UNEMPLOYMENT AND GROWTH IN ADVANCED ECONOMIES IN THE PRE-CRISIS PERIOD

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Abstract

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The paper is aimed at assessing the relationship between the unemployment growth rate and the real GDP growth rate in three biggest advanced economic bodies of the world. In the statistical part of the paper the correlation determination of the real GDP growth rate and unemployment rate has been examined. The results of quantitative methods especially regression and correlation analysis statistically approved the correlation of chosen characteristics including the statistical significance in Japan and the United States. The situation in the European Union differs from the results of two other examined economies and the existence correlation hadn't been proven statistically. This might be caused by a relatively specific economic development, structural and institutional changes which had occurred in the European Union during the reference period and which has had significant impacts for output and unemployment.

unemployment rate, real GDP growth, correlation, United States, Japan, European Union

Unemployment as one of the accompanying phenomena of functioning the market economy has become a serious economic, social and political problem even in modern economics. Therefore, governments try to reduce already often high unemployment by specific tools of macroeconomic policy based on economic theories. Particularly the policy of employment is an important tool balancing the imbalance on the labour market. Its task is to achieve dynamic balance between labour offer and labour demand and to ensure the productive use of labour sources. However, it is necessary to emphasize that governments do not affect the labour market directly on the level of enterprises but they try to create such conditions the labour market to operate better. It refers particularly to the improvement of services associated with labour market, offering sufficient information and surveys on vacancies, the use of public costs within regional policy, governmental retraining programmes and the creation of public job opportunities. Further it refers to legislative measures, tax, wage and social policy including pension policy and other forms of employment policy. Thus, employment policy can only support or modify the development on the labour market but it cannot modify it in principle. Jurčík (2007) points out that EU public procurement has a significant influence on the business environment.

A practical macroeconomic policy including employment policy based on theoretical findings of various trends in economic theories does not bring necessary results in the field of reducing the unemployment to a tolerable level. Actually it appears that it is generally little effective. The problem can also consist in a fact that governments of countries with unused production factors deal particularly with problems of unemployment while they ought to shift the main stress to measures of macroeconomic policy maximizing the production and supporting free market. Naturally, civilization progress is also of great importance. It reduced the need of human labour and thus, it lowered the rate of employment. The trend will continue certainly also in the future. However, rich countries achieving the high level of productivity can rather afford to keep part of population unemployed (thanks to direct support) than artificially create co-called full employment. The paper is aimed at assessing the relationship between the unemployment growth

rate and the real GDP growth rate in the United States, Japan and the European Union. It attempts to verify the existence of correlation of unemployment regarding to the real GDP growth rate.

METHODS AND DATA

The analysis is realized by means of quantitative methods especially regression and correlation analysis including testing the statistical significance. Used factual material comes from the sources of EUROSTAT and respects international rules for measuring unemployment respecting the methodology of International Labour Organization (ILO). The rate of unemployment is measured as the proportion of unemployed persons in total active population. The reference period for following analysis was set on the period 1983–2009. As for data from The European Union, the reference period was shortened to 2000–2009 due to availability of these data.

The use of statistical methods was described by Aczel (1989) or Mason, Lind (1990). The factual data processing comes from the methodology published by Hindls *et al.* (2003), Seger *et al.* (1998), Dirschedl, Osteermann (2001). Minařík (1996, p. 97) states, that the statistical dependence of two characteristics (numeric figures) can be expressed as their functional relation by a formula, table or graph. We recognize these types of statistical dependence: fix, functional alias deterministic dependence and free, statistic alias stochastic dependence. The stochastic dependence makes itself felt like more or less significant repeatable tendency, which realizes in different form on different place and in different time. It is characteristic for its variability of individual causes and makes itself felt under a row of noteless, variously reacting factors. The stochastic dependence is referred to as a correlation dependency. For this dependency, we distinguish from dependent and independent variable. The correlation analysis of two variables is called pair or simple analysis.

The main graphical data presentation tool for examining the dependence between two variables is a point diagram, where we mark particular cases as points in a reference frame with coordinates, which are the values of particular dependent and independent variables.

The equation for a linear model is:

$$y' = b_0 + b_1 t. \tag{1}$$

The equation for a quadratic model is:

$$y' = b_0 + b_1 t + b_2 t^2. \tag{2}$$

The equation for a cubic model is:

$$y' = b_0 + b_1 t + b_2 t^2 + b_3 t^3. \tag{3}$$

The equation for a logarithmic model is:

$$y' = b_0 + b_1 \ln t. \tag{4}$$

In this paper, particular characteristics of tightness of the dependency of variables are calculated. Conjugate regression lines show the same values of the tightness dependency characteristics, the correlation coefficient $r_{yx} = r_{xy}$, determination coefficient $r_{yx}^2 = r_{xy}^2$ (at the first place in this index is stated variable thought to be dependent). Correlation coefficient can also be defined as a geometrical mean of regression coefficient values b_{yx}, b_{xy} for the conjugate regression equations (bisectors). Correlation coefficient can vary between −1 to +1 (−1 $\leq r_{yx} \leq$ +1) whereas according to its absolute value the tightness dependency is assessed and the number sign shows the dependency "direction trend":

a) The more closely the value of $|r_{yx}|$ approximates the value 1, the tighter is the dependence (observed values y_i are more closely gathered in the correlation field around regression line), whilst the more closely to value 0, the weaker (looser) is the dependency.

b) The "+" sign of correlation coefficient describes a linear upward-sloping dependency, the "–" sign indicates a linear downward-sloping dependency. The correlation index I_{yx} is a dependency tightness characteristics for any type of regression function (for simple as well as multiple dependencies of variables). Its second power is determination index I_{yx}^2. Determination index multiplied by 100 presents the explanation percentage of the calculated regression function (how the changes of dependent variable Y are explained by the changes of independent variable(s). The statistical computation of economic time series was described in Arlt and Arltová (2007). Statistical software Unistat 5.11 for Windows and Microsoft Excel has been used for the calculation of following results.

RESULTS

This paper is focused on relationships between changes in the unemployment rate and the real GDP growth. This includes a statistical approval or disproval of correlation of chosen characteristics based on data from United States, Japan and the European Union. While the growth tendencies were similar, see Fig. 1 that depicts the development of the real GDP growth, the unemployment trends differ significantly in those three examined countries, see Fig. 2 that depicts the development of the unemployment rate. In the first step of this analysis it is possible to compare graphically the development of the real GDP growth and the unemployment rate separately in particular countries. From the graphical depiction on Fig. 3 we could assume a possible existence of a negative correlation between those two examined indicators in Japan which is moreover highlighted by used logarithmic trends of both time series used in the chart. Also in the United States we might find some possible signs of a negative correlation, see Fig. 4. The less of those signs are to be found in the European
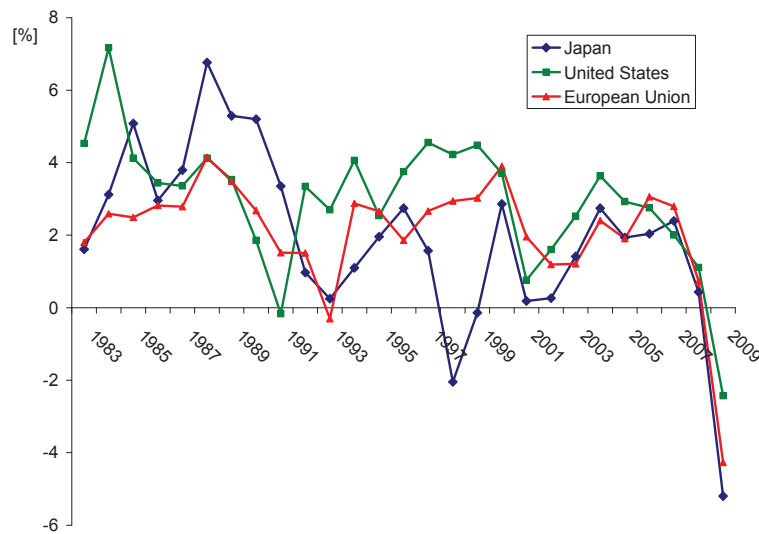
1: *GDP growth rate development in the United States, Japan, and the European Union in 1983–2009*
Source of data: UNCTADSTAT (2011)
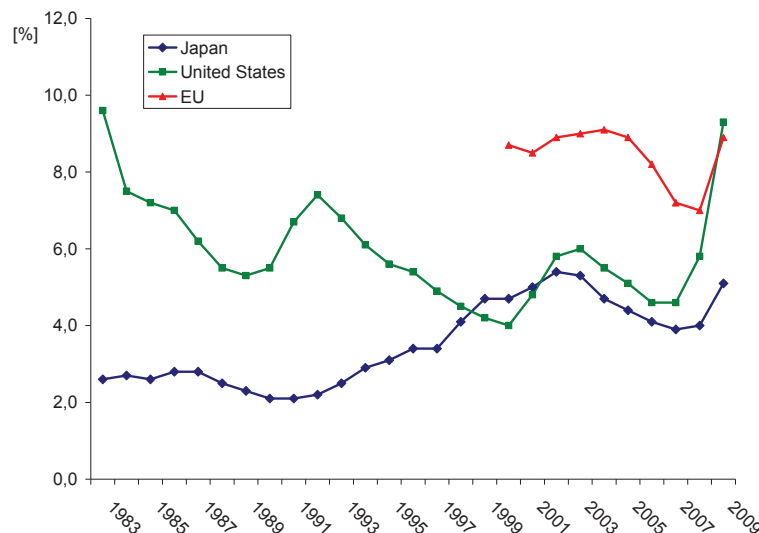
2: *Unemployment rate development in the United States, Japan, and the European Union in 1983–2009*
Source of data: EUROSTAT (2011)

Union, see Fig. 5. To prove these assumptions statistically, the methods of regression and correlation analysis were used and the parameters of regression functions were determined. The reference period for this analysis has been set to 1983–2009 (in case of the European Union: 2000–2009). These methods are described in the methodological part of this paper. For the analysis purposes, linear, quadratic and cubic functions were used, which led to nearly similar results. Calculated correlation indices for particular countries under examination in the given reference period are in Tab. I.

The correlation indices were tested on the significance level $\alpha = 0.05$ and $\alpha = 0.01$. From Tab. I it is obvious that in the United States, a polynomial of the first degree didn't show statistically significant results but a negative correlation was proved between the rate of unemployment and the real GDP growth rate using a polynomial of the second degree (or higher) and these correlation indices I_{yx} may be marked as statistically important. Calculated correlation indices in Japan are statistically highly significant already using a polynomial of the first degree. Thus in Japan a correlation of these two indicators can also be confirmed. Other situation is in the European Union, where correlation indices for all types of functions are statistically insignificant.

I: *Correlation indices for the unemployment rate with regard to the real GDP growth in the United States, Japan and the European Union*

Model	USA	Japan	EU
1	0.1473	0,5754[++]	0,1584
2	0.5372[++]	0,5832[++]	0,2017
3	0.5570[++]	0,5837[++]	0,2608

Note: significance level: [+] $\alpha = 0.05$; [++] $\alpha = 0.01$
Source: Own calculations

Other preceding analyses on this relationship in European countries brought different results. Palát (2009) had examined the existence of correlation between these characteristics for established member countries (EU15), where the free market economy has a long lasting tradition. This analysis made for old member countries lead to different results. The negative correlation was proven between the increments of all observed unemployment rates (long-term, short-term and total) and the real GDP growth, when all tested correlation indices I_{yx} were statistically important on the significance level $\alpha = 0.05$. This means that growing values of the real GDP growth indicator lead to higher negative increments of all unemployment rates. The unemployment situation in the European Union has been very different from the situation in another advanced free market economies worldwide. The explanations could
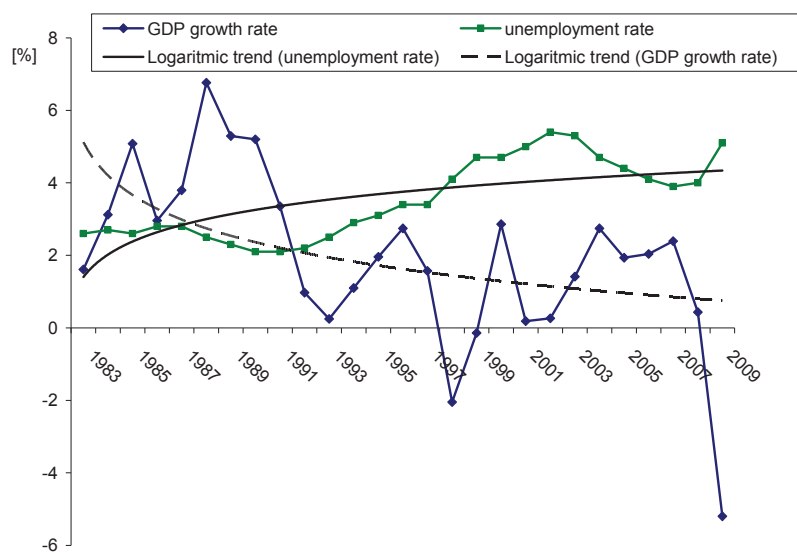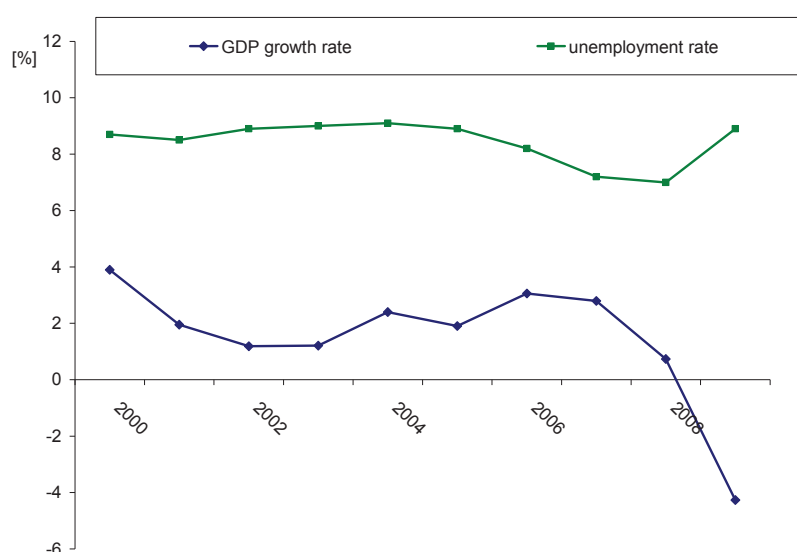

3: *GDP growth rate and unemployment rate development in Japan in 1983–2009 (incl. logarithmic trends)*
Source of data: UNCTADSTAT (2011), EUROSTAT (2011), own calculations
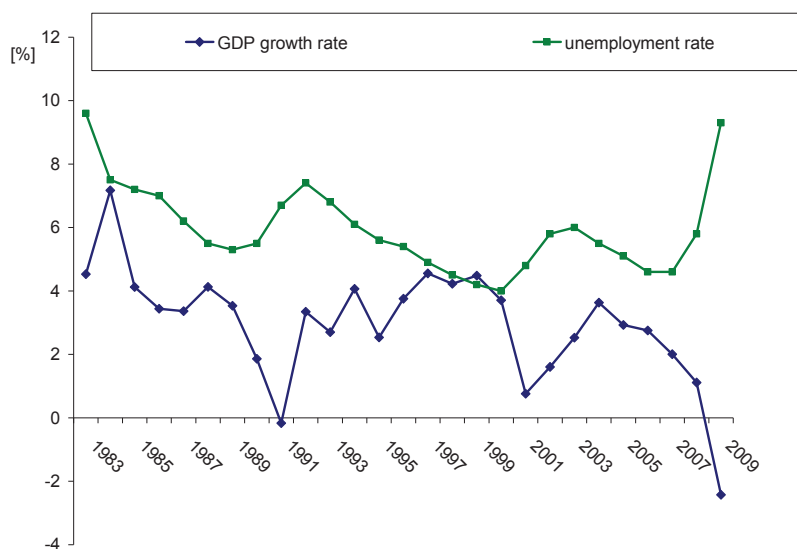
4: *GDP growth rate and unemployment rate development in the United States in 1983–2009*
Source of data: UNCTADSTAT (2011), EUROSTAT (2011)

5: *GDP growth rate and unemployment rate development in the European Union in 1983–2009*
Source of data: UNCTADSTAT (2011), EUROSTAT (2011)

be found in different attitudes and behaviour of unemployed persons. These attitudes are definitely influenced by the existence of a nationally-cultural surrounding and legal or social background. And also these factors are to be taken into consideration when assessing the development of unemployment with regard to economic output or the efficiency of taken measures regarding the diminution of the number of unemployed people in each country.

CONCLUSIONS

The existence of a negative correlation between unemployment rate and the real GDP growth rate has been proven in the United States and Japan. The situation in the European Union differs from the results of other two examined economies and the existence correlation hadn't been proven statistically. This could be caused by a relatively specific economic development in the European Union. In post-communist countries during a long period of transformation and restructuring processes that were usual in free-market economies had been pushed into the background by other causes and circumstances. This could be also be explained by specific structural and institutional changes which had occurred during this period and which has had a significant impacts for output and unemployment. These results are to be taken into consideration also with regard to other circumstances not pointed out in this short analysis. The unemployment situation in the European Union has been different from the situation in another advanced free market economies worldwide. The explanations could be found in different attitudes and behaviour of unemployed persons. These attitudes are influenced by the existence of a nationally-cultural surrounding, social and legal background. And also these factors are to be taken into consideration when assessing the development of unemployment with regard to economic output or the efficiency of taken measures regarding the diminution of the number of unemployed people in each country.

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