An Analysis of the Changes in University Education Attainment Following the Transition from Communism to Market Economy in Hungary

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Introduction

With the fall of the Berlin Wall in 1989 and the collapse of the centrally planned socialist regimes across Central and Eastern Europe, the 1990's marked a decade of complex socioeconomic developments in Hungary (Bunce & Csanadi, 1993). The transition from command to market economies led to the decentralisation of key decision-making processes, as formerly government operated businesses were privatised or closed (Coricelli, 1998). The subsequent decreasing production led to mass unemployment and a severe economic recession. The country's GDP and industrial production fell by 9% between 1990 and 1991, with inflation rates reaching 35% by 1991 and the rate of unemployment reaching 12% within the first two years of transition (Večerník, J., 2001). However, the transition towards capitalism also produced a significant expansion in people's social and political freedoms (Havrylyshyn, 1999). Hungary had opened its borders with Western Europe, allowing foreign businesses, predominantly large multinationals to enter and expand in the country, which presented an array of new opportunities to those who were able to take advantage of them (Münich et al., 2005).

This essay will explore the change in university education attainment in Hungary following the fall of the centrally planned communist regime in 1989.

Returns to Education

Under the communist system, the government oversaw the regulation of employment, wages and educational institutions at all levels. The majority of the labour force had little to no flexibility in their wages, as they were determined in accordance with a centrally planned wage framework (Münich et al., 2005). Employment was assured for everyone, as national production was set at the government level as opposed to market demand, causing shortages in certain products or large amounts of waste being produced in others (Kogan et al, 2011). Small businesses, such as hairdressers or bakeries, were managed in accordance with government expectations, with extremely limited entrepreneurial opportunities. Wages were predominantly linked to years of experience, as opposed to levels of education or skill, which combined with an absence of competitive forces in the market caused a lack of financial incentives for innovation (Kornai, 2010). Academic freedoms were also limited by the political ideals of time (Mateju et al., 2003). University level education was linked to membership of the Communist Party and was awarded only partially based on merit and entrance exams, but also political loyalty. The socialist ideology allowed for only minimal differences in wages between workers of varying skills. As such, the returns to additional years in education were primarily reflected as an increase in social status, rather than expected financial rewards.

However, with the end of communism in 1989 and emergence of various capitalist features in the early 1990's, the demand for higher education expanded (Münich et al., 2005). While unemployment remained extremely high, new opportunities were arising. Large multinationals were searching for young, English speaking talent to help build their presence in Hungary. Wages detached from their prior, pre-determined rates, and were increasingly determined by market forces, leading an accelerating increase in inequality (Mateju et al., 2003). Local entrepreneurial activities remained relatively low through most of the 1990's, due to lack of public expertise (as it was a relatively new experience) and little government support for small entrepreneurship (Gabor, 1997). Those who were willing and able to quickly adapt to the new, developing environment were rewarded the most in wages, while those who were unable to break from their manual labour-intensive fields saw their industries collapse and faced unemployment (Večerník, J., 2001). Due to this considerable income mobility resulting from the transition from communism to a capitalist economy, workers experienced a significant increase in the expected rates of return to human capital investment (education), which in turn resulted an increase in the proportion young students enrolling in universities.

Research Question

Did the shift towards capitalist, market economy, following the regime change in 1989 affect the natural growth of university educational attainment rates among young people in Hungary?

Data – transformations, finding outliers

The analysis used the latest Hungarian national census data available from 2011. The data was provided on request by IPUMS International. The dataset contains 496,762 data entries, each entry represents a person taken the national survey. The sample represents approximately 5% of the entire Hungarian population. To follow the serial trend of university educational attainment, the EDUCHU variable was used. The code 530 indicates university completed.

Methodology

The subject period selected ranged from 1960 to 2010 to incorporate plenty of data from both the communist and post-communist experiences. To measure the level of university educational attainment, a ratio of higher education was calculated by age. That can be transformed to look at each year's 25 year-old-cohort to better understand the change in the educational ambitions of the young population in the observed period. The result of the transformations shows that for instance in 1970 - 17.2%, in 2000 - 24% of 25-years-old had obtained university level education. The growth is clearly visible, however in our analysis we're interested in the change of the steepness of this growth following the 1989 regime change. The object cohort of 25-year-olds was selected based on the assumption that educationally ambitious students are likely to obtain at least a bachelor's degree by the age of 25.

To observe the change in university attainment following the regime change an Interrupted Time Series (ITS) analysis was used. Segmented regression analysis is the most common approach of ITS and will be conducted across the analysis (Hategeka et al., 2020) as it is a useful tool to discover secular trends and estimate the effect of an intervention/interruption s in retrospective research (Valsamis et al., 2019). In our case the intervention is the regime change which occurred in 1989. The multilinear regression equation will be the following:

$$y_t = \beta_0 + \beta_1 * time + \beta_2 * change + \beta_3 * postslope + \varepsilon_t$$

Where y_t dependent variable is the proportion of the 25-year-old population with university degrees (including Bachelor, Masters, and doctorate) at a particular t period. The *time* is a continuous independent variable starting from 1 with the first year of the study (1960) ending with the last (2010). The *change* bool independent variable is assigned the value of 0 for the years before the regime change (1989) and 1 on and after the interruption time point. Finally, the *postslope* is coded 0 up to the year before the interruption time point and starts to continuously increase by 1 following that to the end of the observation period (2010). These unique types of independent variables were created prior to performing the analysis.

The model's β_1 parameter indicates the structural growth rate of university educational attainment unaffectedly by the regime change. β_2 parameter is used to estimate the intermediate impact of the political change. The β_3 parameter captures the level of change in trend after the regime change occurred.

At the evaluation of the model the Durbin-Watson test will be implemented to determine whether first-order autocorrelation occurs within the model (Lagarde, 2012). If it does, a GLS estimator will be used in order to correct the presence of serially correlated errors. In Python the statsmodels library's GLSAR model can be used.

Results - Discussion

After all the necessary variables were prepared, an Ordinary Least Square (OLS) analysis was performed along with the Durbin-Watson test (Test 1). The Durbin-Watson test resulted the value of 0.5, which suggests a positive serial correlation of the residuals.

Table 1: Test 1 – Result of OLS regression

Independent variables	Coefficient	Std. Error	t	P > |t|
Intercept β_0	0.1145	0.005	21.151	0.000
time β_1	0.0027	0.000	8.693	0.000
change β_2	-0.0234	0.008	-2.809	0.007
postslope β_3	0.0048	0.001	7.871	0.000

Rsq	Adj. Rsq	F	Prob>F	Durbin-Watson
0.946	0.943	275.8	7.87e-30	0.574

Therefore, a transformation is required to correct the model of autocorrelation. Test 2 was created with a Generalized Least Square estimation. The results of Test 2 show a significant yearly 0.21% growth of university educational attainment among 25-year-olds independently from the regime change. Interestingly, the *change* variable suggests an immediate negative effect on the higher educational attainment following the regime change. However, the high p-value indicates that its negative trend is not significant. This is a reasonable finding as it is unlikely that an immediate change could occur after the regime change. Obtaining a university degree takes a minimum of 3 years, therefore sudden, 1-year effect cannot be linked directly to the regime change. Most importantly, the *postslope* variable's coefficient indicates a sharp increase in the university educational attainment following the break from communism in Hungary, suggesting that the yearly growth doubled to 0.41%.

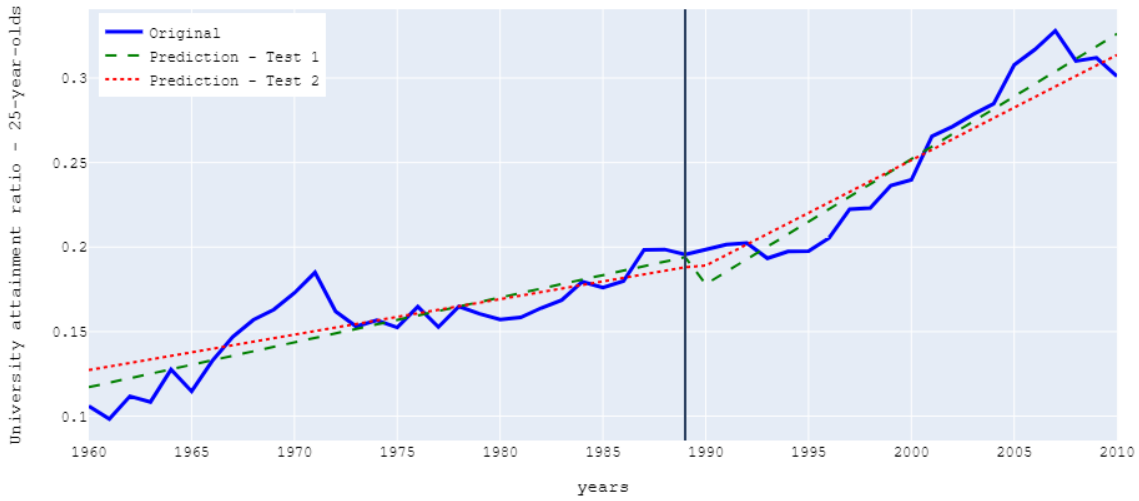
Table 2: Test 2 – Result of GLS regression – the presence of serially correlated errors corrected

Independent variables	Coefficient	Std. Error	t	P > |t|
Intercept β_0	0.1252	0.019	6.758	0.000
time β_1	0.0021	0.001	2.418	0.020
change β_2	-0.0052	0.010	-0.497	0.621
postslope β_3	0.0041	0.002	2.727	0.009

Rsq	Adj. Rsq	F	Prob>F	Durbin-Watson
0.696	0.677	35.18	5.72e-312	1.955

On figure below we can also observe a steady growth between 1960-1989, prior to the collapse of the socialist regime. This natural trend of growth could be due to the general rise of technological improvement that increasingly needed to be served by the university educated workforce. Additionally, a plateau is visible in the first couple years immediately following the regime change. This is likely due to severe economic crisis that followed the fall of the socialist state. Even though, from 1996 its start to take a significantly steeper upward trend that the segmented linear regression is proved to be statistically significant.

Figure 1: Test 2 – University education attainment of 25-year-old-cohort by years. Census data and fitted values of Test 1 and Test 2. Solid, black vertical line represents 1989.



Conclusion

Expected financial rewards are not the sole motivating factor behind most student's decision to pursue tertiary education. Higher education was associated with more interesting, less manual work even under communism, where skill-based wage inequality was not present. However, with the fall of communism and the eradication of the centrally planned decision-making processes in 1989, capitalist market forces quickly began influencing Hungarian labour market conditions. The emergence of the productivity and skill-based wage system led to rapidly rising inequality, which was not previously prevalent under the socialist system (Mateju et al., 2003). The increased market competition from advanced, Western firms and lack of government subsidies for manual production drove a significant portion of the low-skilled labour force into unemployment (Münich et al., 2005). These complex socioeconomic developments occurring in the early years of transition triggered the increase in the financial value of education. Ultimately, university level education had almost immediately become more valuable than under communism, and as such more sought after by young people (Mateju et al., 2003).

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