Was It All Worth It? On the Value of Tertiary Education for Generation ’77 in Poland

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Abstract

This research paper aims at estimating the value of tertiary education in Poland for men and women over the life cycle using specific dataset of Labor Force Surveys for generation born in 1977. Regression-adjusted counterfactual wages are estimated using Heckman selection models as proxy of the alternative costs of studying and a special Discrete Choice Experiment is designed to evaluate the value of time devoted for studying as a proxy of effort required to complete the studies. Results suggest that the net present value of tertiary education is lower for men than women in the short horizon of professional career. In the long run however both net present values nearly equalize. The surprising effect is that the internal rate of return appears to be slightly higher for women.

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1. Introduction

The decision to pursue tertiary education has very important implications. In the short run it generates costs which realize in the form of direct financial expenditure and devotion of other scarce resources like time. It also involves an alternative cost of studying which manifests itself in the flow of forgone potential earnings. In the long run however it creates a stream of benefits through increased income and reduced incidence of non-employment. The studies of the costs and benefits of tertiary education have been undertaken many times in economic literature. This topic is very popular in the public debate as well. Economists generally agree that the tertiary education is a profitable investment. The scale of these benefits is however very diversified across different countries, years of study, sex, study fields, and other dimensions. Recently, the social movement called UnCollege gathers attention and points out that the costs of obtaining higher education in USA have gone too high and the investment is questionable in terms of rate of return as compared to typical financial assets.

The most fundamental approach adopted in empirical analysis of returns to education is based on an influential Mincerian wage regression type models, in which a wage premium to the years of study is estimated as a proxy of the return to education. There are however several limitations to this approach which allows us to directly interpret the result as a rate of return to education.

There are a number of studies which account for costs and benefits more directly and try to estimate the net present value of tertiary education and this kind of analysis is adopted here.

In some of the research cohort data have been used to infer the value of education for a group of people observed in a longitudinal studies. In Poland, we do not have any kind of a panel study of a given generation to begin with. There are some attempts undertaken to fill this gap but obviously it will take a long time before researchers are blessed with this kind of dataset (sadly, in the long run we are all dead as Mr. Keynes had predicted). To overcome this obstacle in this study an attempt was made to take advantage of the LFS datasets for 1995−2013 for Poland and select for each quarterly wave only those individuals that were born in 1977. The reason for selecting this particular generation was that the 1995 was the year of them becoming 18, the next year was the year of majority of them attending secondary schools taking their A level exams and it was the time for them to decide to go for studies or not. Constructed sample is clearly not a pure panel dataset, but the surveying of populations in any of respective years was random, so it can be justified to think of it as a collection of representative samples of generation born in 1977 surveyed between 1995 and 2013. In any of the years, the number of observations was no less than 1800 (the year with fewest observations is 1999 when the Central Statistical Office conducted only two out of four surveys).

The dataset constructed in this way was used to estimate the net present value of tertiary education and the internal rate of return for men and women. The information on the costs of studies was based on the special survey coming from a project run by the Educational Research Institute.

The outline of the paper is the following: first section briefly discusses significant papers in the literature of the field. The description of the data and methodology is laid out in the next section of the paper. Stylized facts on education and labor market history of the generation '77 are presented in the next section. Original empirical results are then presented and commented. The article ends with conclusions and statistical appendix.

2. Literature review

The estimates of returns to education obtained in the earliest studies range from 5 to 10% per additional year of studying. Internal rate of return to schooling, denoted by ρ, is a discount rate which equalizes costs and benefits of investment in education (Cahuc, Zylberberg, 2004). Let be the potential income related to devoting years for schooling. If for simplicity, the costs of education are equal to forgone earnings, then the cost of studies at the moment is simply. This cost allows us to increase future income by. Let T be the moment of terminating the professional career. The present value of gains at the moment becomes:

$$\dot{y}(t) \int_t^T e^{-\rho(\tau-t)} d\tau = \dot{y}(t) \left[1 - e^{-\rho(T-t)}\right]/\rho \tag{1}$$

Internal rate of return equalizes costs and benefits, therefore it is given by the following equation:

$$\frac{\dot{y}(t)}{y(t)} = \rho \frac{1}{1-e^{-\rho(T-t)}} \tag{2}$$

If T is sufficiently large with respect to t, the right hand side of the above equation can be approximated by ρ leading to a simple differential equation $\rho = \dot{y}(t)/y(t)$. Integration of the above formula yields solution in the form:

$$\ln y(t) = \ln y(0) + \rho t \tag{3}$$

Knowing the income at the moment t as well as time devoted for schooling, the above equation can be estimated using OLS. If time is measured in years, an estimate of ρ becomes a rate of return to an additional year of schooling. First estimates obtained by Mincer (1974b) using data for white males in the US of 1959 showed the value of 7%. Basic equation exhibited however poor wage determination, explaining only 7% of the variation in log income. The empirical works which followed this first attempt were aimed at improving the wage determina-

tion and at dealing with other methodological issues. Mincer himself postulated to include the job experience into the wage equation, which significantly improved statistical properties of the estimated equation, yielding the rate of return at 10.7%.

OLS estimates were proven to be biased (Heckman 1979; Angrist and Krueger 1991; Ashenfelter and Rouse 1998; Card 1999). The most important sources of bias come from ability bias and selection bias. The human capital theory (Becker1962) points out that there is a positive correlation between the length of schooling and personal ability. Education and productivity are also positively correlated according to this theory. The problem arises since we do not know if there is a causal effect of education on earnings or maybe it is a mere fact of being intrinsically more able, which affects the number of years in schooling which then translate into higher productivity and earnings. The signaling theory of education (Spence 1973) arrives at very similar conclusions – it is the personal unobserved characteristics that make people want to send a positive signal to employers by educating themselves in order to break the asymmetry of information. Angrist and Krueger (1991) tried to use the instrumental variables technique to deal with this kind of bias. Their results were surprisingly only slightly different from OLS results. Ashenfelter and Rouse (1998) used a population of twins and siblings to indicate that the estimated rates of return were on average only 10% lower than obtained by OLS. This approach was recently criticized by Sandewall *et al*. (2014) where they showed a significant IQ differences between supposedly identical twins in the aspect of ability.

Acemoglu and Angrist (1999) estimated the return to additional year of schooling in the US at 6−7%. The study of Bar-Or *et al*. (1995) indicated a wage premium for higher education of 30% for Canadian labor market. Blundell (2001) showed the premium for the UK to be 25%. Harmon *et al*. (2000) pointed out that the OLS estimates of return to additional year of schooling in the UK was 6−9% using OLS and 11–15% using instrumental variables approach. They also showed significant differences in education premia across the distribution of personal abilities. The least able individuals exhibited only 2.5% return on every additional year of schooling, compared to a sample average of 7%. Brewer *et al*. (1999) using NLSY 1972 data showed that there were significant wage returns to elite colleges. The members of 1982 cohort attending elite private colleges exhibited in 1992 a 39% premium in the annual earnings over bottom public college attendees. Webber (2014) uses a simulation approach to estimate a lifetime earning patterns for different study fields using 1979 cohort of the National Longitudinal Survey of Youth and American Community Survey. He controls for selection into higher education and specific study fields using information on cognitive and noncognitive ability. The highest returns are observed for Business and STEM majors (Science, Technology, Engineering, Math) and the lowest for Arts and Humanities.

Higher education wage premium was studied for Poland in a number of papers. Rutkowski (1996) using Mincerian wage regressions showed a wage premium to additional year of schooling at 7–8% in the initial period of transformation. The returns to higher education turned out to be higher for the private sector employees, although a majority of tertiary graduates are employed in the public one (Bedi 1998). Newell and Reilly (1999) indicated a return of 10.9% for 1992 and increasing to 11.1% over the next four years. Hanushek and Zhang (2006) conducted across country analysis of returns to education controlling for the quality of education and personal cognitive skills. They estimated the rate of return to an additional year of schooling in Poland at 8%. Strawiński (2006) using a Mincerian wage regression, corrected for selection into employment, estimated the yearly rate of return to education at 5.9−9.3% for the period 1998–2005. Morawski, Myck and Nicinska (2009) used a microsimulation model for Poland to show the yearly return to education of 6.7% for men and 8% for women when using simple OLS technique on the net income. Using gross incomes and correcting for non-random selection into employment they obtained results of 9.7% for men and 13.4% for women.

3. Data

3.1. Data on wages and labor market experience

Polish Labour Force Survey has been used as a source of data for empirical analysis in terms of wages and labor market experience. In each wave of the data, which is gathered quarterly starting in 1992 (second and third quarter of 1999 are exempt from this rule) the sample was reduced to persons born in 1977. The initial year of observation was set in 1995, when the generation ’77 turned 18. Table below summarizes the sample in each year of LFS broken down by the levels of education and sex.

Table 1. Sample of generation ’77 by sex and education level

Year	Men	Women	Tertiary	Secondary vocational	Secondary general	Basic vocational	Basic	Total
1995	2 475	2 511	0	26	25	594	4 341	4 986
1996	2 419	2 399	0	291	491	1 411	2 625	4 818
1997	2 120	2 170	0	807	887	1 526	107	4 290
1998	2 032	2 018	3	1 132	985	1 449	481	4 050
1999	940	878	18	617	400	612	171	1 818
2000	1 764	1 601	133	1 159	636	1 119	318	3 365

Year	Men	Women	Tertiary	Secondary vocational	Secondary general	Basic vocational	Basic	Total
2001	1 665	1 645	282	1 121	531	1 063	313	3 310
2002	1 801	1 589	523	1 082	407	1 078	300	3 390
2003	1 737	1 613	758	933	317	1 034	308	3 350
2004	1 624	1 548	778	884	289	924	297	3 172
2005	1 508	1 485	786	820	261	876	250	2 993
2006	1 489	1 423	844	779	228	831	230	2 912
2007	1 457	1 366	805	761	229	774	254	2 823
2008	1 431	1 384	827	700	239	790	259	2 815
2009	1 447	1 320	821	698	215	804	229	2 767
2010	2 708	2 741	1 734	1 383	401	1 548	380	5 449
2011	2 741	2 799	1 788	1 367	413	1 564	408	5 540
2012	2 750	2 831	1 829	1 399	462	1 521	370	5 581
2013	2 538	2 696	1 742	1 304	458	1 369	361	5 234
Total	36 646	36 017	13 671	17 263	7 874	20 887	12 965	72 663

Source: own calculations, LFS data (1995−2013).

Altogether, the sample contains 72 663 observations. Data on monthly nominal net wages were recalculated for net yearly income, which was deflated using consumer price indices.

3.2. Data on costs of higher education

Information on the costs of studies is based on a survey conducted by the Educational Research Institute for the project "Social and economic conditions of educational choices of people aged 18−30". One of the survey modules was devoted to expenditures for study related purposes.

Average yearly private expenditure for tertiary education is 3 500 USD (PPP exchange rate) as declared by current students only. The costs include: current expenditure – tuition fees; exam fees; books; materials; prints; scientific appliances; expenditure for additional courses, competences, and certificates; expenditure for activity in students' organizations; transportation; internet and phone; additional expenditures – housing and food (only incrementally if they changed in relation to pre-study levels) and expenditure for electronic devices – computers, printers, tablets, software. Table 2 shows basic descriptive statistics of private yearly expenditure for tertiary education in Poland. The values were converted from PLN into US dollars using purchasing power parity exchange rate for 2013 of 1.821618 (OECD).

Table 2. Private expenditure for tertiary education, USD (PPP equivalent) per year

Category	Mean	SD	Median	p25	p75	N
Current expenditure	2 383.62	1 980.43	1 850.00	933.24	3 348.67	2 892
Additional expenditure	945.04	1 879.12	0.00	0.00	988.13	2 892
Electronic devices	181.45	370.36	0.00	0.00	219.59	2 892
Total	3 510.11	2 697.94	2 799.71	1 427.30	4 913.21	2 892

Source: own calculations using "Social and economic conditions of educational choices of people aged 18−30" survey.

The average private expenditure for men (3 437.43 USD) and women (3 501.11 USD) are not statistically different ($F = 0.40$, p-value 0.5257). Comparing the entire distribution using Kolmogorov-Smirnov test yields the test statistic of D = 0.0441 with a p-value of 0.062.

3.3. Data on time devoted for studying

The information on time devoted to various education related activities comes from the same survey of the project "Social and economic conditions of educational choices of people aged 18–30". Information on time devoted to studies is used as a proxy for effort necessary to complete the studies. The value of tertiary education will be calculated for men and women separately, therefore, the difference in time input can be an important source of variation in costs. Education activities taken into account were the following:

- obligatory courses,
- voluntary courses,
- own studying,
- commute to university (both ways),
- additional courses organized by the university (outside standard curriculum),
- additional courses organized outside of the university (e. g. language courses),
- activity in student scientific research groups,
- activity in student organizations,
- private lessons received.

Fig. 1 below shows the distribution of weekly time of all education related activities for men and women. Women tend to engage more time in studying with the average of 36.2 hours per week compared to 34.3 for men. The Mann-Whitney statistic for a test of equality of distributions takes the value of -3.48 with a p-value of 0.0005, which suggests strong rejection of the equality hypothesis.

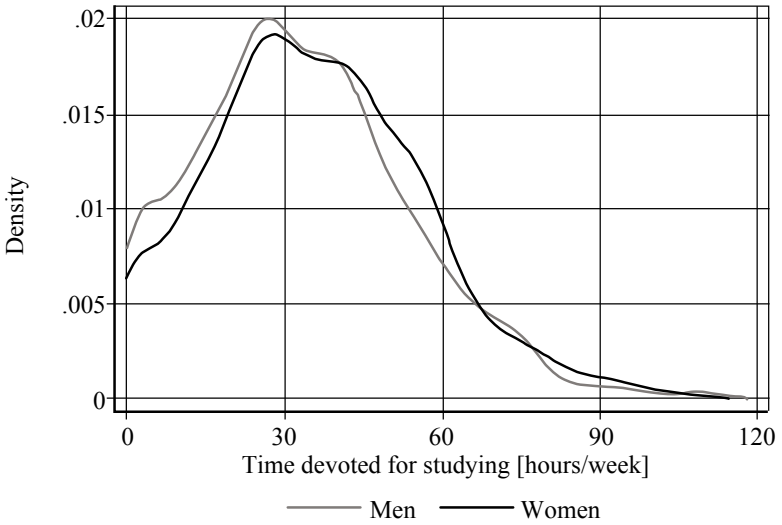

Figure 1. Distribution of time devoted for studying for men and women

Source: own calculations using "Social and economic conditions of educational choices of people aged 18−30" survey.

Table below shows basic descriptive statistics for time devoted to educational activities for men and women in Poland.

Table 3. Time devoted to educational activities for men and women (hours per week)

Sex	Category	Mean	SD	Median	p25	p75	N
Men	Studying	26.7	18.23	25	13	38	1376
	Travel	4.9	5.93	3	1	6	1427
	Additional activities	3.1	8.53	0	0	3	1390
	Total	34.3	21.32	32	19	46	1297
Women	Studying	28.3	17.78	27	15	40	1638
	Travel	5.3	6.19	3	2	7	1690
	Additional activities	2.8	7.05	0	0	3	1650
	Total	36.2	20.95	35	22	50	1524
Total	Studying	27.6	18.01	26	14	40	3014
	Travel	5.1	6.07	3	2	6	3117
	Additional activities	2.9	7.76	0	0	3	3040
	Total	35.3	21.14	34	21	48	2821

Source: own calculations using "Social and economic conditions of educational choices of people aged 18−30" survey.

4. Methodology

In order to calculate the value of tertiary education a number of steps is required to account for costs and benefits of education. The cost side is represented by:

- direct financial expenditure related to studying,
- forgone earnings,
- disutility related to the effort put into completing the studies.

The benefit side is represented by:

- higher flows of income,
- higher probability of employment.

Direct costs of studies are taken as declared by current students in the survey of the project "Social and economic conditions of educational choices of people aged 18−30". Forgone earnings are estimated using a wage model described in section 4.1. Disutility of studies is evaluated using a Discrete Choice Experiment model described in section 4.2. Flows of income for tertiary graduates are given as observed in the data for generation '77 up to 2013 and then approximated by fitted values from a wage model (the same as described in section 4.1.) for the remaining years of professional career. Probabilities of employment follow the same scheme with fitted values given by selection equation.

4.1. Calculation of counterfactual earnings

The counterfactual wages of those who decided to study as if they did not are used as a proxy for alternative cost of studies rather than just observed wages of secondary school leavers who did not decide to study at all. Human capital theory predicts there are significant differences in those two populations, so that selection into studies is not random. Wage model is constructed using augmented Mincerian equation corrected for non-random selection into employment (Heckman 1979).

$$\begin{aligned} \ln w_j &= \mathbf{x_j}\beta + u_{1j}, \\ s_0 &= \mathbf{z_j}\gamma + u_{2j}, \\ u_1 &\sim N(0,\sigma), \\ u_2 &\sim N(0,1), \\ corr(u_1,u_2) &= \rho, \end{aligned} \tag{4}$$

where ln w_j stands for log of net yearly income in the main job of the respondent; s_0 is a binary variable taking on the value of 1, when the wage is observed for |person j and 0, when the wage is not observed; γ is a vector of parameters in the selection equation; $\mathbf{z_j}$ control characteristics (sex interacted with the level of education, marital

status, class of settlement unit and voivodeship); β is the vector of parameters for the wage equation; $\mathbf{x}_j$ is a vector of variables used in the wage equation (sex interacted with the level of education, ownership sector, firm size, type of contract and class of settlement unit). Identification of the model requires at least one variable to be included into the selection equation that is not included in the wage equation, therefore being responsible for selection and not influencing the wage. Definitions of variables used for this step are presented in the Appendix Table A1. The results of estimated models are not directly interesting for this particular study and are reported in the Appendix Table A2. It follows that women on average earn less than men in all yearly samples. Tertiary graduates experience significant wage premia over other groups, however, it is not always true for women. Graduates living in the largest cities, working in the largest companies, married and having full time contracts earn significantly more than respective groups of reference for given variable. The coefficients of selection equation reveal an interesting fact – tertiary male graduates do not exhibit significantly higher probabilities of employment than their secondary graduate colleagues. For women however, obtaining tertiary education boosts the probability of employment significantly. This observation will be important later on for the net present value of education for men and women.

4.2. Valuation of time using a Discrete Choice Experiment

For each student a residual time was calculated using simple benchmark of full employment time equivalent to 40 hours weekly. Each individual will be said to have a negative residual time if time effort put in studies exceeds 40 hours per week. In the other case there a positive residual time will exist. Having strongly negative values of residual times are associated with a disutility of studying indicating a high effort needed to complete the studies (reduction of leisure time).

Valuation of time is not an easy task. In order to evaluate the residual time of studying a special Discrete Choice Experiment was designed and conducted[1] on a subsample of 225 random respondents, being students of various study fields. Methodological background for a *DCE* models can be found in Hanley *et al*. (1998) and Louviere *et al*. (2006). Based on Hensher and Green (2002) the utility function of an individual can be given by:

$$U_{ij} = \beta' \mathbf{x}_{ij} + \varepsilon_{ij}, \tag{5}$$

[1] This DCE model was designed for the purpose of the project "Social and economic conditions of educational choices of people aged 18−30 related to tertiary education". Author of this article wishes to express his gratitude for Przemysław Kusztelak and Tomasz Gajderowicz for designing and conducting this study. Results of this evaluation have been used in this article for the purpose of estimating the value of time of education activities.

where β is a vector of parameters and is individual and alternative specific vector of choice characteristics. In the classical approach all individuals are assumed to have identical parameters of the utility function (β) and IID error terms.

Valuation of time in a *DCE* model is based on declared preferences in hypothetical choices. The attributes of presented alternatives were as simple as possible. The hypothetical job to be performed by respondents was a „Specialist for software testing". Each respondent was presented with six choice-sets of two alternatives and an opt-out choice. In every situation respondents were asked to choose preferred alternative or reject both. Each job offer was characterized by various time horizon:

- 1 hour,
- 8 hour (1 working day),
- 16 hours (2 working days),
- 40 hours (1 typical working week, 5 days of 8 hours per day),
- 80 hours (2 working weeks),
- 160 hours (4 working weeks).

For each offer there was a wage in terms of total net salary as well as its hourly equivalent ranging from 8 to 40 PLN. Example of a choice card presented to each respondent is shown below:

Choice card no. NN	**Offer A**	**Offer B**	
Time of work	1 hour	8 hour	
Total (net) salary	8 PLN	80 PLN	Reject both
(hourly wage)	(8 PLN/h)	(10 PLN/h)	
Choice:			

Combination of attributes in all choice sets was done in such a way to get the highest precision of the estimates using possibly the lowest number of respondent-choices. A D-effective design was adopted (Reed *et al.* 2011) after a pretest on 75 respondents. Design used for the study utilized 60 choice cards divided into 10 blocks assigned randomly to respondents. As a result each respondent was offered six cards of alternatives. Total number of choices gathered in this model was 1328 (there were missing choices or mistakes in 22 situations).

Having these 1328 observed choices it was possible to estimate a multinomial logit model to get the parameters of the utility function. The estimated coefficients of the model are reported in the Appendix (Table A3). They indicate that all parameters are highly significant. Higher number of hours of work reduces the utility all else equal. Higher salary increases the probability of a choice of given alternative all else equal. The negative sign for 'status quo' indicates reduction of the utility resulting from taking any alternative at all. The interaction term of the salary and

time devoted for studies allows us to calculate the value of time dependent on how much effort each individual puts in their studies. The value of each attribute in terms of money is derived from a marginal rate of substitution, which is given by diving the parameter for a given attribute by the parameter for salary. The willingness to accept a reward for one unit of time (an hour here) wascalculated using the following formula:

$$WTA = \frac{\beta_{hours\_of\_work}}{\beta_{salary} + t * \beta_{salary\ x\ time\ devoted\ for\ studies}} \tag{6}$$

Obtained estimates of *WTA* are monotonically increasing with time devoted to studies, which means they are decreasing over residual time. Those who devote significantly less than 40 hours per week for studying are willing to sell an hour of their time at the lowest price. The values of one hour of time for different levels of time devoted to studying are presented in Table A4 in the Appendix. Table 4 below shows the average weekly valuations of residual time for men, women and by fields of study. The values were converted from PLN into US dollars using purchasing power parity exchange rate, as before.

The average for total population is negative 20.64 USD. This results from a fact of strongly skewed distribution of residual time. The important difference is that men on average experience lower disutility of studying than women, which can be evaluated at approximately 600 USD per annum of lower costs for them (assuming 30 weeks of studying per year). The differences between the fields of studies are not the subject of this article, but interestingly, the positive valuation is obtained for Social Sciences, Agriculture and Services, where students on average have more residual time than their colleagues studying more demanding fields, especially Health, Life Sciences or Engineering.

Table 4. Value of weekly residual time (USD) by sex and fields of study

	Mean	SD	Median	p25	p75	N
Men	–9.00	314.12	73.95	–70.60	163.59	1290
Women	–30.36	331.46	50.89	–107.71	149.32	1520
Education	–12.68	327.84	60.50	–75.37	149.32	298
Arts And Humanities	–34.42	356.22	53.69	–62.80	147.45	235
Social sciences	25.09	236.93	92.45	–58.85	174.19	920
Life Sciences	–64.89	356.39	30.80	–132.25	145.26	310
Health	–90.36	471.78	49.52	–124.18	129.17	247
Engineering	–63.24	362.81	29.70	–148.93	139.05	479
Agriculture	30.03	296.22	90.96	9.11	170.89	40
Services	13.39	239.62	60.72	–70.60	175.17	261
Total	–20.64	323.78	60.50	–92.23	155.41	2810

Source: own calculations using "Social and economic conditions of educational choices of people aged 18−30 related to tertiary education" survey.

5. Stylized facts on education and economic activity of the generation ‘77

Around 17% of those born in 1977 at the age of 19 (which was in the year of 1996) were graduates from a secondary school (offering either vocational or general education). After A level exams 64% (37.8% of vocational school graduates and 79.1% of general school graduates) decided to continue education. The figure below shows the distribution of generation ’77 among the levels of education, regardless of the fact of continuing the education or not.

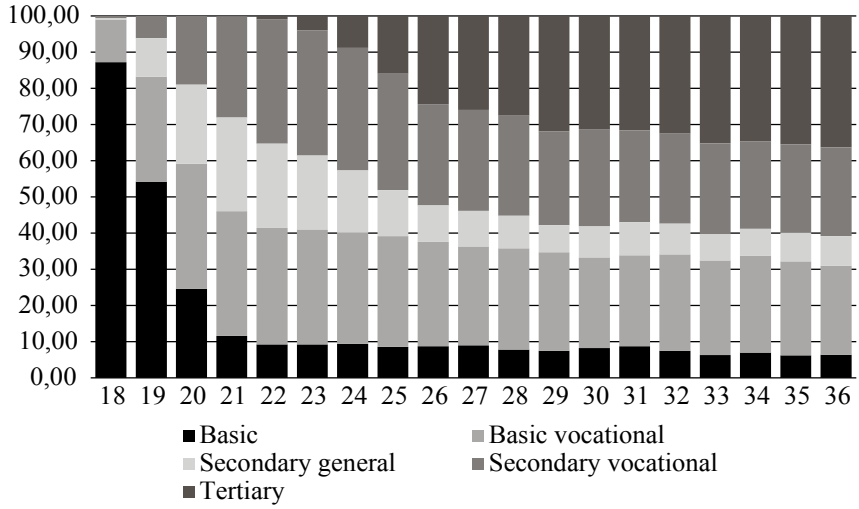

Figure 2. The level of completed education by age

Source: own calculations using LFS, 1995−2013.

First tertiary graduates started to show up at the age of 21. Considerable increase of tertiary education graduates is observed starting from the age of 24, which is the standard age of graduation once leaving the secondary school at the age of 19 after 5 years of studying. Currently observed sample of generation ’77 – at the age of 36 in the year of 2013 – indicates that more than one for every three is a highly educated person, half has vocational education (equally distributed between basic and secondary education levels), 8.2% has secondary general education and nearly 7% has a basic one, incomplete or lower.

The economic activity of the generation ’77 is shown in the Figure 3. The share of employed steadily grew until the generation becomes aged 31 from where it settled around 80%. The share of unemployed remained a two digit number until they finished 29. In the years of 1999−2003 (the hardest time on Polish labor market since the start of economic transformation) the share of unemployed was between 19.7% and 22.6%. The improvement of economic performance after 2006 is clearly evident in the reduction of the share of unemployed which ever since was a one digit number not exceeding 7.2%.

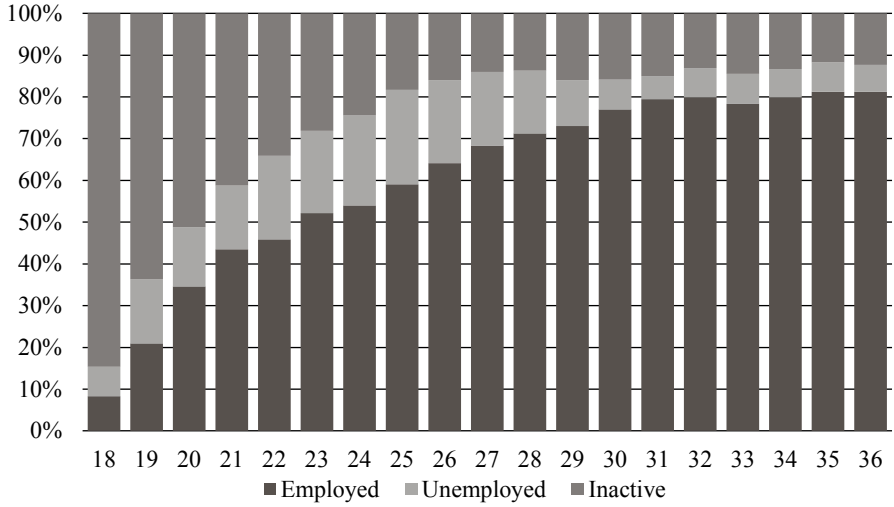

Figure 3. Economic activity of generation '77 by age

Source: own calculations using LFS, 1995−2013.

Things went in a similar fashion for those who completed the tertiary education (see Figure 4 below). The most common year of graduation (2001) happened to be one of the years with historically the highest unemployment rates, which turned the transition from school to work quite difficult (27.5% were unemployed in that year). The shares of unemployed remained quite high until 2003 (over 15%). Considerable improvement in terms of economic activity was exhibited by tertiary education graduates after their age of 30.

Figure 4. Economic activity of generation '77 by age – tertiary education

Source: own calculations using LFS, 1995−2013.

Relatively better job opportunities for tertiary graduates are clearly visible in the evolution of unemployment rates over professional career (Figure 5). The year of entry into the labor market – most commonly 2001 – was quite challenging, since the average unemployment rate was 31.8%, which was even higher than for other participants of the labor market, having more job experience, except for those with the lowest education attainment. Unemployment rates for tertiary graduates declined gradually reaching stable and low levels after their age of 30. At the age of 36 the group of tertiary graduates has the best chances for employment, followed by the secondary vocational, secondary general and basic vocational graduates. The economic crisis of 2008–2009 resulted in an increase of unemployment rates for all groups except those with tertiary education level.

Figure 6 shows the evolution of average net yearly wages for selected groups of generation ’77. Wages have been shown as yearly nominal salaries obtained at main job in 2013 prices using CPI indices as deflators. Wages for men generally exceeded the wages for women, showing even growing disparity over time. The same is true when we compare the wages for tertiary graduates and secondary graduates. The economic crisis of 1999−2003 left a clear mark on the wage evolution – on both panels of Figure 5 it is clearly visible that the wage curves are relatively flat. The slowdown of wage growth is also visible in the period 2009−2010, as a result of global financial crisis. Again, it can also be shown that the tertiary graduates suffered only a little as compared to other groups on the labor market as their wages slowed down only temporarily between 2009 and 2010. For the group of secondary school graduates, which are the reference group for our study of education returns, the wage curve after 2009 remains relatively flat up to 2012.

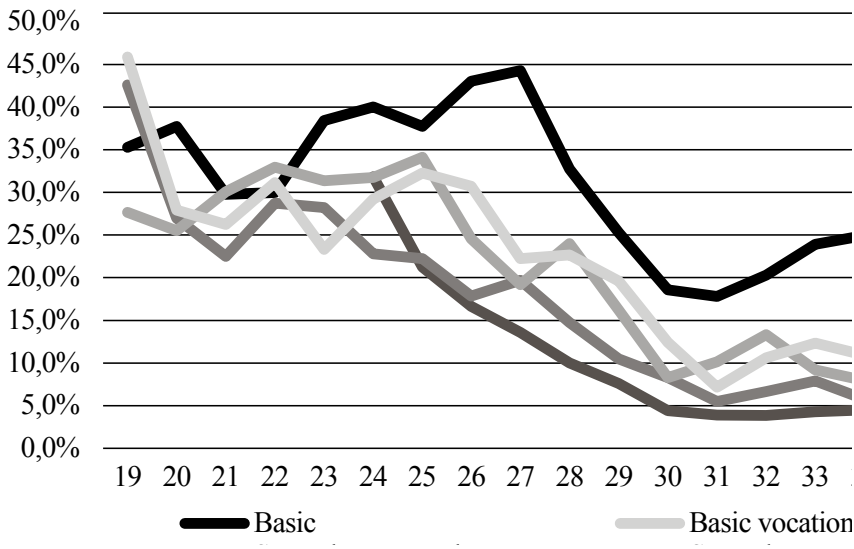

Figure 5. Unemployment rate of generation ’77 by the level of education

Source: own calculations using LFS, 1995−2013.

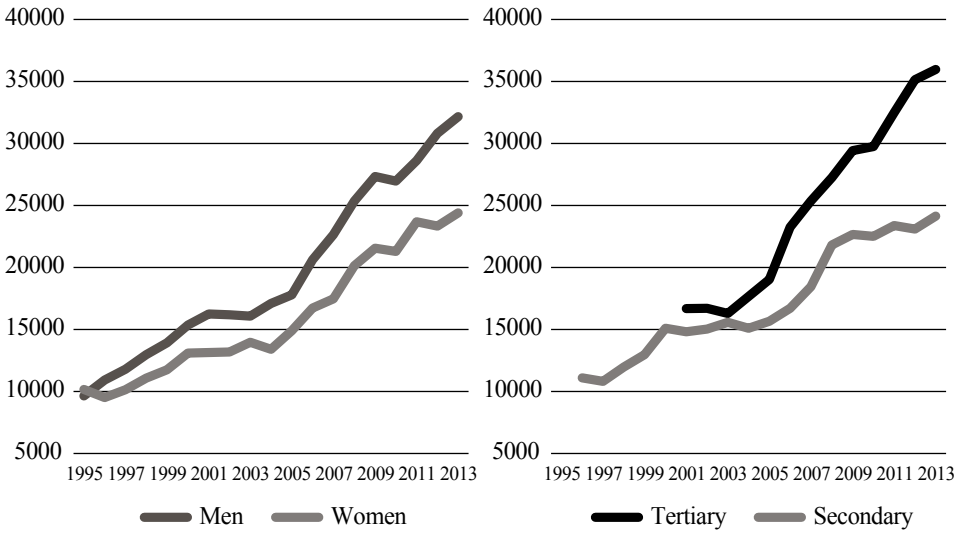

Figure 6. Yearly earnings (PLN) of generation '77 by sex and the level of education

Source: own calculations using LFS, 1995−2013.

6. The value and the rate of return to tertiary education

6.1. Assumptions

The net present value of tertiary education and the internal rate of return were calculated based on the following set of assumptions:

- the studies last for 5 years and begin at the age of 19 (t = 0 of the analysis);
- direct costs of studies and the costs of effort are identical in all years of studying and are equal per year;
- yearly expected income is equal to the yearly salaries of the main job () multiplied by the probability of employment among those who do not continue their education – for secondary school graduates denoted by and for tertiary graduates denoted by ;
- the alternative cost of studies is equal to the flow of expected income generated by counterfactuals of secondary school graduates, denoted by ;
- expected income of tertiary graduates is denoted by ;
- income of non-employed is assumed zero;
- discount rate equals 3%.

Using the standard accounting method for expressing the present value of future financial flows, the net present value of tertiary education can be calculated as follows:

$$NPV = -\sum_{t=0}^{4} \frac{C_t}{(1+r)^t} - \sum_{t=0}^{4} \frac{p_t^S W_t^S}{(1+r)^t} + \sum_{t=5}^{17} \frac{p_t^W W_t^W - p_t^S W_t^S}{(1+r)^t} \quad (7)$$

For the formula above, the value of $\tilde{r}$, which makes can be calculated (found numerically). It is the internal rate of return. For each $r < \tilde{r}$ it follows that $NPV > 0$, which makes the investment worthwhile. Every investment bringing positive *NPV* can be considered as profitable.

6.2. Short term horizon of professional career

The short term horizon of professional career ends with the available dataset, which is in 2013. The population under study is 36 years old at that point. Tertiary graduates leaving schools typically at 24 have 12 years of professional career. Secondary school leavers on the other hand have 5 years more of experience. Using the real data for wages and labour market activity of the generation '77 the net present value and internal rate of return for tertiary education can be calculated. The results utilizing the accounting formula with discrete time are presented in Table 5. The values are converted from PLN into US dollars using purchasing power parity exchange rate, as before.

Table 5. The net present value (USD) and internal rate of return for tertiary education (as part of secondary education) up to the age of 36

	Net present value of direct costs of studies	Net present value of forgone earnings	Net present value of expected earnings	NPV (r = 3%)	IRR
Men	17 608.67	22 111.83	33 251.26	–6 469.24	1.40%
Women	20 457.13	17 500.22	41 858.38	3 901.03	4.01%
Total	19 144.74	19 135.00	34 030.01	–4 249.73	1.88%

Source: own calculations using LFS, 1995−2013.

For the whole population under 36 the net present value of tertiary education is negative and amounts to –4.2 thousand USD. The internal rate of return is only 1.9%. It means that the investment in tertiary education does not pay off in this time frame. The analysis of *NPV* by sex shows that it does not for men, but perhaps surprisingly it does for women. For men the net present value of tertiary education is still quite significantly negative at the age of 36 and they need to wait at least two more years to break even.

The general conclusion is nonetheless somewhat positive. The decision to invest in tertiary education can be seen as economically rational, especially for women. It is worth noting that the private financial costs of studies have been

probably overestimated as they are based on the study conducted in 2014/2015 (deflated using 2013 consumer prices). It is very likely that these costs have grown at a higher rate than average prices for the economy. Even though the costs were overestimated, the value of tertiary education for generation ’77 at the age of 36 is only slightly negative (compared to overall costs) and clearly positive for women.

Three further observations are worth to notice. First, the direct financial costs of studies are assumed higher for women than men. It mostly follows from the fact that women engage more time in studying than men leaving less residual time for consumption, enjoying leisure or additional work. *Discrete Choice Experiment* was designed and used to calculate the value of an hour of residual time, which shows that the yearly equivalent of time is around 600 USD in favour of men. Second, the value of forgone earnings is higher for men than women. This is a result of two facts: higher wages for male secondary school leavers and considerably better job opportunities for male secondary school leavers as compared to women. Third, perhaps quite surprisingly, the net present value of expected earnings up to the age of 36 is higher for women than men. It follows from a very strong influence of employment rates for female tertiary graduates in relation to female secondary school graduates. The average difference in employment rates between the age of 24 and 36 is 17.8 pp for women, while for men the analogous difference is only 1.1 pp. It results in a very slow increase in the net present value for men between the age of 24 and 36.

6.3. Long term professional career perspective

All the assumptions made in the section 6.1. are still in force. It is assumed further that the evolution of wages and economic activity will follow the pattern observed for older generations in the data for 2013. Using the same methodology the hypothetical net present value and internal rate of return can be calculated for entire professional careers of men and women born in 1977. Calculations are shown in Table 6 below.

Table 6. The net present value (USD) and internal rate of return for tertiary education (as part of secondary education) for the entire professional career

	Net present value of direct costs of studies	Net present value of forgone earnings	Net present value of expected earnings	NPV (r = 3%)	IRR
Men	17 608.67	22 111.83	135 026.57	95 306.07	9.03%
Women	20 457.13	17 500.22	134 344.20	96 386.85	10.28%
Total	19 144.74	19 135.00	129 405.27	91 125.53	9.28%

Source: own calculations using LFS, 1995−2013.

The long term perspective shows significant value of tertiary education. The net present value for entire population is roughly 91 thousand USD while the internal rate of return reaches 9.3%, which is more than the long run return on typical financial assets. The decision to invest in tertiary education appears to be more economically profitable for women than men, but the difference is very small. Internal rate of return is also higher for women (10.3% as compared to 9%). The gap between men and women, resulting from the slow buildup in the initial years of career, appears to close in the last stages of professional career, where the employment rates for women are very low.

7. Summary

The studies of the value of education show that tertiary education is still a worthwhile investment, although some of them indicate that the rates of return have declined with the popularity of higher education. This particular study uses LFS data for Poland for the generation born in 1977 to calculate the net present value and the internal rate of return to tertiary education. In addition to forgone earnings and direct costs of studies, a special Discrete Choice Experiment was designed and conducted to supplement the cost side by adding the value of effort put to complete the studies. Cross section data for generation born in 1977 are a proxy to longitudinal data gathered in many countries. Estimates show that the NPV for tertiary education is highly positive in the entire professional career, bringing an IRR of 9.3%. Surprising effect is that the found IRR is higher for women than men, which seems to be mainly driven by the impact of tertiary education on women's labour market participation, which is not so strong for men. Although women still do earn less than men, their relative expected earnings over secondary female graduates are high enough to provide substantial return. It can then be argued that women born in 1977 on average might have had more incentives to undertake tertiary education than men.

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Appendix

Table A1. Definitions for variables used in the wage model

Variable (short name)	Definition
Sex (SEX)	1 – man* 2 – woman
Education level (EDU)	1 – tertiary 2 – secondary (general and vocational) 3 – basic vocational 4 – primary
Class of settlement unit (CSU)	0 – town 100 thousand and more 1 – town 50 – 100 th. 2 – town 20 – 50 th. 3 – town less than 20 th. 4 – countryside*
Voivodeship (VOI)	dolnośląskie* kujawsko-pomorskie lubelskie lubuskie łódzkie małopolskie mazowieckie opolskie podkarpackie podlaskie pomorskie śląskie świętokrzyskie warmińsko-mazurskie wielkopolskie zachodniopomorskie
Marital status (MS)	0 – single, widowed, divorced or separated* 1 – married
Ownership sector (OWN)	1 – public* 2 – private

Contract type (CONTRACT)	1 – full time* 2 – part time
Firm size (FS)	1 – 10 employees and less* 2 – 11-19 employees 3 – 20-100 employees 4 – 101 employees and more

Note: reference categories are marked with an asterisk (*).

Table A2. Estimates of the wage model (Heckman selection)

VARIABLES	(1) Pooled	(2) 2001	(3) 2002	(4) 2003	(5) 2004	(6) 2005
SEX = 2	-0.2430**	-0.1808**	-0.2175**	-0.1280**	-0.1244**	-0.2638**
	[0.000]	[0.000]	[0.000]	[0.001]	[0.005]	[0.000]
EDU = 1	0.2274**	0.1553*	0.1293*	0.1987**	0.2884**	0.1367**
	[0.000]	[0.033]	[0.035]	[0.000]	[0.000]	[0.001]
EDU = 3	-0.0773**	-0.0767*	-0.1338**	-0.0888*	-0.0271	-0.0881*
	[0.000]	[0.048]	[0.000]	[0.014]	[0.490]	[0.012]
EDU = 4	-0.0347	-0.0855	-0.1565*	-0.0801	0.0245	-0.1502*
	[0.064]	[0.219]	[0.012]	[0.302]	[0.767]	[0.015]
SEX x (EDU = 1)	0.0004	-0.0468	0.0595	-0.1419*	-0.2563**	0.1087
	[0.980]	[0.598]	[0.436]	[0.039]	[0.000]	[0.056]
SEX x (EDU = 3)	-0.0097	0.0141	0.0537	-0.0066	-0.1399*	-0.0238
	[0.541]	[0.803]	[0.374]	[0.913]	[0.026]	[0.709]
SEX x (EDU = 4)	-0.0931**	-0.1558	-0.0124	-0.0294	-0.3705**	-0.1280
	[0.002]	[0.174]	[0.905]	[0.804]	[0.004]	[0.226]
CSU = 0	0.1172**	0.0859**	0.0004	0.0582	0.1355**	0.1951**
	[0.000]	[0.004]	[0.988]	[0.057]	[0.000]	[0.000]
CSU = 1	0.0168	-0.0995*	-0.1358**	0.0276	0.0485	0.0517
	[0.142]	[0.030]	[0.003]	[0.531]	[0.274]	[0.235]
CSU = 2	-0.0070	-0.0728	-0.0549	0.0702	0.1010*	0.0387
	[0.491]	[0.070]	[0.175]	[0.099]	[0.025]	[0.347]
CSU = 3	-0.0094	-0.0093	-0.0364	-0.0324	0.0558	0.0365
	[0.311]	[0.805]	[0.308]	[0.370]	[0.147]	[0.296]
MS = 1	0.0199**	0.0966**	0.0506*	0.0106	0.0686**	0.0731**
	[0.003]	[0.000]	[0.041]	[0.657]	[0.007]	[0.002]
OWN = 2	0.0790**	0.0998**	0.0661*	0.0943**	0.0423	0.1028**
	[0.000]	[0.001]	[0.023]	[0.000]	[0.139]	[0.000]
CONTRACT = 2	-0.1728**	-0.1888**	-0.1865**	-0.2068**	-0.2170**	-0.1401**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
FS = 2	0.1183**	0.1526**	0.0958**	0.0875**	0.1287**	0.1108**
	[0.000]	[0.000]	[0.001]	[0.001]	[0.000]	[0.000]
FS = 3	0.1711**	0.2541**	0.1875**	0.1232**	0.1415**	0.1218**
	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]
FS = 4	0.2610**	0.2597**	0.2334**	0.2163**	0.1650**	0.2286**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Year dummies	YES	NO	NO	NO	NO	NO
Constant	9.7353**	9.5519**	9.7091**	9.8024**	9.7601**	9.6136**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

	(7) 2006	(8) 2007	(9) 2008	(10) 2009	(11) 2010	(12) 2011	(13) 2012	(14) 2013
	-0.2640**	-0.2938**	-0.2587**	-0.2875**	-0.3220**	-0.2843**	-0.3128**	-0.2894**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	0.2189**	0.2571**	0.2506**	0.2105**	0.1623**	0.2154**	0.2568**	0.2956**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	-0.0913*	-0.1287**	-0.0746	-0.0319	-0.0728	-0.1072**	-0.0868**	-0.0153
	[0.018]	[0.002]	[0.052]	[0.456]	[0.080]	[0.000]	[0.002]	[0.594]
	-0.1168	-0.0053	-0.0012	-0.0106	-0.1287	-0.0612	-0.0678	-0.0522
	[0.079]	[0.940]	[0.986]	[0.888]	[0.072]	[0.264]	[0.267]	[0.377]
	0.0488	0.0249	0.0348	0.0085	0.1396*	0.1071**	0.0685	0.0083
	[0.381]	[0.667]	[0.539]	[0.892]	[0.022]	[0.004]	[0.076]	[0.833]
	0.0574	0.0911	-0.0172	-0.0470	-0.0924	-0.0836*	-0.0269	-0.0763
	[0.379]	[0.165]	[0.775]	[0.485]	[0.157]	[0.040]	[0.539]	[0.093]
	0.0685	-0.0151	-0.1404	-0.0296	-0.1228	-0.2622**	-0.0830	-0.2307**
	[0.585]	[0.907]	[0.181]	[0.801]	[0.297]	[0.003]	[0.398]	[0.008]
	0.0976**	0.1559**	0.1020**	0.1126**	0.1106**	0.1633**	0.0968**	0.1047**
	[0.002]	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]
	0.0425	-0.0022	0.0434	0.1065*	0.1290**	0.1317**	0.0205	0.0082
	[0.346]	[0.961]	[0.302]	[0.050]	[0.005]	[0.000]	[0.512]	[0.795]
	-0.1252**	0.0109	0.0226	-0.0935*	0.0833*	0.1409**	-0.0251	-0.0011
	[0.002]	[0.799]	[0.570]	[0.027]	[0.033]	[0.000]	[0.360]	[0.971]
	-0.0551	0.0023	-0.0335	0.0494	0.0707	0.0694**	-0.0311	-0.0109
	[0.128]	[0.951]	[0.347]	[0.232]	[0.058]	[0.005]	[0.227]	[0.675]
	0.0635**	0.0399	0.0438	-0.0085	0.1119**	0.0564**	-0.0356	0.0195
	[0.009]	[0.125]	[0.078]	[0.774]	[0.000]	[0.006]	[0.075]	[0.336]
	0.1310**	0.1746**	0.1655**	0.1125**	0.0086	0.0499**	0.0409*	0.0086
	[0.000]	[0.000]	[0.000]	[0.000]	[0.753]	[0.006]	[0.028]	[0.656]
	-0.1352**	-0.1309**	-0.1225**	-0.0849**	-0.1691**	-0.2125**	-0.1820**	-0.1697**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	0.1393**	0.1073**	0.0714*	0.0451	0.1326**	0.1769**	0.1345**	0.1401**
	[0.000]	[0.001]	[0.014]	[0.125]	[0.000]	[0.000]	[0.000]	[0.000]
	0.1309**	0.1624**	0.1963**	0.1568**	0.2289**	0.1984**	0.1660**	0.1833**
	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	0.2956**	0.2754**	0.2667**	0.2631**	0.3068**	0.3223**	0.2460**	0.2347**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	NO	NO	NO	NO	NO	NO	NO	NO
	9.7110**	9.7693**	9.9208**	10.1757**	9.3048**	9.7053**	10.2258**	10.1664**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

VARIABLES	(1) Pooled	(2) 2001	(3) 2002	(4) 2003	(5) 2004	(6) 2005
SEX = 2	-0.2391**	-0.0138	-0.1640*	-0.3140**	-0.3804**	-0.3485**
	[0.000]	[0.837]	[0.019]	[0.000]	[0.000]	[0.000]
EDU = 1	0.0576**	0.1238	-0.2021	-0.4081**	-0.0906	0.1179
	[0.010]	[0.412]	[0.077]	[0.000]	[0.336]	[0.206]
EDU = 3	-0.0098	0.3368**	0.0644	-0.0867	0.0024	0.1004
	[0.619]	[0.000]	[0.358]	[0.245]	[0.976]	[0.210]
EDU = 4	-0.4474**	-0.3185**	-0.2416*	-0.7921**	-0.7466**	-0.2881*
	[0.000]	[0.008]	[0.037]	[0.000]	[0.000]	[0.023]
SEX x (EDU = 1)	0.3122**	-0.0238	0.4541**	0.9560**	0.5845**	0.3654**
	[0.000]	[0.896]	[0.001]	[0.000]	[0.000]	[0.003]
SEX x (EDU = 3)	-0.1505**	-0.3302**	-0.3222**	-0.1465	0.1039	-0.3783**
	[0.000]	[0.002]	[0.004]	[0.206]	[0.386]	[0.003]
SEX x (EDU = 4)	-0.0963	-0.2643	-0.1500	0.3152	0.3641	-0.0288
	[0.059]	[0.161]	[0.411]	[0.115]	[0.078]	[0.886]
CSU = 0	0.0681**	0.0901	0.0898	0.0836	0.0090	-0.0173
	[0.000]	[0.136]	[0.141]	[0.183]	[0.891]	[0.790]
CSU = 1	0.1901**	0.1564	0.1475	0.1231	0.3638**	0.4094**
	[0.000]	[0.098]	[0.111]	[0.167]	[0.000]	[0.000]
CSU = 2	0.2276**	0.1357	0.1340	0.0037	0.0742	0.3310**
	[0.000]	[0.093]	[0.101]	[0.965]	[0.409]	[0.000]
CSU = 3	0.1645**	-0.0178	0.0848	0.2337**	0.1072	0.2526**
	[0.000]	[0.810]	[0.237]	[0.001]	[0.158]	[0.001]
MS = 1	0.2008**	-0.0705	0.1666**	0.1272**	0.0831	0.1373**
VOI	YES	YES	YES	YES	YES	YES
Constant	-0.3184**	-0.6603**	-0.4352**	-0.4058**	-0.1012	-0.1931
	[0.000]	[0.000]	[0.000]	[0.000]	[0.331]	[0.091]
atanh ρ	-0.8723**	-0.5015**	-0.5420**	-1.0120**	-0.9895**	-0.5980**
	[0.000]	[0.009]	[0.004]	[0.000]	[0.000]	[0.001]
ln sigma	-0.7966**	-0.9520**	-0.9412**	-0.8359**	-0.8070**	-0.9571**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	48 462	3 310	3 345	3 268	3 066	2 993
N_uncensored	18 619	1 001	1 045	1 051	1 006	1 103
Wald Chi^2	12 136	232.7	209.3	236	296.9	296.9
LR	207.6	3.748	5.028	17.34	20.16	5.039
LR p-value	[0.000]	[0.0529]	[0.0249]	[0.000]	[0.000]	[0.0248]

Note: p-values are reported in square brackets under estimates. Significance levels are denoted by:
** $p < 0,01$, * $p < 0,05$.
Parameters for Voivodeships have been omitted for the sake of brevity.

	(7) 2006	(8) 2007	(9) 2008	(10) 2009	(11) 2010	(12) 2011	(13) 2012	(14) 2013
	-0.3560**	-0.2822**	-0.3994**	-0.3818**	-0.1193	-0.2147**	-0.1802**	-0.2268**
	[0.000]	[0.001]	[0.000]	[0.000]	[0.078]	[0.000]	[0.002]	[0.000]
	0.0665	0.1191	0.0114	0.0518	-0.0136	0.0447	0.0949	0.0005
	[0.464]	[0.188]	[0.903]	[0.567]	[0.850]	[0.492]	[0.140]	[0.994]
	-0.0654	-0.1191	-0.0706	-0.0924	-0.0412	-0.0802	-0.0604	-0.0098
	[0.443]	[0.167]	[0.407]	[0.267]	[0.540]	[0.191]	[0.324]	[0.879]
	-0.4548**	-0.4399**	-0.5325**	-0.5057**	-0.0911	-0.5350**	-0.5687**	-0.5844**
	[0.001]	[0.001]	[0.000]	[0.000]	[0.430]	[0.000]	[0.000]	[0.000]
	0.2695*	0.2779*	0.4895**	0.5929**	0.2157*	0.3142**	0.1550	0.2917**
	[0.028]	[0.025]	[0.000]	[0.000]	[0.025]	[0.000]	[0.067]	[0.001]
	-0.2539	-0.1616	0.0093	0.0715	-0.1120	-0.1194	-0.1275	-0.1937*
	[0.050]	[0.213]	[0.942]	[0.569]	[0.276]	[0.189]	[0.158]	[0.041]
	-0.2432	-0.3981	-0.1028	0.2087	-0.3284	-0.2775	-0.1895	0.1694
	[0.272]	[0.066]	[0.593]	[0.296]	[0.062]	[0.082]	[0.253]	[0.297]
	0.1258	0.0212	0.2501**	0.1951**	-0.0392	0.0648	0.0784	0.1004*
	[0.057]	[0.751]	[0.000]	[0.003]	[0.466]	[0.173]	[0.096]	[0.042]
	0.3101**	0.2612**	0.2604**	-0.0509	0.0559	0.2368**	0.1373*	0.2475**
	[0.002]	[0.007]	[0.006]	[0.629]	[0.465]	[0.000]	[0.043]	[0.000]
	0.3927**	0.1737	0.1282	0.2709**	0.1227	0.3511**	0.4182**	0.3913**
	[0.000]	[0.056]	[0.145]	[0.002]	[0.061]	[0.000]	[0.000]	[0.000]
	0.3570**	0.2848**	0.1331	-0.0785	0.0808	0.2210**	0.2471**	0.2439**
	[0.000]	[0.000]	[0.085]	[0.310]	[0.190]	[0.000]	[0.000]	[0.000]
	0.0740	0.1774**	0.2578**	0.4185**	0.1162**	0.2563**	0.1757**	0.1694**
	YES	YES	YES	YES	YES	YES	YES	YES
	-0.1563	-0.2831*	0.2116*	-0.0092	-0.9962**	-0.2825**	-0.1549	-0.1669
	[0.171]	[0.011]	[0.048]	[0.932]	[0.000]	[0.002]	[0.075]	[0.067]
	-0.7067**	-0.8042**	-1.0447**	-1.3221**	1.0746**	0.3334*	-0.7527**	-0.6089**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.026]	[0.000]	[0.000]
	-0.8900**	-0.8334**	-0.7741**	-0.6346**	-0.7080**	-0.9824**	-0.8411**	-0.9155**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	2 812	2 730	2 741	2 711	5 363	5 464	5 513	5 146
	1 103	1 106	1 430	1 405	1 145	2 505	2 505	2 214
	399.4	418.1	453.9	371.4	603.5	1212	1090	1031
	29.24	20.12	36.28	115.5	8.789	3.525	16.04	11.94
	[0.000]	[0.000]	[0.000]	[0.000]	[0.0030]	[0.0604]	[0.000]	[0.0006]

Table A3. Estimates of the multinomial logit model for the utility

Attribute	Coefficient (β)	Standard error	p-value
Hours of work	–0.01840	0.0016	0.0000
Salary	0.00156	0.0002	0.0000
Salary x time devoted for studies	–0.00002	0.0000	0.0000
Status Quo	–0.99127	0.0872	0.0000
N	1 328		
Log likelihood	–1 207.77		

Source: "Social and economic conditions of educational choices of people aged 18−30" survey.

Table A4. Value of one hour of time (PLN) for selected levels of time devoted to studying implied by DCE estimated parameters of utility function

	Hours of time devoted to studying	Value of one hour of time (PLN)
	20	15.33
	25	16.57
	30	18.03
	35	19.78
	40	21.90
	45	24.53
	50	27.87

Source: "Social and economic conditions of educational choices of people aged 18−30" survey.