Average years of education in Hungary: annual estimates 1920-2006

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Abstract

The average years of education, an indicator of the average educational attainment in a population, is a widely used proxy of human capital stock in the empirical literature. Its application is somewhat limited by the availability of data, even though annual series have already been created for a few countries. In this paper we offer an annual series of the average years of education in Hungary between 1920 and 2006 estimated by a slightly modified version of the Barro-Lee methodology so that the systematic bias arising from the assumption of the uncorrelatedness of the mortality with educational attainment is corrected for. Using the new series we also carry out a simple growth accounting exercise at the end of the study and find that human capital accumulation was a major determinant of the economic growth in Hungary only in the 1990s.

1. Introduction

Human capital is generally believed to be one of the major factors that may explain differences in income levels and long run economic performance. The need for empirical tests of growth theories incorporating human capital led to an increasing demand for measures of human capital endowment. Perhaps the most popular of these measures is the "average years of education" that is the duration of formal education followed by an average individual in a society.

There are a number of estimates of the average years of education that have been widely used in empirical studies (De la Fuente and Doménech 2000; Barro and Lee 2001; Cohen and Soto 2007). Since these estimates are only available for certain benchmark years for a large number of countries, these were mostly used for either cross-sectional or panel analyses. For a country-specific time-series analysis, one needs series with at least annual frequency. For a few, mostly western, countries such as Sweden, Spain, USA, Japan, and Portugal such series exist. For these countries, this generally led to an increase in analyses of the role of human capital in economic development (Hayami and Ogasawara 1999; Lains 2003; Turner *et al.* 2007; De la Croix, Lindh and Malmberg 2008).

In this paper we offer annual estimates of the average years of education in Hungary between 1920 and 2006 using a modified version of the Barro and Lee method. We review the fundamental methods applied to construct average years of education series in Section 2, which is followed by the comparison of the average years of education estimated for benchmark years from population censuses and household surveys in Section 3. The method of creating the annual dataset is presented in section 4. In order to estimate the contribution of human capital accumulation to economic growth, in section 5, using our newly estimated dataset, we carry out a growth accounting exercise for Hungary for the period 1980-2001. Section 6 concludes our findings.

2. Methods to estimate the 'average years of education'

Since the 1990s 'average years of education' has been suggested as a relatively straightforward proxy of human capital endowment. Using this indicator meant an obvious methodological development since the previously used proxy (enrolment ratios) was fundamentally a flow variable, while the 'average years of education' can be seen as a stock. The popularity of this variable may be judged from the fact that the most popular dataset created and updated by Barro and Lee (1993, 1996, 2001), has been cited to date 500 times according to the *Social Science Citation Index.*

However, the methodology of the estimation of average years of education is not as uniform as it may seem at first sight. Wössmann (2003) distinguishes three fundamental techniques. The first one, (Lau *et al.,* 1991; Nehru *et al.,* 1995, Godo 2001) is based on a Perpetual Inventory Method (PIM); with sufficiently long series of enrolment data available one can calculate the total years spent with formal education. This crude estimate is, when possible, corrected for mortality, repeaters, and drop-outs, and finally divided by the number of working age population yielding the average years of education. The second method is the projection applied by Kyriacou (1991): he calculates the 'average years of schooling' from mid-1970s censuses for a few benchmark years and then uses lagged enrolment ratios to interpolate average years of schooling in the labour force for the missing years.

Many objections have been raised against both methods: lack of data on mortality and repeaters, assumptions about the relation between enrolment and attainment, ignoring available data sources (censuses). Therefore, generally, a third method is preferred, pioneered by Barro and Lee (1993; 1996; 2001). Initially, this method relied solely on attainment figures taken directly from censuses (Psacharopoulos and Arriagada 1986), even though these are usually available at best for every 10th year. Therefore, Barro and Lee developed a perpetual inventory method to estimate the average years of education for every fifth year (between the benchmarks) based on the enrolment ratios and population. Because this method takes account of all available data in the benchmark years, it is generally considered superior to the alternatives.

During the last decade, however, doubts have been raised about the accuracy of the these estimates: after careful revision and using better quality data, the Barro-Lee estimates have been updated and modified by De la Fuente and Doménech (2000) for the OECD countries and by Cohen and Soto (2007) for a larger set of countries. Equally, the unbiasedness of their perpetual inventory method has been questioned as well. Portela *et al* (2004) argue that since Barro and Lee implicitly assume the mortality rate to be independent of the level of education, their estimates exhibit a serious downward bias which accumulates over time until the next census is available.

3. Comparing benchmarks

The most reliable source of data is the population census available from the Hungarian Central Statistical Bureau (KSH, http://www.nepszamlalas.hu/eng/index.html). For the years of censuses (1920, 1930, 1941, 1949, 1960, 1970, 1980, 1990, 2001) we have good quality data available on the educational attainment of the population. We also used the estimates of the Government Commission on Population Policy (http://www.nepinfo.hu/) for 2006. For these benchmark years we can estimate the average years of education by assigning a length to each educational level attained. Since choosing the duration of a certain type of education may affect the results significantly, we estimated two versions:

The first one (version 1) assumes that length of primary education to be 8 years independently of the year of census. This should not be necessarily true, however: even though there were initiatives in the 1930s to extend the 6 class primary school (people's school") to a 8 year class, the general 8-class primary education became actual practice in Hungary only in 1945 (theoretically from 1940 when the 8 class people's school was introduced) (Simkus and Andorka 1982, 742). As a result, it is possible that those respondents, who completed their primary education before 1945, studied only 6 years and not 8. In this case, we can expect an upward bias until the 1960s/70s when these people were still present in the population. For this reason we estimated a version 2 as well, under the assumption that the primary school's duration was 6 years until 1940, and 8 years afterwards. We assume that therefore the duration of the primary education of the average individual gradually increased from 6 year in 1940 through 6.98 in 1973, to 8 in 1990.

To check our estimates, we compared them to two available average years of education estimates: one by Barro and Lee (2001) and another by Cohen and Soto (2007). Both estimates are available for some benchmark years after 1960. As Table 1 suggests, our estimates nicely overlap with the Cohen and Soto estimates, but exceed that of Barro and Lee. This is not a problem however, since the Cohen and Soto estimates are generally believed to be more reliable.

Table 1

An alternative to the use of censuses would be the information gathered from household surveys. Ideally, these should lead to the same results but in practice one finds significant differences probably resulting from a positive relationship between the probability of response and the respondent's educational attainment. Since there are household surveys available for Hungary, we used the TÁRKI's Hungarian Household Survey (1992-1998) to estimate the average years of education for a few years. The individual query included a question regarding the educational attainment of the respondent in the following classifications: no schooling, 1-3 classes, 4-5 classes, 6-7 classes, 8 classes, vocational school, secondary school, college or 5 year technical secondary school, university. After assigning our estimates of the years of schooling needed to achieve the given level of education (0, 2, 4.5, 6.5, 8, 11, 12, 14, 17 respectively), we have calculated the mean and the std. deviation. The results of this exercise for seven years covered by the household survey are summarized in the table below:

Table 2

Although the results move in the same direction as the census estimates, it seems that the average years spent on education is generally overestimated in the household surveys compared to the population census data. Possible explanations may be the following: 1) people are required by law to participate in census surveys while household surveys are voluntary, 2) especially the lower skilled have the incentive to overstate their true education, 3) people with less education were more likely not to participate.

4. A set of annual estimates of average years of education for Hungary

Since, as pointed out in section 2, the Barro-Lee method is designed to provide estimates for each fifth year, we need to modify it in order to arrive at annual estimates. An additional problem is that the Barro and Lee method has difficulties with dealing with repeaters and drop outs of the education system. Although in their 2001 estimates they try to solve this problem, the corrections must necessarily be limited, especially for the pre-WWII years when less and lower quality data are available. Their most important implicit assumption is that mortality is equal among different educational groups. A consequence of this approach is that when a population's educational attainment grows considerably, and hence mortality decreases in the more educated groups, their method tend to underestimate the average years of education. This can clearly be seen in Figure 1 where we present the Barro-Lee estimates together with the Cohen and Soto and our own series:

Figure 1

Besides that the Barro and Lee figures have lower values for the benchmark years (1960, 1970, 1980, 1990, 2001) than the Cohen and Soto data, the years in between are underestimated even more. This is especially obvious in 1975, 1985, and 1995. As a result, Barro and Lee find a decline in average years of education in the 1980s and 1990s where the other estimates do not.

The mortality assumptions, as we saw, cause an underestimation of the growth of attainment (and the average years of education) when the attainment is estimated forward from the previous census. This is even more apparent in Figure 2, where we present the share of the population with primary education estimated forward and backward (calculated back from the next census). As the mortality assumption leads to an underestimation of the growth of attainment, estimating backward results in an overestimation of average years of education.

To avoid these issues we use a simple correction method. We start with the standard Barro and Lee equations which we slightly modified to allow for the estimation of annual series:

$$h_{0,t} = H_{0,t}/L_t = h_{0,t-i}\left[1-\left(L15_t \cdot i/5 \cdot L_t\right)\right] + \left(L15_t \cdot i/5 \cdot L_t\right)\cdot\left(1-PRI_{t-i}\right)$$

$$h_{1,t} = H_{1,t}/L_t = h_{1,t-i}\left[1-\left(L15_t \cdot i/5 \cdot L_t\right)\right] + \left(L15_t \cdot i/5 \cdot L_t\right)\cdot\left(PRI_{t-i} - SEC_t\right)$$

$$h_{2,t} = H_{2,t}/L_t = h_{2,t-i}\left[1-\left(L15_t \cdot i/5 \cdot L_t\right)\right] + \left(L15_t \cdot i/5 \cdot L_t\right)\cdot SEC_t - \left(L20_t \cdot i/5 \cdot L_t\right)\cdot HIGH_t$$

$$h_{3,t} = H_{3,t}/L_t = h_{3,t-i}\left[1-\left(L15_t \cdot i/5 \cdot L_t\right)\right] + \left(L20_t \cdot i/5 \cdot L_t\right)\cdot HIGH_t$$

where h is attainment per level of education (0= no education, 1=prim, 2=sec, 3=high). H is the total number of people in the population with a certain education level, i is the length of the forward estimation (so if one wants to estimate attainment in year t based on attainment 5 years ago, i would be 5, yielding the standard Barro-Lee formula), L is the total population aged 15 years or older, *L15* is total population aged 15-19, *L20* is total population aged 20-24, *PRI, SEC, HIGH* are the enrolment ratios in primary, secondary, and higher education respectively.

As can be seen in Figure 1 and 2, this method leads to an underestimation of the actual attainment (and hence, of the average years of education) because of the assumption that mortality is independent is of the education level. If we calculate backwards, the bias is exactly reversed (see Figure 2). Simply rewriting above equations we arrive at the formula to estimate the attainment backwards:

$$h_{0,t-i} = \left(h_{0,t} - \left(L15_t \cdot i/5 \cdot L_t\right) \cdot \left(1 - PRI_{t-i}\right)\right) \Big/ \left(1 - L15_t \cdot i/5 \cdot L_t\right)$$

$$h_{1,t-i} = \left(h_{1,t} - \left(L15_t \cdot i/5 \cdot L_t\right) \cdot \left(PRI_{t-i} - SEC_t\right)\right) \Big/ \left[1 - \left(L15_t \cdot i/5 \cdot L_t\right)\right]$$

$$h_{2,t-i} = \left(h_{2,t} - \left(L15_t \cdot i/5 \cdot L_t\right) \cdot SEC_t + \left(L20_t \cdot i/5 \cdot L_t\right) \cdot HIGH_t\right) \Big/ \left[1 - \left(L15_t \cdot i/5 \cdot L_t\right)\right]$$

$$h_{3,t-i} = \left(h_{3,t} - \left(L20_t \cdot i/5 \cdot L_t\right) \cdot HIGH_t\right) \Big/ \left[1 - \left(L15_t \cdot i/5 \cdot L_t\right)\right]$$

The next step is that we estimate the attainments both backward and forward. We have census data for about every 10 years. So, if we have census data for 1960 and 1970, we calculate the figure for 1965 from both the 1960 and the 1970 benchmark and calculate their average. This should net out the effect of repeaters, mortality, and drop outs (which means removing the downward bias caused by using the forward method (as can be seen in Figure 2) under the assumption that these three factors remain constant between two benchmarks. These assumptions are far less restrictive than assuming that mortality is uncorrelated with education or simply ignoring repeaters and dropouts.

As we now have attainment figures for 1965 and 1970, we again calculate attainment for the year between these benchmarks (1967). We do the same for 1969 (based on 1967 and 1970), etc. The main rule is that in each step one needs to estimate the year that is in the middle between two benchmarks. If the forward estimate (underestimation) is made over a longer time period than the backward estimate (overestimation), the downward bias could not be offset by the upward bias. Using this method, as can be seen in Figure 1, all implausible fluctuations drop out. The estimated average years of education series are reported in Table A.1.

5. Growth accounting for Hungary 1960-2001

Now that we have annual estimates of average years of education for Hungary, it is possible to employ it in a growth accounting analysis. Growth accounting, that is the estimation of the share of economic growth that cannot be explained by the accumulation of the observed production factors, is a frequently used technique, suggested by Solow (1957) and made popular by Dennison (1974). The major problem of this approach is twofold: first, it is generally based on the assumption of constant income share of the factors of production (a Cobb-Douglas production function), and secondly, it is often used only with physical capital stock and labour, that is the effect of human capital accumulation, institutions and technology on economic growth will all be included in the residual. If we have a theoretically feasible method to link educational attainment with the human capital stock, knowing the average years of education annually, we can give a direct estimate how human capital accumulation contributed to economic growth. Since the availability (and reliability) of the data (especially physical capital stock) differs a lot before and after 1980, we carry out the growth accounting exercise in two steps.

For the post-1980 period we can turn to Gábor Pula's (2003) estimates of the Hungarian physical capital stock in the period 1980-2001, who also uses a growth accounting in his paper. He finds that the TFP grew rapidly in the 1992-1995 period, indicating that a productivity growth took place after the change of system. He did not include human capital though.

Like Pula, we use a growth accounting formula that is not based on the unit elasticity of substitution assumption of the Cobb-Douglas production function (but we assume constant returns to scale):

$$\frac{\Delta A_t}{A_t} = \frac{\Delta Y_t}{Y_t} - \left(\frac{w_t L_t}{Y_t}\right)\left(\frac{\Delta L_t}{L_t} + \frac{\Delta h_t}{h_t}\right) - \left(1 - \frac{w_t L_t}{Y_t}\right)\frac{\Delta K_t}{K_t}$$

where *Y, A, L, w, h* and *K* denote the GDP, the TFP, the labour force, the real wage, the per capita human capital stock, and the physical capital stock respectively. For our growth accounting exercise we use Pula's physical capital stock data, with the GDP, GDP deflator, and labour force data from the World Development Indicators of the World Bank (2007). The data on labour's factor share are available from the OECD for the years 1992-2005. There is an apparent reduction in the labour's factor share over time: from 0.783 in 1992 it drops to 0.543 in 2005. Since the factor share was not available prior to 1992, we assumed that it was 0.783 prior to 1992.

The human capital stock was calculated by the method suggested by Hall and Jones (1999), which is based on a Mincerian approach (Mincer 1974). The per capita human capital stock is defined as follows:

$$h = e^{r_t S_t}$$

where r denotes the rate of returns to education, and S is the average years of education. The rate of returns to education has been estimated by Campos and Jolliffe (2003) for Hungary in 1986, 1989, 1992, 1995, 1998.[1] They find that the r grew considerably after the Transformation (6.2%, 7.4%, 9.5%, 10.9%, 11.2% respectively). To interpolate their data, without any further relevant information, we assumed that the r grew at a constant rate between the observations, while it remained constant prior to 1986 and after 1998.

The results of the growth accounting exercise are reported in Table 3.

Table 3

We find that, independently whether we take human capital into account or not, around 1990 there is a reduction in the TFP. If we do neglect human capital accumulation (last column), we find, in accordance with Pula that the TFP began to grow considerably after 1992. Once we subtract the contribution of human capital to economic growth, though, the picture changes dramatically: the TFP growth is now predominantly negative (if the first years of transition (1990-1992) are mitted the TFP growth is still positive but very small). These results suggest that human capital accumulation was a major source of economic growth in Hungary in the 1990s, while the effect of the latent factors included by the TFP (productivity, social infrastructure, institutions, etc) seems to have been very small, occasionally, in the first years of the transition even negative.

For the pre-1980 period, we rely on the official statistics of the Hungarian Statistical Bureau (KSH, 1969, 1974, 1979, 1980a, 1980b, 1981), offering annual estimates of the physical capital stock in Hungary in both current and constant prices. We obtained the indices of nominal GDP, and the economically active population, together with CPI from the ECOSTAT (www.ecostat.hu). Since the Penn World Table has the real GDP for Hungary only after 1970, for 1960s we relied on Hungarian statistics. As we have no GDP deflator for the period, we use CPI to convert the GDP series to constant 1960 prices, and we use the economically active population as proxy of the labor force, which still should suffice due to the administratively maintained full-employment policy of the socialist regime. Unfortunately, we have no estimates of the rate of returns to education or the factor shares in this period. For this reason we assume that the respective values 6.2% and 0.783 are valid between 1960 and 1980. The results (5 year averages) are reported in Table 4.

Table 4

The results are in accordance with the expectations: we can observe the growth slowdown beginning in the second half of the 1970's (paired with increasing prices). The accumulation of the human capital seems to have been steady at 0.4% per annum, with a low effect on TFP. This trend is observable in Table 3 as well, until 1986. We can therefore conclude that in the period 1960-86, human capital accumulation was a minor source of economic growth, while in the 1990's, following the change of system and the transition to a market economy, human capital was appreciated so that it became a major factor of productivity growth in Hungary.

Conclusion

The "average years of education" is a very popular indicator of educational attainment and is widely used as a human capital proxy in empirical analyses. The extent and depth of these analyses, however, has severely been hampered by the lack of annual data for individual countries. In this paper we present annual estimates of the average years of education for Hungary in the 1920-2006 period, based on population census data and a modified version of the Barro-Lee method. The simple modification deals with the bias resulting from the correlation between mortality and educational attainment, and with the bias caused by the exclusion of repeaters and drop outs.

The resulting series do not yield the implausible interpolated values of the Barro and Lee data. In addition, it corresponds far better to the Cohen and Soto (2007) figures, which are generally considered superior. This makes an important difference in the results, especially after 1990: while in the Barro and Lee figures the average years of education in Hungary appears to decline since the 1980s, we find an increase similarly to Cohen and Soto.

Using our annual estimates of the average years of education, we carried out a growth accounting exercise for Hungary between 1960 and 2001, with the 1960-1980 and 1981-2001 periods treated individually due to heterogeneous data quality and different assumptions regarding factor shares and the rate of returns to education. In the period 1960-1986, we find that human capital accumulation was a minor source of economic growth contributing around

0.3 percentage point annually. In the 1990s, however, the situation seems to have changed fundamentally. After the effect of human capital accumulation is captured, the estimated TFP growth is significantly reduced. This seems to be especially the case after the change of system in 1990, suggesting that as the expanding private sector offered a better possibility for the productive use of human capital (which seems to be the only factor of production that dynamically grew during the transition), human capital accumulation became an important source of economic growth (with its contribution above one percentage point annually).

Appendix

Table A.1.

Footnotes

Varga (1995) also estimated the rate of returns to education for a few benchmark years in Hungary, for different educational levels. Since we here employ average years of education, the Campos and Joliffe data were easier to use in our analysis.

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Table 1

Average years of education as estimated from Population Censuses

year of census	Average years of education version 1	Average years of education version 2	Barro and Lee (2001) estimates	Cohen and Soto (2007) estimates
1920	5.20	4.45	n.a.	n.a.
1930	6.17	5.27	n.a.	n.a.
1941	6.89	5.79	n.a.	n.a.
1949	7.75	6.60	n.a.	n.a.
1960	8.51	7.46	6.65	7.43
1970	8.96	8.10	7.90	8.05
1980	9.30	8.88	8.81	8.83
1990	9.45	9.45	8.71	9.50
2001	10.64	10.64	8.81[a]	10.16[a]

Note: [a] 2000

Table 2

Estimated average years of schooling from the TÁRKI Hungarian Household Panel Study

year of survey	number of observations	average years of education	std. deviation	interval estimation (95%)
1992	4207	10.15	3.36	10.07 – 10.23
1993	5359	10.24	2.99	10.16 – 10.32
1994	4976	10.19	3.04	10.11 – 10.28
1995	4397	10.27	3.04	10.18 – 10.36
1996	3859	10.37	2.98	10.27 – 10.46
1997	3037	10.36	2.98	10.26 – 10.47

Table 3

Growth accounting with human capital, 1981-2001, annual growth rates and averages (bold)

year	ΔY/Y	ΔK/K	ΔL/L	h	Δh/h	(w*L)/Y	r	TFP with human capital effect subtracted	TFP without human capital effect subtracted
1981	2.9%	5.2%	-1.0%	1.74	0.3%	0.783	0.062	2.3%	2.5%
1982	2.8%	4.7%	-1.1%	1.74	0.3%	0.783	0.062	2.5%	2.7%
1983	0.7%	4.8%	-1.1%	1.75	0.3%	0.783	0.062	0.3%	0.5%
1984	2.7%	4.2%	-1.0%	1.76	0.4%	0.783	0.062	2.2%	2.5%
1985	-0.3%	2.4%	-1.2%	1.76	0.3%	0.783	0.062	-0.1%	0.1%
1986	1.5%	3.4%	-1.2%	1.77	0.4%	0.783	0.062	1.4%	1.8%
1987	4.1%	3.9%	-1.2%	1.84	4.0%	0.783	0.062	1.1%	4.2%
1988	-0.1%	2.9%	-1.2%	1.92	4.2%	0.783	0.066	-3.1%	0.2%
1989	0.7%	3.0%	-1.1%	2.01	4.7%	0.783	0.070	-2.7%	1.0%
1990	-3.5%	2.0%	-0.7%	2.14	6.7%	0.783	0.074	-8.6%	-3.4%
1991	-11.9%	-25.9%	-0.4%	2.31	8.2%	0.783	0.080	-12.4%	-5.9%
1992	-3.1%	1.5%	1.4%	2.52	9.0%	0.783	0.087	-11.6%	-4.5%
1993	-0.6%	1.1%	-3.8%	2.67	5.9%	0.783	0.095	-2.5%	2.1%
1994	2.9%	2.9%	-2.9%	2.80	4.8%	0.783	0.099	0.7%	4.3%
1995	1.5%	2.7%	-2.2%	2.98	6.5%	0.730	0.104	-2.3%	2.4%
1996	1.3%	2.3%	-0.8%	3.02	1.3%	0.720	0.109	0.2%	1.2%
1997	4.6%	3.5%	-1.5%	3.04	0.5%	0.682	0.109	3.8%	4.1%
1998	4.9%	4.8%	0.2%	3.08	1.3%	0.610	0.109	2.0%	2.7%
1999	4.2%	5.0%	2.4%	3.12	1.6%	0.587	0.109	-0.2%	0.7%
2000	5.2%	3.9%	0.8%	3.14	0.6%	0.574	0.109	2.8%	3.1%
2001	4.1%	4.2%	-0.6%	3.19	1.5%	0.594	0.109	1.9%	2.8%
1981-2001	**1.2%**	**2.0%**	**-0.9%**	**2.39**	**3.0%**	**0.736**	**0.084**	**-1.1%**	**1.2%**
1990-2001	**0.8%**	**0.7%**	**-0.7%**	**2.83**	**4.0%**	**0.701**	**0.099**	**-2.2%**	**0.8%**
1981-1989	**1.7%**	**3.8%**	**-1.1%**	**1.81**	**1.6%**	**0.783**	**0.063**	**0.4%**	**1.7%**
1993-2001	**3.1%**	**3.4%**	**-0.9%**	**3.00**	**2.7%**	**0.674**	**0.106**	**0.7%**	**2.6%**

Table 4

Growth accounting with human capital, 1960-1980, average annual growth rates and averages

year	ΔY/Y	ΔK/K	ΔL/L	h	Δh/h	TFP with human capital effect subtracted	TFP without human capital effect subtracted
1960-1965	4.0%	4.1%	-0.4%	1.60	0.4%	3.1%	3.1%
1966-1970	5.3%	4.6%	2.4%	1.64	0.3%	2.1%	4.3%
1971-1975	5.5%	5.8%	0.9%	1.68	0.4%	3.1%	4.2%
1976-1980	3.2%	5.9%	-0.9%	1.72	0.4%	2.3%	1.9%

Note: the returns to education and the factor share of labor are assumed to be 6.2%, and 0.783 respectively.

Table A.1.

Annual estimates of the average years of education in Hungary 1920-2006

year	average years of education	Year	average years of education	year	average years of education
1920	4.45	1951	6.83	1982	8.96
1921	4.57	1952	6.94	1983	9.00
1922	4.70	1953	6.96	1984	9.08
1923	4.81	1954	7.07	1985	9.12
1924	4.85	1955	7.15	1986	9.19
1925	4.93	1956	7.18	1987	9.26
1926	5.02	1957	7.24	1988	9.32
1927	5.11	1958	7.33	1989	9.40
1928	5.19	1959	7.37	1990	9.45
1929	5.19	1960	7.46	1991	9.60
1930	5.27	1961	7.49	1992	9.74
1931	5.34	1962	7.54	1993	9.88
1932	5.41	1963	7.61	1994	9.89
1933	5.48	1964	7.72	1995	10.02
1934	5.53	1965	7.79	1996	10.15
1935	5.60	1966	7.87	1997	10.19
1936	5.62	1967	7.93	1998	10.31
1937	5.66	1968	7.99	1999	10.45
1938	5.66	1969	8.07	2000	10.51
1939	5.68	1970	8.10	2001	10.64
1940	5.72	1971	8.19	2002	10.71
1941	5.79	1972	8.28	2003	10.78
1942	6.01	1973	8.35	2004	10.84
1943	6.20	1974	8.42	2005	10.91
1944	6.34	1975	8.50	2006	10.95
1945	6.43	1976	8.59		
1946	6.47	1977	8.67		
1947	6.51	1978	8.74		
1948	6.55	1979	8.81		
1949	6.60	1980	8.88		
1950	6.71	1981	8.92		