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The Development of Real Unit Labour Costs in the Context of Cyclical Fluctuations in the Economy

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Abstract: *The main aim of this paper is to analyse the reaction of real unit labour costs and labour productivity in the EU Member States to cyclical fluctuations in the economy of the EU and in the context of different starting positions for each state. The starting position of the states was determined by the value of gross value added per employee. The used dates were gathered over the period 1996 - 2011 (16 years). The analysis shows that the dynamics of labour productivity is strongly positively determined by the cyclical development of the economy of the EU. On the other hand, the dynamics of real unit labour costs is not significantly affected by cyclical fluctuations. The analysis has found that the states with the lowest average gross value added per worker in the base year have less reaction to cyclical fluctuations from the perspective of the dynamics of the monitored indicators.*

Key words: Real Unit Labour Costs· Labour Productivity· European Union· Gross Value Added

JEL Classification: D24 · E01 · E23

1 Introduction

In this period of global economy, an important factor influencing competitiveness, at both company and national levels, is the effectiveness in using factors of production and the significance of this factor is growing continuously. In probing the effectiveness of used factors of production we judge, on the one hand, their production and on the other hand costs of factors of production namely from the static and dynamic point of view. A particular influence on the effectiveness level and dynamics in using the factors of production can be attributed, also, to cyclical fluctuations in the economy. Focusing on the area of human resources, the question is, how quickly wages and labour productivity react to cyclical fluctuations in the economy and if it is possible to identify particular developmental trends from the point of view of individual economies in the EU.

2 Literature review

The article is directed at the area of the factor of production of labour, which is considered to be one of the main sources of economic growth, if we proceed from the work of Robert Solow (1957), who formulated the macroeconomic production function. The function has four variables: output (*Y*), capital (*K*), labour (*L*) and knowledge or effectiveness (productivity) of the use of labour (*A*).

The production function can be written in the form: $Y = f(K, A, L)$ for a particular time *t* (Romer, 2000). Labour, as a factor of production, represents inputs connected with a human factor. These inputs include both the number of workers and the amount of time worked and their skills and abilities (Barro, 2004). In monitoring inputs in the economy, it is important to monitor not only their size, but also costs connected with these inputs. In the case of labour it is the size of the costs of labour. Costs of labour are defined by the size of unit labour costs. *ULC* can be defined as costs of labour needed to produce one unit of output in the industry, sector of services or in the whole econ-

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omy (Ark, Stuivenwold & Ypma, 2004). Another view is provided by Jílek (2005) who sets the indicator of *ULC* as the relation of compensations to employees (gross wages and salaries increased by social, pension and similar insurance paid by employers) to gross value added in constant prices. In the practice of significant international institutions and domestic national statistic offices you can see their expression in the form of index or growth rates of a given quantity, called boom indicators. The European Central Bank (ECB), in its monthly newsletters, presents an indicator called directly *ULC* right in a gain form, the statistics office of the European Commission- Eurostat- publishes directly the so called growth rate (Unit Labour Cost Growth = *ULCG*) (Kozelský, Prušvic & Vlach, 2006). The Eurostat defines *ULC* as a gain quantity comparing compensation of employees and productivity (gross national product per worker) to express how compensation of employees are connected with the productivity of their labour.

In real practice, companies do not usually study only the size of labour costs, but also the relationship between the growth of these costs and labour productivity (Felipe & Kumar, 2005),which can be defined as value added per employee (Hesmati & Kim, 2011). From the point of view of the relationship between these two quantities, it is desirable that the costs of employees (compensation of employees) grow more slowly than the average labour productivity. Within the EU the basic analysis is provided by Dubská et al (2011).

An important factor influencing the development of labour productivity and labour costs is the cyclical development of the economy or the business cycle (Bartelsman & Doms, 2000), which can be defined as a period of rotation of recession and economic growth (Krugman, 2006). The basic theory, today, is the theory of the real business cycle. Edward Prescott or Robert Barro are among its main authors. This concept tries to explain economic fluctuations along the lines of a classical model. The main starting point is the theory that prices, wages and interest rates adapt quickly to clean up markets. The theory proceeds from the fact that causes of an economic cycle lie in real changes (Hartley et al., 1998). The theory of the real business cycle provides at least an explanation of some but not all, macroeconomic fluctuations (Romer, 2000).

Generally, it can be assumed that the business cycle influences both the growth of wages and the development of labour productivity. This theoretical basis of the relationship between labour productivity and the business cycle was validated by Dow (1995) in his article. Within the business cycle, real wages differ from labour productivity. Wages are fluctuating less than labour productivity. Therefore, productivity leads to the growth of employment during the cycle (Merz, 1995). The question is, whether the behaviour of the dynamics of wages and productivity is identical within individual states or if it differs within cyclical fluctuations, using a starting view provided by Akr (2008), which compared Europe and the U.S. However, this study does not specify the evident influence of the business cycle.

3 Methodology and Material

The main aim of this paper is to consider the development of individual member states of the EU over the period 1996 -2011 and their mutual relations in connection with the real business cycle and their different starting positions; this is done on the basis of selected indicators (real unit labour costs and labour productivity) over the period 1996 – 2011, i.e. an interval of 16 years, with the awareness that some states were not member states during the whole period. First, it was necessary to classify the EU countries in the first year of monitoring (1996) for considering their starting positions.

The chosen tool was the ratio:

$$\frac{\frac{GVA_{i,1996}}{L_{i,1996}}}{\frac{GVA_{1996}}{L_{1996}}}, \quad (1)$$

where:

$GVA_{i,1996}$ is gross value added in PPS country of the EU in 1996 ,

$L_{i,1996}$ is total employment rate– domestic concept of a country of the EU in 1996,

GVA_{1996} is total aggregate gross value added per the EU (27 countries) in 1996

L_{1996} is total employment rate – domestic concept per the EU in 1996.

Gross value added (economic output in basic prices) was preferred in all monitored indicators to the indicator gross domestic product (economic output in purchase prices). The reason was that net taxes on products are not allocated into sectors and branches (Jílek, 2007), and since the authors intend to continue their analysis, the results would be difficult to compare. The same method in the calculating of labour productivity is used e.g. by Freedmen (2008), when labour productivity is defined as gross value added divided by the number of employed people. Another step of the analysis was to divide the period of 16 years (1996 – 2011) into intervals corresponding with individual phases of the real business cycle. The dynamics of the indicator gross value added (*GVA*) for the whole EU (27) was chosen as a tool.

Using the above mentioned steps, groups of countries were created according to their starting positions and intervals related to the real business cycle of the EU countries, which enabled us to monitor the level and dynamics of the chosen indicators. These were: real unit labour costs *RULC* (*Compensation of employees*/*GVA*), labour productivity – *LP* (i.e. *GVA*/*Total employment* – domestic concept). All mentioned indicators were probed as real, i. e. with the help of the purchasing power standard of currency (*PPS*) in the Eurostat in the section of national accounts. This evaluation is recommended for international comparison and draws only from price relations of goods in various states, while the influence of supply and demand of state currencies stays apart (Jílek, 2005).

The calculation of average annual indices – average growth rates of monitored productivities in partial time intervals was carried out by using the geometrical mean:

$$\overline{k} = \sqrt[n]{k_1 . k_2 . \ldots . k_n} = \sqrt[n]{\frac{u_1}{u_0} . \frac{u_2}{u_1} . \ldots . \frac{u_n}{u_{n-1}}} = \sqrt[n]{\frac{u_n}{u_0}}, \quad (2)$$

where:

$\overline{k}$ is an average growth rate or average growth coefficient,

$k_1 \ldots k_n$ are chain indices of indicators,

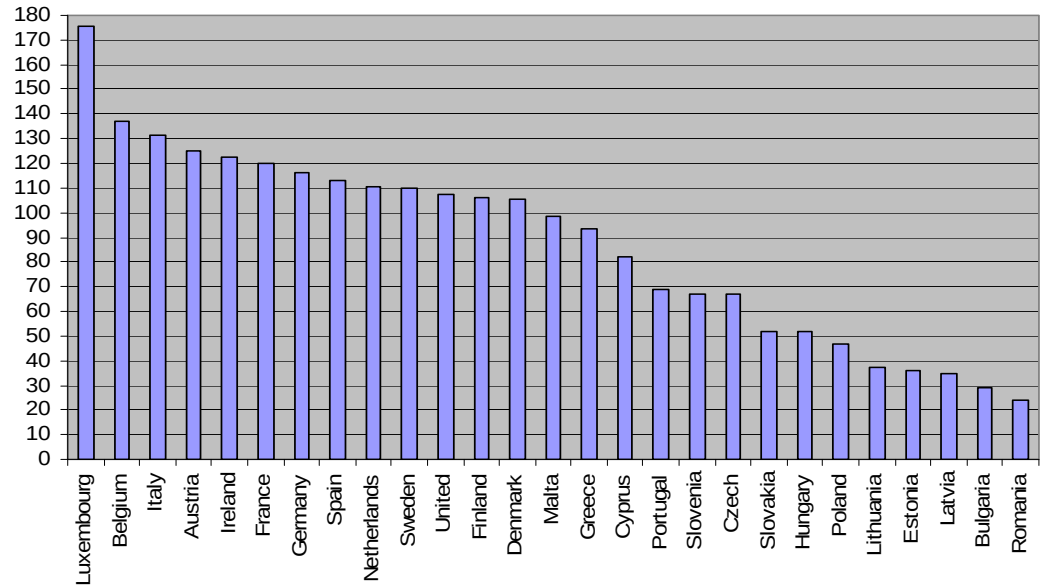
$u_0 \ldots u_n$ are values of individual indicators.

The construction of time intervals, which may seem different at first sight, is given by the fact that, in the tables, the intervals are probed from absolute values of indicators and, within the graphs, the indicators are presented in the form of average annual growth rates.

4 Results and Discussion

Individual steps of the analysis draw from the initial division of the EU states into groups according to the above mentioned methodology, i.e. the size of *GVA* per employee. Figure 1 presents, also, a proportional comparison of *GVA* per employee (domestic concept) of individual member states and an average *GVA* per employee in the EU (27 countries) in the starting year of monitoring, i. e. in 1996, arranged downwards.

Figure 1 Share gross value added / employed person in basic year 1996



Source: Own calculations based on the data National account

On the basis of these data, the EU states were divided into three groups. The first group includes the states whose *GVA* per employee is higher than the average value in all the 27 countries of the EU, i.e. the value of the indicator is higher than 100 %. The second group includes the states whose *GVA* per employee is between 50 % and 100 % of the average value in the EU. The third group represents the states not reaching 50 % of an average *GVA* per employee in the EU. Since the *GVA* per employee in Luxembourg is far higher than in the other countries and could distort the results, this country was monitored separately. This means:

- Group 1 - Belgium, Italy, Austria, Ireland, France, Germany, Spain, Netherlands, Sweden, Great Britain, Finland, Denmark.
- Group 2 - Malta, Greece, Cyprus, Portugal, Slovenia, Czech Republic, Slovakia, Hungary
- Group 3 - Poland, Latvia, Estonia, Lithuania, Bulgaria, Romania.

The graph of the *GVA* in the EU enables us to identify the intervals which summarise the whole of the monitored period (1996 – 2011) in the following intervals:

1996 – 2000 is characterised by stable or slightly growing inter-annual gains of *GVA*

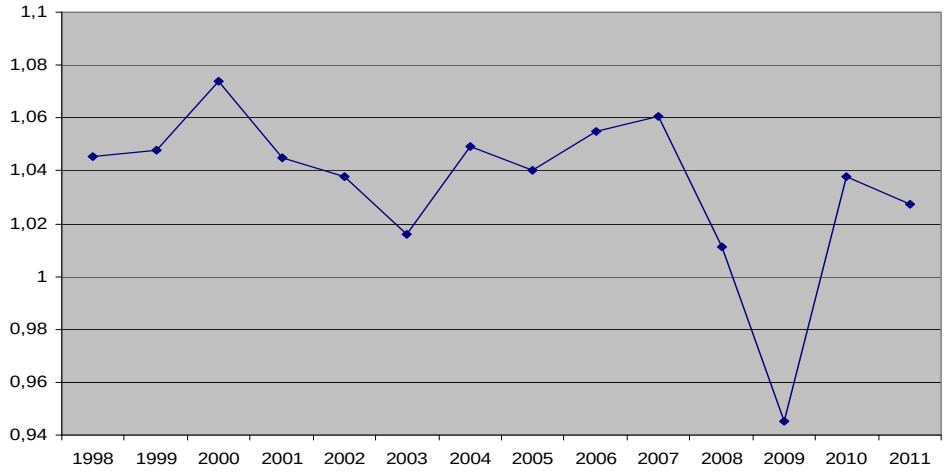
2000 – 2003 shows a decreasing growth rate of *GVA*

2003 – 2007 indicates repeatedly growing gains of *GVA*

2007 – 2009 can be determined as a period of slumping gains of *GVA*; in 2009 the gain of *GVA* reaches negative values, i.e. the growth rate is lower than 1

2009 – 2011 shows a slow recovery of increasing growth rates

Figure 2 Index of gross value added in the European Union



Source: Own calculations based on the data National account

Table 1 presents an average level of the indicator of *RULC* and *LP* according to the groups of countries. *ULCs* give information of what levels of compensation of employees belongs to a particular product unit. From the viewpoint of the need to increase competitiveness, the decrease of *ULC* is desirable, which can be also interpreted as a claim for slower growth of compensation of employees in comparison with the change (volume) of a product. Furthermore, suppose that we also include the employment rate index, then the aforementioned relationship can be elaborated further:

$$I_{RULC} = \frac{I_{CE}}{I_{GVA}} = \frac{I_{\frac{CE}{L}}}{I_{\frac{GVA}{L}}} < 1 \quad \text{i.e.} \quad I_{\frac{CE}{L}} < I_{\frac{GVA}{L}}, \tag{3}$$

where:

CE are Compensation of employees in *PPS*,
L is Total employment – domestic concept,
GVA is Gross value added in *PPS*.

Therefore the average compensation of employees should grow more slowly than the average *LP*.

The value structure of *GDP* or *GVA*, i.e.:

$$\frac{Compensation\ of\ employees}{Gross\ domestic\ product} + \frac{Gross\ operating\ surplus\ and\ mixed\ income}{Gross\ domestic\ \text{product}} = \frac{\text{GVA}}{\text{GDP}}$$

$$\frac{\text{GVA}}{\text{GDP}} + \frac{\text{Net taxes on production and imports}}{\text{GDP}} = \frac{GVA}{\text{GDP}} = 1 \tag{4}$$

implies that if the proportion of compensation of employees in *GDP* rises, then, logically, the proportion of gross operating surplus and mixed pension in *GDP* will be lower, provided that the proportion of net taxes from production and import in *GDP* is changeless. Therefore, the growth of

ULCs (growth of proportion of compensations in *GVA*) will result in a lower profitability of individual branches or individual economic entities.

Table 1 shows clearly that the highest ratio of compensations of employees to *GVA* (exceeding the average of the whole EU) can be identified in the first group of countries. As expected, in the second group – primarily in the countries entering the EU later – the level of the indicator is lower. In the third group this indicator stands at 80% of the level of the 1st group. In all monitored groups the highest value is in the period of world crisis, i.e. in 2008 – 2009. In this period *GVA* dropped more quickly than compensation of employees, which is also the result of the so called cost remanence. In total, the value of *RULC* between 1996 and 2011 has a decreasing character except for group 1. This phenomenon is validated, also, by Dubská et al. (2012) whose interpretation of the situation is: the cost competitiveness, expressed by the change of *RULC*, rises.

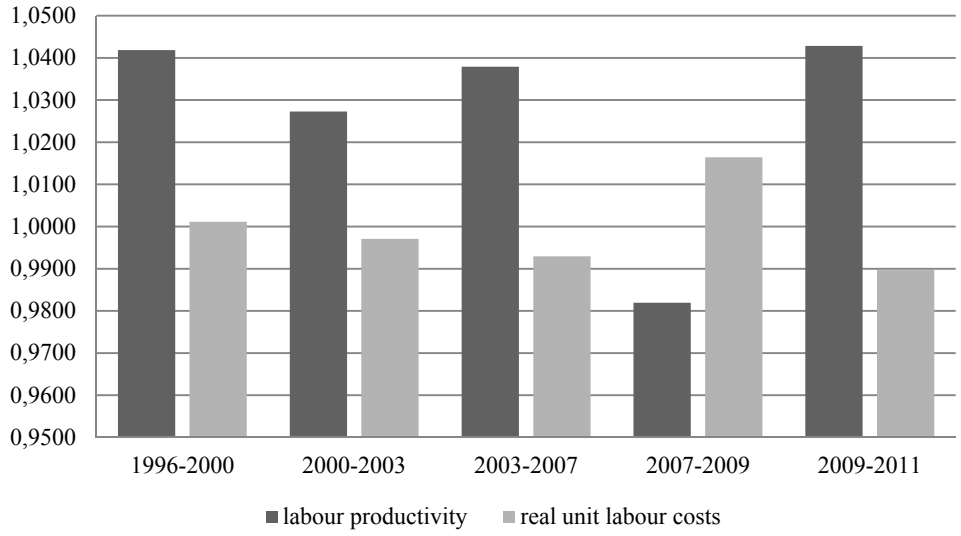
Table 1 Values of indicators RULC and labour productivity by the groups

GEO/TIME	1996-2000	2001-2003	2004-2007	2008-2009	2010-2011
Average *RULC* in *PPS*					
European Union (27 countries)	0,5579	0,5585	0,5457	0,5515	0,5529
Group 1	0,5618	0,5621	0,5547	0,5712	0,5661
Group 2	0,5070	0,4961	0,4981	0,5040	0,5000
Group 3	0,4681	0,4431	0,4497	0,4890	0,4608
Luxembourg	0,5225	0,5420	0,5012	0,5051	0,5136
Average labour productivity in thousands of *PPS*/1 employee					
European Union (27 countries)	35,71	41,39	46,29	48,14	49,26
Group 1	41,55	46,99	51,83	53,31	55,05
Group 2	23,16	30,59	35,51	38,22	39,14
Group 3	15,10	18,43	23,19	26,62	28,65
Luxembourg	61,76	68,55	81,43	84,07	85,74

Source: Own calculations based on the date National account

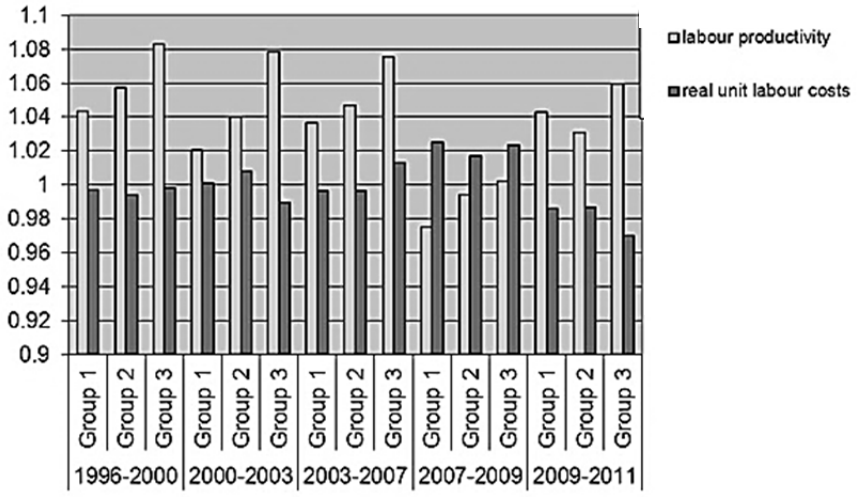
The level of labour productivity in thousands of *PPS* rises continuously in all groups of states regardless of the cyclical development (Table 1). The highest *LP* is reached in the 1st group of countries; the 2nd and, similarly, the 3rd group, also have a constantly rising level of *LP*. As a result of faster growth rate in the last monitored interval the 2nd group reaches a level of 70 % of the 1st group, the 3rd group reaches approximately a level of 52 % of the 1st group. The dynamics of followed indicator dependent on the business cycle (Figure 3).The period of growth of *GVA* in the EU, i.e. 1996-2000 and 2003-2007, is characterised by the highest growth rates of *LP*; reaching an annual average growth of about 4 %. On the contrary, in the period of slowing growth rates of *GDP* in the EU, the dynamics of *LP* evidently slows down as well and the period 2007-2009 shows an average annual drop of about 2 % in the EU (27). This conclusion is supported in a former analysis by Down (1995) who found that business cycles are responsible for the fluctuation of *LP*. In all monitored intervals, except for the period 2007-2009, a positive relationship between the indices *RULC* and *LP* can be found (that is, the growth rate of *LP* exceeded the growth of *RULC* significantly).

Figure 3 Development of selected indicators EU (27)



Source: EUROSTAT- national accounts, author´s own research

Figure 4 Development of selected indicators by groups of countries



Source: EUROSTAT- national accounts, author´s own research

In making a more detailed analysis of labour productivity in relation to real unit labour costs in individual groups of countries (Figure 4) we can find that the highest dynamics of *LP* in every period is demonstrated by the 3rd group of countries whose level, expressed absolutely, was the lowest at the beginning of monitoring (Table 1). Not even during the period of the world crisis did it drop below the value 1. The 3rd group also shows the biggest gap in growth rates between the indicators of *LP* and *RULC*, which was an advantage to some extent in 2007-2009 as such a large exceeding of growth rates of *RULC* above *LP*, as in the other groups, did not come about; simplified, this means the wages cost rate of the economies did not grow so intensely. The same conclusion does not apply

to the 1st group of countries, where, in the crisis period 2007-2009, the growth of *RULC* exceeds the growth of *LP* significantly.

5 Conclusion

The paper analyses how dynamically real unit labour costs and labour productivity of individual states of the EU react to cyclical fluctuations in the economics of the EU in connection with the different starting positions of a country. The countries were divided according to gross value added per employed person into three groups of states.

The analysis found that the size of labour productivity expressed in PPS is constantly growing regardless of the cyclical development in all economies, but there are big differences in the growth of labour productivity in individual European countries (Ark et al., 2008). The dynamics of labour productivity shows changes in the periods of cyclical fluctuations when in the periods of slowing growth rates of gross value added the dynamics of labour productivity also slows down. The analysis of the dynamics of real unit labour costs in the monitored intervals found that the growth rate of real unit labour costs exceeds labour productivity only in the crisis period 2007-2009, which simply increases the wages cost rate of economies, influences their competitiveness and can result in an anti-inflation impact, especially in economies with the biggest difference between the dynamics of these indicators.

From the point of view of individual groups of countries, the biggest value of unit labour costs and labour productivity can be found in states whose value of *GVA* per employee in 1996 (the initial year of monitoring) exceeded the average of the EU (27). On the contrary, the greatest dynamics of labour productivity can be seen in the 3rd group of countries where the largest positive differences in growth rates of *LP* and *RULC* were registered. Even in the periods of recession, in the 3rd group, the reaction to the drop in economic dynamics, is the most favourable of all monitored groups (this conclusion results from the comparison of the dynamics of *RULC* and *LP*). The reason can be that these states try to catch up economically with the states with a higher economic efficiency as is proven by the analysis.

The given data, therefore imply that the dynamics of labour productivity is determined by the cyclical development of the economy and that, on the contrary, the dynamics of real unit labour costs is not influenced by the cyclical fluctuations too much, but that it actually reacts with a delay. From the point of view of groups of states, a lower reaction to cyclical fluctuations, from the viewpoint of the dynamics of monitored indicators in states with the lowest average of gross value added per employed person in the starting year of monitoring, was found. It is, therefore, evident that the cyclical development influences the dynamics of these indicators, but it is only one of the factors.

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