.

The individual makes his educational choice based on the expected future wage returns to the two educational types. A good proxy for the future market wage differential,  $W$ , is the present market wage differential. But as there is a substantial lag from when the individual makes his educational choice to when the wage return to education is generated, the actual market wage differential he experiences might very well be a different one. Thus a Teacher's College graduate's willingness to pay for the consumption value of Teacher's College at the time of the educational choice can be different from the price he actually ends up paying. See Cunha and Heckman (2007) for more on the ex ante vs. ex post return to schooling.

#### **4. The ex ante price of the consumption value of Teacher's College**

I use the 1970 Household Census to estimate earnings profiles by potential work experience for males with completed Teacher's College and Business School. These cross-section wage profiles are interpreted as the Teacher's College and Business School attendants' expected future earnings profiles when they made their educational choice in the 1960's. As there is no information on actual working experience for the individuals, define potential experience,  $X_p$ , as the age of the individual minus the age at school enrolment minus the duration of the education minus a year for mandatory military service. Only individuals with 30 years of potential experience or less are included because of a very small sample of Business School graduates with more than 30 years of potential experience. This leaves us with a sample of 2106 Business School graduates and 6731 Teacher's College graduates. The average annual wages by years of potential experience are listed in table 3 in the appendix. The average wage after one year of potential experience is at a much lower level than for two and three years of potential experience. This is due to the fact that the students mostly graduate in June / July, and thus only are able to work parts of the first year.

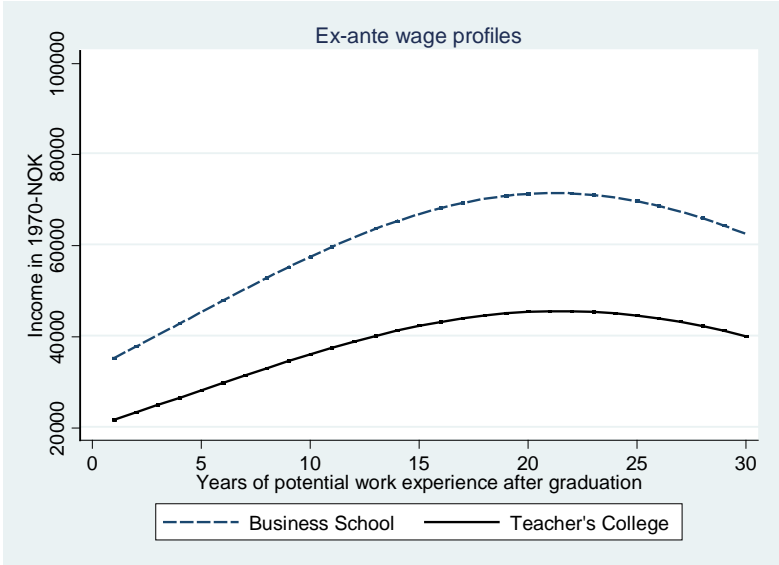
The earnings of the Business School graduates constitute the potential income for the Teacher's College graduates. Hence their minimum willingness to pay for the consumption

value of Teacher's College is the market compensating wage differential. The estimation approach differs from Mincer's, since the duration of the education is fixed. The specification below is estimated separately for each group using ordinary least squares:

$$(1) \quad \ln W = \alpha_1 + \alpha_2 X_p + X_p^2 + \varepsilon.$$

Smoothed versions of the wage profiles for 30 years of work experience from the 1970 census are shown in figure 1 below. The Teacher's College graduates pay a substantial wage premium, and this wage premium increases over their career. The earnings vary more among Business School graduates than among Teacher's College graduates. This may to some extent be due to the fact that most teachers work in the public sector where the wage level is set by centralized negotiations. The government is the employer and exercises monopsony power. Business School graduates, on the other hand, mostly work in the private sector, where wage negotiations are local and the wage structure is more flexible.

Figure 1. Wage profiles of Teachers' College and Business School graduates in 1970.



These are gross wages, and the presence of a progressive income tax would most likely reduce the wage gap and thus the price on Teacher's College as a consumption good. The existence of a substantial willingness to pay for the consumption value of Teacher's College is still non-dismissible.

Let us now calculate the present value of the individual's life time income at the time of the educational choice, defined as 30 years from start of the education. The difference in duration of the two educational types is accounted for by setting the income of the two first years to be 0 for Teacher College. Business School has three year duration, so set the income

for the first three years to zero for this educational type. The present value,  $PV$ , of the future income stream of educational type  $i$  at time of the educational decision is then given by

$$(2) \quad PV_0^i = \sum_{t=1}^{30} y_t^i,$$

where  $i = T, S$  denominates the educational type Teachers' College (T) and Business School (B), and  $y_t$  denominates the average income at  $t$  years from the time of the educational choice. For Teacher's college, the average wage at  $t$  years in the future is the average wage of Teacher's College graduates at  $\max\{0, t-2\}$  years of potential experience, while it for Business School is the average wage at  $\max\{0, t-3\}$  years of potential experience:

$$i = T \Rightarrow y_1^T = 0, y_2^T = 0, y_3^T = y_{p \text{ exp}=1}^T, y_4^T = y_{p \text{ exp}=2}^T, \dots, y_{30}^T = y_{p \text{ exp}=28}^T$$

$$i = B \Rightarrow y_1^B = 0, y_2^B = 0, y_3^B = 0, y_4^B = y_{p \text{ exp}=1}^B, y_5^B = y_{p \text{ exp}=2}^B, \dots, y_{30}^B = y_{p \text{ exp}=27}^B$$

The results are reported in table 1 below. We there see that individuals who attend Teacher's College are willing to pay a substantial price for the consumption value of their education, measured by foregone potential gross lifetime income. As the wage differentials increase over time, it matters which discount rate is used for the calculation. The more weight the individual puts on future earnings, the lower his discount rate, and the higher the price of the consumption value of Teacher's College measured in forgone potential income. At a 3% discount rate, the price of the consumption value of Teachers' College is 35%, measured in foregone wage return by not attending Business School. This price reduces to 33% of potential gross earnings when applying a 7% discount rate.

*Table 1 Present value of the ex ante expected income stream (average wages by potential experience) 30 years from the educational decision is made.*

| <b>1970-census, expected wages</b> |                        |                          |   |
|------------------------------------|------------------------|--------------------------|---|
| <b>Discount rate</b>               | <b>Business School</b> | <b>Teachers' College</b> | <b>Foregone wage return by choosing Teachers' College</b> |
| <b>3</b>                           | 1 020 783              | 660 891                  | <b>35 % of potential wage</b>                             |
| <b>5</b>                           | 747 305                | 513 505                  | <b>34 % of potential wage</b>                             |
| <b>7</b>                           | 561 207                | 373 343                  | <b>33 % of potential wage</b>                             |

The different duration of the two educational types matters if the individual has a high discount rate, as discussed by Bowles (1972), Ainslie and Haslam (1992), and Osterbeek and van Ophem (2000). He then wants to start earning money as soon as possible, which might induce him to choose Teacher's College rather than Business School.

The wage return to Business School varies more across individuals than the wage return to Teachers' College, where the wage is set uniformly in the public sector. This might induce a risk averse individual to choose Teachers' College.

## **5. The ex post price of the consumption value of Teacher's College**

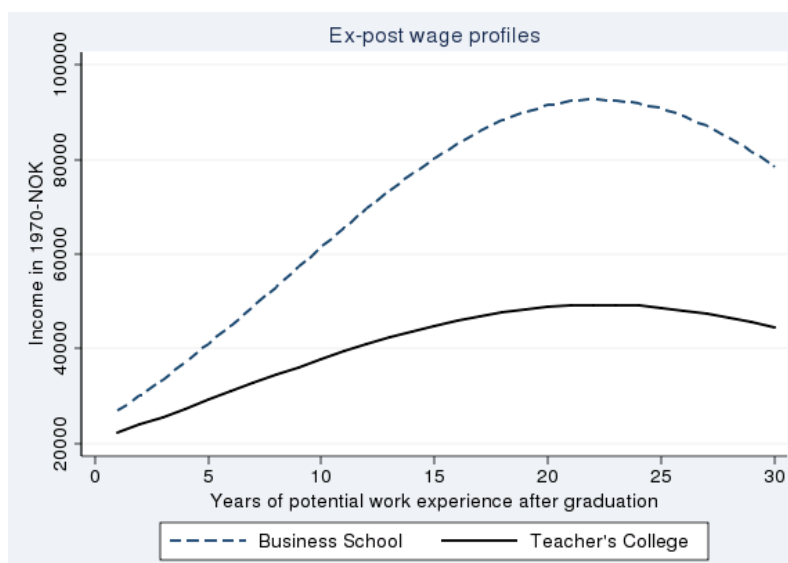
The previous section estimated the ex ante willingness to pay for the consumption value of Teacher's College among the individuals acquiring their education in the 1960's. Did these individuals end up paying a higher or lower price than expected for this consumption value?

Now combine the Earnings Register and the Core Administrative Register to estimate the actual wage profiles of all individuals attending and graduating from Business School and Teacher's College during the 1960's. We have information on their annual gross income from 1967 to 2000. Unfortunately, the graduation date is missing for these early cohorts.

Therefore, I use their date of birth, add 19 years (to complete High School) to find the time when they most likely started their higher education. To be sure to include all males that acquired their education during the 1960's, I include all Norwegian males with completed Teacher's College and Business School who were born between 1942 and 1951. This leaves us with 1253 Business School graduates with a total of 34,292 observations, and 3974 Teacher's College graduates with a total of 113,997 observations. Potential working experience ranges from 1 to 30 years. The average annual wages by years of potential experience are listed in table 3 in the appendix.

Apply the same empirical specification as in equation (1) to estimate the actual wage profiles that these individuals experienced after graduation, but now estimate with robust standard errors. The estimation results are reported in table 4 in the appendix, and smoothed wage profiles for the two groups are drawn in figure 2 below.

Figure 2. Actual wage profiles of Teachers' College and Business School who started their education in the 1960's.



The ex post wage profiles differ from the ex ante wage profiles, and the wage gap at the beginning of the career is smaller than predicted from the expected wage profiles in the previous section. Part of the reason for this low wage differential at the beginning of the career is the fact that the students normally graduate in the summer, such that the income during the first year they are working only amounts to half a year's work. We do not have information on working hours, and cannot correct for this, neither can we correct for possible part-time work. Business School graduates experienced rapid wage increases over their careers, relative to the Teacher's College graduates, as is clearly seen in figure 2. Part of the reason for these high wage differentials might be that observations from the 1980's are included in the sample, a period where the private sector enjoyed high wage increases relative to the public sector.

Now use the same method as in equation (2) in the previous section to find the actual difference in the present lifetime income of the two educational types at the time of the educational choice. The results are displayed in table 2 below. The ex post price on the consumption value of Teacher's College is 36% of the potential life time income at a 7% discount rate, 39% at a 5% discount rate, and 41% at a 3% discount rate.

*Table 2 Present value of the ex post actual income stream (average wages by potential experience) 30 years from the educational decision was made.*

| <b>Earnings register, actual wages</b> |                        |                          |   |
|--|------------------------|--------------------------|---|
| <b>Discount rate</b>                   | <b>Business School</b> | <b>Teachers' College</b> | <b>Foregone wage return by choosing Teachers' College</b> |
| <b>3</b>                               | 1 223 688              | 725 577                  | <b>41 % of potential wage</b>                             |
| <b>5</b>                               | 876 909                | 537 926                  | <b>39 % of potential wage</b>                             |
| <b>7</b>                               | 644 944                | 409 575                  | <b>36 % of potential wage</b>                             |

## **6. Concluding remarks**

The present paper argues for the existence of an individual specific consumption value of education for which the individual is willing to pay. I to some extent control for ability sorting by using minimum required grade level from High School for admittance at Teacher's College and Business School as a proxy for ability. The individuals who attended Teacher's College in Norway during the 1960's expected to earn substantially less than their potential earnings. Their potential earnings are defined as the wage return they would have achieved had they instead chosen Business School. The full ex ante willingness to pay for the consumption value of Teacher's College at the time of the educational choice is at a 5 % discount rate calculated as 34 % of the present value of their potential lifetime income.

We also observe the actual wage profiles of the individuals who attended Teacher's College and Business School during the 1960's. It turns out that the wage differential during their first year of work was smaller than they might expect based on the wages levels in the two professions at the time of their educational choice. This can also be due to some measurement error, as potential experience is used to calculate wage return per year of experience. The actual wage differentials of the Teacher's College and Business School graduates increased over time. This can to some extent be caused by differences in working hours, which we do not observe. It is also partly due to a skewed real income growth, especially during the 1980's. Business School graduates to a large extent work in the private sector, while Teacher's College graduates mainly work in the public sector, where the wage growth is modest compared to the private sector. At a 5% discount rate, the ex post price on the consumption value of Teacher's College during the 1960's turned out to be 39 % of the present value of the individuals' potential lifetime income.



Other methods for measuring the consumption value of education could be to compare enrolment rates of different types of educations to the wage levels of these educational types over time, corresponding to the work by Fredriksson (1997). High enrolment rates to educational types with low wage levels would indicate the presence of a strong consumption motive in the educational choice. 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. Under both these approaches, there is a need to control for ability sorting.

The willingness to pay for the consumption value of education can vary over time and across countries. It is likely that in an egalitarian country like Norway, with small wage differentials, high taxes, no tuition fees, subsidized student loans and a broad social security system that provides a minimum income for all will induce the individuals to attach more weight to the consumption value of education when making their educational choice. By providing higher public education free of charge to the students the government removes liquidity constraints for many individuals and enable a higher participation rate in higher education. As the social returns to many types of education are higher than the private returns, this increased participation rate in higher education is a desired effect of public stimulus policies. But these policies to some extent also subsidize private consumption of certain types of higher education.

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## Appendix

Table 1: Return to schooling and attendance rates in tertiary education.

|                    | Percentage of men, age 25-34, who have attended tertiary education.* | Rate of return to schooling. Men only.** |
|--------------------|--|--|
| Japan              | 51   | 8  |
| Russian Federation | 49   | 4  |
| Canada             | 48   | 4  |
| Israel             | 45   | 5  |
| Switzerland        | 38   | 5  |
| New Zealand        | 37   | 3  |
| Ireland            | 36   | 9  |
| United States      | 36   | 7  |
| United Kingdom     | 36   | 13                                       |
| Norway             | 35   | 2  |
| Spain              | 34   | 5  |
| Australia          | 34   | 5  |
| Sweden             | 34   | 2  |
| Netherlands        | 34   | 3  |
| Poland             | 23   | 7  |
| Italy              | 14   | 4  |

\*Source: OECD Education at a Glance, 2008. Numbers from 2006.

\*\* Source: Trostel et al. (2002)

Table 2: Admission requirements for Teachers' College and Business School

| Year | Teachers' College <sup>1</sup>   | Business School <sup>2</sup> |
|------|--|------------------------------|
| 1962 | Ca. 60 GP.   |                              |
| 1964 |  | Ca. 69 TP                    |
| 1965 | 65-73 TP, depending on college.<br>The most popular colleges in the southern part: minimum 70-73 CP.                                 | Ca. 68 TP                    |
| 1966 | 65 TP in Tromsø Teachers' College.<br>Same as in 1965, when the most popular colleges had admission limits at 5-8 points above this. | Ca. 67 TP                    |
| 1967 |  | 66 TP                        |
| 1968 |  | 66 TP                        |
| 1969 | Average 64.3 GP, st.dev. 4.54.<br>Admission rate: 44.2% of all applicants.   | 67 YP                        |
| 1970 | Average 62.5 GP, st.dev. 5.13.   | 67 TP                        |

**GP: Grade points from High School.**

**TP: Total competition points.** TP= GP + awarded additional points (for work experience and extracurricular activities).

<sup>1</sup>16 Teacher Colleges throughout Norway, including one very popular in Bergen. Information on admission requirements was found in the archives of the Teacher Education Council in the National Archive of Norway and is available on request.

<sup>2</sup>Norwegian School of Economics and Business Administration, in Bergen. All information on admission requirements was found in attachments to board meetings in the respective autumn meetings of the board.

Table 3: Average wages by years of potential work experience. In 1970-NOK.

| Years of potential exp. | 1970-census, expected wages |              |                   |              | Earnings register, actual wages |              |                   |              |
|-------------------------|-----------------------------|--------------|-------------------|--------------|---------------------------------|--------------|-------------------|--------------|
|                         | Business School             |              | Teacher's College |              | Business School                 |              | Teacher's College |              |
|                         | Obs.                        | Average wage | Obs.              | Average wage | Obs.                            | Average wage | Obs.              | Average wage |
| 1                       | 162                         | 31 869       | 524               | 18 966       | 977                             | 24 412       | 2999              | 21 508       |
| 2                       | 141                         | 38 943       | 595               | 24 713       | 1136                            | 33 078       | 3664              | 25 705       |
| 3                       | 120                         | 44 351       | 638               | 27 226       | 1183                            | 41 348       | 3834              | 28 933       |
| 4                       | 96                          | 46 008       | 574               | 29 884       | 1188                            | 47 587       | 3889              | 31 671       |
| 5                       | 113                         | 47 462       | 481               | 31 295       | 1193                            | 52 985       | 3925              | 33 639       |
| 6                       | 84                          | 54 948       | 358               | 32 017       | 1192                            | 56 767       | 3941              | 35 779       |
| 7                       | 97                          | 55 137       | 338               | 34 447       | 1192                            | 59 988       | 3929              | 37 802       |
| 8                       | 85                          | 54 460       | 285               | 34 964       | 1194                            | 62 817       | 3929              | 39 499       |
| 9                       | 81                          | 59 020       | 292               | 36 593       | 1197                            | 65 657       | 3929              | 41 281       |
| 10                      | 65                          | 63 074       | 233               | 36 190       | 1193                            | 67 707       | 3927              | 42 687       |
| 11                      | 60                          | 72 237       | 235               | 39 188       | 1192                            | 70 738       | 3922              | 43 503       |
| 12                      | 62                          | 62 998       | 170               | 39 062       | 1196                            | 73 473       | 3917              | 43 742       |
| 13                      | 51                          | 63 378       | 164               | 40 163       | 1188                            | 75 924       | 3910              | 43 815       |
| 14                      | 59                          | 64 239       | 130               | 41 481       | 1181                            | 80 194       | 3906              | 44 314       |
| 15                      | 57                          | 83 602       | 137               | 41 402       | 1187                            | 83 837       | 3893              | 45 162       |
| 16                      | 80                          | 68 981       | 141               | 43 219       | 1176                            | 87 116       | 3896              | 45 951       |
| 17                      | 74                          | 73 119       | 158               | 43 563       | 1186                            | 93 812       | 3908              | 46 865       |
| 18                      | 64                          | 68 116       | 118               | 44 174       | 1184                            | 97 614       | 3894              | 47 850       |
| 19                      | 62                          | 71 694       | 159               | 43 932       | 1188                            | 101 304      | 3882              | 48 622       |
| 20                      | 66                          | 66 399       | 136               | 45 929       | 1188                            | 100 813      | 3884              | 49 187       |
| 21                      | 70                          | 73 396       | 143               | 45 434       | 1188                            | 105 250      | 3881              | 49 877       |
| 22                      | 72                          | 75 429       | 128               | 44 020       | 1179                            | 109 737      | 3877              | 49 957       |
| 23                      | 66                          | 69 432       | 129               | 46 984       | 1175                            | 107 165      | 3862              | 49 830       |
| 24                      | 47                          | 71 138       | 113               | 44 022       | 1173                            | 110 618      | 3845              | 50 039       |
| 25                      | 58                          | 80 895       | 118               | 43 993       | 1168                            | 111 989      | 3834              | 50 178       |
| 26                      | 54                          | 79 863       | 89                | 46 679       | 1151                            | 126 679      | 3820              | 50 473       |
| 27                      | 42                          | 75 898       | 111               | 45 249       | 1106                            | 118 231      | 3730              | 50 882       |
| 28                      | 33                          | 73 458       | 82                | 47 845       | 1026                            | 127 015      | 3607              | 51 310       |
| 29                      | 31                          | 79 177       | 65                | 43 722       | 897                             | 129 651      | 3447              | 51 824       |
| 30                      | 25                          | 75 670       | 79                | 43 734       | 761                             | 130 540      | 3116              | 52 369       |

Table 4: Regression results. Standard errors in parenthesis.

|   | <b>1970-census, expected wages</b> |                           | <b>Earnings register, actual wages</b> |                           |
|---|------------------------------------|---------------------------|--|---------------------------|
|   | OLS                                |                           | OLS, robust standard errors            |                           |
|   | <b>Business School</b>             | <b>Teacher's College</b>  | <b>Business School</b>                 | <b>Teacher's College</b>  |
| <b>Observations</b>                       | 2106                               | 6731                      | 34292                                  | 113997                    |
| <b>Clusters</b>                           |                                    |                           | 1253                                   | 3974                      |
| <b>R<sup>2</sup></b>                      | 0.2264                             | 0.2358                    | 0.2529                                 | 0.2058                    |
| <b>Constant</b>                           | 10.3930<br>(0.0254)                | 9.9083<br>(0.0133)        | 10.07793<br>(0.0197718)                | 9.931857<br>(0.0087801)   |
| <b>Potential experience</b>               | 0.0738<br>(0.0045)                 | 0.0762203<br>(0.0026075)  | 0.1223584<br>(0.002731)                | 0.0785031<br>(0.0011294)  |
| <b>(Potential experience)<sup>2</sup></b> | -0.0017398<br>(0.0001566)          | -0.0017722<br>(0.0000931) | -0.0027528<br>(0.0000852)              | -0.0017616<br>(0.0000327) |

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