Return to schooling in Hungary before and after the transition years

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Abstract

In this paper, I compared the return to schooling in Hungary by using datasets available from the Hungarian Wage Survey carried out in 1986 and in 2000, with more than 600 thousand observations altogether. The results are in conformity with the expectations and other empirical researcher's works, showing an increase in the return to schooling of 74% in these 14 years, and large increases in returns to education for those who attended a high school or a university/college. The lower positioned education levels didn't bring significant changes in their premiums, this fact being one of the most plausible explanations why attendance to vocational schools dropped so dramatically after the communism collapsed. I also searched for explanations and solutions for the puzzle: why changes occurred in these 14 years, highlighting some possibilities which could be used as extension to the present work, solving the data selection problems faced with the current dataset.

Keywords: return to schooling, wage inequality/ differentials, human capital, transition economies, Hungary

I. Introduction

Hungary in many aspects is similar to the other neighboring countries, especially in what concerns the evolution of the educational and academic system and also of the youth labor market. In the past twenty years there was a huge increase in demand for schooling in Europe, and especially in the Center-Eastern European countries. The education system in this part of the world changed very rapidly and enormously in a relatively short time period – for example many teachers switched from preaching about socialist ideologies to apostolate about free markets and capitalism. Step by step, the mechanism of the whole system became more market oriented, serving the needs of those who enrolled and those who were anxiously searching for young professionals to grease the wheels of their own businesses. Universities, grad schools or even post graduate schools face higher number of applicants each year, while the vocational schools became less preferred, among applicants. Many say it is a fashion to go to university, but the true underlying reason may be in the fact, that the premium of schooling has increased, and young people actually realized this before any other policy or advertisement of a university.

Empirical research has been conducted in many instances about the same or similar topic using evidence from Hungary and neighboring countries. It

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has been done with data from more years, or including variables with the most different purposes. The present paper aims to reanalyze the findings of some highly respected researchers, like Campos and Jolliffe (2007), with a larger dataset, but highlighting only two important years of this process: 1986 – the pre-transition year, when not even the most progressive society form the Soviet bloc opened itself for reforms, and 2000 – when the transition period came near to its end, not like in Romania, Bulgaria or Ukraine. The first year analyzed is characterized mostly by wages set below equilibrium, equalitarian distribution of income and artificially compressed returns to skill. But the most interesting aspect of that era lays in the fact that unemployment in that time was something inadmissible from the society's point of view; hence there is a very little proportion of the labor force that didn't enter the labor market. To understand, what happened beneath the increase of enrollment to school ratios, it is important to calculate the rate of returns to different schooling levels in at least two time periods, that aren't close to each other, but also being aware of the social, constitutional and professional dissimilarities between the two eras. I expect to find an increase in the return to every educational level, especially for the higher ones, increase in the premium of an additional year of education, and a smaller return to school of those cohorts who graduated after 1989. The latter expectation is based on the general opinion in Hungary, that people graduating after the communism are not so well prepared, because of the reduction in government expenditures on education and because the changes occurred in the curricula, especially in the fields of mathematics, engineering or other technology related sciences.

II. Data and empirical specification

I will carry out my empirical analysis using data from the Hungarian Wage Survey, covering two years, 1986 and 2000, with a total of 664 815 observations. To gather evidence for the expectations expressed above, I will pursue with three methods: (1) by computing the rate of return to an additional year of schooling; (2) by computing the rate of return to every level of education in the two periods; (3) by examining those people's return to schooling, who graduated just before the data collection. The sample for the year 1986, used in my empirical analysis, grasps almost entirely the true distribution of the population and their wages. The 1.a Figure illustrates the kernel density of the log of real wages from 1986, while Figure 1.b shows the same density from year 2000. It can be seen, that the first one – as expected – has a lognormal distribution, being skewed to the right, meaning that there is a larger proportion of those workers, who earn less (below the median and average), than those who earn

very much compared to average. The second figure, on the other hand, shows a two mode distribution, meaning that the population is heterogeneous. The explanation would be that in 2000 there were not present the same constraints for working, each individual could choose freely between entering the job market and staying out. If the return of the owned skills or education was too small, one had the option to not participate in 2000, not like in the communist era, when the unemployment was seen as a major prejudice brought to the entire society. Hence the sample for 2000 doesn't contain those who have chosen not to participate in the labor market, making the sample selection bias an issue present in the estimations from this year.

To estimate the wage equations I used the standard Mincer equation:

$$log(w_i)=\beta_0 + \beta_1 S_i + \beta_2 EXP_i + \beta_3 EXP^2 + \beta_4 X_i + u_i \qquad (1)$$

Here S stands for years of schooling, EXP[1] is the potential experience, while X can stand for demographic or institutional characteristics, as well for spatial price differences. Because the data is pooled, for X I included a gender dummy, that is 1 for females and zero otherwise, to be able to capture also the dynamics of the gender gap in wages. The left hand side variables in every case will be the log of real gross monthly earnings, (in 2005 forints) including base salary and other pecuniary items of worker compensation, like regular bonuses, premiums, overtime pay, allowances, etc. and 1/12 of last year's irregular premium and bonuses (incl. 13th month salary e.g.). Experience is a crucial factor, which needs to be included, but because of its difficult characteristic, it is something often asked in the questionnaires through indirect tools. The present work will rely on potential experiences, which are calculated as follows:

Potential experience = Age of the individual – 6 years[2] – the years needed to fulfill the given schooling level.

In the second part of my work, to be able to analyze the evolution of the returns to different educational levels, I used an extension of the previous standard Mincer equation:

[1] Experience is included in simple and also in quadratic form to be able to show if there is a diminishing return of experience. The suspicion that experience is not a variable which influences wages linearly is quite a common thought, but it will gain no importance if the maxima of the function will not lie between reasonable time intervals (e.g. between the age of starting a career and retirement).

[2] The average age when a Hungarian child goes to school.

$$log(w_i)=\beta_0 + \beta_1 ELEM_i + \beta_2 VOC_i + \beta_3 HIGH_i + \beta_4 UNI_i + \\ + \beta_5 EXP_i + \beta_6 EXP^2 + \beta_7 FEMALE_i + u_i \qquad (2)$$

In the above equation I included 5 categories of highest individual educational level: ELEM – elementary, VOC – vocational, HIGH – high school and UNI – university or college[3]. The other explanatory variables are the same as described in previous paragraphs.

The aim of the third extension of my analysis is to gather some evidence for or against the general belief, conform which after the fall of communism the quality of higher education declined. If this is to be true the return to each year of schooling also had to drop in fourteen years of transition for those cohorts who are under the age of 24 and have at least a high school diploma. For simplicity I will only include in the samples those who are less than 24 years old, have at least a high school degree and are males. Since examined cohorts have very few or no experience at all, I will also omit the experience variables from the estimated equation:

$$log(w_i)=\beta_0 + \beta_1 S_i + u_i \qquad (3)$$

III. Results

Being in conformity with the general expectations, in Table 1 it is shown how the return to an additional year of schooling has risen with 74 percent, from 0.084 to 0.146, between the two time periods. What wasn't expected is the fact that based on the estimated coefficients the gender wage gap didn't widened as the competitive markets settled in, but rather narrowed, from a 36% negative difference to 7.7 % discrimination only. The expected widening of the gender gap has been based on the intuition that wages aren't suppressed anymore like in communism, but dispersed on a larger scale. It is also interesting to calculate the turnover point of the experience. This point shows until which year is the return of experience positive – has a diminishing but positive return[4], and after which it will start "harming". While in 1986 this point was at the 40th year of experience, by 2000 it increased to 50 years, meaning that experience is present as a positive factor in people's carrier for a much longer period (almost their entire carrier).

[3] The base group is 'less than elementary'.

[4] It can be calculated with the simple method:

$$\frac{\partial \log(\text{SALARY})}{\partial \text{EXP}} = \hat{\beta}_{exp} + 2 * \hat{\beta}_{exp^2}\text{EXP} = 0 \Leftrightarrow \text{EXP} \approx -\frac{\hat{\beta}_{exp}}{2 * \hat{\beta}_{exp^1}}$$

The changes occurred in the return to the different education levels are captured in Table 2. It is very interesting to find, that conform the estimated coefficients the returns to elementary and vocational schooling levels changed the less, only couple of percents of increase reported, while high school and university/college level's premium rise much more significantly. The return to high school increased with 51.8%, from 0.405 to 0.615 in 14 years. One explanation for the large difference could be that in socialism high school was an option only for those who wanted to go to university later on, but vocational schools were preferred by everyone who just wanted to work in any of the manufacturing industries. With vocational schools people were able to gain specific skills and become breadwinners at very young ages; therefore this solution was chosen by a larger proportion of the population, but with a high school degree in socialism one didn't have so many options. In 2000 the share of those who opted for vocational schools in the previous couple of years had fallen dramatically, high school becoming something much more accessible and favorable, mainly because many jobs first criteria was a high school degree. Significant changes occurred also in the return to university or college degrees: they went from a premium of 0.895 to 1.292, an increase of almost 45%, to a return that has been already very high relatively to the other educational levels. The turnover points of the experience functions evolved differently from the previous case; instead of a shift to the right from the same 40^{th} year in 1986 it diminished to 33.33 years of experience, causing uncertainty about the true direction. Ideally the four turnover points would have to be close to each other in pairs, by years. The gender wage gap shows the similar tendencies as in the previous case, with female's wage inequalities narrowing substantially, from -36.36% to -12.44%.

The third case's estimation output can be seen in Table 3, and there is clearly no evidence for the decrease of quality of higher education after the transition period. It might not be evidence that would prove the contrary either though. The increase, between 1986 and 2000, of the return to an additional year of schooling has been quite significant, having a magnitude of 216%, growing from a premium of 0.04 to 0.15. Once again, the massive rise in the return to schooling seems to have a bigger impact on the overall young employment than the diminishing allocations from the government or the changes in the curricula.

IV. Conclusion

The three main parts of my analysis – the return to an additional year of schooling, the return to education levels and the evidence against the dimini-

shing quality of higher education – have all ended up with the same findings: a huge increase in each of these returns can be perceived and proved. But these very significant numbers, with signs that are in conformity with the expectations and general intuition should not be considered as the absolute measures for what happened in reality. One major fault in these evidences is the fact that in the sample from 2000 those individuals are missing, who didn't enter the labor market. It would be of a great interest to see what would have been their return to education and for which reasons they opted out. Was it because their reservation wage, let's assume the unemployment benefit, was above to their educational return? With current data it would be very difficult to say, but certainly there is room for broader analysis and research in this topic. One of the few solutions to this problem of sample selection was brought in by DiNardo, Fortin and Lemieux in the Heckman Selection framework in 2002, and would be interesting to apply it in a further research as a continuation of the present work.

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Appendix

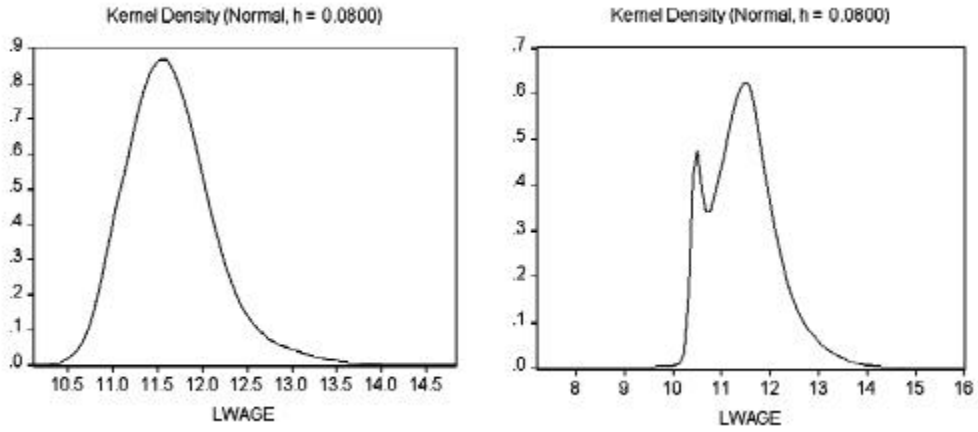


Figure 1.a and 1.b: The kernel density of log real wages in 1986 and 2000

Table 1. Returns to years of schooling

	1986	2000	Change 1986-2000
School Years	0.0840128	0.146437	74%
	(0.000240)	(0.000912)	
Experience	0.039385	0.019440	-51%
	(0.000165)	(0.000623)	
Experience^2	-0.000542	-0.000265	-51%
	(3.65E-06)	(1.40E-05)	
Female	-0.359248	-0.077065	-79%
	(0.001010)	(0.003475)	
Constant	10.39538	9.355915	-10%
	(0.003217)	(0.012214)	
R^2	0.415965	0.239836	

Source: Authors' analysis based on the Hungarian Wage Survey data described in the text.

Notes: Dependent variable is the log of monthly wages. Standard errors, in parentheses, are robust to White heteroscedasticity. All listed parameters are

statistically significant with a p-value less than 0.001. The point estimate for Experience^2 in 2000 has the smallest t-statistic with an absolute value of 18.26.

Table 2. Returns to Educational Levels

	1986	2000	Change 1986-2000
Elementary	0.133104 (0.001997)	0.172056 (0.018536)	29%
Vocational	0.275760 (0.002196)	0.284068 (0.018510)	3%
High School	0.405476 (0.002210)	0.615453 (0.018584)	52%
University/ College	0.895196 (0.003004)	1.292580 (0.019559)	44%
Experience	0.039501 (0.000169)	0.021724 (0.000620)	-45%
Experience^2	-0.000570 (3.78E-06)	-0.000328 (1.40E-05)	-42%
Female	-0.363626 (0.001037)	-0.124373 (0.003542)	-66%
Constant	10.98193 (0.002535)	10.71680 (0.019060)	-2%
R^2	0.424814	0.260450	

Source: Authors' analysis based on the Hungarian Wage Survey data described in the text.

Notes: Dependent variable is the log of monthly wages. Standard errors, in parentheses, are robust to White heteroscedasticity. All listed parameters are statistically significant with a p-value less than 0.001. The point estimate for elementary in 2000 has the smallest t-statistic with a value of 9.28.

Table 3. Comparing selection corrected returns to education by age

	1986	2000	Change 1986-2000
Elementary	0.048360 (0.002006)	0.153065 (0.007291)	217%
Constant	10.62918 (0.025119)	9.418897 (0.090842)	-11%
R^2	0.020706	0.089637	

Source: Authors' analysis based on the Hungarian Wage Survey data described in the text.

Notes: Dependent variable is the log of monthly wages. Standard errors, in parentheses, are robust to White heteroscedasticity. All listed parameters are statistically significant with a p-value less than 0.001.