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The Effect of Education on Unemployment in the Czech Republic

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Abstract: The current economic situation in the European Union changes the type of unemployment in recent years. Structural unemployment is aggravated by cyclical unemployment. The human capital theory assumes that investments in education increase worker productivity which leads to the growth of salary and to the reduction of unemployment risk. The study addresses the recessional economic developments in the Czech Republic and unemployment rate of the economically active population associated therewith. The objective is to chart the development of the basic indicator of the functioning of the economy and to identify the types of unemployment by educational groups (ISCED) in the Czech Republic by the Hodrick-Prescott filter. The statistical data are modeled in a graph through the software EViews.

Key words: Structural unemployment, classification ISCED, cycle unemployment, Hodrick-Prescott filter, Czech Republic

INTRODUCTION

The economic recession is affecting the aggregate demand within the economy, total output and has a negative impact on the labor market and on the employment rate of the economically active population. When reducing employee levels, companies are focusing on maintaining key and qualified employees with experience. The current recessionary situation in the economies of the European Union is negatively affecting the labor market and employment of the economically active population in most countries. In the Czech Republic, we can identify primarily structural unemployment and cyclical unemployment and, at the same time, the duration of unemployment is becoming longer. Researchers of the human capital theory look at the education as an investment, bearing benefits both to individuals and society. They do not take education as a form of consumption but as an investment and try to measure the value of this investment. The increasing number of such investment in the human capital through the formal, non-formal and informal learning leads to the elimination of unemployment risk. The various levels of education in the Czech Republic have their own levels of the unemployment risk. When the level of education decreases, the length of unemployment increases and the unemployment rate in a given educational level also increases. Individuals in different education levels are segmented by risk groups which is another determinant affecting people's employability. A reduction in the number of jobs and increased competition on the supply side of the labor market in the form of experienced workers is bringing down the ability of young people and graduates without practical experience to apply them. Businesses are currently focusing on acquiring qualified people with experience, specialists and experts with the appropriate professional expertise and qualification structure required by the given job.

Theoretical basis: In economic theory such a situation is called cyclical unemployment. The cyclical element of unemployment copies the development of the economic cycle. Besides cyclical unemployment, the structural component of unemployment is known. Structural unemployment represents an incongruity on the labor market which comes about primarily as a result of structural changes in the economy, whereby certain sectors (professions) are expanding and others are fading away or declining. For the reduction of structural unemployment, the continuous education (training, requalification) of the labor force and increasing their spatial mobility are key issues (Samuelson and Nordhaus, 1991; Hindls *et al*., 2007).

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Table 1: The level of education according to ISCED 1997

The level of education	The level of ISCED	Marked in the analysis as
Without education and preschool education	0	ISCED_0,1,2
Basic education	1, 2	--
Secondary education without GCSE (General Certificate of Secondary Education)	Part 3	ISCED_3
Secondary education with GCSE (General Certificate of Secondary Education)	Part 3, 4	ISCED_3,4
Higher education	5, 6	ISCED_5,6

Czech Statistical Office (Website: MINISTERSTVO PRACE A SOCIALNICH VICI. Statistiky. http://portal.mpsv.cz/sz/stat [15.8.2014])

The creation of the concept of human resource presents the fact that people are not only the workforce of the market but they also belong to the one of the most important organizational resources of the market. The concept of human capital has appeared in the last few decades. Economists of the Chicago School T.W. Schultz, G.S. Becker and J. Mincer are the founders of the theory of human capital. They invented the theory of human capital in the early sixties of the 20th century. The qualitative component of human capital can be observed by the number of employed and unemployed according to their level of education by the number of employed in different professions (this number reflects in addition to the level of education informal education, skills, competencies and experience) and by the average length of education (BECKER, 1964; Toth *et al*., 2014).

International Standard Classification of Education was developed and published by UNESCO in 1976 in order to serve as an instrument suitable for the collection, processing and making available educational statistics. Classification of basic groups of education was designed to be easily transferable to the international standard ISCED 1997 in particular in the level of education. ISCED 1997 has 7 levels of education (0-6) which has an internal division from A-C (Schiller, 2004). The study uses the following basic classification Table 1.

MATERIALS AND METHODS

On the basis of theoretical data, an analysis of the elements of unemployment in the Czech Republic was conducted by way of the Hodrick-Prescott filter. The Hodrick-Prescott filter decomposes a time series into trend and cyclical components. As input data are usually used logarithmic time series. Performing logarithmic transformation is in addition to ensure normal distribution of the data also benefit in the interpretation, when the difference of two adjacent observations logarithmic series can be approximated by the growth rate for the period and cyclical components can be understood as the percentage deviation from trend. Logarithmic time series (as well as the original) can be expressed as the sum of the trend and cyclical components: $x_t = y_t + c_t$. The research will be used to decompose the seasonally adjusted time series are available from the national accounts and statistics available is therefore no longer necessary to purify these series seasonally. Hodrick-Prescott filter of time series extracted trend component of y_t^{HP} as a solution to the optimization problem in which the objective function is minimized:

$$\min \sum_{t=1}^{T} (x_t - y_t^{HP})^2 + \lambda \sum_{t=2}^{T-1} \left[\left(y_{t+1}^{HP} - y_t^{HP} \right) - \left(y_t^{HP} - y_{t-1}^{HP} \right) \right]^2$$

The relative weight is assigned to each criterion, depending on the value of smoothing parameter λ. If $\lambda \to 0$, the second term of the objective function ceases to play a role in minimizing and HP trend estimate is close to the original series x_t. If conversely, $\lambda \to \infty$, all the weight is assigned to the second member and the HP trend is reduced into a linear trend. In the case of low values of smoothing parameter λ is therefore, most variability original time series contained in the HP trend in the case of high values is the opposite. The standard for quarterly data has become a value $\lambda = 1600$ which is recommended in the original research of Hodrick and Prescott (1997) Hindls *et al*. (2007).

The information and statistical data have been obtained from the Ministry of Labor and Social Affairs, the Czech Statistics Office.

Unemployment among educational groups in the czech republic: Table 2 shows the progress of specific unemployment rates by types of education. The highest unemployment rate is monitored by the economically active population having basic or no education. The unemployment rate for economically active population having basic or no education was 11.2% and in 1996, 26.1% in 2004 and 24.3% in 2012. When the level of education increases the unemployment risk decreases. Highly educated people in the labor market had 1.1% for the unemployment rate in 1996, 2.3% in 2004 and 2.8% in 2012. The highest growth rate for the entire reporting period, we have observed among people with primary education or no education and the lowest growth rate, we have observed among people having the secondary education with GCSE.

Table 2: Specifically Unemployment in the Czech Republic in the Period of 1996-2012 in percentage

	Year (%)																
Unemployment	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ISCED_0,1,2	11.2	13.5	16.1	20.9	23.3	23.4	20.8	22.5	26.1	26.7	24.5	20.1	19.0	24.1	25.0	24.4	24.3
ISCED_3	3.6	4.4	6.2	8.9	8.9	8.4	7.8	8.4	9.4	8.9	7.7	5.9	4.4	7.4	8.5	7.7	7.7
ISCED_3, 4	2.5	3.5	5.1	6.6	6.5	5.7	5.1	5.6	5.3	5.1	4.9	3.3	2.8	4.7	5.3	5.0	5.0
ISCED_5, 6	1.1	1.5	2.4	3.3	2.9	2.5	2.1	2.2	2.3	2.3	2.4	1.7	1.6	2.4	2.8	2.8	2.8

Czech Statistical Office, Ministry of Labor and Social Affairs (Website: CESKY STATISTICKY URAD. HDP narodni uety http://www.czso.cz/csu/redakce.nsf/i/hdp_narodni_ucty [12.8.2014])

RESULTS AND DISCUSSION

Using the Hodrick-Prescott filter decomposed individual component of unemployment for specific unemployment rates by education level. The results of this decomposition are compared with the results of Baxter-King filter. Due to the availability of secondary data for decomposition of selected annual time series 1996-2012. For annual data at various levels of education ISCED_0,1,2; ISCED_3; ISCED_3,4 and ISCED_5,6 is chosen $\lambda = 100$.

Figure 1 shows percentage data for specific unemployment rates in educational level ISCED_0,1,2: right axis is the value of a variable; left axis is the percentage change in the variable; blue line specific total unemployment; red line structural component of unemployment and the green line the cyclical component of unemployment. Before using the HP filter decomposition was carried out to describe the time series using selected indicators. The average value of the specific rate of unemployment for the whole year time series is 21.5%. Median, i.e., the mean value of the time series insensitive to extreme values is 23.4%. This measure of central tendency determined that at least 50% of the values is smaller than or ≤50%≥23.4. The standard deviation of the time series is 4.39. This statistical measure of dispersion determines the root mean square deviations of the values of the character (4.39%) from the arithmetic average (21.5%). The time series shows a further negative skewness of 1.08 and a positive kurtosis coefficient of 3.21. Positive kurtosis 3.21 indicates that most of the values of random variables is close to the median. Boxplot revealed only one outlier which is a value of 11.1%, an extreme value in the time series not. Figure 1 contains percentage data for specific unemployment rates in ISCED_3. Before using the HP filter decomposition was again made to describe the time series using selected statistical indicators. The average value of the specific rate of unemployment for the whole year time series is 7.3%. Median, i.e., the mean value of the time series insensitive to extreme values is 7.7%. This measure of central tendency determined that at least 50% of the values is smaller than or equal to and less than 50% is greater than or equal to the value 7.3. The standard

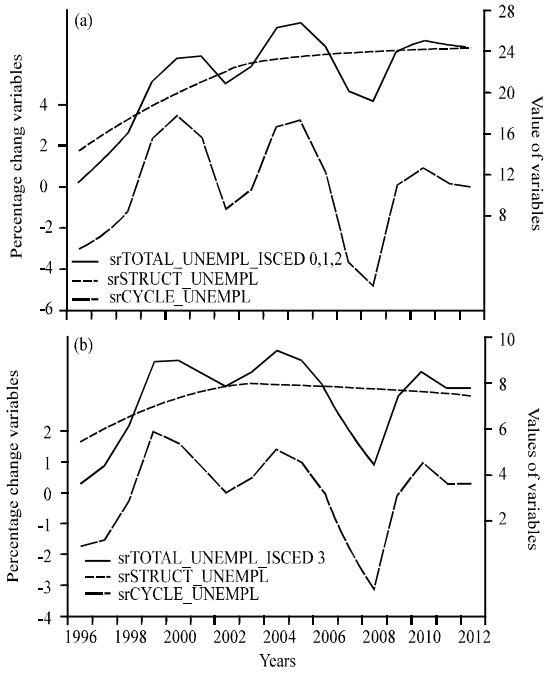

Fig. 1: Hodrick-Prescott filter, a specific unemployment rate for ISCED_0,1,2 and ISCED_3 in % in the Czech Republic in the years 1996-2012

deviation of the time series is 1.77. This statistical measure of dispersion determines the root mean square deviations of the values of the character (1.7%) from the arithmetic average (7.3%). The time series shows a further negative skewness of 0.90 and a positive kurtosis coefficient of 2.53. Positive kurtosis 3.21 indicates that most of the values of random variables is close to the median. Boxplot not reveal outlying or extreme values in the time series.

Figure 2a shows percentage data for specific unemployment rates in ISCED level 3,4 and ISCED level 5,6. Before using the HP filter decomposition was carried out to describe the time series using selected statistical indicators. The average value of the specific rate of unemployment for the whole year time series is 4.82%. Median, i.e., the mean value of the time series insensitive to extreme values is 5.08%. This measure of central tendency determined that at least 50% of the values is smaller than or equal to and less than 50% is greater than

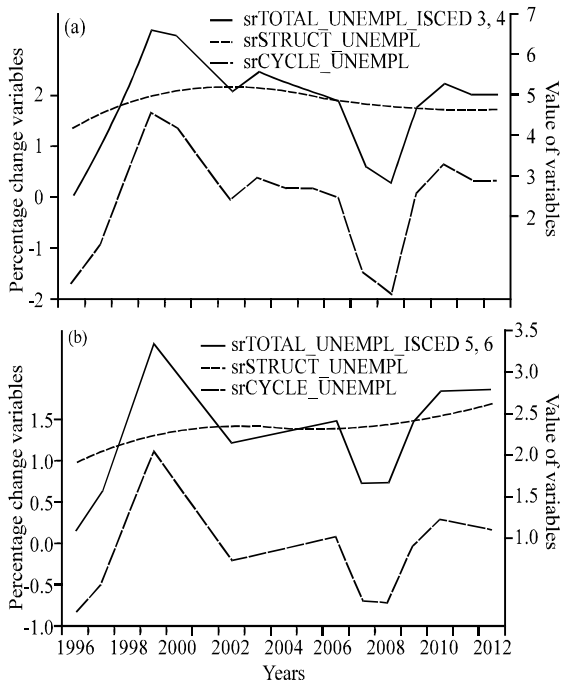

Fig. 2: Hodrick-Prescott filter, a specific unemployment rate for ISCED_3, 4 and ISCED_5, 6 in % in the Czech Republic in the years 1996-2012

or equal to the value 4.82. The standard deviation of the time series is 1.16. This statistical measure of dispersion determines the root mean square deviations of the values of the character (1.16%) from the arithmetic average (4.82%). The time series shows a further negative skewness of 0.62 and a positive kurtosis coefficient of 2.63. Positive kurtosis indicates that most of the values of random variables is close to the median. Boxplot revealed outliers in time series and that 2.8 and 2.5%. Figure 2b shows percentage data for specific unemployment rates in ISCED level 5,6. Before using the HP filter decomposition was carried out to describe the time series using selected statistical indicators. The average value of the specific rate of unemployment for the whole year time series is 2.3%. Median, i.e., the mean value of the time series insensitive to extreme values is 2.4%. This measure of central tendency determined that at least 50% of the values is smaller than or ≤50%≥2.3. The standard deviation of the time series is 0.57. This statistical measure of dispersion determines the root mean square deviations of the values of the character (0.57%) from the arithmetic average (2.3%). The time series shows a further negative skewness of 0.42 and a positive kurtosis coefficient of 2.81. Positive kurtosis indicates that most of the values of random variables is close to the median. Boxplot not revel outlying or extreme values in the time series.

CONCLUSION

In ISCED_0,1,2: the total specific unemployment rate peaked in 2004 (26.1%) and 2005 (26.7%), decreased in 2008, the lowest rate of 19% was in 1999. The cyclical component faithfully follows the tendency of the total unemployment rate; however, it reached a peak of 17 % in 2000 and 2005. In contrast, very low levels were recorded in 2008. The structural component of the unemployment rate among people with primary education or no education grows throughout the period.

In ISCED_3: the total specific unemployment rate peaked in 2004 (9.4%) and in 1999, 2000, 2005 (8.9%), decreased in 2008 and in 1997 when it showed a rate of 4.4%, the lowest rate was recorded in 1996 of a value of 3.6% in this level of education. The cyclical component follows the course of the total unemployment rate, reached a peak in 1999 of a value of 6% and the lowest value of 4% had reached in 2008 and 2012. Its share on the total unemployment rate in this specific educational level decreased in 2000-2005 and showed the highest proportion in the beginning of the given time series. According to this filter the structural component for persons with secondary education without GCSE has been in stagnation from 2002.

In ISCED_3,4: the total unemployment rate (blue line) peaked in 1999 (6.6%) and in 2000 (6.5%). It showed a very low level in 1996 (2.5%) and 1997 (3.5%). It had been declining till 2008 when showed a rate of 4.4%, the lowest rate was recorded in 1996 and in 1997 of a value of 3.6%. The cyclical component follows the tendency of the total unemployment rate. It reached a peak in 1999 of a value of 4% and the minimum value below the 3% was reached in 1996, 2008 and 2012. Over time, the difference between the total and the cyclical unemployment oscillates around 2%, what means that the cyclical unemployment rate has 65% in the total unemployment rate. The highest proportion was recorded at the beginning of the given time series and the lowest was recorded between 2000 and 2004. In 2008, with regard to the asymmetric cyclic rate and the total unemployment rate, it can be said that it was caused mainly by the structural component of the unemployment rate. According to this filter, the structural component for persons with secondary education with GCSE has decreased since 2002.

In ISCED_5,6: the total unemployment rate (blue line) peaked in 1999 (3.3%) and the highest values were measured in 2000 (2.9%), 2010, 2011 and 2012 (2.8%). The lowest level was in 1996 (1.1%) and in 1997 (1.5%). The significant drop happened in 2008. The cyclical component follows the tendency of the total unemployment rate and reached a peak in 1999 when it

exceeded the value of 2%. The minimum level was reached in 1996, 1997, 2007, 2008 and in 2012, when it was just above the level of 1%. Over time, the difference between the total and the cyclical unemployment oscillates around 2%, what means that cyclical unemployment rate has 65% in the total unemployment rate. The highest proportion was recorded at the beginning of 1996; the lowest proportion was recorded in 2000-2004 and the highest spread between the cyclic and the total unemployment rate occurred in 2009-2012. The specific structural component of the unemployment rate exhibits stable trend throughout the period but compared to other levels of education it increases slightly throughout the given period of time.

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