

## **Tax and Labor Cost Competition in Central Europe in European Union Pre –Accession Period**

### Authors:

Przemyslaw Kulawczuk, Ph.D., Institute for Private Enterprise and Democracy, Warsaw, Poland and the University of Gdansk, Chair of Macroeconomics, Gdansk, Poland  
Mieczysław Bąk, Ph.D., Institute for Private Enterprise and Democracy, Warsaw, Poland  
Anna Szcześniak, ME, Institute for Private Enterprise and Democracy, Warsaw, Poland

Przemyslaw Kulawczuk, Ph.D., Institute for Private Enterprise and Democracy,  
Address:

Morska 27/4 Str. 81-323 Gdynia, Poland

[pkl@post.pl](mailto:pkl@post.pl), phone 48 58 661 92 52, mobile 48 501 299 781

This research was supported by a grant from CERGE-EI Foundation under a program of the Global Development Network. Additional funds for grantees in the Balcan countries have been provided by the Austrian Government through WIIW, Vienna. All opinions expressed are those of authors and have not been endorsed by CERGE-EI, WIIW, or the GDN. The authors thank Professor Petr Zemcik, CERGE-EI Prague, Czech Republic for his methodological advice in conducting the research. This does not change the fact that the only responsibilities of the research results are those of authors.

## Abstract

The article deals with tax and labor cost competitiveness of four Central Europe countries from the investor's point of view. The paper contains a proposition of a synthetic index which shows financial benefits for the investor from moving manufacturing from one of the 14 European Union countries to Central Europe in the pre - accession period (1998-2004). The proposition assumes that financial benefits from moving production come from differences in labor hourly rates and from the share of labor in the product in capital origin country. They also depend on the corporate income tax rates of the capital location country and capital origin country. Under accepted assumptions the most important mechanism for yielding financial benefits for investors is built of labor cost competitiveness factors: the share of labor in created gross added value and differences in hourly labor costs. Opposite to common thinking, corporate tax rates differences between countries alone are not critically important in creating benefits from moving manufacturing from one country to another. The sensitivity analysis reveals that corporate tax rate of investment destination country is much more important for investors than tax rate in investment origin country. This reduces tax policy alternatives for countries with high labor costs in Europe.

Key words: tax competition, manufacturing delocalization, Central Europe

## Introduction

The issue of tax competition in Europe became a matter of critical political importance shortly after joining the European Union by ten new members on May 1<sup>st</sup>, 2004. Politicians from some European countries, especially from France and Germany raised a problem of unfair tax policies which influence on the delocalization of manufacturing from those countries to Central Europe. Therefore it is worth measuring whether differences in tax rates really constitute a problem and what is the role of labor cost competitiveness in the process of creation benefits for moving production from one country to another. It is also important to asses what are real policy alternatives for different categories of EU members with respect for tax and labor costs levels.

The presented paper consists of eight sections. The first section presents up to date results of FDI competitiveness research of the Central Europe countries. The second section describes the changes in statutory CIT rates in Central Europe Countries and in EU member countries which took place in pre - accession period. The third section analyzes if cost of capital and depreciation rules significantly inflow on the FDI competitiveness of different countries. In section four the concept of labor cost and tax competitiveness is discussed. The fifth section describes the model used for estimation of competitiveness indices values. Section sixth contains measurements of competitiveness indices on basis of Eurostat data. The seventh section analyzes the sensitivity of the index to contributing factors. The conclusions from the research are included in the eighth section.

The following symbols are used in the paper:

CIT – Corporate Income Tax

FDI – Foreign Direct Investment

GVA – Gross Value Added

TA<sub>FDI</sub> - Tax and Labor Cost Advantage from FDI

TAI<sub>FDI</sub> - Index of Tax and Labor Cost Advantage form FDI as a result of moving one euro manufacturing gross value added

TSR<sub>i</sub> = Tax Statutory Rate in *i* country, where *i* = 1, 2

EATR – Effective Average Tax Rate

EP<sub>1</sub> = Existing Profit Rate per gross value unit in the 1<sup>st</sup> country

EP<sub>2</sub> = New Profit Rate per gross value added (final sales) unit in the 2<sup>nd</sup> country

MT – Gross Value Added created in Manufacturing

MR – Retained Manufacturing Gross Value Added

MM – Moved Manufacturing Gross Value Added

PPAT - Previous Profit After Tax (Old location)

NPAT – New Profit After Tax (New location)

P – Profit

TC – Total costs

TC<sub>MM</sub> – total costs of moved manufacturing gross value added

TC<sub>MR</sub> – total costs of retained manufacturing gross value added

a – share of labor in manufacturing gross value added

b – relative cost difference in hourly labor costs between two countries

## 1. Tax competitiveness in Central Europe before accession to the EU

The tax competitiveness in Central Europe can be discussed either as the issue strictly connected with foreign direct investment or as a general competitiveness for any investor to realize an investment regardless of the origin of the capital. The first approach will strongly accept the fact that authorities may create favorable conditions for foreign investors – better than for domestic ones. The second approach declines better treatment for foreign capital and provides equal treatment for domestic and foreign investors due to the fundamental competition rules accepted by the European Union<sup>1</sup>. The first approach of tax competition was reflected mostly to the period before 2000, when preferential treatment for foreign investors was provided by Poland, Hungary, Slovakia and Czech Republic.

The problem of tax competition in Central Europe and the impact of this competition under preferential treatment system was discussed broadly by Milan Sedmihradsky and Stanislav Klazar (Semihradsky and Klazar 2001). The authors came to the conclusion that “The introduction of tax incentives in Poland has probably caused stagnation of inflow of FDI to Hungary. Later on again the introduction of investment incentives in the Czech Republic decreased flow of foreign investments into Hungary but not to Poland. It verifies conclusions on the theory of the tax competition, that such kind of intergovernmental competition is effective especially in case of symmetric countries. In case of asymmetry in the size of the country the larger country has a competitive advantage of large market and tax factors play a minor role”.<sup>2</sup> The observations of Sedmihradsky and Klazar (2001) were the first ones on the impact of the tax competition in the region on FDI in particular countries.

However the situation discussed no more exists. As the result of accession to the European Union, the four countries had to resign from preferential treatment of FDI and replace them by investment grants understood as a subsidy to the capital investment realized by the investor. These subsidies should be available regardless of the investor’s country of origin. From the theoretical point of view this created a new situation in which preferential rates and incentives had diminishing significance, while general corporate taxation rules gained the importance. In practice large multinational companies started to announce competitions for investment packages provided by Central Europe governments with special stress placed on the size of the investment subsidy.

Despite the fact that in the moment of accession all preferential treatments for new investors were strictly forbidden, some preferences were still available for old investors and in fact new investors managed to achieve significant state aid<sup>3</sup>. The issue how to trade investment subsidies is however not the topic of this paper, despite the fact that for some large investors the size of the state aid had a critical importance. This paper is aimed at presenting how changes in the tax and labor environment in the pre-accession period could change the attractiveness of particular Central Europe countries for foreign investment, regardless of the traded investment subsidies.

---

<sup>1</sup> It reflects mostly to the rules of the state aid to enterprises which must be followed by member states. See Article 87 of the Treaty Establishing the European Community, “Official Journal of the European Community” 325 of 24 December 2002

<sup>2</sup> As above p. 7.

<sup>3</sup> In Slovakia significant investment subsidies were received by car manufacturers like VW and Hundai, in Czech Republic by Toyota, Peugeot, and Citroen, in Poland by GM, FIAT and VW.

## 2. Changes in statutory CIT rates in Central Europe Countries and in EU member countries

Below, in the table 1. changes of statutory, nominal rates of Corporate Income Tax (CIT) in four Central European Countries and in 15 “old” EU members, are presented. The period of 90-ties and 2000+ is a period of reducing statutory rates in the most of countries of the world. However the pace of this reduction was diversified in the different countries.

**Table 1. Corporate Income Tax Top Statutory Rates in %**

Country	Year and CIT statutory rates in %							
	1997	1998	1999	2000	2001	2002	2003	2004
Poland	38	36	34	30	28	28	27	19
Hungary	19,6	19,6	19,6	19,6	19,6	19,6	19,6	17,7
Czech Rep.	39	35	35	31	31	31	31	28
Slovakia	40	40	40	29	29	25	25	19
Germany	56,7	56	51,6	51,6	38,3	38,3	39,6	38,3
Netherlands	35	35	35	35	35	35	35	35
France	36,7	41,7	40	36,7	36,4	35,4	35,4	35,4
Sweden	28	28	28	28	28	28	28	28
Austria	34	34	34	34	34	34	34	34
Belgium	40,2	40,2	40,2	40,2	40,2	40,2	34	34
Denmark	34	34	32	32	30	30	30	30
Greece	40	40	40	40	37,5	35	35	35
Ireland	36	32	28	24	20	16	12,5	12,5
Italy	53,2	41,3	41,3	41,3	40,3	40,3	38,3	37,3
Luxembourg	39,3	37,5	37,5	37,5	37,5	30,4	30,4	30,4
Portugal	39,6	37,4	37,4	35,2	35,2	33	33	27,5
Finland	28	28	28	29	29	29	29	29
Spain	35	35	35	35	35	35	35	35
United Kingdom	31	31	30	30	30	30	30	30

Source: (*Structures of the Taxation...*, 2004, p. 116)

The data on CIT statutory rates in the beginning of the analyzed period 1997-2004 show that only Hungary, Sweden and Finland had rates under 30%. Hungary offered a CIT rate of 19,6% significantly lower than the rest of the countries. In 1996 Poland implemented a plan of gradual reductions of CIT rates (2% yearly) aiming at 30% rate in 2000. The plan was prolonged and in 2004 the final CIT was 19%. Changes in Poland and significant shift from rates around 30% into around 20% were caused mostly by the example of Slovakia, who in 2004 decided to implement unified CIT, PIT and VAT rate at the level of 19%. After moves of Slovakia and Poland also Hungary decided to reduce its rate from 19,6% to 17,7%. Czech Republic maintained much more conservative approach and reduced rates from 39% in 1997 to 28% in 2004.

As reflects from EU study, the average decrease in top CIT rates in 15 “old” EU members amounted to 6,6 percentage points and in new 10 members it amounted to 9,1 percentage

points in the period 1995-2004. However the arithmetic starting point for “15” was 38% while for the 10 new members only 30,6% (*Structures of the Taxation...*, 2004, p. 116). Typical representative for “15” was Germany. In Germany the starting point for CIT reductions was significantly higher and despite significant positive changes still the rates in 2004 were 38,3%. In four analyzed countries: Sweden, Austria, France and the Netherlands rates remained unchanged or changed insignificantly. Summing up: differences between countries with higher income per capita and new four Central European EU members remained significant and even increased. In 4 central European countries in 1997 the statutory rates were 34,15% on the average while the average for EU 15 was 37,78%. In 2004 the respective value for 4 CE was 20,93% and 31,43% for the EU 15. The difference in CIT statutory rates increased from 3,63 to 10,5 percentage points. Differences in CIT statutory rates increased what created a challenging situation in the area of tax competition for FDI in Central Europe in 2004.

### 3. Differences between statutory rates and estimated EATR rates

In the classic tax literature there is an important approach to measuring the effective CIT rates from the scope of individual investor. This approach takes into account the diversified depreciation rules in the different countries and diversified methods of investment financing (Bond S., Chennels L., 2000). The full methodology of this approach is described in the paper of Devereux and Griffith (1998): *The taxation of discrete investment choices*. In the paper, construction of two fundamental measures are described: Effective Average Tax Rate – EATR and Effective Marginal Tax Rate EMTR. Especially important is EATR, with regard that it accounts the average rate from the investors point of view (including type of investment financing and depreciation rules)<sup>4</sup>. To show how EATR differ from CIT statutory rates, estimations of Bond and Chennels are presented in Table 2.

**Table 2. Differences in Statutory CIT rates and CIT EATR in 1999**

Tax rates	USA	Japan	Germany	France	Denmark	Netherlands
Typical tax rate paid	39,3	40,9	51,6/42,8	40,0	32,0	35,0
(.) Sequence	(4)	(2)	(1)	(3)	(6)	(5)
Domestic effective average tax rate-buildings	35,2	35,5	38,6	33,5	26,9	29,6
(.) Sequence	(3)	(2)	(1)	(4)	(6)	(5)
Domestic effective average tax rate-plant and machinery	29,6	32,9	31,9	29,4	24,3	26,9
(.) Sequence	(3)	(2)	(1)	(4)	(6)	(5)

Source: Bond S. Chennels L. (2000)

The data estimated by Bond and Chennels allows for observation that the tax base can significantly influence on the final tax rate for the investor. Under some assumptions the final rate can be decreased even by 9,7% in comparison to CIT statutory rate. It is mostly due to the narrower tax base which excludes from the tax base significant allowances just in the first years of the exploitation of the asset. Therefore the economic depreciation is slower than tax depreciation and the tax cost for the investor can be reduced. However, generally speaking EATR only slightly changes the sequence of countries. In the list of 6, only two countries changed its position: USA and France, however difference in their statutory rates was below 1%. If we take into consideration USA, additional CIT taxes imposed by the particular states, ranging from 0 to 6%, the actual US statutory rate is higher than French one and the sequence

<sup>4</sup> Important role in the both constructions is played by factors of assumed inflation, interest and profit rate.

in Statutory rates is copied by EATRs. It means that EATR can show the impact of the tax base definitions on tax rates but in none situation this definitions changed the sequence of countries in comparison to statutory rates. Therefore statutory rates have similar value in determining the sequence of countries.

It can also be expected that with time the role of tax base differences will be significantly lower than now with regard for the fact that all countries are accepting international standards of accounting and surprisingly some international companies are not ready to use high depreciation rates, especially when they are not yielding profits. One can also remember that the higher depreciation of assets the lower profit rate and it can significantly influence on the company value when it goes public. Besides, within the EU the cost of capital will be much more similar after full monetary integration. There is also a concept of creating so called European Single Tax Base for company taxation, strongly supported by Germany and France. However, it may take years when the aim of Single European Tax Base would be achieved<sup>5</sup>. Without doubt EATR and EMTR measures can better present differentiation of tax costs of investments but they do not significantly change the order set up by statutory rates sequence listings. The most important problem with EATR and EMTR is that they are not broadly used and their definitions is not commonly known outside scientific community. Also estimations of rates for particular countries are very rare; sometimes they should reflect complexity of depreciation rules in particular countries.<sup>6</sup>

These reasons allow for ignoring the importance of depreciation and cost of capital when we accept the simplicity of capital flows within the European Union and the tendency of equalization of capital costs. Besides, it can be accepted that multinational company can select financial sources for capital in the cheapest place while depreciation rules problem can be easily solved by transfer prices. In the presented model it is assumed that the consumption of fixed capital in relation to created gross value added is constant in the similar factories using the same technologies but located in two different countries.

#### 4. Tax and labor cost competitiveness

International business location decisions very often take into consideration differences in CIT rates, transfer rules, and general taxation. However international business has to work out much more complex picture to decide whether to choose this or that country for business location<sup>7</sup>. Besides CIT taxation, one of the most critical factors deciding on the FDI profitability, is labor consumption and labor costs. The factor of labor is often taken into account when moving of manufacturing is considered. Some economists maintain that modern manufacturing factories does not require too high level of labor costs in proportion to total costs. It may happen that when moving a factory from high level labor costs country to low labor level costs country – the share of labor in total costs decreases. However this decrease is a result of moving the production to the cheaper country. In all estimations the

---

<sup>5</sup> Approaching the European Single Tax Base could be done through application of European Referential Tax Base, which could serve as the reference point for businesses in Europe for comparisons of tax bases in company taxation among countries.

<sup>6</sup> For. E.g. Poland at least two sets of EATRs should be estimated: one for areas with high unemployment which enjoy preferential depreciation treatment and the second for the rest of the country.

<sup>7</sup> There is a long literature on industry location choices.

starting point of the analysis should be the level of labor costs in the capital exporting country, the final level of labor costs is only the result of the employing the local cheaper labor force and to a very slight extent the differences in labor productivity. In the developed countries, the level of labor costs in the product (gross value added) can reach 60-70%. When total labor effort is transferred abroad to markets which provide 4-5 times lower costs, and total sales are done at the same prices and on the same markets – budgetary benefits from such an operation could be significant.

The total labor cost, including social security contributions and personal taxes is a critical factor for assessing the competitive advantage of moving manufacturing from one country to another. All labor costs have a significant impact on labor competitiveness. Therefore the total competitiveness of moving production from one country to the another could be considered as a sum of: tax competitiveness and broadly understood labor cost competitiveness. These two groups of factors have critical impact on the efficiency of FDI.

In the present literature of industry multi-country competitiveness a method invented by M. Bruno in 1963, called Domestic Resource Cost (DRC) (M. Bruno 1963, p. 16-33) is very often utilized to compare competitiveness of industries from different countries. DRC counts the economic resource costs of production based on "social prices", i.e. prices of goods that reflect the true economic value ignoring price distortions from taxes, subsidies, price controls, import tariffs, or other government policies. We do not consider using the DRC method to compare competitiveness in attracting FDI between two countries for one main reason. The application of DRC method is based on the valuation of domestic resources used in the domestic (traditional) way.

The concept of so called Net Social Profitability (R. Pearson, 1973), which can be expressed by the output value minus all resource costs incurred by producing the output plus the externalities is also very academic. It does not present data in the form easy understandable for investors. Different researches on international industry competitiveness and its impact on FDI take into account the differences in labor productivity and in general in productivity between local and foreign industry.

The approach presented in the herewith paper is different. When FDI comes, e.g. in the form of greenfield investment, it copies technology patterns and the structure of costs of the mother company. Definitely it copies physical labor productivity with regard for the application of similar technologies. It is not the competitiveness of domestic resources used in the domestic way but the competitiveness of domestic resources used in the capital origin country way.

Critical role in the proposition is played by a structure of costs copied by the new company. What is the copied structure of costs? It may be understood as the structure in which old labor (social) cost ratios correspond with sums of new labor (social) costs and benefits (savings) on new costs in new location.

$$c_1 = c_2 + b_{c2}$$

where:  $c_1$  - labor cost ratio in gross added value in capital supplier country,  $(c_2 + b_{c2})$  – is a sum of new labor cost ratio in FDI location country  $c_2$  and  $b_{c2}$  is a benefit (savings) ratio on applying the resources at lower labor costs. The proposed concept of copying the cost structure of old location by a new one is presented in table 3.



**Table 3****Copying cost structure of old location in FDI destination country – the proposed concept**

Costs or profits	Values of costs (profits) per unit of gross value added created	
	Capital origin country 1	FDI location country 2
A- capital	A	A
B- intermediate consumption	B	B
C – labor, S- savings on cheaper labor	C	C-S
D – other costs	D	D
T – total costs	A+B+C+D	A+B+C+D-S
P – Profit	P	P+S
TC – Tax cost TSR – Tax statutory rate in country 1 or 2	$P*TSR_1$	$(P+S)*TSR_2$
AP – after tax profits	$P*(1-TSR_1)$	$(P+S)(1-TSR_2)$

Source: own proposition

The critical importance for investors has got the fact that additional benefits from lower costs contribute to new enlarged company profits, which are taxed. However withdrawal of benefits is costly and therefore company taxes should be imposed on  $b_{c2}$  (or P enlarged by S in the table) to measure the actual benefit.

Accordingly to present research observations, labor productivity in manufacturing is mostly based on the existing technology and interrelations between employees and technology. In general, typical manufacturing does not require too high skills and growing part of production is done automatically or with limited use of manual work. When two teams of people are trained in the similar ways, people have similar educational backgrounds and work discipline is maintained in both teams – the labor productivity can also be similar. Such observation is confirmed by numerous FDI, especially greenfield FDI executed in Central Europe, starting from car manufacturing and ending on households appliances manufacturing. The only significant difference in these areas is tax and labor cost competitiveness of manufacturing goods in two countries and therefore different profitability. When taking into account greenfield FDI we should accept that in the new factory productivity should be the same (or similar) like in the mother country.

Besides, when price convergence in the European Union will proceed also differences in the costs of inputs to the production will be diminishing. The only significant differences which will remain will be tax and labor cost differences.

There is another misunderstanding, exploited both by domestic (in Central Europe) and foreign economists, it is the problem of burdens levied on labor. In common thinking Central Europe is at least the same costly like the average “old 15” EU member. It is very often indicated that that the tax wedge<sup>8</sup> over labor is a critical factor for low international labor competitiveness of Central Europe countries. Economists thinking in this way usually present the relative burdens measured as percentage to net employee compensation, forgetting that for

<sup>8</sup> The tax wedge on labor cost calculates the income tax on gross earnings + the employee’s & employer’s social security contributions and then expresses this sum as a % of the total labor cost for this low-wage earner. See: Eurostat Structural Indicators:

[http://europa.eu.int/newcronos/suite/info/notmeth/en/theme0/strind/emploi\\_tr.htm](http://europa.eu.int/newcronos/suite/info/notmeth/en/theme0/strind/emploi_tr.htm)

business not the relative burden is important but burden in absolute terms – e.g. in euro per one working hour. Data on tax burden in relative and absolute values are presented in Table 4.

**Table 4. Tax wedge in relative and in relative and absolute terms in EU15 and in selected candidate countries 1999/2000**

Country	Tax wedge %	Average hourly labor costs EUR <sup>9</sup>	Tax wedge EUR
Poland	42,9	4,04	1,73
Hungary	52,6	3,84	2,02
Czech Republic	43,0	3,75	1,61
Slovakia	42,0	3,10	1,30
Estonia	40,0	3,10	1,24
Lithuania	39,7	2,90	1,15
Latvia	41,7	2,81	1,17
Cyprus	16,5	11,78	1,94
EU-15	43,2	23,39	10,10

Source: OECD, Eurostat

The data for 1999 and 2000 show that the tax wedge which was high in relative terms in Central Europe, in absolute values was 5-8 times lower in Central Europe than in EU15. Tax wedge can have an impact on the local unemployment situation<sup>10</sup> but its meaning is low for foreign investors who analyze total labor costs. Tax wedge in absolute values for Central Europe countries is very attractive for foreign investors.

Important lesson which can be drawn from the above observations is that not only share indicators or rates should be taken into account by FDI investor but also values of variables measured in amount of money. When amount of money is taken into account, the picture is absolutely different.

## 5. Proposed concept of estimating tax and labor cost competitiveness

The proposed concept is based on the assumption that the tax and labor advantage from moving manufacturing from one country to another is composed on basis of measurements of differences of due taxes and effected labor costs.

We accept the following assumptions:

- 1) Tax bases of CIT and costs of capital in two countries are the same,
- 2) Physical productivity of labor and fixed capital are the same in two locations,
- 3) Old manufacturing location can reduce its costs proportionally in relation to the reduction of manufacturing,
- 4) New manufacturing location copies structure of costs of old location, but actually additional profits are brought from cheaper labor and lower CIT taxes
- 5) Fixed capital consumption ratios in output and in gross value added in the FDI supplier country and the in new FDI factory are the same.
- 6) Production of final goods in current prices (gross added value) is analyzed; intermediate consumption is ignored,
- 7) Consumption of capital is reflected in the gross value added; the issue of capital investment is ignored,

<sup>9</sup> Hourly labor costs, NACE sections C to K, in EUR per employee, enterprises with 250-499 employees.

<sup>10</sup> Unfortunately there are still not empirical evidences for it for Poland.

8) Goods are sold on the uniform European market for international prices.

### Tax and Labor Cost Advantage from FDI Model Formulation

We accept that tax and labor advantage from FDI for the investor is coming from the increase of after tax profit from reduction of CIT rates and from the reduction of labor costs.

Tax and Labor Cost Advantage from FDI =  $TA_{FDI}$  = Increase of after tax profit from reduction of tax rates + increase of profit from reduction of labor costs

Total Manufacturing Gross Value Added (MT) is split into Manufacturing Retained Gross Value Added (MR) and Manufacturing Moved Gross Value Added (MM)

$$MT = MR + MM \quad (1)$$

Previous profit after tax (PPAT) is equal total manufacturing gross value added (final sales) (MR+MM) times old profit rate to gross value added ( $EP_1$ ) times one minus old tax rate ( $1 - TSR_1$ )

$$PPAT = (MR + MM) * EP_1 * (1 - TSR_1) \quad (2)$$

New profit after tax (NPAT) (referring the situation when a part of production was moved to the new location) is equal retained manufacturing g.v.a. (MR) times old profit ratio to g.v.a. ( $EP_1$ ) sales times one minus old tax rate ( $1 - TSR_1$ ) and plus moved manufacturing g.v.a. (MM) times new profit rate ( $EP_2$ ) times one minus new tax rate ( $1 - TSR_2$ ). The task of the company is to maintain the profitability in retained manufacturing on the previous level.

$$NPAT = MR * EP_1 * (1 - TSR_1) + MM * EP_2 * (1 - TSR_2) \quad (3)$$

Total Labor Cost and Tax Advantage from FDI ( $TA_{FDI}$ ) is the difference between new and previous profits after tax

$$TA_{FDI} = NPAT - PPAT \quad (4)$$

$$TA_{FDI} = MR * EP_1 * (1 - TSR_1) + MM * EP_2 * (1 - TSR_2) - (MR + MM) * EP_1 * (1 - TSR_1) =$$

$$MM * EP_2 * (1 - TSR_2) - MM * EP_1 * (1 - TSR_1) =$$

$$MM [EP_2 * (1 - TSR_2) - EP_1 * (1 - TSR_1)]$$

Therefore

$$TA_{FDI} = MM [EP_2 * (1 - TSR_2) - EP_1 * (1 - TSR_1)] \quad (5)$$

How changes profit in moved manufacturing and how it changes  $EP_1$  into  $EP_2$ ?

Profit rate as relation of profit to gross value added is a relation between profits and final sales (manufacturing gross value added)

$$EP = P/GVA, P = GVA - TC,$$

Where

EP- profit rate to gross value added

P – profit

GVA – gross value added

TC – total cost of creating gross value added

Total cost of creating gross value added (ignoring intermediate consumption) is composed of three main items: labor costs, fixed capital consumption and financial costs of interest on borrowed resources (e.g. capital, land, leases etc.) There are also several insignificant balancing items besides mentioned positions. Gross value added equals to Total cost of creating gross value added plus Profit. TC is a balancing item to P within GVA.

In the new location the profit rate  $EP_2$  is a relation between new profit  $P_2$  and new g.v.a. (manufacturing final sales) in MM

$$EP_2 = P_2/MM \quad P_2 = MM - TC_{MM} \quad (6)$$

$TC_{MM}$  – total costs of moved manufacturing gross value added

If we assume that total cost is split between MM and MR respectively to their relative values of moved and retained manufacturing g.v.a. and reduced in the new location by savings on labor

$$\begin{aligned} TC_{MM} &= TC * MM / (MR + MM) - \text{savings on labor} = \\ &= TC * MM / (MR + MM) - MM * a * b \end{aligned} \quad (7)$$

where:

a – share of labor in manufacturing g.v.a. (final goods sales), e.g. 0,5

b – relative cost difference in labor between two countries e.g. 0,7

The value of “b” can be explained in the following way: when old labor costs were 1 and new only 0,3 the  $b = 1 - 0,3 = 0,7$

Therefore:

$b = (\text{hourly rate in capital origin country} - \text{hourly rate in destination country}) / \text{hourly rate in capital origin country}$

In that case  $P_2 = MM - TC * MM / (MR + MM) + MM * a * b = MM [1 + a * b - TC / (MR + MM)]$

$$P_2 = MM [1 + a * b - TC / (MR + MM)] \quad (8)$$

And

$$EP_2 = 1 + a * b - TC / (MR + MM) \quad (9)$$

### Example

When relation of TC to total gross value added (MM+MR) = 0,95

a – share of labor in manufacturing gross value added = 0,5

b – relative cost difference in labor = 0,7

$EP_2 = 1 - 0,5 * 0,7 - 0,95 = 0,4$ , what accounts to 40% of profit to GVA (moved manufacturing) ratio

What happens with  $EP_1$  in MR?

$$EP_1 = P_1/MR, P_1 = GVA_{MR} - TC_{MR}, GVA = MR$$

$$P_1 = MR - TC_{MR}$$

where:

$TC_{MR}$  – total costs of manufacturing retained gross value added

$$TC_{MR} = TC * MR/(MR+MM)$$

$$P_1 = MR - TC * MR/(MR+MM) = MR[1 - TC/(MR+MM)]$$

$$EP_1 = 1 - TC/(MR+MM) \quad (10)$$

When relation of TC to total GVA ( $MM+MR$ ) = 0,95

$EP_1 = 1 - 0,95 = 0,05$  what accounts to 5% of profit to GVA ratio

#### Total Labor and Tax Advantage $TA_{FDI}$ Estimation

$$TA_{FDI} = MM[EP_2 * (1 - TSR_2) - EP_1(1 - TSR_1)] \quad (\text{as taken from (5)})$$

Where

$$EP_1 = 1 - TC/(MR+MM)$$

$$EP_2 = 1 + a * b - TC/(MR+MM) = 1 - TC/(MR+MM) + a * b = EP_1 + a * b$$

Therefore the final formulation of the model of estimating tax and labor advantage from FDI is the following:

$$TA_{FDI} = MM [(EP_1 + a * b)(1 - TSR_2) - EP_1(1 - TSR_1)] \quad (11)$$

#### Example

When previous  $EP_1 = 0,05$ ,  $a = 0,5$ ,  $b = 0,7$  and  $TSR_1 = 0,3$  (e.g. UK),  $TSR_2 = 0,19$  (e.g. PL, SK) and moved production  $MM = 6$  million euro

$$TA_{FDI} = 6 \text{ million EUR} [(0,05 + 0,5 * 0,7)(1 - 0,19) - 0,05(1 - 0,3)] = 6 \text{ million} (0,40 * 0,81 - 0,05 * 0,70) = 6 \text{ million} * 0,289 = 1,734 \text{ million EUR}$$

## 6. Measurements of relative tax and labor cost advantage of FDI indices on basis of actual data

The proposed model allows for estimating the value of the total labor costs and tax advantage for moving manufacturing from one country to another. However investors may want to know a simple index telling what were the average additional after tax profits from moving 1 Euro of manufacturing from one country to another in the given year. It can constitute a valuable information whether FDI create an interesting option for the investor. The general formula for the  $TAI_{FDI}$  index could be transformed equalization (11), when  $MM=1$

$$TAI_{FDI} = (EP_1 + a * b)(1 - TSR_2) - EP_1(1 - TSR_1) \quad (12)$$

Here investors can discuss different situations. One of such situations could be the situation when the company is not producing profit and therefore FDI can improve the situation. Let's call this index as FDI Rescue Index, when FDI are used to improve the economic situation of

the company whose profitability is equal to zero, therefore  $EP_1 = 0$ . Such a situation can save workplaces which are in danger with regard for the lowering profitability of the company. If the company would continue manufacturing in old location all jobs could be in danger of liquidation. In the opposite situation a part of workplaces should be transferred to the new location but the remaining could enjoy safety connected with improved business profitability. The formula for counting the FDI Rescue Index would be:

$$\text{(FDI Rescue Index) } TAI_{FDI} = a * b(1 - TSR_2) \quad (13)$$

To count Rescue index, the tables presenting the hourly labor costs for EU countries, absolute differences in hourly labor costs between 14 EU countries and four CE countries, and the share of labor costs in the product should be used. Such tables are presented below. Besides, a table presenting absolute differences in labor costs between old EU countries and CE countries in 1998 and in 2002 is presented.

**Table 5. Hourly Labor Costs in Manufacturing in 1998-2002**  
NACE D section<sup>11</sup>

COUNTRY	HOURLY LABOR COSTS IN MANUFACTURING IN EURO			DIFFERENCES IN LABOR COSTS 2002-1998	
	1998	2000	2002	Relative in %	Absolute in euro
<b>BELGIUM</b>	21,03	22,33	23,99	14,1	2,96
<b>CZECH REPUBLIC</b>	2,54	3,02	3,86	52,0	1,32
<b>DENMARK</b>	24,60	26,50	29,10	18,3	4,50
<b>GERMANY</b>	19,03	20,19	21,07	10,7	2,04
<b>GREECE</b>	5,39	5,53	6,30	16,9	0,91
<b>SPAIN</b>	12,15	13,28	14,44	18,8	2,29
<b>FRANCE</b>	17,64	19,21	20,97	18,9	3,33
<b>ITALY</b>	12,79	13,54	14,60	14,2	1,81
<b>LUXEMBOURG</b>	21,60	24,50	26,20	21,3	4,6
<b>HUNGARY</b>	2,63	3,14	3,75	42,6	1,12
<b>NETHERLANDS</b>	15,61	16,79	18,58	19,0	2,97
<b>AUSTRIA</b>	17,68	17,87	18,40	4,1	0,72
<b>POLAND</b>	3,00	3,58	3,93	31,0	0,93
<b>PORTUGAL</b>	5,83	6,48	7,14	22,5	1,31
<b>SLOVAKIA</b>	1,89	2,13	2,65	40,2	0,76
<b>FINLAND</b>	16,33	17,72	19,49	19,4	3,16
<b>SWEDEN</b>	18,62	21,56	21,69	16,5	3,07
<b>UNITED KINGDOM</b>	17,02	24,09	25,20	48,1	8,18

<sup>11</sup> Those data come from Eurostat Data Base on ESA. Data on employees compensation per employee (gross) were divided by the number of working hours in the week taken from Labor Force Survey (LFS) multiplied by 52,14 (the average number of weeks in the year). Data for hours worked for Slovakia and Hungary were taken from Industry Survey (IS) which regularly gives lower values than LFS and then adjusted to the results of LFS by the use of comparative base. The comparative base was taken from Eurostat who re-estimated Industry Survey into LFS results in 2003. The comparison of IS and LFS for 2003 was the base for work time adjustments. "Compensation of employees (ESA 1995, 4.02) 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. Compensation of employees consists of wages and salaries, and of employers' social contributions". See Eurostat ESA Data base- Concepts, definitions and classifications.

Source: own estimations on basis of Eurostat data base

**Table 6. Differences in Absolute Hourly Labor Costs in Manufacturing in 1998 and 2002, between EU 14 Countries and four Central Europe Countries, NACE D section**

	<b>DIFFERENCES IN LABOR COSTS 1998-2002 IN ABSOLUTE VALUES IN EURO</b>							
	1998	1998	1998	1998	2004	2004	2004	2004
<b>COUNTRY</b>	<b>SLOVAKIA</b>	<b>HUNGARY</b>	<b>CZECH R.</b>	<b>POLAND</b>	<b>SLOVAKIA</b>	<b>HUNGARY</b>	<b>CZECH R.</b>	<b>POLAND</b>
<b>BELGIUM</b>	19,14	18,4	18,49	18,03	21,34	20,24	20,13	20,06
<b>DENMARK</b>	22,71	21,97	22,06	21,6	26,45	25,35	25,24	25,17
<b>GERMANY</b>	17,14	16,4	16,49	16,03	18,42	17,32	17,21	17,14
<b>GREECE</b>	3,5	2,76	2,85	2,39	3,65	2,55	2,44	2,37
<b>SPAIN</b>	10,26	9,52	9,61	9,15	11,79	10,69	10,58	10,51
<b>FRANCE</b>	15,75	15,01	15,1	14,64	18,32	17,22	17,11	17,04
<b>ITALY</b>	10,9	10,16	10,25	9,79	11,95	10,85	10,74	10,67
<b>LUXEMBOURG</b>	19,71	18,97	19,06	18,6	23,55	22,45	22,34	22,27
<b>NETHERLANDS</b>	13,72	12,98	13,07	12,61	15,93	14,83	14,72	14,65
<b>AUSTRIA</b>	15,79	15,05	15,14	14,68	15,75	14,65	14,54	14,47
<b>PORTUGAL</b>	3,94	3,2	3,29	2,83	4,49	3,39	3,28	3,21
<b>FINLAND</b>	14,44	13,7	13,79	13,33	16,84	15,74	15,63	15,56
<b>SWEDEN</b>	16,73	15,99	16,08	15,62	19,04	17,94	17,83	17,76
<b>UNITED KINGDOM</b>	15,13	14,39	14,48	14,02	22,55	21,45	21,34	21,27

Source: own estimations on basis of Eurostat Data base

**Table 7. Share of labor per unit of product 1998-2002 in Manufacturing (NACE D section)<sup>12</sup>**

<b>COUNTRY</b>	<b>SHARE OF LABOR COSTS IN GROSS VALUE ADDED<sup>13</sup></b>		
	1998	2000	2002
Belgium	0,62	0,61	0,63
Czech Republic	0,57	0,51	0,54
Denmark	0,69	0,68	0,68
Germany	0,72	0,73	0,72
Greece	0,40	0,38	0,37
Spain	0,64	0,65	0,68
France	0,60	0,60	0,59
Italy	0,55	0,55	0,56
Luxembourg	0,59	0,61	0,63
Hungary	0,52	0,55	0,54

<sup>12</sup> The share of labor in gross value added was estimated on basis of Eurostat Data Base on ESA. The values of employees compensations (gross) were divided by gross value added created by manufacturing in particular countries.

<sup>13</sup> "Gross Value Added (GVA) (ESA 1995, 8.11) is the net result of output valued at basic prices less intermediate consumption valued at purchasers' prices. Gross value added is calculated before consumption of fixed capital. It is equal to the difference between output (ESA 1995, 3.14) and intermediate consumption (ESA 1995, 3.69)." See: Eurostat ESA Data base- Concepts, definitions and classifications.

Netherlands	0,59	0,59	0,63
Austria	0,63	0,57	0,56
Poland	0,63	0,61	0,60
Portugal	0,60	0,61	0,63
Slovakia	0,54	0,48	0,53
Finland	0,53	0,51	0,57
Sweden	0,61	0,61	0,66
United Kingdom	0,69	0,81	n.a.

Source: own estimations on basis of Eurostat Data base

With regard for availability, data for Ireland were not counted. Estimation of  $TAI_{FDI}$  is based on the relative difference in labor costs and share of labor in manufacturing in the capital exporting country. It is worth mentioning that despite the fact that all four Central Europe countries had the highest increases of hourly wages in relative terms, in absolute terms their increases were rather very low. It means that in respect to all 14 old EU countries except for Greece and Austria absolute differences in hourly labor costs has been increasing in the period of 1998-2002. Especially interesting situation was in the United Kingdom where the absolute increase was the highest in 19 analyzed countries and in relative terms amounted to 48,1% and was lower only in relation to Czech Republic where it amounted to 52,0%. It is also surprisingly that a low level of labor costs was observed in Italy, quite opposite to conventional thinking. All data used for calculations came from Eurostat Data Base of ESA 95.

Below it is shown how the index can be estimated between Germany and Hungary in 2000 terms.

**(Rescue)  $TAI_{FDI} = a \cdot b(1 - TSR_2)$**

$$TAI_{FDI} = (20,19 - 3,14) / 20,19 \cdot 0,73 \cdot (1 - 0,196) = 0,50$$

Where:

3,14 EUR – hourly labor costs in Hungary

20,19 EUR – hourly labor costs in Germany

0,73 – share of labor in unit of product in Germany

$TSR_2 = 0,196$  (see table 1)

It means that when German company was able to move unprofitable (Profit = 0) production to Hungary, for each 1 EUR gross value added moved to Hungary, potential additional savings would be on the average 49 cents. And it did not require any specific tax incentives for foreign investors.

Below, the tables 8 and 9, with rescue indices estimations based on 1998, 2000 and 2002 labor costs, gross value added and CIT statutory rates from the respective years are presented. There was also a simulation done for 2004, which took data from 2002 apart from changes of CIT rates in 2004. The last column (2004) for each Central Europe country shows the impact of changes in taxation on the total social labor costs and tax competitiveness.



**Table 8. Average profits from moving 1 EUR gross value added unprofitable manufacturing from 14 old EU members to Poland and Czech Republic in EUR per unit of gross value added**

	POLAND				CZECH REPUBLIC			
	AVERAGE PROFITS IN EURO PER 1 EURO OF MOVED GROSS VALUE ADDED				AVERAGE PROFITS IN EURO PER 1 EURO OF MOVED GROSS VALUE ADDED			
YEAR	1998	2000	2002	2004	1998	2000	2002	2004
<b>COUNTRY</b>								
<b>BELGIUM</b>	0,34	0,36	0,38	0,43	0,35	0,36	0,37	0,38
<b>DENMARK</b>	0,39	0,41	0,42	0,48	0,40	0,41	0,41	0,43
<b>GERMANY</b>	0,39	0,42	0,42	0,48	0,40	0,43	0,41	0,43
<b>GREECE</b>	0,11	0,09	0,10	0,11	0,14	0,12	0,10	0,10
<b>SPAIN</b>	0,31	0,33	0,35	0,40	0,33	0,35	0,34	0,36
<b>FRANCE</b>	0,32	0,34	0,35	0,39	0,33	0,35	0,33	0,35
<b>ITALY</b>	0,27	0,29	0,30	0,33	0,29	0,30	0,29	0,30
<b>LUXEMBOURG</b>	0,33	0,37	0,39	0,44	0,34	0,37	0,37	0,39
<b>NETHERLANDS</b>	0,30	0,32	0,36	0,40	0,32	0,33	0,34	0,36
<b>AUSTRIA</b>	0,33	0,32	0,32	0,35	0,35	0,33	0,30	0,32
<b>PORTUGAL</b>	0,19	0,19	0,20	0,23	0,22	0,23	0,20	0,21
<b>FINLAND</b>	0,28	0,29	0,33	0,37	0,29	0,29	0,31	0,33
<b>SWEDEN</b>	0,33	0,35	0,39	0,44	0,34	0,36	0,37	0,39
<b>UNITED KINGDOM</b>	0,36	0,48	n.a.	n.a.	0,38	0,49	n.a.	n.a.

Source: own estimations on basis of Eurostat data base

**Table 9. Average profits from moving 1 EUR gross value added unprofitable manufacturing from 14 old EU members to Hungary and Slovakia in EUR per unit of gross value added**

	HUNGARY				SLOVAKIA			
	AVERAGE PROFITS IN EURO PER 1 EURO OF MOVED GROSS VALUE ADDED				AVERAGE PROFITS IN EURO PER 1 EURO OF MOVED GROSS VALUE ADDED			
YEAR	1998	2000	2002	2004	1998	2000	2002	2004
<b>COUNTRY</b>								
<b>BELGIUM</b>	0,44	0,42	0,43	0,44	0,34	0,39	0,42	0,46
<b>DENMARK</b>	0,50	0,48	0,48	0,49	0,38	0,44	0,46	0,50
<b>GERMANY</b>	0,50	0,50	0,48	0,49	0,39	0,47	0,47	0,51
<b>GREECE</b>	0,16	0,13	0,12	0,12	0,16	0,17	0,16	0,17
<b>SPAIN</b>	0,40	0,40	0,40	0,41	0,32	0,39	0,41	0,45
<b>FRANCE</b>	0,41	0,40	0,39	0,40	0,32	0,38	0,39	0,42
<b>ITALY</b>	0,35	0,34	0,34	0,35	0,28	0,33	0,35	0,37
<b>LUXEMBOURG</b>	0,42	0,43	0,44	0,45	0,32	0,40	0,43	0,46
<b>NETHERLANDS</b>	0,39	0,39	0,40	0,41	0,31	0,37	0,40	0,44
<b>AUSTRIA</b>	0,43	0,38	0,36	0,37	0,34	0,36	0,36	0,39
<b>PORTUGAL</b>	0,26	0,25	0,24	0,25	0,24	0,29	0,30	0,32
<b>FINLAND</b>	0,36	0,34	0,37	0,38	0,28	0,32	0,37	0,40
<b>SWEDEN</b>	0,42	0,42	0,44	0,45	0,33	0,39	0,43	0,47

<b>UNITED KINGDOM</b>	0,47	0,57	n.a.	n.a.	0,37	0,52	n.a.	n.a.
-----------------------	------	------	------	------	------	------	------	------

Source: own estimations on basis of Eurostat Data base

The data included in the above tables show that all four Central Europe countries possess high tax and labor cost advantage for moving unprofitable production from all discussed 14 EU countries. The values of TAI indices reach usually values of between 0,30-0,50 for the most of countries, lower between 0,09-0,17 for Greece and 0,19-0,32 for Portugal. It is important to observe that out of 14 countries, the highest indices are represented by Germany, Denmark and United Kingdom. They reach even 0,57 euro per one euro of moved manufacturing in the case of UK-Hungary in 2000. Respectively they reach the level of 0,48 for Poland, 0,43 for Czech Republic and 0,49 for Hungary and 0,51 for Slovakia in 2004. The countries with lower than maximum levels, but still high level, are Sweden, France, Spain, Belgium, Luxembourg and Finland. Surprisingly moderate values are for Austria and Italy. In general, apart from Greece, manufacturing transfers of unprofitable production could be highly beneficial from all remaining countries. If we want to observe dynamics and take inter period changes into account, the largest positive changes were observed in Slovakia between 1998-2000, in Poland between 2002-2004, in Czech Republic there was no specific period of accelerating changes. In Hungary indices were slowly decreasing between 1998-2002 and increased between 2002-2004. Table 8 presents how competitive positions of four respective Central Europe countries changed within the period of 1998-2004.

**Table 10. TAI (FDI) values of transferring "0" profit manufacturing to Slovakia, Hungary Czech Republic and Poland in 1998 and in 2004 (simulations) Section NACE D, per unit of Gross Value Added**

	<b>TAI (FDI) VALUES OF TRANSFERRING "0" PROFIT MANUFACTURING TO SLOVAKIA, HUNGARY CZECH REPUBLIC AND POLAND</b>							
	1998	1998	1998	1998	2004	2004	2004	2004
<b>COUNTRY</b>	<b>SLOVAKIA</b>	<b>HUNGARY</b>	<b>CZECH R.</b>	<b>POLAND</b>	<b>SLOVAKIA</b>	<b>HUNGARY</b>	<b>CZECH R.</b>	<b>POLAND</b>
<b>BELGIUM</b>	0,34	0,44	0,35	0,34	0,46	0,44	0,38	0,43
<b>DENMARK</b>	0,38	0,50	0,40	0,39	0,50	0,49	0,43	0,48
<b>GERMANY</b>	0,39	0,50	0,40	0,39	0,51	0,49	0,43	0,48
<b>GREECE</b>	0,16	0,16	0,14	0,11	0,17	0,12	0,10	0,11
<b>SPAIN</b>	0,32	0,40	0,33	0,31	0,45	0,41	0,36	0,40
<b>FRANCE</b>	0,32	0,41	0,33	0,32	0,42	0,40	0,35	0,39
<b>ITALY</b>	0,28	0,35	0,29	0,27	0,37	0,35	0,30	0,33
<b>LUXEMBOURG</b>	0,32	0,42	0,34	0,33	0,46	0,45	0,39	0,44
<b>NETHERLANDS</b>	0,31	0,39	0,32	0,30	0,44	0,41	0,36	0,40
<b>AUSTRIA</b>	0,34	0,43	0,35	0,33	0,39	0,37	0,32	0,35
<b>PORTUGAL</b>	0,24	0,26	0,22	0,19	0,32	0,25	0,21	0,23
<b>FINLAND</b>	0,28	0,36	0,29	0,28	0,40	0,38	0,33	0,37
<b>SWEDEN</b>	0,33	0,42	0,34	0,33	0,47	0,45	0,39	0,44
<b>UNITED KINGDOM</b>	0,37	0,47	0,38	0,36	n.a.	n.a.	n.a.	n.a.

Source: own estimations on basis of Eurostat Data base

It is important to observe that with time the level of tax and labor costs advantages indices is growing in relation to Slovakia, Poland and Czech Republic. Slovakia growth was the highest, Polish one is on the second place. Hungary does not observe the growth of indices, but they

were very high in 1998. Hungary, which in 1998 had the highest level of profitability of moving 0% profit manufacturing maintained the high relative level, but lost the first position in favor of Slovakia. Poland improved its competitive position in relation to 1998. In 1998 the labor and tax competitiveness order was 1. Hungary, 2. Czech Republic, 3. Slovakia and Poland. In 2004 accordingly to simulations, which freeze labor costs and share of labor in gross value added, and show only changes in taxation, the sequence would be different: 1. Slovakia, 2. Hungary, 3. Poland. 4. Czech Republic. It should be however underlined that the differences between countries are not high. They still represent the same size of benefits. It is important to underline that all Central Europe countries maintained very high tax and labor competitiveness and 3 of them, with previously lower positions, significantly increased their competitiveness. In the table 11, the relative differences in the competitiveness index are presented.

**Table 11. Differences in TAI<sub>(FDI)</sub> values of transferring "0" profit manufacturing from 13 old EU members to 4 Central Europe EU members Section NACE D, in euro per unit of Gross Value Added**

	<b>DIFFERENCES IN TAI<sub>(FDI)</sub> VALUES OF TRANSFERRING 1 EURO "0" PROFIT MANUFACTURING FROM 13 OLD TO 4 NEW EU MEMBERS 1998-2004</b>			
<b>COUNTRY</b>	<b>SLOVAKIA</b>	<b>HUNGARY</b>	<b>CZECH R.</b>	<b>POLAND</b>
<b>BELGIUM</b>	0,12	0,00	0,03	0,09
<b>DENMARK</b>	0,12	-0,01	0,02	0,09
<b>GERMANY</b>	0,12	-0,01	0,02	0,09
<b>GREECE</b>	0,02	-0,04	-0,03	0,00
<b>SPAIN</b>	0,12	0,01	0,03	0,09
<b>FRANCE</b>	0,10	-0,01	0,01	0,07
<b>ITALY</b>	0,09	-0,01	0,01	0,06
<b>LUXEMBOURG</b>	0,14	0,03	0,05	0,11
<b>NETHERLANDS</b>	0,13	0,02	0,04	0,10
<b>AUSTRIA</b>	0,05	-0,06	-0,03	0,02
<b>PORTUGAL</b>	0,08	-0,02	-0,01	0,04
<b>FINLAND</b>	0,12	0,02	0,04	0,09
<b>SWEDEN</b>	0,14	0,03	0,05	0,11

Source: own estimations on basis of Eurostat Data base

In 0% profit manufacturing, the largest increases of indices were observed in Slovakia. They reached even 0,14 euro of additional benefits from transferring 1 euro of unprofitable production from Sweden and Luxembourg and 0,13 euro from the Netherlands. The second country which observed the highest positive changes was Poland. Increases of indices reached 0,11 euro in relation to the Sweden and Luxembourg and 0,10 euro in relation to the Netherlands. Also high increases were observed in relation to Germany, Belgium, Denmark and Finland. In Czech Republic changes were also positive but were lower than in Slovakia and Poland. It is worth observing that there were negative changes in relation to Greece and Portugal. In Hungary the number of positive and negative changes is the same. It is due to the high initial base in 1998. It is worth noting that Hungarian index was significantly reduced in relation to Austria (-0,06).

Summing up: it seems that moving unprofitable production from the most of analyzed 14 “old” EU members can increase the total profitability of EU businesses and allow to save jobs, which in the opposite situation could be in danger with regard for losing profitability. In this case it is necessary to sacrifice a number of workplaces and move them to the new locations and then saving the most of jobs in the mother countries.

## PROFITABLE PRODUCTION

If we take into consideration the situation of profitable business with profit to gross value added rate equal to 5%<sup>14</sup>,  $EP_1=0,05$ , we can adopt this data to the model:

$$TAI_{FDI} = (EP_1 + a \cdot b)(1 - TSR_2) - EP_1(1 - TSR_1)$$

$$TAI_{FDI} = (a \cdot b + 0,05)(1 - TSR_2) - 0,05(1 - TSR_1)$$

Therefore for example Tax and Labor Cost Advantage Index from FDI between Germany and Hungary for year 2002 could be estimated as follows:

$$TAI_{FDI} = \{[(21,07 - 3,75/21,07) \cdot 0,72] + 0,05\}(1 - 0,196) - 0,05(1 - 0,383) = 0,49$$

Where:

3,75 EUR – hourly labor costs in Hungary (see table 4)

21,07 EUR – hourly labor costs in Germany (see table 4)

0,72 – share of labor in unit of product in Germany in 2002 (see table 5)

$TSR_2 = 0,196$  (see table 1)  $TRE_1 = 0,382$  (see table 1)

It means that when German company was able to move profitable (Profit/Gross Value Added = 0,05) production to Hungary, for each 1 EUR moved to Hungary, potential additional savings were on the average 49 cents. And it did not require any specific tax incentives for foreign investors.

Below, in the table 12, with 5% PROFIT INDICES, estimations based on actual data for 1998 and simulations for 2004 (only tax changes) are presented.

**Table 12. Average profits of transferring 5% profit/value added manufacturing to Slovakia, Hungary Czech Republic and Poland in 1998 and in 2004 (simulations), Section NACE D, in euro per unit of Gross Value Added**

	AVERAGE PROFITS OF TRANSFERRING 5% PROFIT/VALUE ADDED MANUFACTURING TO SLOVAKIA, HUNGARY CZECH REPUBLIC AND POLAND IN 1998 AND IN 2004							
	1998	1998	1998	1998	2004	2004	2004	2004
COUNTRY	SLOVAKIA A	HUNGARY	CZECH R.	POLAND	SLOVAKIA	HUNGARY	CZECH R.	POLAND
BELGIUM	0,34	0,45	0,36	0,34	0,46	0,45	0,39	0,44
DENMARK	0,38	0,51	0,40	0,39	0,51	0,49	0,43	0,48
GERMANY	0,40	0,52	0,42	0,40	0,52	0,50	0,43	0,49
GREECE	0,16	0,17	0,14	0,12	0,18	0,13	0,11	0,12
SPAIN	0,32	0,41	0,33	0,31	0,46	0,42	0,36	0,41
FRANCE	0,32	0,42	0,34	0,32	0,43	0,41	0,35	0,40
ITALY	0,28	0,36	0,29	0,27	0,38	0,36	0,30	0,34
LUXEMBOURG	0,32	0,43	0,34	0,33	0,47	0,45	0,39	0,44

<sup>14</sup> When intermediate consumption constitutes about 50% of the output, 5% of Profit to Gross Addend Value ratio ( $EP_1=0,05$ ) can constitute about 2,5% Profit/Sales ratio, what is a typical size of profitability in manufacturing in numerous developed countries.

<b>NETHERLANDS</b>	0,31	0,40	0,32	0,30	0,44	0,42	0,36	0,41
<b>AUSTRIA</b>	0,33	0,44	0,35	0,33	0,39	0,37	0,32	0,36
<b>PORTUGAL</b>	0,24	0,27	0,22	0,19	0,33	0,25	0,21	0,23
<b>FINLAND</b>	0,28	0,36	0,29	0,27	0,40	0,38	0,33	0,37
<b>SWEDEN</b>	0,32	0,43	0,34	0,32	0,47	0,45	0,39	0,44
<b>UNITED KINGDOM</b>	0,36	0,47	0,38	0,36	n.a.	n.a.	n.a.	n.a.

Source: own estimations on basis of Eurostat Data base

Moving profitable production in both years: 1998 and 2004 from 14 old EU to 4 CE countries provided better benefits than moving 0% profit production. However if we compare table 12 with table 10, which shows results for 0% profit production transfers, we see very slight differences. It means that there is not a significant quality difference in both situations. Moving all types of manufacturing from 14 EU countries to 4 CE countries provides significant benefits for the movers (investors). In table 13 the differences of TAI<sub>FDI</sub> index between two years 1998-2004 are presented.

**Table 13. Differences in TAI (FDI) values of transferring "5%" profit/value added manufacturing from 13 old EU members to 4 Central Europe EU members in years 1998-2004, in euro per unit of Gross value added, Section NACE D**

	<b>DIFFERENCES IN TAI<sub>(FDI)</sub> VALUES OF TRANSFERRING "5%" PROFIT/VALUE ADDED MANUFACTURING FROM 13 OLD EU MEMBERS TO 4 CENTRAL EUROPE EU MEMBERS 1998-2004</b>			
<b>COUNTRY</b>	<b>SLOVAKIA</b>	<b>HUNGARY</b>	<b>CZECH R.</b>	<b>POLAND</b>
<b>BELGIUM</b>	0,13	0,00	0,03	0,09
<b>DENMARK</b>	0,13	-0,01	0,02	0,09
<b>GERMANY</b>	0,13	-0,02	0,02	0,09
<b>GREECE</b>	0,03	-0,04	-0,03	0,01
<b>SPAIN</b>	0,13	0,01	0,03	0,10
<b>FRANCE</b>	0,10	-0,01	0,01	0,08
<b>ITALY</b>	0,10	-0,01	0,01	0,07
<b>LUXEMBOURG</b>	0,14	0,03	0,05	0,11
<b>NETHERLANDS</b>	0,14	0,02	0,04	0,11
<b>AUSTRIA</b>	0,06	-0,06	-0,03	0,03
<b>PORTUGAL</b>	0,08	-0,02	-0,01	0,05
<b>FINLAND</b>	0,13	0,02	0,04	0,10
<b>SWEDEN</b>	0,15	0,03	0,05	0,12

Source: own estimations on basis of Eurostat Data base

This table shows nearly the same changes in the period of 1998-2004 as into relation to 0% profit manufacturing. The question is what are the differences in indices of 0% profit to gross value added and 5% profit to value added to Central Europe from the analyzed 13 countries who provided suitable data. The results are presented in the table 14.

**Table 14. Differences between 0% profit and 5% profit/value added manufacturing Section NACE D, in euro per 1 euro of gross value added in 2004 (simulations)**

	<b>DIFFERENCES BETWEEN 0% PROFIT AND 5% PROFIT/VALUE ADDED MANUFACTURING</b>

<b>COUNTRY</b>	<b>SLOVAKIA</b>	<b>HUNGARY</b>	<b>CZECH R.</b>	<b>POLAND</b>
<b>BELGIUM</b>	0,01	0,01	0,00	0,01
<b>DENMARK</b>	0,01	0,01	0,00	0,01
<b>GERMANY</b>	0,01	0,01	0,01	0,01
<b>GREECE</b>	0,01	0,01	0,00	0,01
<b>SPAIN</b>	0,01	0,01	0,00	0,01
<b>FRANCE</b>	0,01	0,01	0,00	0,01
<b>ITALY</b>	0,01	0,01	0,00	0,01
<b>LUXEMBOURG</b>	0,01	0,01	0,00	0,01
<b>NETHERLANDS</b>	0,01	0,01	0,00	0,01
<b>AUSTRIA</b>	0,01	0,01	0,00	0,01
<b>PORTUGAL</b>	0,00	0,00	0,00	0,00
<b>FINLAND</b>	0,01	0,01	0,00	0,01
<b>SWEDEN</b>	0,00	0,01	0,00	0,00

Source: own estimations on basis of Eurostat Data base

It seems to be very astonishing that the differences are very slight or even invisible. It shows how small role in building the advantage between countries is played by differences in profitability even when there are significant differences in tax rates. So the thesis that the differences in CIT rates create significant stimuli for delocalization of profitable manufacturing is not confirmed by data on significant benefits from it (in comparison to unprofitable production). The impact of alone CIT rates differences in profitable manufacturing is too small to speak about other stimuli as PR of building beneficial climate for FDI location in the given country. Benefits refer to all types of production, regardless to profitability.

However where is the impact? The impact is performed by differences in broadly understood labor costs. The higher share of labor in manufacturing and the higher relative difference in labor costs between countries the stronger impact. Tax rates in new location can play a critical role in creating net profits in the new location, while tax rates in the old location are nearly meaningless. They refer to low productivity.

## 7. Sensitivity of the index

Sensitivity analysis is a process through which the robustness of an economic model is assessed by examining the changes in results of the analysis when key variables are varied over a specified range. The sensitivity measures can be counted as the first derivatives of the model with regard to the assessed variable. The model of estimating social and tax advantage index is the following (full formula):

$$TAI_{FDI} = (EP_1 + a * b)(1 - TSR_2) - EP_1(1 - TSR_1)$$

Derivatives could be counted with regard to independent variables:  $EP_1$ ,  $a$ ,  $b$ ,  $TSR_1$ ,  $TSR_2$

### a) Sensitivity of the index to the profit ratio in the old location

$$\frac{\partial TAI_{FDI}}{\partial EP_1} = TSR_1 - TSR_2$$

### Numerical analysis

Let us check what is the significance of the sensitivity of the index to the profit ratio in the old location. Let us accept the case of Germany in 2002 and four Central Europe countries.  $TSR_1(DE) = 0,383$ ,  $TSR_2(SL) = 0,25$  – sensitivity = 0,133;  $TSR_2(PL) = 0,28$  – sensitivity 0,103; Conclusion: when  $EP_1$  in Germany grows by 1% the value of the index will grow by 0,133% in Slovakia and in by 0,103% in Poland when all remaining elements are constant. Sensitivity to  $TSR_2(CZ) = 0,31$  is much lower and amounts to 0,073%. The highest sensitivity is in relation to Hungary  $TSR_2(HU) = 0,196$  and amounts to 0,187% for each percent of growth of the index.

The sensitivity of the index in relation to the profit ratio in the old location is not too high.

### b) Sensitivity of the index to the share of labor in manufacturing gross value added

$$\frac{\partial TAI_{FDI}}{\partial a} = b(1 - TRS_2)$$

### Numerical analysis

Let us check what is the significance of the sensitivity of the index to the share of labor in manufacturing gross value added. Let us accept the case of Germany in 2002 and four Central Europe countries.  $TSR_2(SL) = 0,25$ ,  $TSR_2(PL) = 0,28$ ,  $TSR_2(CZ) = 0,31$ ,  $TSR_2(HU) = 0,196$ ;  $b(CZ) = 0,817$ ,  $b(SL) = 0,874$ ,  $b(HU) = 0,822$ ,  $b(PL) = 0,813$

The sensitivities of the index are: in relation to Slovakia =  $b(1 - TSR_2) = 0,656$ , to Poland = 0,585, to Hungary = 0,661, to Czech Republic = 0,563

Conclusions: on basis of data from 2002 and relation Germany – Central Europe: the increase of the share of labor in the product by 1% increases the index value from 0,563% in the Czech Republic to 0,661% in Hungary.

It must be noted that this sensitivity has got at least three to eight times higher values than the previous one.

### c) Sensitivity of the index to the relative cost difference in hourly labor costs between two countries

$$\frac{\partial TAI_{FDI}}{\partial b} = a(1 - TSR_2)$$

### Numerical analysis

Let us check what is the significance of the sensitivity of the index to the relative difference in labor costs between Germany in 2002 and four Central Europe countries.  $TSR_2(SL) = 0,25$ ,  $TSR_2(PL) = 0,28$ ,  $TSR_2(CZ) = 0,31$ ,  $TSR_2(HU) = 0,196$ ;  $a(DE) = 0,72$ ,

The sensitivities of the index are: in relation to Slovakia =  $a(1 - TSR_2) = 0,54$ , to Poland = 0,51, to Hungary = 0,579, to Czech Republic = 0,497

Conclusions: on basis of data from 2002 and relation Germany – Central Europe: the increase of the difference in hourly labor costs between two countries by 1% increases the index value from 0,497% in Czech Republic to 0,579% in Hungary.

This sensitivity is high but its meaning is slightly lower than the share of the labor cost in the product.

d) Sensitivity of the index to the Tax statutory rate in old location

$$\frac{\partial TAI_{FDI}}{\partial TSR_1} = EP_1$$

Numerical analysis

In our case of profitable production each increase of  $TSR_1$  by 1 % will increase the value of the index by 0,05% ( $EP_1=0,05$ ). The same happens when the capital origination country wants to reduce  $TSR_1$  by 1%. It will reduce the value of the index only by 0,05%. Of course the higher profitability to product ratio the stronger sensitivity.

Conclusion: the sensitivity of the index in relation to  $TSR_1$  is nearly meaningless.

e) Sensitivity of the index to the Tax statutory rate in the new location

$$\frac{\partial TAI_{FDI}}{\partial TSR_2} = -(EP_1+ab)$$

Numerical analysis

Let us check what is the significance of the sensitivity of the index to the Tax statutory rate in the new location between Germany in 2002 and four Central Europe countries.  $a(DE)=0,72$ ,  $b(CZ)=0,817$ ,  $b(SL)=0,874$ ,  $b(HU)=0,822$ ,  $b(PL)=0,813$ ,  $EP_1=0,05$

The first observation is that the sensitivity of the index to  $TSR_2$  is negative.

The sensitivities of the index are: in relation to Slovakia =  $-(EP_1+ab) = -0,679$ , to Poland =  $-0,635$ , to Hungary =  $-0,642$ , to Czech Republic =  $-0,638$

Conclusions: on basis of data from 2002 and relation Germany – Central Europe: the decrease of the Tax statutory rate in the investment location country by 1% increases the index value from 0,635% in Poland to 0,679% in Slovakia.

This sensitivity is very high and comparable with sensitivities towards a and b.

f) Sensitivities in unprofitable production

We also can discuss the case of unprofitable production, with  $EP_1=0$ . In this case the model would have the following form:

$$TAI_{FDI} = a*b(1-TSR_2)$$



We can count sensitivities with regard to  $a$ ,  $b$ , and  $TSR_2$ . Sensitivities of the index to  $a$  and  $b$  will be identical as examples b) and c). The sensitivity of the index to  $TSR_2$  will give results like in the example e) minus 0,05.

## 8. Conclusions

1. The estimations done on basis of the proposed model show that 4 Central Europe countries provide highly competitive environment for FDI from 14 analyzed EU countries.
2. Each Central Europe country provides significant labor cost and tax advantages (benefits for investors). Differences between countries are significant but all advantages represent a similar size group. In 1998 the highest advantages were provided by Hungary, but advantages from Czech Republic, Slovakia and Poland were also very high. In 2004 the sequence changed: the leader position was occupied by Slovakia, second Hungary and the next positions were occupied by Poland and Czech Republic.
3. Simulations of Tax and Labor Cost Advantage Index from FDI, done for 2004 in frozen labor environment from 2002, show that changes of CIT in Central Europe increased the competitiveness of 4 Central Europe countries in attracting FDI. The largest increase was observed in Slovakia and in Poland.
4. Accordingly to analysis of national accounts data, critical role in the complex index is played by difference in labor costs and share of labor in gross added value. Taxes play relatively lower role, however they have much more significance when differences in rates are important.
5. It seems that differences in taxation play important role when there are also big differences in labor costs. In fact it is not the truth. The taxation level in the destination country  $TSR_2$  is much more important than the level of taxation in the capital origin country  $TSR_1$ . It is explained by the sensitivity analysis of the index to both variables.  $TSR_2$  is a saturator of profits in the transmission channel from differences in labor costs, share of labor in the product and overall profitability. In this respect the role of  $TSR_1$  is very low or even meaningless. With regard for the low profitability in the capital origin country and high labor costs,  $TSR_1$  can not saturate a lot. Through changing  $TSR_1$  a little could be changed what reduces policy alternatives for high labor costs countries.
6. Surprisingly there is not a significant difference in moving unprofitable and profitable production from high labor and high CIT rates countries to countries with limited labor costs and low CIT rates. All manufacturing moves are very profitable. There is a limited logics to move profitable production with regard for the differences only in taxation where there are not differences in labor costs. On the opposite, there is high logics to move unprofitable production to low labor costs EU country even when there is not big difference in tax rates. This can save jobs in the unprofitable businesses what allows for reduction of job losses, increases jobs retention and creates new jobs in capital destination country. When the market required profitability rate is a certain value – e.g. 5% - there is no need to move all manufacturing to the new EU country, but only such a portion which allows to achieve the required profitability rate.
7. Important factor is the share of labor in manufacturing costs. It is illustrated by high sensitivity of the index to this variable. Moving manufacturing from Germany is extremely profitable just because of high share of labor in the manufacturing gross value added reaching 0,72 in 2002. On the opposite moving production from Finland (with 0,57 share) and Austria (with 0,56 share) does not provide so high benefits like from

- Germany. Surprisingly France (opposite to common French complaints on tax rates in Central Europe) does not possess too high share of labor costs in the product. The share of labor in manufacturing gross value added reached 0,59 in 2002 in this country, what is satisfactory result in the whole classification.
8. The estimations create especially bad news for countries with high labor costs and high share of labor in the product like Germany and Denmark. Moving manufacturing from those countries is the most profitable. The problem of those countries is not only too high labor costs level but also high share of labor in production. It may mean that labor is over valued in those countries or extensively used. In the case of Denmark exchange rates of crown to euro could be also an issue.
  9. As was estimated and presented above, Central Europe overall increased tax and social competitiveness in the pre-accession period of 1998-2004. All Central Europe countries represent significant potential in this area of attracting FDI. It seems that the tax and labor cost advantages are so high that there no sense to move production outside the Union (e.g. to Asia).
  10. The presented estimations have also large significance for American and Japanese companies which possess their production facilities in European Union. To maintain their competitiveness they would be forced to move at least a portion of their production facilities from Western to Central Europe or elsewhere. Those who would not do this would have profitability problems soon.

### **Bibliography:**

- Baldwin R.E., Krugman P., *Agglomeration, Integration and Tax Harmonization*, National Bureau of Economic Research, Working Paper 9290, Cambridge 2002
- Bond S., Chennells L., *Corporate Income Taxes and Investment: A Comparative Study*, The Institute for Fiscal Studies, London 2000
- Bond S., Chennells L., *Corporate Income Taxes and Investment A Comparative Sstudy*, Institute for Fiscal Studies London 2000
- Bruno M.: *Domestic Resource Costs and Effective Protection: Clarification and Synthesis*, "Journal of Political Economy" 1963, No 80, (Jan.-Feb.)
- Chennells L., Griffith R., *Taxing Profits in a Changing World*, The Institute for Fiscal Studies, London 1997
- Deregulation Needs for Tax Systems in Central Europe*, Bak M., Kulawczuk P., Szcześniak A. at alia, Institute for Private Enterprise and Democracy Warsaw, Institute for Market Economics Sofia, Institute for Liberal Studies Bratislava, 1998
- Deregulation of the Tax System in Poland*, Bak M. Kulawczuk P., Szczeniak A., Hampel I., Institute for private Enterprise and Democracy, Warsaw 1997
- Desai M.A., Hines Jr. J.R., *Foreign Direct Investment in a World of Multiple Taxes*, National Bureau Of Economic Research, Working Paper 8440, Cambridge 2001
- Devereux M.P., Griffith R., *The taxation of discrete investment choices*, Institute for Fiscal Studies, Working Paper 98/16, London 1998
- Devereux M.P., Lockwood B., Rodano M., *Do Countries Compete over Corporate Tax Rates?*, University of Warwick, April 2002
- Devereux M.P., Griffith R., *The taxation of discrete investment choices*, Institute for Fiscal Studies, Working paper 98/16, London 1998.
- Easson A., *Duty Free Zones and Special Economic Zones in Central and Eastern Europe and the Former Soviet Union*, "Tax Notes International" February 1998
- Harmful Tax Competition: An Emerging Global Issue*, OECD, Paris 1998
- Heady C., Rajah N., Smith S., *Tax reform and economic transition in the Czech Republic*, "Fiscal Studies", vol. 15, 1994
- Hines Jr. J.R., *Tax Policy and the Activities of Multinational Corporations*, National Bureau of Economic Research, Working paper 5589, Cambridge 1996
- Mendoza E. , *The International Macroeconomics of Taxation and the Case Against European Tax Harmonization*, National Bureau of Economic Research, Working paper 8217, Cambridge, April 2001
- Pearson R.: *Net Profitability, Domestic Resource Costs, and Effective Rate of Production*, Food Research Institute, Stanford University 1973.

Sedmířradský M., Klazar S., *Tax Competition for FDI in Central –European Countries*, Univeristy of Economics Prague, Prague 2001  
Statistical materials and data of OECD, Eurostat, OPEC, GUS  
*Structures of the Taxation Systems in the European Union*. European Commission Directorate General Taxation and Customs Union, Luxembourg 2004  
Treaty Establishing the European Community, “Official Journal of the European Community” 325 of 24 December 2002  
Wilson J.D., *Theories of Tax Competition*, “National Tax Journal”, June 1999