LABOUR PRODUCTIVITY AS A FACTOR OF COMPETITIVENESS - A COMPARATIVE STUDY[1]

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I. Introduction

With the globalization process, economies strive towards creation of a business environment that stimulates economic growth, facilitates cross border trading, encourages the inflow of foreign direct investments, improves employment, and increases labour productivity. In fact, it is a common contest among countries granting more favourable business advantages for foreign investments than competitors do. Hence the present share of a country's participation along with its competitiveness on the world market is derived from competitive rather than comparative advantages. However, these can result in providing preferential business conditions for foreign companies at the expenses of domestic entities. As long as foreign investments use temporarily offered competitive advantages without the sustainable ones, consequences in case of possible investment mobility might have a serious impact on the further development of the former host economy. Thus for a block of countries (e.g. the EU) to be competitive, success of individual EU member states encourages the economic development of the entire grouping. Within the EU this means meeting the goal set in March 2000, when the EU Heads of States and Governments agreed to make the EU "the most competitive and dynamic knowledge-driven economy by 2010". This challenge simply calls for a need to present some indicators of individual national competitiveness within the EU. The presented article copes (deals?) with national Labour Productivity. From this point of view, this paper handles Labour Productivity as a decisive factor for a long-term competitiveness in domestic and a foreign competitive environment. We are trying to find outwhether the new EU countries threaten the competitiveness of older EU members as far as the Labour Productivity is concerned. Improving productivity is of national importance because a society improving its standard of living has to increase its productivity first. We present an overview of trends of Labour Productivity in Slovakia, the Euro 12, and Germany, respectively. Changes in Labour Productivity are captured within the six main branches according to NACE Rev. 1 (Statistical classification of economic activities in the European Community) based on quarterly data from the first quarter 2000 to the second quarter 2006.

II. Theoretical postulates to the literature of Competitiveness

There are many articles devoted to the notion of competitiveness both on the macro and micro level. With this respect we do not intend to provide a detailed insight into the overview of various postulates regarding the theory of competitiveness. However, as far as the definition of national competitiveness is concerned, there is not any uniform meaning when specifying a country's successful participation in the world market or business environment.

The principal goal of a nation is to produce a high and growing standard of living for its citizens.[2] This often refers to a macroeconomic event, under the influence of exchange rates, interest rates and government deficits. The ability to do so depends upon the productivity with

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[2] E. M. **PORTER**: *Clusters and the new economics of competition*, Harvard Business Review; 1998 Boston.

which a nation's labour and capital are used. A nation's prosperity[3] is sometimes diagnosed from the point of view of trade flows, monetary, fiscal and budget policies. While it is argued that economic value is only created by enterprises and that nations can only establish an environment for hindering or supporting the activities of enterprises, a nation does not directly generate an economic value added. However, the first known statement of the principle of comparative advantage and trade appeared in 1815, in an article by Robert Torrens which was titled *Essay on the External Corn Trade*. David Ricardo formalized the idea and introduced a numerical example in his book *On the Principles of Political Economy and Taxation*. The idea appeared again in James Mill's *Elements of Political Economy* in 1821. Finally, the concept became a key feature of the international political economy by the publication of *Principles of Political Economy* by John Stuart Mill in 1848. The theory of competitiveness was in fact initiated by the postulate of Adam Smith about absolute advantages. In comparison to its competitor, a country has an absolute advantage in the production of goods if it can produce at lower cost or with higher productivity. Absolute advantages compare industry productivities across countries. On the contrary, a country has a comparative advantage in producing goods if it can produce the goods at lower opportunity costs relative to another country. At present, when explaining factors driving economic growth, more importance is put upon competitive rather than comparative advantages. A more comprehensive explanation of the comparative cost differences between individual countries was brought in by Eli Heckscher in 1919. The H-O (Heckscher–Ohlin) theorem predicts the pattern of trade between countries based on the features the economies are characterized by. The H-O theorem[4] says that a capital-abundant country will export the capital-intensive good while the labour-abundant country will export the labour-intensive good. In addition, the Stolper-Samuelson theorem describes the relationship between changes in output, or goods, prices and changes in factor prices such as wages and rents within the context of the H-O model. The Rybczynski theorem demonstrates[5] the relationship between changes in national factor endowments and changes in the outputs of the final goods within the context of the H-O model. Briefly stated it says that an increase in a country's endowment of a factor will cause an increase in output of the good which uses that factor intensively, and a decrease in the output of the other good. Theory of management and importance of human creative ability added other statements to the postulates of competitiveness (comparative and competitive advantages). The role of an entrepreneur along with technological progress was pointed out by Schumpeter and Solow.

However, a dynamic study[6] on international trade also explains the essentials of intra-industry trade, as the intra-industry trade became much more popular among industrial nations in comparison to the classical exchange of different products. Standard economic theory proclaims that factors of production – labour, land, natural resources, capital, and infrastructure – will determine the flow of trade. However, a nation does not inherit the factors of production – but it creates the most important factors of production – such as skilled human resources, or scientific base. As the entire trade and business environment indicates, the theory of comparative

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[3] S. GARELLI: *Competitiveness of Nations: The Fundamentals*, IMD World Competitiveness Yearbook 2006.

[4] B. OHLIN: *International and Interregional Trade*, MA, Harward University Press 1933.

[5] M. S. SURANOVIC: *International Trade Theory and Policy,* 1997-2006. Lecture Notes: To define absolute advantage it is useful to define labour productivity first. To define comparative advantage, it is useful to define opportunity cost at first. Opportunity cost is defined generally as the value of the next best opportunity.

[6] U. VAN SUNTUM: *The Invisible Hand*, Springer – Verlag, Berlin, Heilderberg 2004.

advantages based on factors of production does not sufficiently justify the patterns of trade. Therefore a new model of competitive advantage has risen to the forcewhich features a better reflection of the fact that nations can develop and improve their competitive positions. It focuses on the main important features of an economy that allow its companies to create and sustain competitive advantages in particular fields. For Porter, the only meaningful concept of competitiveness is productivity.[7] Thus the doctrine of competitive advantage substituted the theory of comparative advantage in economic analysis of international competitiveness. While competitive – specific advantages can influence the trade flow of internationally competitive goods, comparative advantages[8] are fixed of nature, for at least a given time, and are determined by a surplus of some factors such as labour or natural resources and are more easily identified than competitive advantages. Competitive advantages can modify their appearance more frequently and easily. Hence if a country's trade output is relative to comparative advantages, special conditions or factors of production are associated with that output. On the contrary competitive advantages enable any country or any company to produce the given output. However, sustainable competitive advantages allow the maintenance and improvement of the country's competitive position[9] in the market. It is an advantage that enables a nation to survive against its competitor over a long period of time. Among others, competitive advantages thus contribute to preserve given comparative advantages, help finding new sources of additional value, attract foreign investments, create favourable conditions for domestic investors, and finally generate job creation. Jean-Philippe Cotis, the chief economist of the OECD, proposes factors for boosting competitiveness. He points out open and closed sectors within national economy and barriers to entry of new enterprises. However, the major innovations are often engineered by newcomers. Innovations are important for growth not just through increased labour utilisation, but also through gains in productivity. Productivity growth stimulates sufficient growth in income and output to generate overall employment growth. Labour Productivity is a "single factor productivity" or "partial productivity" concept. Growth rates or levels of Labour Productivity can differ between countries either because the two countries use different combinations of resources (labour, capital and intermediate inputs) or because one of the two countries uses inputs more efficiently.[10]

True competitiveness is measured by productivity. Productivity allows a nation to support high wages, a strong currency and attractive returns to capital, and along with that a high standard of living. Krugman considers a national competitiveness as being generated in the long run by the ability to increase the output per worker – productivity.[11]

III. Methodology of Labour Productivity (LP)
Productivity measures are used at the level of firms, industries and entire economies. Productivity is an overall measure of the ability to produce goods or services. More specifically,

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[7] M. KITSON – M. RON – P. TYLER: *The Regional Competitiveness Debate.*

[8] FUENTES: *The FTAA: Costs and Benefits*, Latin America and the Caribbean in the Next Millenium. Edition No 55. 1999; M. E. PORTER: *On Competition*, Harvard Business School Press 1998.

[9] P. BALÁŽ: *Analýza niektorých vývojových faktorov ekonomiky SR vo vzťahu k jej konkurenčnej výkonnosti.* in: Podpora rastu exportnej výkonnosti – základ hospodárskej stratégie transformácie slovenskej ekonomiky. Bratislava, JAMEX 1998.

[10] B. van ARK: *Issues in Measurement and International Comparison Issues of Productivity – An Overview*, Croningen Growth and Development Centre, Univeersity of Croningen

[11] M. E. PORTER – C. H. M. KETELS: *UK Competitiveness: Moving to the next Stage*, DTI Economic Papers 3, London: Department of Trade and Industry 2003.

productivity is the measure of how specified resources are managed in order to accomplish timely objectives as stated in terms of quantity and quality. Productivity may also be defined as an index that measures output (goods and services) relative to the input (labour, materials, energy, etc., used to produce the output). Overall productivity for individual countries is calculated by dividing output, as measured by GDP (Gross Domestic Product) or GVA (Gross Value Added) by the country's total employment. Hence, there are two major ways to increase productivity: increase the numerator (output) or decrease the denominator (input). Of course, a similar effect would be seen if both input and output increased but output increased faster than input; or if input and output decreased but the former decreased faster than the latter. Labour Productivity is typically measured as output per worker or output per labour-hour.[12] Evidence of productivity growth usually means that better ways have been found to create greater output from given inputs. Labour Productivity is in fact the "average product of labour" (average output per worker or per worker-hour, an output which could be measured in physical terms or in prices terms). In principle, inputs can be broadly defined as involving e.g. human capital (people's skills), land, raw materials, machinery and equipment, energy, time. Most commonly though, inputs are defined in terms of labour (number of employees or hours of work) and capital (buildings, machinery and equipment, etc). Labour Productivity is the ratio of output to labour input; and output is influenced by many factors that are beyond of workers' influence - including the nature and amount of capital equipment that is available, the cost of capital, the introduction of new technologies, management practices and so on. Productivity growth means more value is added in production and this means that more income is available to be distributed. At the national level, productivity growth raises living standards because more real income improves people's ability to consume more goods and services, to improve their investment positions, enjoy leisure, improve housing and education.

IV. Selected Indices of National competitiveness based upon Labour Productivity

Labour Productivity is one of the factors used for calculating the Unit labour costs (ULCs). These represent a direct link between the productivity and the cost of labour in terms of generating output. Unit labour cost is defined as the cost of labour required to produce one unit of output in a particular industry, sector or the total economy. In other words, the unit labour cost measure is a ratio that is constructed from a numerator reflecting the major cost category in the production process (labour compensation) and the denominator reflecting the output from the production process per worker (GDP or value added). Comparing ULC among countries enables us to find a country that might be regarded as cost competitive in comparison to other countries. A specific characteristic of unit labour cost measures is that the numerator, which reflects the labour cost component of the equation, is typically expressed in nominal terms, whereas the denominator (output or productivity) is measured in real or volume terms. Compensation of employees (at current prices) (ESA 95) is defined as the total remuneration in cash or in kind, payable by an employer to an employee in return for work done by the latter during the accounting period. Another indicator is the Real Exchange Rate. It is defined by the following model:

$$PER = e\left(\frac{P}{P^*}\right),$$

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[12] R. PUTTEN: *Labor productivity: an international perspective*, Entrepreneurship in Europe, June 2003.

where "e" is the exchange rate as the number of foreign currency units per home currency unit, "P" is the price level of the home country and P* is the foreign price level. Thus the Balassa-Samuelson effect (BS effect) depends on the inter-country differences in the relative productivity of the tradable and nontradable sectors. Relevant to Labour Productivity the B-S model is then based upon the assumption that productivity growth rates vary more by country in the traded goods sectors than in other.

V. Data description and presentation of results

Data for the GVA (Gross value added) expressed in constant Euro prices (2000 as the base year) were derived from National accounts (ESA 95) published by Eurostat along with total employment in sectors of countries under review. Starting point was the NACE breakdown by six branches. This section of our paper hands over the output per worker in NACE of observed units (Euro 12, Germany and Slovakia). Obtained data are graphically presented as % changes towards the previous quarter. For the sake of comparison, the entire NACE Labour Productivity trend of Slovakia was compared to that of Germany and the Euro 12. In addition, the performance per worker was further classified (described) from the point of view of tradables and non-tradables.[13] For our purposes, the main criterion for classifying as tradable or non-tradable stood the physical transfer of commodities across national boundaries. Then tradable commodities stemmed from NACE branches of A, B, C, D, E, the rest of them was counted among the nontradables. The branch section involved following classification:

a, b: Agriculture, hunting, forestry and fishing;
c, d, e: Total industry (excluding construction);
f: Construction ;
g, h, i: Wholesale and retail trade, repair of motor vehicles, motorcycles, and personal and household goods, hotels and restaurants, transport, storage and communication;
j, k: Financial intermediation, real estate, renting and business activities;
l–p: Public administration and defence, compulsory social security, education, health and social work, other community, social and personal service activities, private households with employed persons.

The total employment in the Euro 12 on the quarter average was about 136 million workers, in Germany there were about 39 million people employed in all NACE branches, and in Slovakia there were about 2 million employees on the quarter average. Fig. 1 indicates the relative changes of the entire NACE Labour Productivity within the EU 12, Germany and Slovakia during the observed period.

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[13] Tradables are goods and services capable of being traded among countries. Non-tradables are goods that are not traded, either because they cannot be or because the trade barriers are too high. With the exception of the case when services are being distinguished from goods, they are often mentioned as examples of nontraded goods.

Fig. 1: Total LP of all NACE branches within Euro 12, Germany, and Slovakia (% changes)
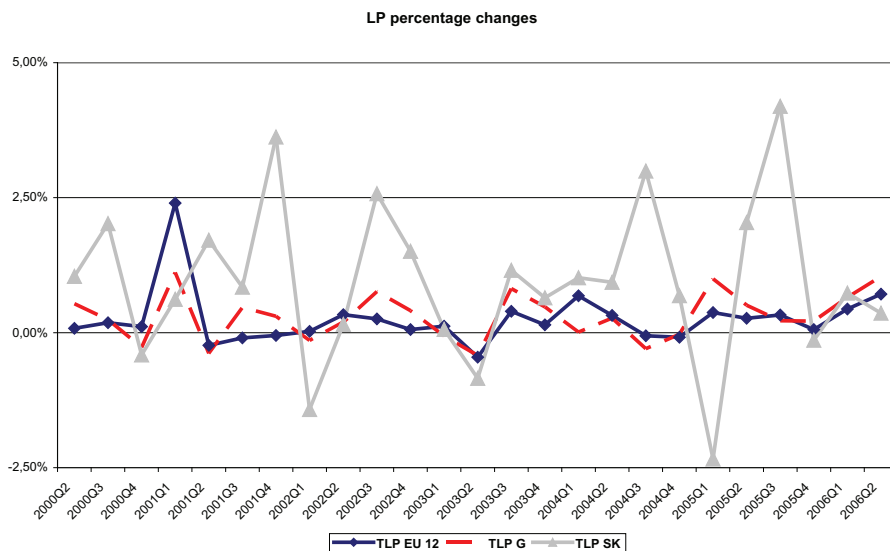

The Labour Productivity trend of Germany complied with the labour performance in the Euro 12 with some exceeds mainly in the first quarter of 2004 and the period between 2005 and 2006. A substantial change in the Euro 12 was recorded in the first quarter of 2001, when the GVA increased by 2.6 % with a nearly 0.2 % improvement in total employment compared to the previous quarter. In the same period an increase in the German Labour Productivity of about 1.1 % was registered and about 0.02 % more employees enhanced the total GVA by nearly 1.1 %. Slovakia's performance per worker seemed somewhat unstable at least in those periods where the LP of Germany and the Euro 12 achieved positive rates. The highest swinging periods appeared between 2002 and 2005. In the first quarter of 2002, the output (GVA, with about 1.8 %) decreased faster than the input (total employment, with about 0.3 %). In addition to that, the GVA in constant prices in Slovakia dropped by 1.8 % in the first quarter of 2005 and a nearly 0.5 % increase in total employment was accomplished.

Fig. 2: Share of the total LP of Slovakia to the total LP of the Euro 12 and Germany
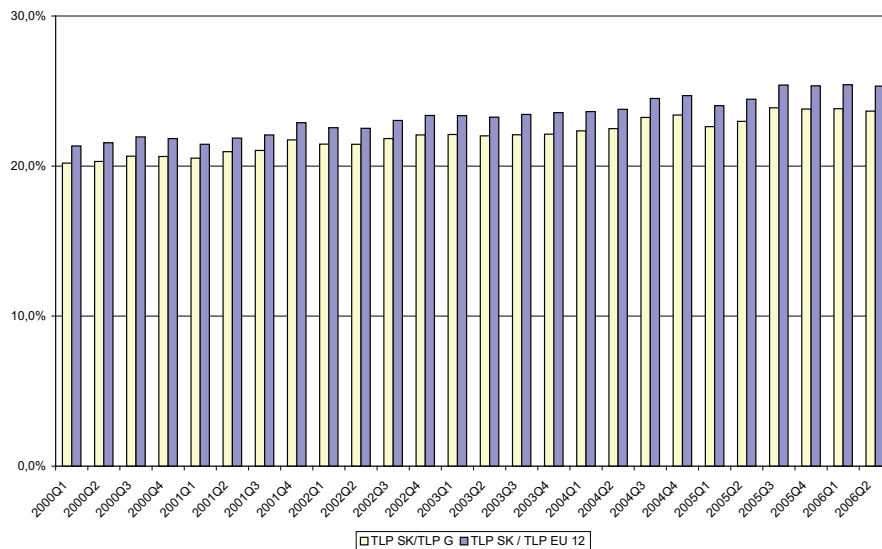
On the quarterly average, Labour Productivity of Slovakia reached about 23 % of the value produced by a worker in Germany and about 25 % of the Labour Productivity of the Euro 12. A moderate development characterized the Slovak Labour Productivity convergence towards the Euro 12 and Germany, respectively. However, there was a faster growth of Labour Productivity recorded in Slovakia than in Germany or the Euro 12 (see Fig. 2).

Fig. 3: LP (cumulative) of Slovakia – NACE breakdown by 6 branches (% changes)
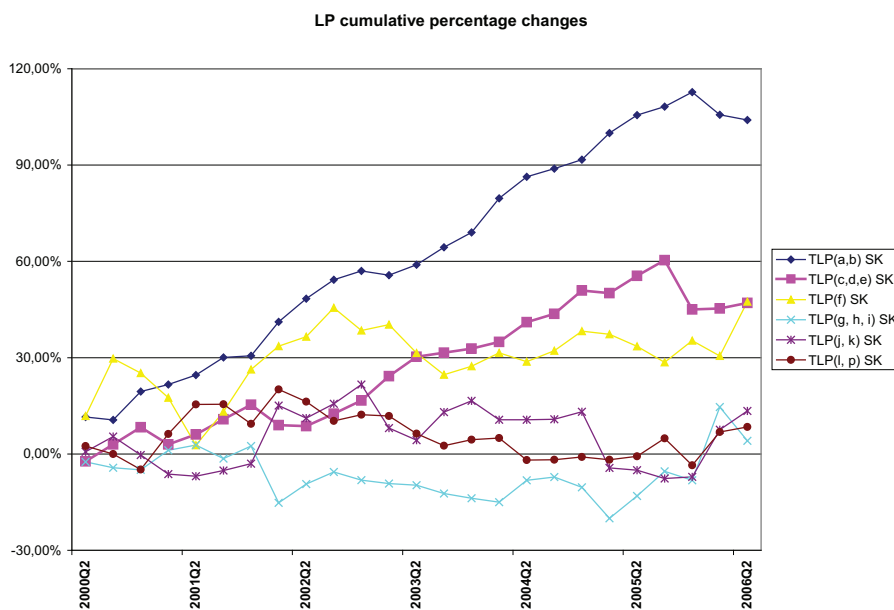
Total industry excluding the construction branch c, d, e showed quite a stable development over a long run with some exceptions, such as the very negative decline in the fourth quarter of 2005 by nearly 15 %. However, the reason was a rapid slackening of output by 18 % and a slight increase of employment in this branch by 0.2 %. On the average, the quarterly total employment growth from the first quarter 2000 to the second quarter 2006 was -0.18 %. The average growth rate of the GVA was 1.50 %. Thus the average rate of Labour Productivity growth of the Slovak worker resulted in 1.69 %.

Output per worker employed in the construction – branch *f* showed a rather unstable trend. Among other factors, this might have been caused by a volatile domestic demand of individual economic subjects. There were about 136,000 workers active in this branch on the quarter average and the average Labour Productivity growth reached 1.50 %.

There was only a slight improvement in the Labour Productivity within the *l* to *p* branch - public administration and defence, compulsory social security, education, health and social work, other community, social and personal service activities, private households with employed persons. The growth rate of the output per worker was 0.18 % on the quarter average. The total employment growth rate was -0.05 %. However, the total employment in this branch seemed to be stable at least from the first quarter of 2004 up to the present.

In Slovakia, the agriculture, hunting, forestry and fishing - branch *a*, *b* was positively stimulated by an increasing Labour Productivity. On the quarter average there were about 93,000 people active in this branch. The average quarter growth of total employment was -1.65 % and the growth of average Labour Productivity was about 3.92 %.

The branch *j*, *k* – financial intermediation, real estate, renting and business activities showed a high volatility. The highest decreases could be determined in the first quarter of 2003 and 2005 respectively. Consolidation process in the system of financial intermediation and the bankruptcy of some nonbanking financial entities in Slovakia in 2002 might have been some of the reasons of this decrease. The quarterly average number of workers employed in this branch was 180,000. The Labour Productivity growth achieved about 0.25 % on the quarterly average.

Similar was the trend of Labour Productivity in the section *g*, *h*, *i* – wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods, hotels and restaurants, transport, storage and communication. In the first quarter of 2002, the Labour Productivity showed a huge decline, contrary to the first quarter of 2006 in which the output per worker in this branch resulted in the highest contribution. The first quarter of 2002 was marked by a nearly 6 % increase in total employment and by an about 15.3 % decrease of GVA. The average number of total employment in this sector was 550,000 employees, the average quarter Labour Productivity growth achieved minus 0.10 %.

However, as the graph illustrates, Labour Productivity was growing faster in tradable sectors than in the non-tradable ones. The tradable sector is under the influence of foreign competition on the world market and catches the changes and challenges of competition very flexibly and quickly.

Fig. 4: LP of the Euro 12 – NACE breakdown by 6 branches (% changes)

LP cumulative percentage changes
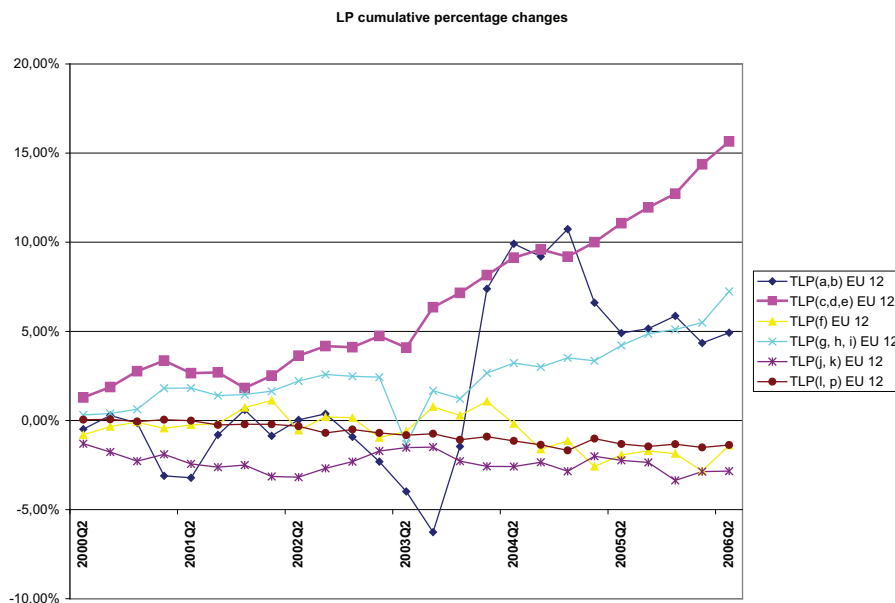
In the Euro 12, the average quarterly growth rate of Labour Productivity within the branch *l – p* – public administration and defence, compulsory social security, education, health and social work, other community, social and personal service activities, private households with employed persons – decreased by 0.05 %. The total employment was about 40 million employees on the quarterly average. Slow and changing Labour Productivity was detected within the sector *j*, *k* – financial intermediation, real estate, renting and business activities. The quarter growth rate of the GVA was about 0.48 % and the Labour Productivity growth declined by 0.11 %.

In the branch *g, h*, *i* – wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods, hotels and restaurants, transport, storage and communication, the average Labour Productivity growth resulted in 0.27 % and the total employment growth rate was about 0.23 % on the average.

The sector *f* – construction in the Euro 12 showed a 0.06 % decreasing Labour Productivity growth on the quarterly average. The total employment rate was 0.33 %. This branch was characterized by negative Labour Productivity growth similar to decline of another branch mentioned above.
The sector of branch *a*, *b* – agriculture, hunting, forestry, showed a very unstable growth of Labour Productivity mainly in the first four years. The average Labour Productivity growth on the quarterly basis was 0,16 % with a negative total employment growth 0.33 %. However, development of this sector is under the influence of the Common Agricultural Policy (CAP) within the EU.

The Labour Productivity trend in the branch *c*, *d*, *e* – total industry (excluding construction) was characterized by a very fast growth in comparison to the other sectors under review. The average growth rate of total employment in this sector was minus 0.20 % and the average Labour Productivity growth rate achieved 0.60 %.

Fig. 5: LP of Germany - Aggregation of NACE branches into tradables and nontradables (% changes)
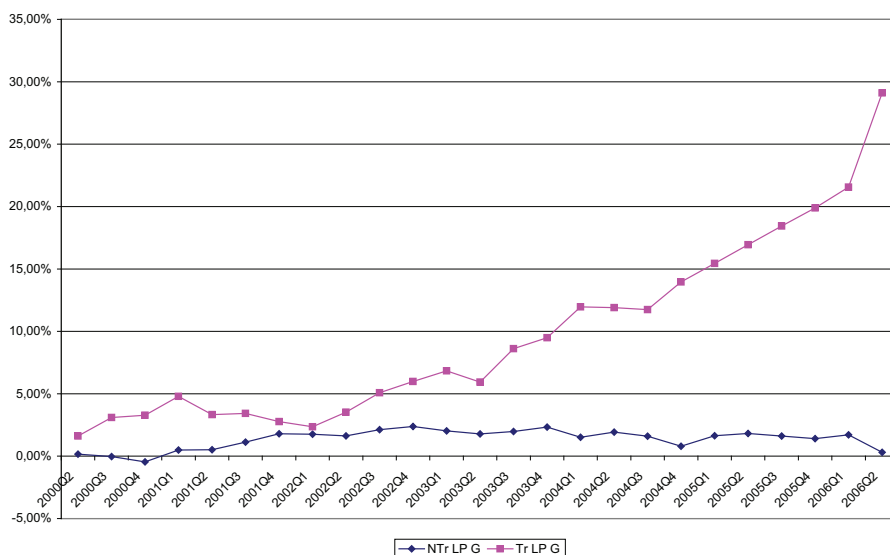
This graph (Fig. 5) clearly confirmed the results for Slovakia and the Euro 12 when characterizing the trend of Labour Productivity within the NACE branches. It was argued that the output per worker increased faster in the cluster of tradables than in the group of non-tradables. However, from the common point of view, the Labour Productivity in tradables was more affected by changes on the world market, resulting in rapid exploitation of new communication systems, implementation of new technologies, new processes, and adaptation of new business environment, new forms of selling and buying.

VI. Conclusion

Because competitiveness and competitive ability of nations are frequent topics, we focused on the performance of a worker within individual economic activities. We worked out a comparing study for presenting the trend of Labour Productivity of Slovakia as a new member state of the EU, the Euro 12 and Germany. As Germany is an important trading partner of Slovakia, it was included in our units of observation. Because the Slovak Republic proclaims its intention to join the ERM (Exchange Rate Mechanism) by 2009, the Euro 12 -countries already participating in the Euro Currency Area- were chosen to be the benchmark concerning the Slovakian Labour Productivity. The obtained results helped us clarify the statement set forth at the beginning of this article which claimed that new EU member countries with their quick growth of Labour Productivity are not an immediat threat to competitiveness of other countries.

References

[1] R. VOKOROKOSOVÁ: *Komparatívne a konkurenčné výhody v novej ekonomike,* EKONÓM 2004, Bratislava.

[2] E. M. PORTER: *Clusters and the new economics of competition*, Harvard Business Review; 1998 Boston;

[3] S. GARELLI: *Competitiveness of Nations*: The Fundamentals, IMD World Competitiveness Yearbook 2006.

[4] B. OHLIN: *International and Interregional Trade*, MA, Harward University Press 1933.

[5] M. S. SURANOVIC: *International Trade Theory and Policy*, 1997-2006.

[6] U. van SUNTUM: *The Invisible Hand*, Springer – Verlag, Berlin, Heilderberg 2004.

[7] M. KITSON – M. RON – P. TYLER: *The Regional Competitiveness Debate*.

[8] FUENTES: The FTAA: *Costs and Benefits, Latin America and the Caribbean in the Next Millenium*. Edition No 55. 1999; M. E. Porter: On Competition, Harvard Business School Press 1998.

[9] P. BALÁŽ: *Analýza niektorých vývojových faktorov ekonomiky SR vo vzťahu k jej konkurenčnej výkonnosti.* in: Podpora rastu exportnej výkonnosti – základ hospodárskej stratégie transformácie slovenskej ekonomiky. Bratislava, JAMEX 1998.

[10] B. van ARK: *Issues in Measurement and International Comparison Issues of Productivity – An Overview*, Croningen Growth and Development Centre, Univeersity of Croningen

[11] M. E. PORTER – C. H. M. KETELS: UK *Competitiveness: Moving to the next Stage*, DTI Economic Papers 3, London: Department of Trade and Industry 2003.

[12] R. PUTTEN: *Labor productivity: an international perspective*, Entrepreneurship in Europe, June 2003.

Summary

Článok "Produktivita práce ako faktor konkurenčnej schopnosti" analyzuje vývoj v oblasti produktivity práce na Slovensku, ktorý ďalej porovnáva s vývojom produktivity práce v Nemecku a EU-12. Analýza sa vzťahuje na klasifikáciu ekonomických činností (OKEČ) s dôrazom na pozorovanie dvoch hlavných sektorov – obchodovateľného a neobchodovateľného. Cieľom príspevku je diagnostikovať dlhodobé konkurenčné výhody na základe vývoja produktivity práce v pozorovaných krajinách.