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Agnieszka Furmańska-Maruszak

Labour Costs Versus Labour Market Development. Empirical evidence for Polish, Czech and Hungarian manufacturing industry

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Abstract

The paper analyses the relationship between labour costs and employment development in manufacturing industry in Poland, Czech Republic and Hungary. It indicates the need for thorough labour cost analysis in Europe in the context low employment rates among New Member States. The steps taken within the framework of the EU's common employment policy emphasise the crucial role of labour costs in enhancing labour demand.

The question raised in this paper is whether the cost of hiring labour is a significant determinant of employment in Polish, Czech and Hungarian manufacturing and is considered in terms of both relative (unit labour costs) and absolute (labour costs per one employee) measures. The study examines the labour cost-employment relationship aiming to find out whether it differs significantly between the three countries and between commodity groups in manufacturing industry within each country.

1. Introduction

Against the background of unsatisfactory European labour market performance, the need for efficient employment incentives arises. The majority of them have already been formulated under the European Employment Strategy. It was in Essen in December 1994 that the idea of the EES was made operational on a practical basis and where the need for reducing the cost of labour was first mentioned. The European Council agreed on five key objectives (the so-called "Essen Strategy"), among which was the goal of reducing non-wage labour costs [11].

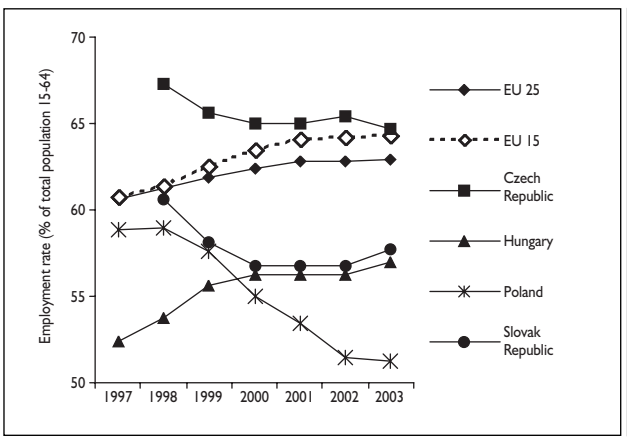
The European Employment Strategy was put into practice before the official implementation of the Amsterdam Treaty during the special Luxembourg Summit in November 1997. The Luxembourg Summit drew special attention to employment policy by declaring unemployment a common challenge and recognising the need to increase employment rates and also by adopting a common strategy based on an integrated approach, involving various supply- and demand-oriented policies. Such an approach was important in terms of labour costs and their impact on labour market performance. The cost of hiring labour influences the level of employment and consequently unemployment, both on the demand side (through job creation and job destruction) and on the supply side (through participation rates).

This approach was continued by the Lisbon Strategy and of labour market demand-oriented instruments the necessity of reducing non-wage labour costs, focusing especially on low wage earners, was emphasised. Moreover, in terms of labour market supply-oriented instruments the reduction of the tax wedge for low wage earners as an antidote to inactivity and poverty traps was specified [5].

The Lisbon Summit strengthened the idea of the EES and among the objectives to be achieved by 2010 formulated a full employment goal for the EU. The EU's progress towards the Lisbon 2010 target of a 70% overall employment rate has today come to a standstill and, at 64.3%, it is now clear that EU will miss its intermediate employment rate target for 2005 of 67%. Without further action the 2010 target will also be missed [3].

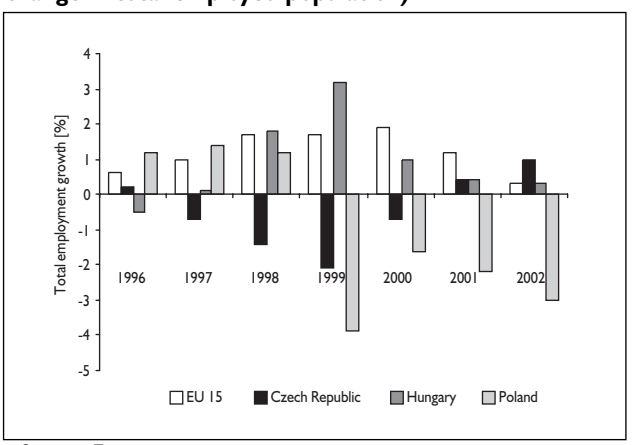
In 2003 Poland had a gap of 18.8 percentage points to the employment objective of 70% set for 2010 (see figure 1). A substantial decrease in the employment rate in Poland was observed between 1998-2002. After 2002 the situation seems to have been less dramatic but still without any strong signs of improvement. The employment rate in the Czech Republic, although deteriorating to some

Figure 1. Employment rates 1997-2003



Source: European Commission (2004): *Employment in Europe*, Brussels.

Figure 2. Total employment growth (annual percentage change in total employed population)



Source: Eurostat.

extent, is still slightly higher than the EU25 average. The Hungarian employment rate reached 57% in 2003 and was 5.8 percentage points higher than in Poland. At the same time the unemployment rate in Hungary was 5.8%, which indicates a serious problem in terms of the low activity of the Hungarian population [4].

Annual employment growth in Hungary between 1998-2000 was the highest in comparison with the Czech Republic and Poland. Analysing data from Eurostat on the overall economy one can see that in this period employment increased annually in the EU15 and in Hungary, while significant annual decreases were registered in the Czech Republic and Poland. The general improvement in employment in Hungary between 1998-2000 was accompanied by strong GDP growth (averaging over 4% between 1997 and 2002), which was in turn correlated with significant export growth. In 2001 Hungarian export growth started to slow down and stagnated around mid 2003. GDP growth in 2002 was mainly due to strong domestic demand caused by strong wage growth. It was associated with administrated pay raises – minimum wage increases and significant wage increases for people employed in the public sector. Since 2000 annual employment growth has slowed significantly. The employment rate for the Hungarian economy stagnated between 2000-2002, before showing a small improvement in 2003 [14].

A quick look at the labour market situation of the three countries against the backdrop of the EU indicates the need for further analyses aimed at finding employment incentives amongst which, as EES emphasised, labour costs should be taken into consideration.

2. Theoretical background

2.1. The significance of labour costs

Labour costs constitute an important social measure. They are a source of every society's income and a crucial factor in human resource management. They represent a significant economic category as an important element of entrepreneurs' employment decisions. A company's labour demand is what is called "derived demand", related to consumers' wants and desires on a given product market. Labour constitutes an important and special input in the production process as workers need good working conditions and opportunities to advance socially. Various aspects of the company's labour demand are regulated by such policies as minimum wages, employment subsidies or restrictions on an employer's ability to fire workers [1]. Under such circumstances labour costs, which are responsible for labour market equilibrium, should be examined as a high priority.

There is still a debate in economic theory on the relationship between labour costs and employment. Economists often argue whether or not lower labour costs can lead to more employment and less unemployment. On the one hand, a drop in labour costs can lead to competitive advantages and therefore enable domestic companies to export more and reclaim parts of the domestic market. Thus, improvement in international competitiveness and the reduction in labour costs relative to capital costs can be a good incentive for investments and can lead to the hiring of more employees [12]. On the other hand, one finds other economists arguing that the labour costs-employment relationship is not a negative one but positive because lower labour costs lower employment through a fall in effective demand in the economy.

Labour costs are usually taken into account by economists for two purposes: in examining changes in international competitiveness trends and defining perspectives for reducing unemployment (or increasing employment levels). Stable high unit labour costs may be a systematic factor of labour market imbalance and may be a source of natural unemployment [15].

Facing problems with unemployment as well as with unsatisfactory employment rates (64.3% in 2003 for the EU15) EU countries are looking for efficient employment incentives. Of countries with the lowest rates of employment Poland is the leader (51.2% in 2003). Employment shedding observed in the majority of commodity groups in manufacturing industry confirms that the labour market is not performing well. On the other hand, with globalisation and the intensity of international competitiveness, it is ever more important for companies producing tradable goods to become and remain competitive. Under such circumstances the analysis of labour costs (which play a key role in setting labour market equilibrium and are an important indicator of international competitiveness) in manufacturing industry seems to be particularly significant.

2.2. Relative unit labour costs

Labour costs can be defined as the total expenditure borne by employers in order to employ workers. They are sometimes identified as being synonymous with gross wages, sometimes with entire labour costs, including all non-wage labour costs, and sometimes with unit labour costs. *Unit labour costs* are a quotient of labour costs and productivity . They stand for labour costs per unit of output and show a direct link between productivity and the cost of labour used to generate output. A rise in an economy's unit labour costs indicates a higher reward for labour's contribution to output. If labour costs increase faster than labour productivity this can constitute a threat to a country's cost competitiveness [10].

Unit labour costs also exert an influence on labour demand. If there is a decline in competitiveness as a consequence of labour costs businesses will seek to cut the least productive jobs in order to offset the cost burden with an increase in labour productivity. The development of unit labour costs shows companies' adjustment reaction to labour cost pressure emanating from both direct wage costs and non-wage labour costs. Moreover, productivity developments might be understood as having two elements: increases in productivity, which come from technical development, and the substitution component, which is related to the substitution of labour by capital. If labour costs increase at a faster rate than the productivity benefits resulting from technical advances, there is an incentive to substitute labour with capital. Hence, productivity adjusts at the cost of employment [8].

The relative competitive position of industries across countries depends on labour productivity and differences in levels of input costs. Labour compensation constitutes an important component of manufacturing costs. *Relative unit labour costs* are the measure of the levels of labour costs per unit of output in a country's (e.g. Poland's, the Czech Republic's or Hungary's) manufacturing industry relative to its major competitors (e.g. the EU15). Analysis of relative unit labour costs across countries provides useful information on the relative performance of manufacturing industries [13]. Whenever the relative unit labour cost (RULC) is above one, the efficiency of use of the labour force in a given country (e.g. Poland) is lower than in its competitor (e.g. the EU15).

2.3. The firm's demand for labour

As well as relative measures, *real labour cost per employee* should also be taken into account in analysis of the relationship between labour costs and employment. Observing the decision-making process of a given employer under perfect competition conditions we assume that an enterprise can maximize its profit by having the marginal labour cost of an additional employee equal to the marginal

sales revenue of the product he manufactured [9]. An employer will increase employment as long as marginal labour productivity equals *real labour costs*.

Changes in demand for labour following a change in labour costs can be conceived of as having two elements (substitution and output effects). Taking into account the former, for any given level of output and real prices of other factor inputs, such as for example capital, materials and fuel, there will be a substitution between labour and the other inputs. This means that entrepreneurs will reduce use of those means of production whose prices became relatively higher. When labour costs fall employers will seek to use more labour and less of other inputs to produce the same amount of output [16]. This will result in more labour-intensive activities and can cause an increase in employment. Considering the latter (the output effect) as a result of lower labour costs there will be an increase in demand for all means of production. Output will grow and there will be a consequential improvement in the demand for labour.

3. The approach used in the research

In order to examine the relationship between labour costs and employment development in manufacturing industry we take into account two measures: relative unit labour costs and labour costs per employee (in real terms).

In the first part of the paper we analyse relative unit labour costs as a competitiveness determinant, taking into account Polish, Czech and Hungarian manufacturing industry in the years 1998-2000 (1996-2000 for Poland), according to the third level of desegregation of the industrial sectors (NACE). Data from NewCronos, Comext and GUS databases are combined to derive new estimates of relative unit labour costs for a number of product groups in manufacturing. Furthermore, we conduct a comparative analysis of relative average unit labour costs and employment changes in manufacturing in the three countries in the years 1996-2000 (Poland) and 1998-2000 (Czech Republic and Hungary) using mainly descriptive statistics. We supplement this research with a comparative analysis of relative unit labour costs changes and employment changes in Poland in two sub-periods: 1996-1998 and 1998-2001.

In the second part of the paper we examine the relationship between labour costs per employee and employment in manufacturing industry in Poland, the Czech Republic and Hungary in the years 1998-2001 using a panel data regression analysis. The purpose is to check whether labour costs are a significant determinant of employment and whether there are any significant differences between the three countries as far as the labour cost-employment relationship is concerned. As a supplement to this analysis we conduct an OLS regression analysis to show differences in the labour cost-employment relationship between commodity groups in the manufacturing industries of Poland, the Czech Republic and Hungary.

Empirical results

4. Unit labour costs as an important measure of competitiveness

Unit labour costs seem to be a significant determinant of competitiveness as far as Polish, Czech and Hungarian manufacturing industries are concerned. In the analysis we assume that changes in the

market share of one competitor (e.g. Poland, the Czech Republic or Hungary) against other foreign competitors (e.g. EU15 countries) are the measure of the results of the competition battle. In this sense, the most competitive enterprises are able to improve their position both on domestic and foreign markets. Therefore, changes in the competitiveness of exported products can be described by changes in foreign (EU15) market share and changes in the competitiveness of domestic-based products competing against imports described by changes in domestic market share [17].

Looking at Polish manufacturing industry (3-digit NACE), in 2000 in comparison with 1996 in 30% of all product groups companies had a stronger position on both domestic and EU15 markets (segment I) – see figure 3. In more than a half of the product groups companies improved their position on the EU15 market and at the same time saw a deteriorating position on the Polish market (segment III). There were only four groups (out of 86 product groups) in which a deterioration of the Polish companies' position on the EU15 market was observed together with an improvement in their position on the domestic market (segment II). In about 9% of the total number of product groups Polish producers lost their position on both markets (segment IV).

Analysing labour costs, the successful product groups in which producers increased their market share on both the domestic and EU15 markets (segment I) were characterised by the lowest relative average unit labour costs (RAULC-average unit labour costs in Poland in relation to average unit labour costs in the EU15). Consequently, the highest relative unit labour costs were observed in product groups in which companies lost shares on both domestic and foreign markets (segment IV). Table 1 shows average unit labour costs in Polish manufacturing in comparison to EU15 manufacturing. Whenever RAULC is above one, on average the efficiency of use of the labour force in Poland is lower than in the EU15.

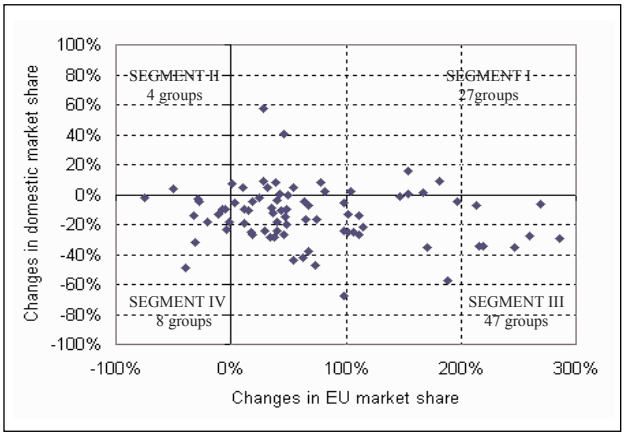
Table 1. Relative average unit labour costs in segments of Polish manufacturing, 1996-2000

Reltive index	Descriptive statistics	**I SEGMENT**	II SEGMENT	III SEGMENT	**IV SEGMENT**	Country average for manufacturing
ULC	mean	**0.886**	1.248	1.054	**1.369**	1.037

Source: Wziątek-Kubiak, A./Winek, D. (2004): On measurement of changes in competitiveness, Gdansk.

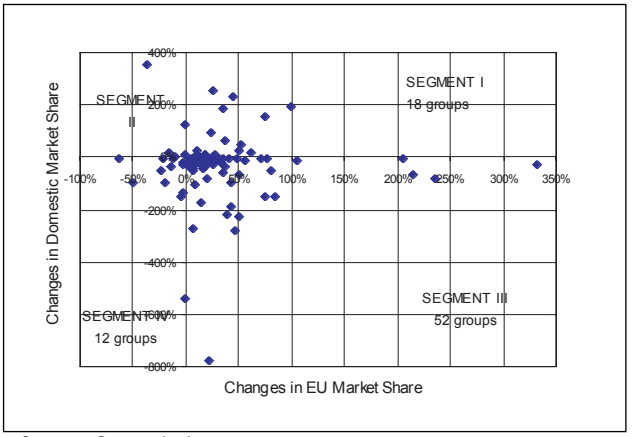
Considering the situation of Czech manufacturing in 2000 in comparison to 1998 one easily notices that in almost 60% of all product groups Czech companies improved their position on the EU15 market and lost their position on the domestic market. About 20% of all Czech product groups had a stronger position both on the EU15 and the domestic markets. In 6% of all commodity groups

Figure 3. Share of Polish manufacturing in domestic and EU15 markets, 1996-2000



Source: A. Wziątek-Kubiak, D. Winek (2004).

Figure 4. Share of Czech manufacturing in domestic and EU15 markets, 1998-2000



Source: Own calculations.

companies had a stronger position on the domestic market while losing their position on the EU15 market. The most difficult segment constituted 14% of all Czech product groups in which companies lost their share both of the domestic and the EU15 market. It is worth emphasising that both in Polish and Czech manufacturing in more than 80% of all product groups companies increased their share of the EU15 market, while gaining or losing share of the domestic market at the same time (Figure 4).

Labour costs play an important role in terms of Czech manufacturing competitiveness. Product groups in which producers increased their market share on the EU15 market were characterised by relatively lower unit labour costs (segment I & III). At the same time commodity groups in which companies lost their position both on domestic and EU15 markets had relatively high unit labour costs (segment IV).

Table 2. Relative average unit labour costs in segments of Czech manufacturing, 1998-2000

Reltive index	Descriptive statistics	I SEGMENT	II SEGMENT	III SEGMENT	IV SEGMENT
ULC	Mean	0.96	1.20	0.89	1.41

Source: Own calculation.

The competitiveness of Hungarian manufacturing in the majority of product groups increased between 1998 and 2000. In only 7% of all commodity groups in 2000 did companies lose their position on the EU15 and domestic markets in comparison to 1998. In 34% of the total number of product groups Hungarian enterprises strengthened their position on both (domestic and EU15) markets. Product groups in which firms' positions deteriorated on the domestic market and improved their share in the EU15 market between 1998-2000 constituted 48% of all commodity groups. About 11% of Hungarian product groups gained a stronger position on the domestic market, at the same time losing their shares in the EU15 market.

Labour costs have played a key role in maintaining Hungary's international competitiveness. During the analysed period 1998-2000 the lowest relative unit labour occurred in the best performing Hungarian product groups, while the worst performing commodity groups were characterised by the highest RAULC. This means that, on average, unit labour costs in the worst performing product groups in Hungary were higher than in the EU15 (RAULC>1).

Table 3. Relative average unit labour costs in segments of Hungarian manufacturing, 1998-2000

Relative index	Descriptive statistics	**I SEGMENT**	II SEGMENT	III SEGMENT	**IV SEGMENT**	Country average for manufacturing
ULC	mean	**0.785**	0.973	0.956	**1.501**	0.945

Source: A. Wziątek-Kubiak, D. Winek (2004): Changes of competitiveness of Polish and Hungarian manufacturing, Torun.

In Polish, Czech and Hungarian manufacturing industries unit labour costs very clearly influence companies' competitiveness, both on domestic and foreign markets. Apart from competitiveness, the cost of hiring labour has an impact on developments in employment in manufacturing industry.

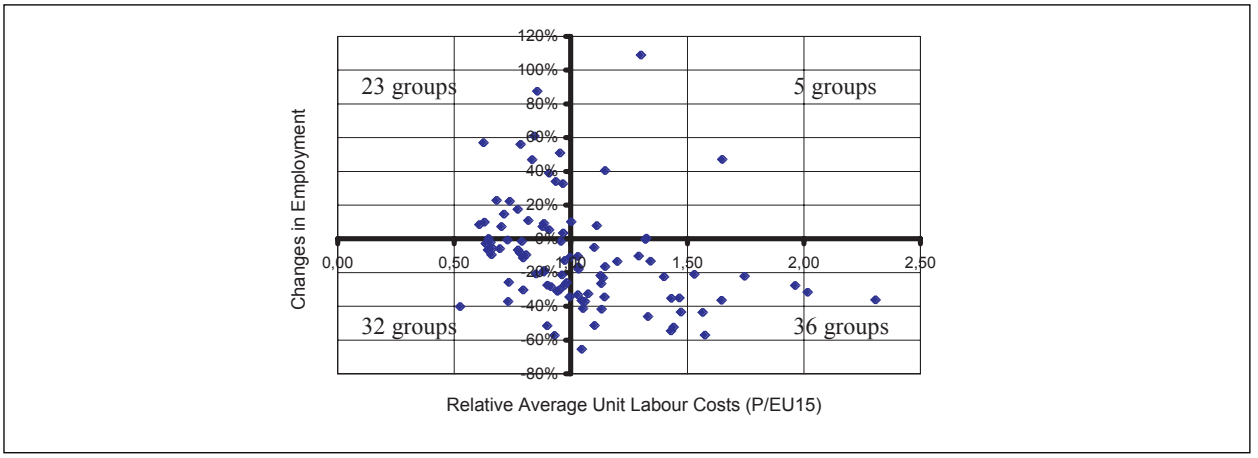
5. Unit labour costs and employment development

5.1. Relative average unit labour costs and employment changes

Polish manufacturing

Analysing the relationship between relative average unit labour costs (ULC in Poland to ULC in the EU15) and employment changes, we seek to test whether relatively lower unit labour costs might

Figure 5. Relative average unit labour costs and employment changes, 1996-2000



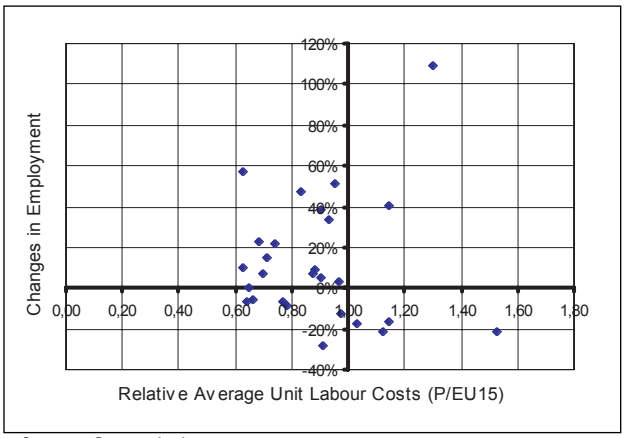
Source: A. Wziątek-Kubiak, D. Winek (2004): Changes of competitiveness of Polish and Hungarian manufacturing, Torun.

be a factor favourable to developments in employment. Figure 5 presents the relation between level of relative average unit labour costs and employment changes in Polish manufacturing in 1996-2000.

In product groups with relative average unit labour costs exceeding one (RAULC>1) there were hardly any improvements in employment. In only 5% of the total number of product groups did Polish producers increase employment despite a high level of RAULC. In almost 38% of all product groups relative unit labour costs were higher than one and in 2000 the employment level in these groups deteriorated from their 1996 level. It is clear that lower efficiency of use of the labour force in Poland in comparison to the EU15 was not favourable to employment increases. On the other hand, more than half of all Polish product groups remained competitive as far as unit labour costs were concerned (RAULC<1), but in only 40% of these groups was there an increase in employment. In the case of the rest of the commodity groups with RAULC<1 between 1996-2000 employment dropped, despite maintaining labour costs competitiveness. One of the explanations for this phenomenon might be the increase in labour productivity in Polish manufacturing industry. Further explanation is provided in this paper's analysis of the two sub-periods.

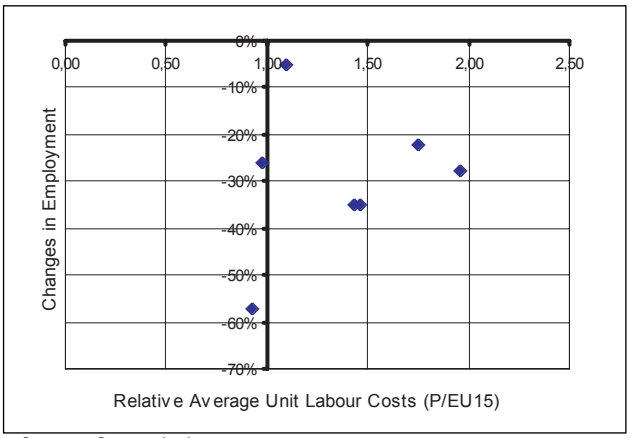
Analysing product groups in which companies improved their position both on domestic and EU15 markets, the relation between relative average unit labour costs and employment changes is quite clear (see figure 6). In almost 80% of these groups RAULC were lower than one and in more than 55% of the groups companies increased employment. This segment was characterised by lower

Figure 6. Relative average unit labour costs and employment changes in the best performing product groups, 1996-200



Source: Own calculations.

Figure 7. Relative average unit labour costs and employment changes in the worst performing product groups, 1996-2000



Source: Own calculations.

relative unit labour costs and high relative intensity of investment (RII – the ratio of total investment in all tangible goods during the reference period to sales).

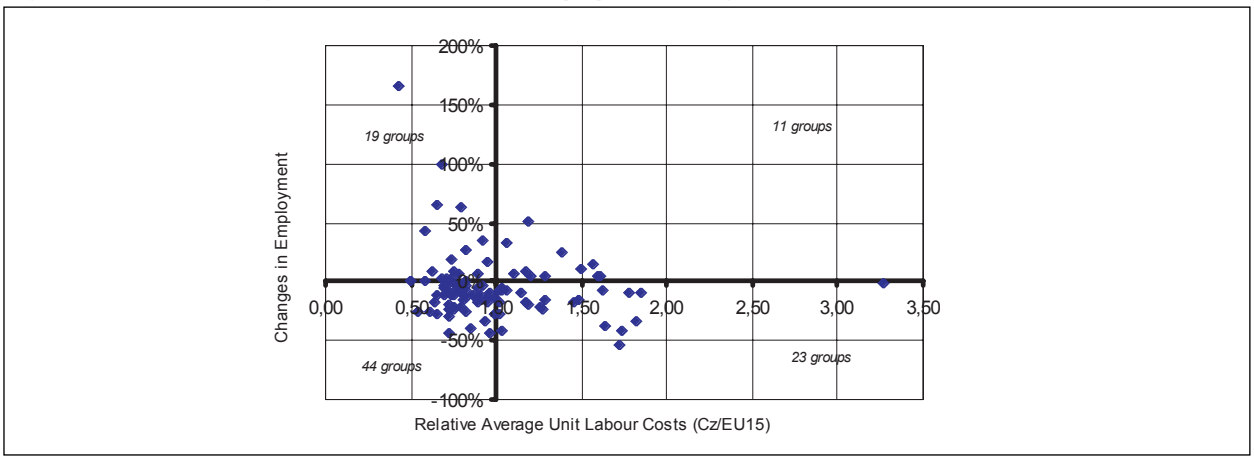
Considering product groups in which firms lost their share on both markets, we can see that most of them on average were characterised by a higher level of unit labour costs in comparison to the EU15. This was accompanied by significant employment decreases (see figure 7). In all products groups in which companies' position deteriorated on both markets employment in 2000 dropped in comparison to 1996.

Czech manufacturing

Lower unit labour costs in the Czech Republic in relation to the EU15 countries were observed in about 60% of all Czech product groups. This would seem to be favourable in terms of strengthening the country's competitive position and consequently to the creation of labour demand. However, in Czech manufacturing in 2000 in comparison to 1998 employment increased in only less than one third of the groups with relatively lower unit labour costs (RULC<1). Higher efficiency of use of labour in the Czech Republic in comparison to the EU15 was accompanied by a drop in employment in 45% of all Czech commodity groups. In 24% of all product groups Czech companies used the labour force less effectively than EU15 companies (RULC>1), which was associated with employment decreases. In 11% of all product groups entrepreneurs increased employment even though unit labour costs were higher than in the EU15 (see figure 8).

Observing competitive segment I (see figure 9) one sees that in 11 out of 17 product groups in

Figure 8. Relative average unit labour costs and employment changes, 1998-2000

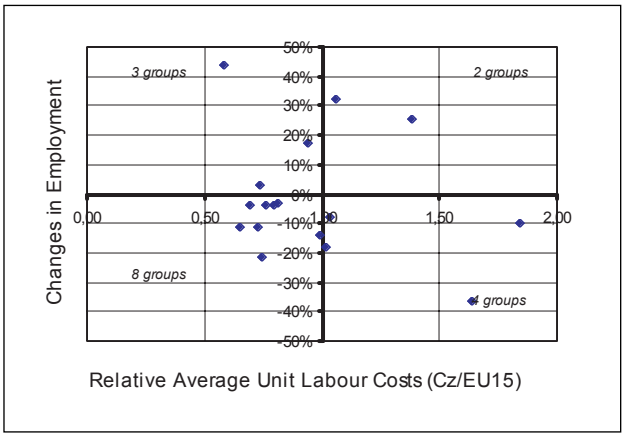


Source: Own calculations.

which companies improved their position both on the domestic and EU15 markets the efficiency of use of labour force in the Czech Republic was higher than in the EU (EU15). Even though in 8 groups with relatively higher efficiency of use of labour force there was a drop in employment.

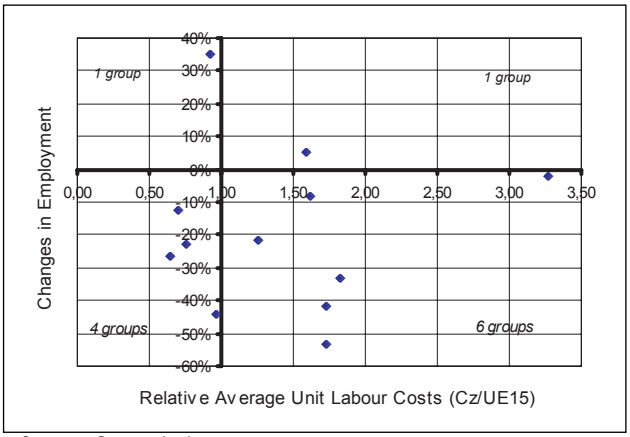
Considering commodity groups from segment IV (see figure 10) in which companies during 1998-2000 lost their position on the EU15 and domestic markets, we can see that in 10 out of 12 product groups there was a drop in employment. In half of all badly performing product groups the efficiency of use of labour was lower than in the EU15 and was accompanied with employment decreases.

Figure 9. Relative average unit labour costs and employment changes in the best performing product groups, 1998-2000



Source: Own calculations.

Figure 10. Relative average unit labour costs and employment changes in the worst performing product groups, 1998-2000



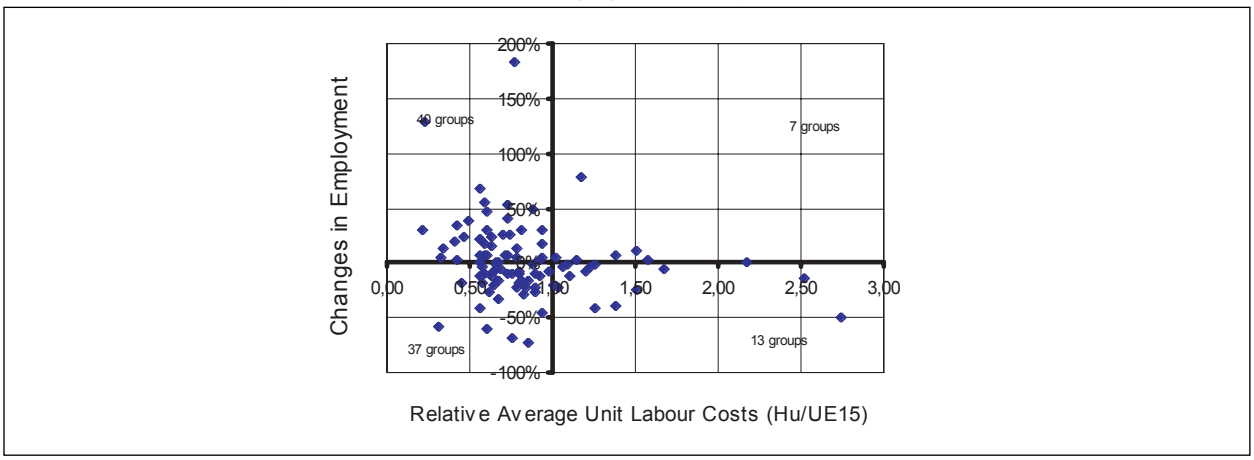
Source: Own calculations.

Hungarian manufacturing

Hungarian companies seem to have been in a better position in comparison to Polish and Czech firms in terms of both employment growth and the level of average relative unit labour costs. In almost 80% of all product groups in Hungary the efficiency of use of labour was higher than in the EU15 (RAULC<1). Between 1998-2000 employment increased in more than half (52%) of the groups with RAULC<1. Taking into account the general employment change for all commodity groups with RAULC<1, one sees that employment increased in absolute numbers by 16,169 persons. In 65% of all product groups with lower efficiency of use of labour in comparison to the EU15 employment decreased. However, there were 7 groups in which, despite high RAULC, employment increases took place. In the majority of them employment increased insignificantly. Only in textile weaving was there any substantial growth in employment (+78%), apart from a relatively lower efficiency in the use of the labour force.

Almost all successful product groups (90%) in which companies improved their position both on

Figure 11. Relative average unit labour costs and employment changes, 1998-2000

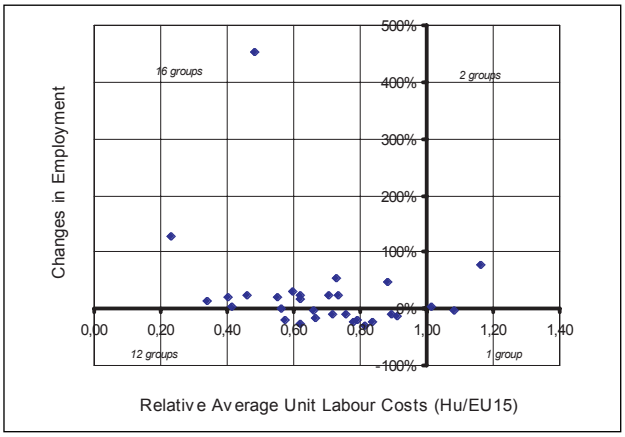


Source: Own calculations.

the domestic and EU15 markets were characterised by relatively low unit labour costs (RAULC<1) – see figure 11. Between 1998-2000 in 52% of all the best performing product groups in which the efficiency of use of labour was higher than in the EU15 countries employment increased. In

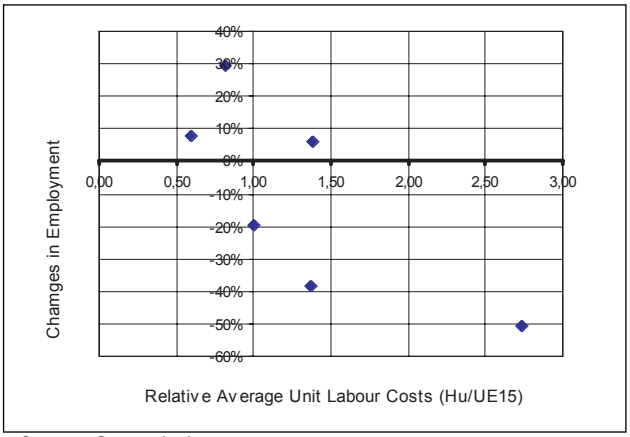
summarising all absolute employment changes for the commodity groups with RAULC<1, one sees that in general employment increased by 16,942 employees.

Figure 12. Relative average unit labour costs and employment changes in the best performing product group, 1998-2000



Source: Own calculations.

Figure 13. Relative average unit labour costs and employment changes in the worst performing product group, 1998-20



Source: Own calculations.

Among the worst performing product groups in Hungarian manufacturing industry were two groups that turned out to be competitive in terms of relative unit labour costs (figure 13). In these groups between 1998-2000 companies increased employment despite losing their shares of the domestic and EU markets. The highest employment increase was observed in enterprises manufacturing electronic valves and tubes and other electronic components. Sales revenues of this product group decreased between 1998-2000 but than increased significantly in 2001. Despite lower production in 2000, companies did not reduce employment.

Table 4. Manufacture of electronic valves and tubes and other electronic components

DL 321	Sales revenue	Wages and salaries	Social contribution	Employment	Total cost of employment	RULC
1998	744177.5	58640.1	24542.8	18946	90431.3	0.57
1999	1008545.1	76241.1	28564.7	23381	113442.8	0.59
2000	642083.9	90583.1	34153.0	24507	134424.0	1.29
2001	2384247.7	93790.9	38533.1	22807	158766.0	1.09
1998-2000	**-13.72%**	**54.47%**	**39,16%**	**29,35%**	**48,65%**	**0.81**
1998-2001	**220.39%**	**59.94%**	**57,00%**	**20,38%**	**75,57%**	**0.88**

Source: Own calculation.

To conclude, in Polish, Czech and Hungarian manufacturing industries the cost of labour constitutes an important measure of competitiveness. The influence of relative unit labour costs on employment developments is significant but requires further examination.

Lower unit labour costs in manufacturing in the analysed countries relative to the EU15 lead to competitive advantage over EU countries (EU15) and therefore have been favourable to increasing exports. Within the periods examined (1996-2000 for Poland and 1998-2000 for the Czech Republic and Hungary) in all three countries in more than 80% of all product groups companies increased their share of the EU market. However, significant export improvements were not always associated with reclaiming parts of the domestic market by domestic companies. In more than a half of product groups of each country companies lost their position on the domestic market, together with a strengthening of their position on the EU15 market. Commodity groups in which firms improved their position both on the domestic and EU15 market were characterised by the lowest relative unit

labour costs in Hungary and Poland. In the Czech Republic the lowest relative unit labour costs were observed in groups in which companies improved their position on the EU15 market and lost their share in the domestic market in 1998-2000.

In the majority of successful product groups in Hungary and Poland companies increased employment. However, there were groups in which employment dropped significantly although the efficiency of use of labour in these groups was higher than in EU15 countries. This situation was typical for the Czech Republic, where in the majority of the best performing groups in 2000 employment decreased in comparison with 1998, although relatively low unit labour costs were observed.

5.2. Relative unit labour costs changes and employment changes

Polish manufacturing

Since the relative average unit labour cost for years 1996-2000 is not a very exact measure it is advisable to divide this period into two sub-periods as well as examine relative unit labour cost changes in comparison to employment changes. We can broaden the analysis to the period 1996-2001, distinguishing two sub-periods (1996-1998 and 1998-2001)

In Polish manufacturing industry the employment level seems to have been on a declining trend from the beginning of the examined period (1996-2001). Having been not so substantial during the higher growth years (1996, 1997), employment shedding intensified during the economic slowdown (1998-2001). Between 1998-2001 in almost all sections of Polish manufacturing employment and unit labour costs decreased (see table 5).

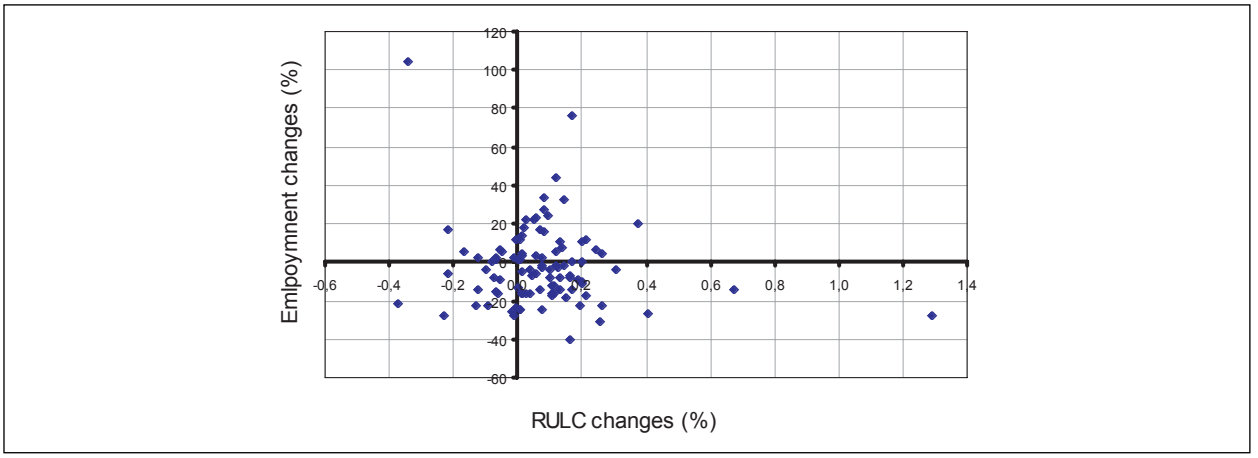
Table 5. Employment and unit labour costs changes (2-digit NACE), 1998-2001

NACE	Employment				Unit Labour Costs			
	1998	1999	2000	2001	1998	1999	2000	2001
DA*	100.0%	95.8%	88.4%	83.8%	100.0%	106.5%	98.4%	96.4%
DB	100.0%	87.4%	78.6%	69.4%	100.0%	98.4%	95.0%	93.1%
DC	100.0%	81.8%	72.7%	63.8%	100.0%	99.8%	87.2%	79.3%
DD	100.0%	97.2%	101.5%	90.8%	100.0%	92.1%	92.4%	97.1%
DE	100.0%	106.8%	100.1%	96.7%	100.0%	100.1%	102.6%	104.4%
DG**	100.0%	96.3%	87.6%	82.8%	100.0%	98.1%	93.8%	94.6%
DH	100.0%	107.1%	114.8%	103.1%	100.0%	100.1%	92.6%	93.0%
DI	100.0%	94.5%	92.9%	83.0%	100.0%	93.6%	90.3%	88.6%
DJ	100.0%	90.5%	83.5%	78.6%	100.0%	94.4%	90.1%	90.0%
DK	100.0%	90.5%	81.8%	73.7%	100.0%	101.1%	98.3%	94.0%
DL***	100.0%	97.4%	93.1%	89.6%	100.0%	94.8%	83.0%	86.4%
DM	100.0%	99.8%	89.4%	81.0%	100.0%	95.5%	84.8%	87.1%
DN****	100.0%	100.1%	97.7%	89.7%	100.0%	98.5%	90.6%	88.6%

* DA without manufacture of tobacco products
** DG without manufacture of man-made fibres
*** DL without manufacture of watches and clocks
**** DN without recycling
Source: Own calculations, F-01.

Widening the analysis to the 3-digit NACE level, in the first sub-period (1996-1998) employment dropped in 58 out of 99 commodity groups, while in the second sub-period (1998-2001) employment decreased in 84 product groups. Less intensive labour shedding was accompanied by favourable cyclical developments. When output slowed the serious unemployment problem was revealed again. In contrast, relative unit labour costs (RULC=ULC PL/ULC UE) increased between 1996 and 1998, indicating the deterioration in the efficiency of use of labour in Poland in comparison to the EU15 countries. During this period RULC rose in 70 product groups.

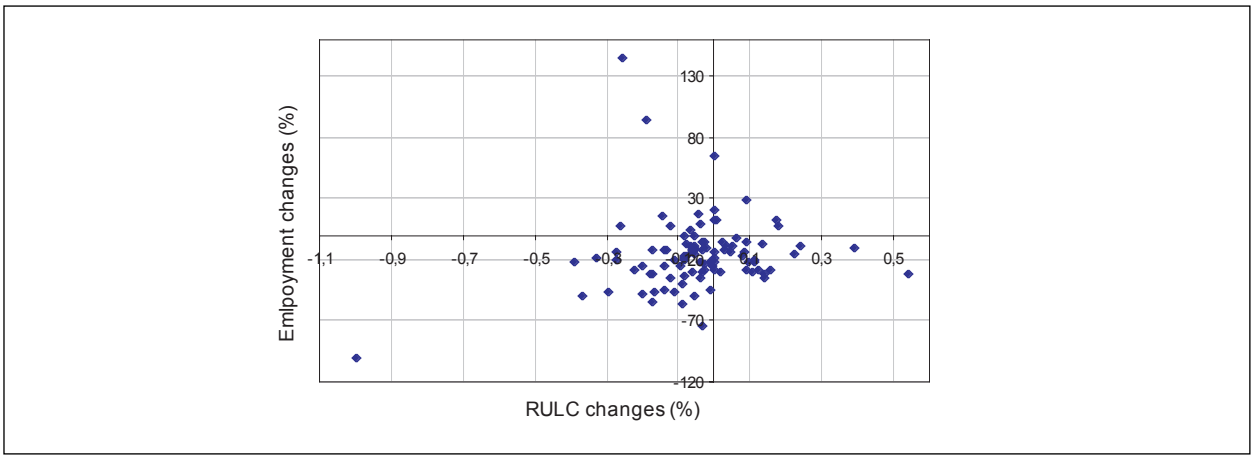
Figure 14. Changes in RULC versus employment changes, 1996-1998



Source: Own calculations.

Between 1998 and 2001 a decline in RULC in the majority of commodity groups (66) took place as a consequence of falls in unit labour costs. This was favourable to improving the situation of Polish companies both on the domestic and the EU15 markets (apart from slower GDP growth). However, alongside RULC (ULC) decreases there were strong falls in employment between 1998 and 2001. This intensive labour shedding contributed to large productivity improvements.

Figure15. Changes in RULC versus employment changes, 1998-2001



Source: Own calculations.

To sum up, lower unit labour costs in Polish manufacturing industry in relation to EU15 industries resulted in the competitive advantage of Polish manufacturers. As a consequence the situation of domestic companies improved, enhancing their ability to export more and/or reclaim parts of the domestic market. However, as a result of lower unit labour costs firms did not always hire more employees. Additional production capacity related to increasing shares in the EU and/or domestic market did not always lead to employment increases (between 1998-2001 employment dropped in 84 out of 99 product groups, while at the same time RULC decreased in 66 commodity groups). A reduction in unit labour costs was caused by productivity increases (not by a reduction in labour costs per employee).

On the other hand, the business cycle played an important role in determining the situation of companies in terms of their ability to employ more people. The period of slower growth (1998-2001) was characterised by deficient labour and product demand, while the years of better economic

activity (1996-1998), during which relative unit labour costs increased in the majority of commodity groups, was accompanied by less labour shedding.

6. The relationship between employment and labour costs per employee

The question that has been raised in this part of the paper is whether labour costs are a significant determinant of employment as far as Polish, Czech and Hungarian manufacturing industry go and in what way they affect employment. Furthermore, we seek to find out whether the labour cost-employment relationship differs strongly between these countries and between product groups within the manufacturing industries of each country.

6.1. Measurement of the labour cost-employment relationship

In order to examine the relationship between labour costs and employment many studies use the static micro-economic model of the optimising firm as the theoretical framework. Decisions related to employment are usually based on some cost-minimisation or profit-maximisation behaviour subject to a technological constraint, which is represented by some production function [2].

As far as manufacturing is concerned, there is usually the assumption of an equilibrium model, on which the industry's decision to produce output using factor inputs such as capital and labour is based. As a consequence, an appropriate function form for the production function is chosen [7].

The model in our analysis is based on the assumptions of profit-maximisation behaviour and technology described by a CES production function. We assume that the industry in aggregate maximises its profit Π, which is given by [1]:

$$\Pi = pY - wE - cK$$

subject to

$$Y = [\alpha K^{\frac{\sigma-1}{\sigma}} + \beta E^{\frac{\sigma-1}{\sigma}}]^{\frac{\upsilon\sigma}{\sigma-1}}$$

where *p* is the price at which the output *Y* is produced, *w* is real labour costs per one employee $(w = \frac{TotalLC/p}{E} = \frac{LC}{E})$, *E* is the flow of labour services (employment), *c* is the "user" cost of capital service, *K* is the flow of capital service (utilisation x capital stock) and α, β, σ and υ represent production function parameters such as capital efficiency, labour efficiency, the elasticity of substitution between factor services and returns to scale respectively [7].

This approach leads to a simple employment (labour demand) equation with a labour cost and a simple output effect. As was mentioned above, this is directly related to the familiar relationship between labour demand, real labour cost and output when the production function is CES [2]:

$$\log E = \alpha_0 + \alpha_1 \log Y - \alpha_2 \log\left(\frac{LC}{E}\right) + \alpha_3 t$$

where $\left(\frac{LC}{E}\right)$ stands for labour costs per one employee in real terms and *t* is time.

6.2. The data, models and methods used in estimations

The data used in the model are mostly available from Comext databases (for the Czech Republic and Hungary) and from the F-01 form for Poland for 4 years (1998-2001) for manufacturing industry at the 3-digit level (commodity groups). From this we have information on the number of employees, revenues from production (output) and labour costs (mainly wages plus social contributions) per employee for all commodity groups in Czech, Hungarian and Polish manufacturing between 1998-2001.

In our analysis we use panel data regression models. In the panel data presented in this paper the same cross-sectional unit (282 commodity groups, which stand for 94 commodity groups in the three analysed countries) is surveyed over time (four years – from 1998 to 2001). Having introduced such an approach to combining the data we take into account space as well as time dimensions. Panel data can enrich empirical analysis in ways that might not be obtainable using only cross-section or time series data [6]. Moreover, time series analysis alone is not of our interest as we have only 4-year observations for which it was possible to gather comparable data for the three countries.

Pooling all the 1,128 observations (282 commodity groups x four years) we can write the following labour demand equation:

$$\log E_{it} = \alpha_0 + \alpha_1 \log Y_{it} + \alpha_2 \log\left(\frac{LC}{E}\right)_{it} + \alpha_3 t + u_{it} \qquad (1)$$

where $i = 1,\ldots,282$ and $t = 1,\ldots,4$

Estimation of the model (1) will be carried out using the fixed effect approach. This estimation depends on the assumption we make about the intercept, the slope coefficients and the error term (u_{it}). First, we assume that slope coefficients are constant but the intercept varies over time. Thus, we introduce time dummies to account for the time effect. Model (2) represents the long-run approach:

$$\log E_{it} = \alpha_0 + \alpha_1 \log Y_{it} + \alpha_2 \log\left(\frac{LC}{E}\right)_{it} + \alpha_{31} Dum_{1999} + \alpha_{32} Dum_{2000} + \alpha_{33} Dum_{2001} + u_{it} \qquad (2)$$

In the next step we create the short-run model and we introduce the time lags:

$$\log E_{it} = \beta_0 + \beta_1 \log Y_{it} + \beta_2 \log\left(\frac{LC}{E}\right)_{it} + \beta_3 Dum_{2001} + \beta_4 \log E_{it-1} + \beta_5 \log E_{it-2} + u_{it} \qquad (3)$$

In this model we have to remember that the presence of time dummies depends on a significance of the time lags.

In order to check whether the differences between the three countries in terms of the labour costs-employment relationship are significant we introduce composite variables. We multiply each of the country dummies by each of the two variables (output and labour costs per one employee).

$$\log E_{it} = \alpha'_0 + \alpha'_1 \log Y_{it} + \alpha'_2 \log\left(\frac{LC}{E}\right)_{it} + \alpha'_5 Dum_{2001} + \alpha'_6 \left(Dum_{POL} \log Y_{it}\right) + \alpha'_7 \left(Dum_{HUN} \log Y_{it}\right) + \alpha'_8 \left(Dum_{POL} \log\left(\frac{LC}{E}\right)_{it}\right) + \alpha'_9 \left(Dum_{HUN} \log\left(\frac{LC}{E}\right)_{it}\right) + \beta'_1 \log E_{it-1} + \beta'_2 \log E_{it-2} + u_{it} \quad (4)$$

6.3. Results

Models (3) and (4) presented above have been estimated using the fixed effect estimation technique. The analysis has led to the following results:

Model (3):

$$\log \hat{E}_{it} = 1.941 + 0.574 \log Y_{it} - 0.680 \log\left(\frac{LC}{E}\right)_{it} - 0.024 Dum_{2000} + 0.115 \log E_{it-1}$$

t = (7.33) (29.82) (-17.45) (-2.91) (5.29)

$R^2 = 0.9308$

Model (4):

$$\log \hat{E}_{it} = 1.693 + 0.611 \log Y_{it} - 0.840 \log\left(\frac{LC}{E}\right)_{it} - 0.022 Dum_{2000} + 0.387 \left(Dum_{HUN} \log\left(\frac{LC}{E}\right)_{it}\right) + 0.091 \log E_{it-1}$$

t = (5.69) (16.35) (-8.81) (-2.65) (3.90) (4.23)

$R^2 = 0.8145$

Taking into account Model (3) we can see that only one time dummy turned out to be significant (Dum_{2000}), which may indicate e.g. a poor business cycle in 2000 (negative impact on employment). The model indicates that "year-old" employment influences current employment and this relationship is positive. This means that the employment level obtained one year earlier increases current employment. In the calculation $\log E_{it}$ was initially lagged for two periods, but $\log E_{it-2}$ turned out to be statistically insignificant and was thus not included. In the long run we can talk about a pretty fast adjustment (the estimated parameter (coefficient) $\hat{\beta}_1 = 0.115$ is small enough to confirm this statement).

Model (3) shows that output and labour costs are significant determinants of employment. The 10% rise in output will cause an employment increase of approximately 5.7% (other things being equal). The relationship between labour costs and employment turned out to be negative. This means that, other things being equal, a 10% increase in labour costs per employee will result in a 6.8% drop in employment (in the short run).

Being an extended version of model (3), model (4) introduces composite variables (*country x LC per employee* and *country x output*). Most of the differential coefficients turned out to be insignificant, apart from the one for Hungary. Here the negative relationship between labour costs and employment was weaker than in Poland and the Czech Republic. The estimation results of model (4),

as in case of (3), indicate a negative impact on employment observed in 2000 and show that the employment level obtained one year earlier increases current employment.

In model (4) the negative relationship between labour costs and employment was even stronger than in model (3). Other things being equal, a 10% rise in labour costs per employee will bring a 8.4% decrease in employment. According to the equation (4) the relationship between output and employment is strongly positive. A 10% increase in output is accompanied by a 6.1% increase in employment (other things being equal).

6.4. The differences between product groups in Polish, Czech and Hungarian manufacturing

As far as the labour-employment relationship is concerned it is advisable to enrich the country effect analysis with an examination of the differences between commodity groups (3-digit NACE). The approach we use is similar to the one presented above. Instead of a fixed effect procedure we introduce OLS regression analysis for a number of commodity groups for manufacturing industry of each of the three countries for the years 1998-2001. The aim is to check whether there are any significant differences between product groups in terms both of the labour cost-employment and output-employment relationship.

Differential coefficients for each commodity group for Czech, Polish and Hungarian manufacturing industry for years 1998-2001 are presented in the Appendix. The contents of the table 6 summarize the estimation results. The base-line models for manufacturing industry of each country are specified under the table.

Table 6. The differences between product groups in Polish, Czech and Hungarian manufacturing

NUMBER OF PRODUCT GROUPS							
labour cost-employment relationship				output-employment relationship			
country	**Poland**	**Czech Republic**	**Hungary**	country	**Poland**	**Czech Republic**	**Hungary**
more negative	4	12	32	more positive	42	28	9
less negative	43	45	0	less positive	5	15	54
equal	46	36	52	equal	47	51	31
positive	1	1	10	negative	0	0	0
TOTAL	94	94	94	TOTAL	94	94	94

than the BASE:

Czech manufacturing:

$$\log \hat{E}_{it} = 1.434 + 0.619 \log Y_{it} - 1.330 \log\left(\frac{LC}{E}\right)_{it} - 0.023 Dum_{2000} + 0.050 Dum_{2001} + 0.202 \log E_{it-1}$$

t = (8.80) (28.98) (-19.35) (-2.52) (4.01) (8.06)
$R^2 = 0.8145$

Polish manufacturing:

$$\log \hat{E}_{it} = -1.701 + 0.645 \log Y_{it} - 0.707 \log\left(\frac{LC}{E}\right)_{it} + 0.071 Dum_{1999} + 0.015 Dum_{2000} + 0.375 \log E_{it-1}$$

t = (-10.08) (33.92) (-20.67) (5.04) (1.72) (19.46)
$R^2 = 0.9994$

Hungarian manufacturing:

$$\log \hat{E}_{it} = 3.237 + 0.543 \log Y_{it} - 0.331 \log \left(\frac{LC}{E} \right)_{it}$$

t = (12.16) (25.53) (-5.42)

$R^2 = 0.9974$

In terms of the output-employment relationship the differences between commodity groups were not substantial – especially in Poland where the variation was the smallest. In the Czech Republic, apart from industries 174 (made-up of textile articles, except apparel), 285 (treatment and coating of metals; general mechanical engineering), 351 (building and repairing of ships and boats) and 364 (sports goods), where the impact of output on employment was much higher than the base, and industry 365 (games and toys), where responsiveness of labour demand to output was much lower than the base, the differences between product groups were not so significant. The most differences appeared in Hungary, where in 63 out of 94 commodity groups the relationship between output and employment was different than the base.

Taking into account the labour cost-employment relationship in Polish manufacturing industry the differences between product groups were not so substantial. In only four (175-other textiles, 192-luggage, handbags and saddler, 363-musical instruments, 364-sports goods) out of 94 commodity groups labour demand was more responsive to labour costs, whereas in the case of the rest the responsiveness was equal (46 product groups) or lower (43 product groups) than the base. There was one commodity group (223-reproduction of recorded media) where the labour cost-employment relationship turned out to be positive.

In Hungarian manufacturing the deviations from the base line model were much higher. In 32 out of 94 commodity groups the impact of labour cost on employment was more negative than the base. One could notice the highest elasticity with respect to the cost of labour in the following product groups: 296 (weapons and ammunition), 273 (other first processing of iron and steel and production of non-ECSC ferro-alloys), 334 (optical instruments. photographic equipment) and 343 (parts, accessories for motor vehicles). There were ten groups in which the labour cost-employment relationship was positive. In 52 product groups there were no deviations from the base line model.

The highest responsiveness of labour demand to labour costs was observed in Czech manufacturing. There were more deviations but the differences between commodity groups were not so substantial. In 12 out of 94 product groups labour demand was more responsive to labour costs in comparison to the base. The highest elasticity with respect to the cost of labour was observed in product groups such as: 174 (made-up textile articles, except apparel), 181 (leather clothes), 271 (basic iron and steel and of ferro-alloys), 297 (domestic appliances n.e.c.), 351 (building and repairing of ships and boats), 352 (railway, tramway locomotives, rolling stock) and 364 (sports goods). In 46 commodity groups the impact of labour costs on employment was less negative than the base. Significantly lower responsiveness to labour costs was observed in product groups: 152 (processing and preserving of fish and fish products). 182 (other wearing apparel and accessories). 205 (other products of wood; articles of cork. straw and plaiting), 267 (stone cutting, shaping and finishing), 268 (other non-metallic mineral products), 274 (basic precious and non-ferrous metals) and 314 (accumulators, primary cells and primary batteries). There was only one commodity group in which the labour cost-employment relationship turned out to be positive (365-games and toys).

7. Conclusion and policy implications

The fulfilment of Lisbon objectives is currently at risk in the EU, which stimulates activities aimed at improving the situation on labour markets. Among the issues raised within the framework of the common discussion on employment policy coordination within the EU, the question of labour costs has been emphasised. Labour cost analysis seems to be particularly relevant for manufacturing industry, which constitutes the export base for all the three examined countries.

According to research, unit labour costs are an important competitiveness determinant in Polish, Czech and Hungarian manufacturing industry. Lower relative unit labour costs were the key factor enhancing the competitive advantage of the three countries over the EU15 and stimulating exports. However, they were not always related to employment increases. In some commodity groups, together with lower RULC, labour shedding also contributed to productivity improvements. Moreover, the business cycle played an important role in enhancing or lowering the demand for labour.

In terms of absolute measures, the study has shown that labour costs per one employee and output are significant determinants of employment as far as Polish, Czech and Hungarian manufacturing industry are concerned. The cost of hiring labour, unlike output, has a strong negative impact on employment. Moreover, the analysis revealed that in 2000 in Polish, Czech and Hungarian manufacturing a negative impact on employment occurred, which might be confirmation of the pejorative impact of the business cycle on demand for labour. In terms of the relation between output and employment there were no substantial differences between countries, whereas in the case of the labour costs-employment relationship a less negative impact of labour costs on employment was observed in Hungary. This means that in Hungarian manufacturing labour demand was less responsive to labour costs than in the Czech Republic and Poland. Between 1998-2001 in Hungary there was strong wage growth related to administrative pay raises (minimum wage increases and large wage increases in the public sector), which may be some explanation of this differential in Hungarian manufacturing industry. Moreover, the differences between commodity groups in terms of the labour cost-employment relationship in Hungary were the most substantial in comparison to Poland and the Czech Republic.

The analysis revealed the following problems that should be tackled by policy makers:

1. **Productivity growth** is desirable in terms of competitiveness. It may lead to lowering labour-intensive production and may contribute to labour shedding in manufacturing. Thereby the need for enhancing **labour-intensive production** arises.
2. Between 1996-1998, alongside dynamic economic growth, employment decreased in the majority of product groups in Polish manufacturing. This fall was accompanied by an increase in relative unit labour costs. The high labour cost level in the economy might be a cause of **labour market rigidity,** which results in **jobless growth**. Hence, it is necessary to find measures to stimulate "pro-employment" economic growth and make the labour market more flexible. The higher the responsiveness of labour demand to labour costs (as was in case of the Czech Republic) the better the developments in employment.
3. Between 1998-2001 in Polish manufacturing the growth slowdown contributed to the significant rise in joblessness. Less intensive labour shedding between 1996-1998 was driven by favourable cyclical developments. When output slowed the unemployment problem intensified, which indicates the presence of **structural unemployment**.
4. Labour costs per one employee and output are significant determinants of employment. Thus, it is important for policy makers to control the labour cost level. As employment is positively

correlated to output, in order to improve labour market performance the return to stronger economy growth is very welcome. To enhance production, product demand should be stimulated and this cannot be done with a too low level of labour costs (wages) in manufacturing. Wages play a crucial role in improving real consumption and are important in terms of motivation and have a social function. Hence, instead of wage cuts it is advisable to reduce **non-wage labour costs** to encourage employers to increase their demand for labour.

Policy actions that can be undertaken with reference to the problems mentioned above require the involvement of different policy areas among which labour market policy plays a key role.

[1] In order to enhance labour-intensive production it is essential to intensify the development of small businesses, which create the majority of jobs. Business promotion activities ought to be introduced, such as e.g. business counselling and training. Subsidies for labour-intensive industries are desirable, especially these from EU structural funds.

[2] Stimulating labour-intensive production has a positive impact on lowering the threshold of jobless GDP growth. As well as this, it is advisable to focus on high-tech industries whose development may accelerate economic growth. In order to do so it is important to stimulate innovation and subsidise R&D activities. It is essential for Polish manufacturing to attract foreign investments in areas where, together with capital inflows, there will be an inflow of "know-how". It is important to create favourable conditions for investors such as subsidies, easy access to land, better infrastructure and others. This requires additional funds, which can be obtained thanks to EU transfers aimed at supporting regional development of the country.

[3] Labour costs play an important role in enhancing GDP growth. They may contribute to increasing the elasticity of employment in relation to economic growth. The low level of labour costs per employee in Poland in comparison to the EU15 countries implicates the possibility of its future growth. That is why it is important for policy makers to emphasise such an increase in labour costs, which does not exceed the increase in productivity of work in order to maintain a country's competitive advantage.

[4] Moreover, there should be a change in the labour cost structure. Employers ought to emphasise those elements of labour costs that constitute expenditures related to improving qualifications or vocational reorientation to improve competitiveness of employees and the whole company. It is also important to develop those labour compensation elements that are directly related to work outcomes so as to enhance productivity.

[5] It is advisable for the state to reduce external costs (obligatory labour cost contributions) by reducing income tax and incorporate tax and/or by reducing some social contributions.

[6] Macroeconomic policy should facilitate all activities which support economic growth, such as restructuring, the reduction of public expenditure and export promotion.

[7] In order to combat structural unemployment it is important to adjust the qualifications of the labour force to current and future market requirements. This can be achieved by active labour market policy instruments focused on the supply side, such as: vocational training for the unemployed, job counselling, employment agencies and others. It is also advisable to subsidise employment in the cases of the most vulnerable groups in order to enhance labour demand in the most difficult areas.

[8] The reduction in non-wage labour costs can be obtained, among other means, by lowering social contributions for low-paid workers. The highest unemployment rate is characteristic for a low-skilled labour force, thus a reduction in non-wage labour costs in the case of this group may contribute to enhancing labour demand and lowering costs related to unemployment benefits and welfare.

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Appendix

Table A. Differential coefficients for commodity groups for Czech, Polish and Hungarian manufacturing industry, 1998-2001

	Czech Republic		Poland		Hungary	
Industry	$\log\left(\frac{LC}{E}\right)_{it}$	$\log Y_{it}$	$\log\left(\frac{LC}{E}\right)_{it}$	$\log Y_{it}$	$\log\left(\frac{LC}{E}\right)_{it}$	$\log Y_{it}$
151	-1.3302	0.6194	-0.7075	0.6453	-0.3307	0.5433
152	-0.5666	0.4508	-0.7075	0.6453	-0.3307	0.2854
153	-1.3302	0.6076	-0.5744	0.6453	-0.3307	0.5056
154	-1.3302	0.6107	-0.7075	0.6453	-0.3307	0.3560
155	-1.3302	0.6050	-0.6553	0.6453	-0.8091	0.5433
156	-1.4321	0.6194	-0.7075	0.6453	-0.3307	0.4794
157	-1.3302	0.6194	-0.7075	0.6321	-0.3307	0.4583
158	-1.0234	0.6194	-0.5465	0.6453	-0.3307	0.5522
159	-1.1446	0.6194	-0.7075	0.6453	-0.5212	0.5433
171	-1.3302	0.6376	-0.7075	0.6923	-0.6641	0.5433
172	-1.0702	0.6194	-0.7075	0.6943	-0.3307	0.5045
173	-1.2383	0.6194	-0.7075	0.6960	-0.3307	0.4088
174	-4.2871*	1.0239*	-0.2907	0.6453	-0.3307	0.5714
175	-1.1746	0.6194	-1.3690	0.7660	-0.6590	0.5433
176	-1.5579	0.6194	-0.4733	0.6453	-1.1276	0.5433
177	-1.0100	0.6194	-0.7075	0.7115	-0.3307	0.5069
181	-2.4549*	0.8054*	-0.0972	0.6453	-0.5551	0.5433
182	-0.7936	0.6194	-0.3984*	0.6719*	-0.3307	0.6122
183	-1.3302	0.6100*	-0.1727	0.6453	-0.3307	0.2339
191	-1.3302	0.5974	-0.7075	0.6823	-1.0758	0.5433
192	-1.1229	0.6194	-1.1831	0.7931	-0.3307	0.5112
193	-0.9935	0.6194	-0.2899	0.6453	-0.3307	0.5747
201	-1.3302	0.6194	-0.7075	0.6836	-0.6729	0.5433
202	-1.3302	0.6194	-0.6627	0.6453	-0.3307	0.4355
203	-1.1745	0.6194	-0.4445	0.6453	-0.3307	0.5105
204	-1.3302	0.6194	-0.1358	0.6094*	-0.3307	0.5121
205	-0.3730*	0.5155*	-0.3162	0.6453	-0.3307	0.4917
211	-1.3302	0.6128	-0.7075	0.6453	-0.8960	0.5433
212	-1.2291	0.6194	-0.5576	0.6453	-0.3307	0.4942
221	-1.3302	0.6734	-0.4262	0.6453	-0.6480	0.5433
222	-1.0622	0.6194	-0.7075	0.6824	-0.3307	0.5295
223	-1.3302	0.6194	0.0200	0.5425	0.7210	0.1617
241	-1.3302	0.6395	-0.6079	0.6453	-0.3307	0.4996
242	-1.3302	0.6194	-0.6048	0.6453	-1.0217	0.5433
243	-1.3302	0.6194	-0.5692	0.6453	-1.0112	0.5433
244	-1.1015	0.6194	-0.7075	0.6906	-0.3307	0.5238
245	-1.3302	0.6041	-0.6524	0.6453	-0.3307	0.4377
246	-1.1408	0.6194	-0.7075	0.6839	-0.3307	0.4372
251	-1.3302	0.6522	-0.7075	0.6843	-0.3307	0.4999
252	-1.0487	0.6194	-0.7075	0.6641	-0.3307	0.5433
261	-0.9683	0.6194	-0.7075	0.6897	-0.3307	0.5100
262	-1.3302	0.6693	-0.7075	0.6987	-0.3307	0.5181
263	-1.3302	0.6395	-0.4142	0.6453	-0.3307	0.4462
264	-1.2046	0.6194	-0.4121	0.6453	-0.8636	0.5433
265	-1.2167	0.6194	-0.7075	0.6749	-0.9462	0.5433
266	-1.1149	0.6194	-0.5240	0.6453	-0.7581	0.5433
267	-0.7167	0.5379	-0.7075	0.7023	3.0209	-0.0707
268	-0.5888*	0.5164*	-0.5499	0.6453	0.6177	0.2273
271	-1.9980*	0.7537	-0.7075	0.6599	-0.7100	0.5433
272	-1.1958	0.6194	-0.4518	0.6453	-1.3634	0.5433
273	-1.2080	0.6194	-0.5934	0.6453	-2.3481	0.7522
274	-0.6903	0.5188	-0.5809	0.6453	-0.3307	0.4678
275	-0.9482	0.6194	-0.7075	0.7034	-0.3307	0.4990
281	-1.0139	0.6194	-0.4131	0.6453	-0.3307	0.5647
282	-1.0931	0.6194	-0.4190	0.6453	-0.3307	0.4856
283	-1.3302	0.6574	-0.7075	0.7123	0.0783*	0.3741
284	-1.0752	0.6194	-0.7075	0.7080	-0.3307	0.4499
285	-1.3302	4.6749	-0.2790	0.6453	1.4195	0.2964

Table A. Differential coefficients for commodity groups for Czech, Polish and Hungarian manufacturing industry, 1998-2001

	Czech Republic		Poland		Hungary	
Industry	$\log\left(\frac{LC}{E}\right)_{it}$	$\log Y_{it}$	$\log\left(\frac{LC}{E}\right)_{it}$	$\log Y_{it}$	$\log\left(\frac{LC}{E}\right)_{it}$	$\log Y_{it}$
286	-1.3302	0.6685	-0.7075	0.6977	-0.5958	0.5433
287	-1.0831	0.6194	-0.4821	0.6453	-0.3307	0.5363*
291	-1.3302	0.6846	-0.4143	0.6453	-0.4499	0.5433
292	-1.3302	0.6735	-0.3475	0.6453	-0.3307	0.5433
293	-1.3302	0.6730	-0.7075	0.6872	-0.5264	0.5433
294	-0.9152	0.6194	-0.7075	0.7210	-0.9035	0.5857
295	-0.8222	0.6194	-0.7075	0.7006	-0.4158	0.5433
296	-1.3302	0.6734	-0.7075	0.7564	-6.6042	1.5616
297	-2.4476*	0.8051	-0.7075	0.6746	-0.3307	0.5007
311	-1.3302	0.6605	-0.3839	0.6453	-0.3307	0.5136
312	-0.9833	0.6194	-0.7075	0.6953	-0.3307	0.4912
313	-1.2243	0.6194	-0.6133	0.6453	-0.3307	0.4787
314	-0.3739	0.4894	-0.5319	0.6453	-1.3224	0.5433
315	-1.3302	0.6467	-0.5092	0.6453	-0.3748*	0.5433
316	-0.9638	0.6194	-0.7075	0.6873	-0.5403	0.5433
321	-1.3302	0.6624	-0.2686	0.6453	0.2892*	0.4673*
322	-1.1956	0.6194	-0.5652	0.6453	-0.3307	0.4654
323	-1.5738	0.6194	-0.7075	0.6453	2.1088	0.1535
331	-1.0560	0.6194	-0.7075	0.7085	-0.3307	0.5067
332	-1.3302	0.6430	-0.1651	0.6033*	-0.6149	0.5433
333	-1.0947	0.6194	-0.3397	0.6453	-0.3307	0.4306
334	-1.0000	0.6194	-0.7075	0.7433	-2.3290	0.7684
341	-1.3302	0.6350	-0.7075	0.6238	-0.3307	0.4439
342	-1.3615*	0.6194	-0.4321	0.6453	-0.3307	0.3922
343	-1.0626	0.6194	-0.7075	0.6735	-2.1376	0.7497
351	-4.2596*	1.2096*	-0.7075	0.6915	-0.3307	0.3307
352	-3.1190	0.9380	-0.7075	0.6969	1.2681*	0.2423*
353	-1.3302	0.6790	-0.2255	0.6453	-0.3307	0.4404
354	-1.3302	0.6336	-0.5131	0.6453	-1.6824	0.5433
355	-1.4688	0.6194	-0.7075	0.7353	1.3124*	0.0762
361	-1.0767	0.6194	-0.7075	0.6751	-0.3307	0.5433
362	-0.1215	0.4484	-0.7075	0.6854	-1.2501	0.5433
363	-1.0844	0.6194	-0.8584	0.7675	-0.3307	0.3062
364	-6.9456	1.4888	-1.3934*	0.8615	1.6913*	0.1293
365	1.0405	0.2920	-0.7075	0.7168	-0.3307	0.4611
366	-1.3302	0.6574	-0.7075	0.6933	-0.3307	0.5014
All significant at 5% level or better except these marked with *						