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# Capital Mobility and Tax Competition between Old and New EU Member States

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*30 June, 2007*

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**Abstract**

Accession of new member states with lower corporate taxation has raised fears on tax competition within enlarged Europe. This paper addresses this issue by calculating effective tax rates and showing relative tax burden in the new and old member states. Then, the issue of tax competition and its effects on investment is examined indirectly by looking at the responsiveness of FDIs to taxation. The tax competition is also examined directly by testing tax mimicking behaviour among the EU countries.

The study confirms that both effective and statutory taxation motivates investment decisions within the enlarged Europe; along with relative prices of labour, size of the sending and the receiving countries and geographical distance between them. However, the influence of taxation over capital flows is different from what one might have expected. Response of FDI flows to relative tax rates seems to be asymmetric. We found no proof for FDIs flowing from old to new member states motivated by lower tax rates. It was found though that higher than at home statutory and effective tax rates discourage FDI outflow. This effect is especially visible in case of relatively small capital flows originating in new EU countries.

Even though investors do not seem to react to lower taxes in new EU member countries, it seems that governments nevertheless compete in setting statutory tax rates. Lower statutory and effective tax rates of other countries seem to motivate governments to cut their own statutory CIT rates. This effect is stronger for new member countries.

**Keywords** : corporate taxation, FDI determinants, tax competition, effective tax rates

**JEL classification**: H25, F21, H87

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# Contents

On the back of 2004 EU enlargement the topic of corporate income tax competition and potential harmonization has gained renewed attention. The main reason for this debate is observed fall in corporate tax statutory rates. In the environment of increasingly mobile capital it is believed that freedom in setting corporate tax rates can produce a harmful tax competition between member states because differences in tax regimes can influence companies' investment decisions and distort competition.

This debate is not new. Although corporate taxation remains within the competences of individual member states, there have been various attempts over the years to seek harmonization in this area. Numerous studies have been carried out[1] all concluding that large variations in corporate tax rates hampered the functioning of the internal market and that harmonization was desirable. However, these recommendations were rejected at the political level and little progress has been observed. Instead, some small steps have been taken, notably three corporate tax directives have been adopted: the parent/subsidiary directive, the mergers directive and the interest and royalties directive. More recently, efforts have shifted toward harmonizing the tax base (EC, 2004) or tax coordination for cross-border operations (EC, 2007a).

With the EU enlargement the potential tax competition between old and new member states (NMS) heated the debate. This paper will try to shed some light on this topic by taking a closer look at issues related to corporate income taxation in the new member states and FDI flows within enlarged Europe. Particularly, the objective is to calculate measure of effective taxation and examine empirically whether tax competition actually exists between old and new EU member states.

This paper is organized as follows. Section 1 summarizes the main hypotheses from tax competition theory. Section 2 presents some stylized facts about new and old member states to identify how different are NMS and their corporate tax pattern from the EU-15 countries. Section 3 addresses a number of methodological issues concerning effective taxation. Calculations of corporate effective tax rates are presented for the whole sample. Section 4 contains empirical work on tax competition by applying two methods. First, with indirect approach the relation between FDI vis-à-vis nominal and effective taxation is tested. Then, tax reaction function is examined. The last section concludes.

## 1. Tax competition theory

Tax competition debate has started with model developed by Tiebout (1956). The model examines competition among regions over mobile households. It is assumed that households select the region according to their preferences for the mix of taxes and public expenditures. Tiebout argues that competition for mobile households is welfare enhancing. Subsequent works have applied similar ideas to competition for mobile firms. EU integration follows the conclusions from Tiebout model applied at the government level.

Liberalization of foreign exchange laws, which accelerated in 1980s led to increased capital mobility and as a result increased competition between countries over capital. At the same time theoretical models of tax competition identified fiscal externalities among countries competing over mobile capital. Standard tax competition model assumes that rise in capital tax rate of one region brings benefits to other regions by increasing their capital supplies, and hence their revenues. As a result taxes are set too low resulting in underprovision of public goods and fall in welfare. This result holds although governments act in the best interest of their countries. Thus, tax competition is harmful and some tax coordination among countries may improve welfare (Janeba, Schjelderup). Unemployment may provide an additional incentive for wasteful tax competition, since governments benefit from the employment generated by additional capital (Huang, 1992).

[1] Including the 1953 Tinbergen Report, the 1962 Neumark Report, the 1970 van Tempel Report, and the 1992 Ruding Report.

The negative effects of tax competition may be mitigated if governments increase those public inputs that enhance productivity of capital. Resulting spillovers may reduce the undersupply of public goods but not alleviate it. Hence, the analysis should differentiate between the sizes of competing countries. Tax competition among small countries drives tax rates to zero, but equilibrium tax rates will be positive if large regions compete. If regions are large enough to influence the equilibrium after-tax return on capital, then the governments have weak incentives to bid for capital. Thus, a large region's optimal tax system includes a tax on capital income higher than in small countries. Finally, theory indicates that any country playing host to an agglomeration can have higher tax on capital and these countries may gain from tighter economic integration.

Theoretical contributions identify efficiency enhancing role for tax competition. Positive effects appear in the models with imperfectly competitive market structures, government commitment problems and political economy considerations (Wilson, 1999). If two governments compete by offering subsidies to firms, some tax competition improves welfare, as the governments recognize its policy affects not only output decisions, but also location decisions (Janeba, 1998). Commitment problems provide another possible role for tax competition as an efficiency-enhancing activity. When the government has commitment problems the equilibrium outcome is excessive firm turnover, which may be mitigated by tax competition.

Tax competition is welfare improving also in political economy branch of the literature, which presents tax competition as curbing the rent-seeking activities of government officials. In the absence of tax competition the size of government would be excessive. Precisely, the outcome of tax competition models based on public choice theory depends on an assessment of the relative strength of Leviathan versus Benevolence (Janeba, Schjelderup).

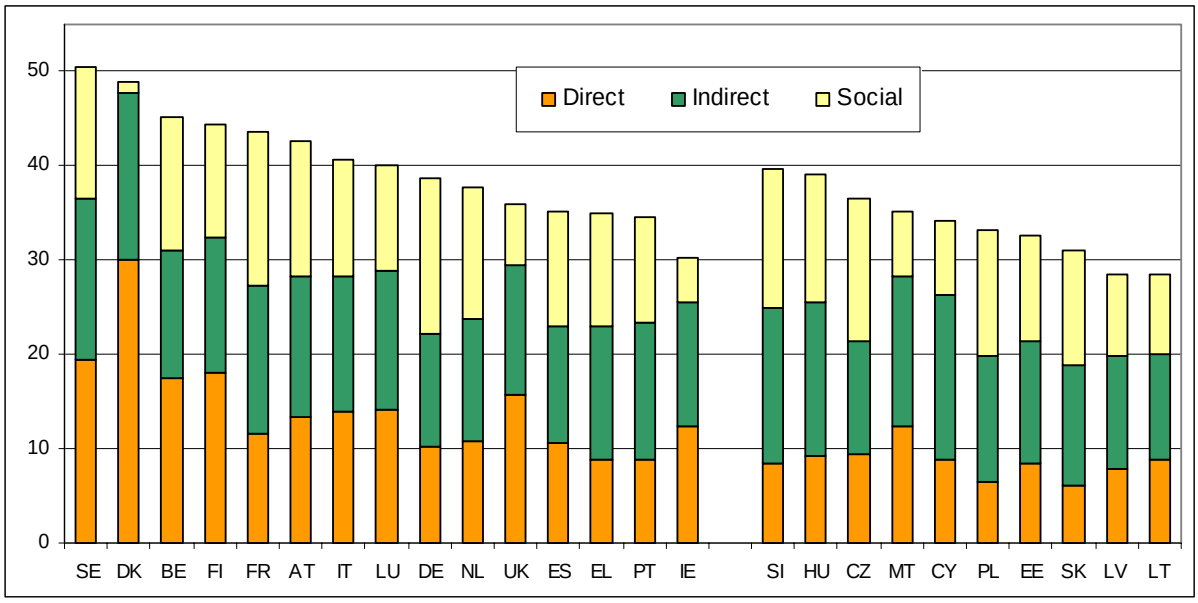
Tax competition not always results in low taxation. Literature identifies two types of tax competition producing inefficiently high taxes: vertical (between different levels of government, each level imposes taxes on the same tax base, tax increases now create negative externalities, rather than positive) and with double taxation conventions. However, as noticed by Wilson (1999) these conclusions may be too hasty.

To sum up, literature is divided in the view on tax competition. Only the models where tax competition leads to inefficiently low taxes due to positive externalities, and reduces welfare, may support the notion that international cooperation between countries (i.e. like in the EU) can alleviate the downward pressure in tax rates and leave all countries better off. But there is also a whole group of models with welfare-improving effects of tax competition.

## 2. How different are new member states?

The new member states are generally characterized by lower tax to GDP ratios than the old members (Figure 1). The average ratio of tax-to-GDP in the NMS-10 countries was 33.7% in 2004 compared to 40.2% in the EU-15 (all new member states were below the average of the old member states). The tax structure differs as share of direct taxes is lower in new member states, at the expense of higher social and subsequently indirect taxation.

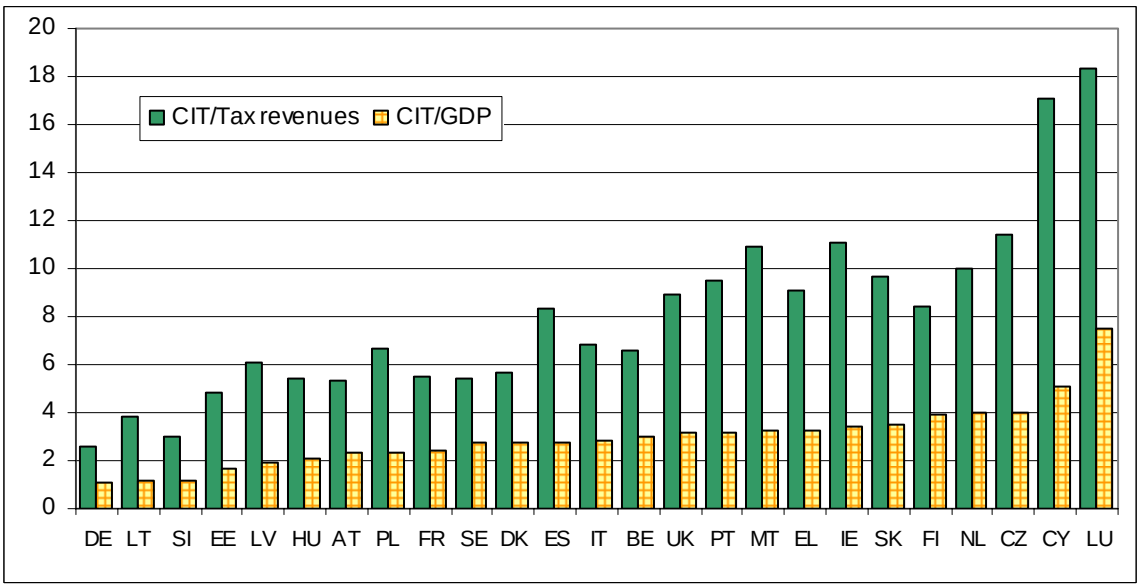
Figure 1: General government tax burden in the EU in 2004 (% of GDP)




Source: EC, 2006

The share of corporate taxation in tax revenues differs across countries and it is not possible to differentiate between old and new MS. For Baltic countries, Slovenia and Germany corporate taxes are below 2% of GDP, whereas for Cyprus and Luxemburg the revenues from corporate taxes amount to above 4% of GDP.

Figure 2: The role of corporate taxation in the EU, average 1995-2004




Source: EC, 2006

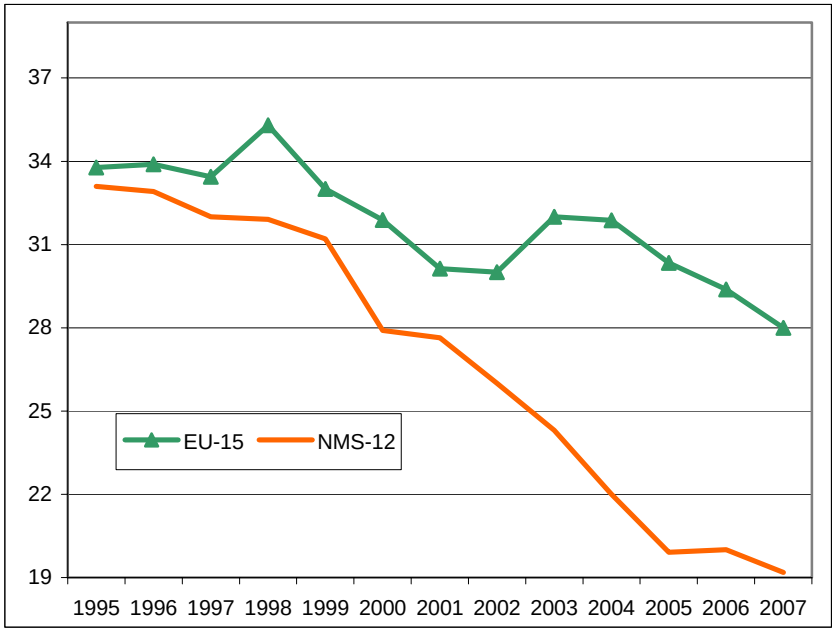
It is worth to stress that companies are taxed also under the PIT system: in Germany 85% of companies do not pay corporate taxes (Nicodeme, 2001) and in Poland the figure is 93%. Conclusions on corporate tax burden should combine these two effects, however in this paper we concentrate on corporate taxation only.

Over the last decade both old and new member states decreased statutory CIT rates and broadened the tax bases, but while this was associated with declining tax revenues in the NMS, they remained broadly stable as proportion of GDP in EU-15. For old member states effective tax rates fell

for profitable projects but remained fairly stable for projects that just break even or make low profits (Griffith and Klemm, 2004).

In 2007, average nominal tax rate in the NMS is by nine percentage points lower than in the old member states, with the difference growing over the last decade (Table 1). During 1995-2007 the average statutory rate in old member states fell by 5.8 percentage points and in NMS by 13.9 percentage points (Figure 3). One of the reasons was the motivation of NMS to adjust their tax systems and cancel these tax incentives which were in conflict with the European Law. The NMS pattern of capital allowances and treatment of losses was converging to EU practices. There were some differences in valuation of inventories for tax purposes, although they have also decreased (WB, 2004; Jacobs 2003, 2004). NMS granted various tax incentives to foreign investors, but as far as most of them were in conflict with the European law, they had to be abandoned. With this remark in mind, the fall in statutory rates to some extension had to compensate for broadening of the tax base.

Figure 3 Average statutory tax rates on corporate income, 1995-2007




Source: EC, 2007b; KPMG, 2007.

The trend to decrease statutory rates continues. In 2007 some old MS lowered their corporate taxation level, specifically Greece, Spain, Netherlands and Portugal cut their rates. Moreover, Estonia reduces its rate by 1 pp annually to achieve 20% in 2009. Slovenia, which resisted the pressure for tax cuts for decade in 2007 decreased it by 2 pp. Judging by numbers one could note that we observe some kind of *race to the bottom* in corporate taxation. The dynamics of this process accelerates. Accession of Romania and Bulgaria in 2007 increases the competition for investments and jobs as the corporate taxation rates in these countries are below the EU level: in Bulgaria the government reduced the corporate tax rate from 15% in 2006 to 10% in 2007 and in Romania a flat rate of 16% for income and corporate taxes was introduced in 2005. Although the cuts in statutory corporate rates are significant it is not clear if result in higher capital inflow.

There is no clear link between statutory CIT rates and revenues raised from corporate taxes, what indicates the role of effective taxation. The good example is Germany with high tax rates and limited revenues and on the opposite Ireland with low rates and relatively high revenue level. It indicates the potential role of effective taxation in generating budgetary revenues. However, the effective tax rates are not observed and therefore do not influence the common perception of the real tax burden.

Table 1: Top statutory tax rates on corporate income in the EU-27, 1995-2007

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Belgium | 40.2 | 40.2 | 40.2 | 40.2 | 40.2 | 40.2 | 40.2 | 40.2 | 34 | 34 | 34 | 34 | 34 |
| Denmark | 34 | 34 | 34 | 34 | 32 | 32 | 30 | 30 | 30 | 30 | 28 | 28 | 28 |
| Germany | 56.8 | 56.7 | 56.7 | 56 | 51.6 | 51.6 | 38.3 | 38.3 | 39.6 | 38.3 | 38.7 | 38.7 | 38.7 |
| Greece | 40 | 40 | 40 | 40 | 40 | 40 | 37.5 | 35 | 35 | 35 | 32 | 29 | 25 |
| Spain | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 32.5 |
| France | 36.7 | 36.7 | 41.7 | 41.7 | 40 | 37.8 | 36.4 | 35.4 | 35.4 | 35.4 | 35 | 34.4 | 34.4 |
| Ireland | 40 | 38 | 36 | 32 | 28 | 24 | 20 | 16 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 |
| Italy | 52.2 | 53.2 | 53.2 | 41.3 | 41.3 | 41.3 | 40.3 | 40.3 | 38.3 | 37.3 | 37.3 | 37.3 | 37.3 |
| Luxemburg | 40.9 | 40.9 | 39.3 | 37.5 | 37.5 | 37.5 | 37.5 | 30.4 | 30.4 | 30.4 | 30.4 | 29.6 | 29.6 |
| Netherlands | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 34.5 | 34.5 | 34.5 | 31.5 | 29.6 | 25.5 |
| Austria | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 25 | 25 | 25 |
| Portugal | 39.6 | 39.6 | 39.6 | 37.4 | 37.4 | 35.2 | 35.2 | 33 | 33 | 27.5 | 27.5 | 27.5 | 26.5 |
| Finland | 25 | 28 | 28 | 28 | 28 | 29 | 29 | 29 | 29 | 29 | 26 | 26 | 26 |
| Sweden | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| United Kingdom | 33 | 33 | 31 | 31 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | | | | | | | | | | | | | |
| Bulgaria | 40 | 40 | 40.2 | 37 | 34.3 | 32.5 | 28 | 23.5 | 23.5 | 20 | 15 | 15 | 10 |
| Czech Republic | 41 | 39 | 39 | 35 | 35 | 31 | 31 | 31 | 31 | 28 | 26 | 24 | 24 |
| Cyprus | 25 | 25 | 25 | 25 | 25 | 29 | 28 | 28 | 15 | 15 | 10 | 10 | 10 |
| Estonia | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 24 | 23 | 22 |
| Latvia | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 22 | 19 | 15 | 15 | 15 | 15 |
| Lithuania | 29 | 29 | 29 | 29 | 29 | 24 | 24 | 15 | 15 | 15 | 15 | 19 | 18 |
| Hungary | 19.6 | 19.6 | 19.6 | 19.6 | 19.6 | 19.6 | 19.6 | 19.6 | 19.6 | 17.6 | 17.5 | 17.5 | 18.6 |
| Malta | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| Poland | 40 | 40 | 38 | 36 | 34 | 30 | 28 | 28 | 27 | 19 | 19 | 19 | 19 |
| Romania | 38 | 38 | 38 | 38 | 38 | 25 | 25 | 25 | 25 | 25 | 16 | 16 | 16 |
| Slovenia | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 23 |
| Slovakia | 40 | 40 | 40 | 40 | 40 | 29 | 29 | 25 | 25 | 19 | 19 | 19 | 19 |

Existing surcharges and local taxes are included.
Source: EC, 2007b; KPMG, 2007.

## 3. Effective tax rates

Statutory rate is only one factor among all determining tax burden. Regulations concerning the tax base are even more important as they provide instruments to differentiate between types of activity and operations. To capture real effects of corporate taxation one should apply the nominal rates to real tax base. Following OECD (2002) for the purpose of computing taxable profits, income may be subject to adjustment for exemptions (income excluded from the tax base), allowances (amount deducted from the gross income to arrive at taxable income), rate relief (a reduced rate of tax applied to a class of taxpayers or activities), tax credits (amount deducted from tax liability), and tax deferral (a relief which taxes the form of a delay in paying taxes). It is common to apply all above mentioned measures. As a result the tax base is influenced by depreciation schemes, treatment of losses and valuation of inventories among others. Another factor determining real tax burden is efficiency of tax revenue office. Thus, effective corporate tax rates differ from announced statutory rates.

### *Methodology of calculating effective tax rates*

There are different methodologies for computing effective corporate tax rates, which may be divided into backward- or forward-looking approach. Backward-looking measures use historical data from firms' financial statements (micro) or from national accounts (macro). Using macro data, effective corporate tax rates are calculated as ratios of taxes paid by corporations from the national accounts on a measure of the tax base which can be aggregate domestic corporate profits, corporate gross operating surplus, gross domestic product, or gross profits reported by CIT payers in tax settlements (Jacobs et al, 1999). This approach was applied first by Mendoza et al. (1994) and subsequently by Martinez-Mongay (1997). It is also possible to compute effective tax rates using a micro forward-looking approach, where the tax burden is calculated for a hypothetical future investment project over the assumed life of the project: the effective marginal tax rate (EMTR) measures the extra tax of a marginal investment project (King and Fullerton 1984). Such calculations

are based on the assumption of capital market equilibrium and optimal investment behaviour where the marginal benefits equal the marginal cost (the project generates only market interest rate). The EMTR can be calculated for the corporation alone or including shareholders, using alternative shareholder taxation, asset types and financing sources. When a project earns more than the capital cost, the effective average tax rate (EATR) can be calculated as the ratio of future tax liabilities to pre-tax financial profits (present value terms) over the estimated life of the project. The EATR can also be calculated for an existing capital stock.

Any approach has its shortcomings. As concerns macro approach the following caveats should be raised: (i) there might be mismatching problems regarding numerator and denominator of the ratio (Nicodeme, 2001); (ii) unincorporated companies often fall under the PIT leading to underestimation of effective corporate taxation; (iii) the corporate operating surplus may include interest, rents, and royalties paid by corporations, while taxes on these sources of income are paid by private owners and do not appear in the numerator; (iv) aggregate gross operating profit usually also includes revenues from agriculture and forestry, royalties or rentals, capital assets and tax-exempt institutions, which blurs the results as some of these taxes are paid by private savers; (v) there may be timing problems in data collection as taxes are levied on previous year profits, and tax receipts can by reduced by loss carry-forwards; and (vi) aggregate profit data include loss-making firms, leading to overestimation of effective tax rates. While there may be forces biasing the results in different directions, on the whole such measures are likely to be downward biased, underestimating effective taxation.

The forward-looking approach is the most appropriate when analyzing incentives for undertaking new investment projects, but application of the EMTR is limited by the fact that in practice only those projects with a rate of return above the cost of capital are realized. EATR is a more suitable concept when an investor has to choose between few projects generating economic rents, but it can also be used to evaluate the choice of a country for foreign investors (WB, 2004). EMTR aims to assess the allocation efficiency of a tax system, when EATR measures the impact of taxation on managerial decisions. Both forward-looking measures are derived from models and conclusions are valid only under the assumptions of these models. Forward-looking studies can not control for tax enforcement.

In theory, in order to measure the impact of taxes on future earnings, forward-looking measures should be preferred as an investment consists of present and future cash flows. However, in practice there may be reasons why backward-looking measures capture important variation in tax rates (Devereux, Griffith, 2002). Applying forward looking measures may result in difficulties to reflect certain complexities of the tax system. Concluding, none of forward-looking concepts is good for the purpose of tax competition, it rather applies to investment choice problems. Therefore, in further analysis we concentrate on macro-backward approach, keeping in mind all the shortcomings and potential downward bias.

### *Existing calculations*

*Forward-looking approach*

There are only few comprehensive studies on NMS providing limited time series. Jacobs et al (2003, 2004) calculated the effective marginal and average corporate rates for NMS at the subsidiary level and at the parent company level located in Germany. The results indicate that the effective tax rates at the subsidiary level are lower than statutory rates with the exception of Hungary in 2004 (Table 2). With data for 2003 and 2004 we observe that in the group of new member states only in Czech Republic the effective rate is growing (whereas the nominal rate felt). Other countries decreased the effective taxation but to lesser extent than the fall in nominal rates what indicates some tax base increase. The underlying reason for the fall in effective taxation from the German company level is cancellation of withholding taxes on dividends as of 1 May 2004.

Table 2 Effective marginal tax rates in the new EU member states, 2003-2004

| | EATR at subsidiary level | | EATR at German parent company level | |
|---|---|---|---|---|
| | 1 Jan 2003 | 1 Jan 2004 | 1 Jan 2003 | 1 Jan 2004 |
| Czech R. | 24.18 | 24.73 | 31.86 | 26.70 |
| Estonia | 22.52 | 22.52 | 24.57 | 24.53 |
| Hungary | 19.37 | 18.08 | 24.85 | 20.18 |
| Latvia | 17.76 | 14.35 | 23.36 | 16.53 |
| Lithuania | 13.11 | 12.82 | 15.36 | 15.03 |
| Poland | 24.73 | 18.02 | 29.84 | 20.13 |
| Slovakia | 22.10 | 16.67 | 27.39 | 18.80 |
| Slovenia | 21.60 | 21.60 | 33.42 | 23.63 |

Source: Jacobs et al (2003), Jacobs et al (2004)

Bellak et al (2005) calculated effective average bilateral tax rates for seven home countries and five new member states for the period 1996-2004. The main message is substantial differences in the variability of the statutory and bilateral average effective tax rates.

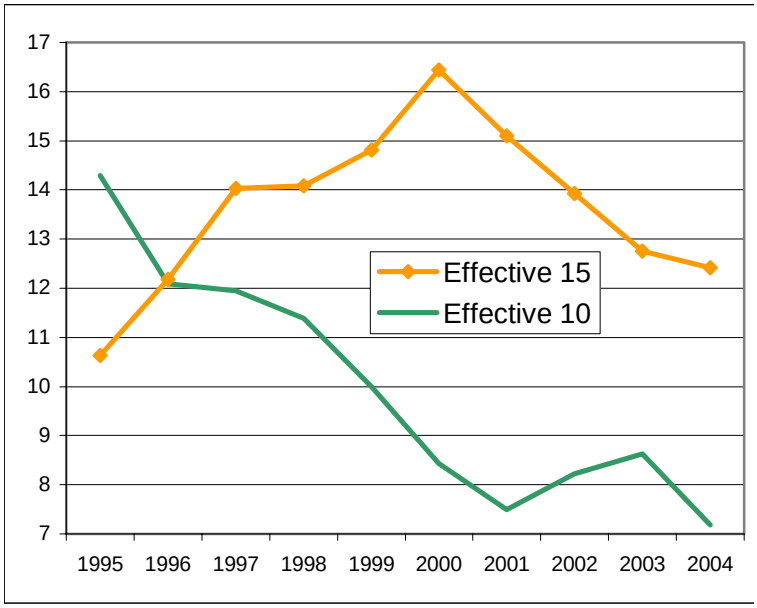
*Backward-looking approach*

Similarly, while there is a bulk of empirical literature on effective tax rates applying the macro backward-looking approach, only two studies that were found refer to the new member states (for the period 1993-98 see Leibrecht et al, 2002; WB, 2004). In this section we present our own results using the same approach on the most recent available data. The data on corporate tax revenues were extracted from the European Commission database (EC, 2006), while the tax base is represented by the gross operating profit of financial and non-financial corporations from the AMECO database of the EC (both using ESA95). The gross operating surplus measures profits before depreciation, thus eliminating the distortion from differences in depreciation rules. The same concerns interest, and consequently the method of investment financing does not matter for the results. Keeping in mind the pitfalls of this measure and its likely downward bias, the results are shown in Table 3.

The results confirm conclusions from other studies: in the second half of the 1990s, effective corporate tax rates were growing in the EU-15, but falling in NMS. Since then, both trends reversed and some convergence was taking place. This was mainly motivated by the EU accession and cancellation of many exemptions. This reflects falling statutory CIT rates and broadening tax base. However, in the accession year the NMS started to decrease the effective taxation again.

Note that at the beginning of the analyzed period, effective rates in the EU-15 were lower than in the EU-10, although nominal rates would suggest the opposite.

Figure 4 Effective tax rates on corporate income in EU-15 and EU-10: macro backward-looking approach (%), 1995-2004




Source: Authors' calculations

Table 3: Effective corporate tax rates in the EU (macro backward-looking approach), 1995-2004

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|
| Belgium | 11.0 | 13.2 | 13.7 | 16.3 | 15.9 | 15.4 | 15.5 | 14.7 | 13.8 | 14.3 |
| Denmark | 11.3 | 12.4 | 13.0 | 15.6 | 12.2 | 15.1 | 13.8 | 14.6 | 14.0 | 15.3 |
| Germany | 4.6 | 6.0 | 6.2 | 6.0 | 7.0 | 8.2 | 2.8 | 2.8 | 3.2 | 3.9 |
| Greece | 14.1 | 12.9 | 17.7 | 20.9 | 22.2 | 27.5 | 21.6 | 22.6 | 18.1 | 18.3 |
| Spain | 8.8 | 9.6 | 12.9 | 12.0 | 15.3 | 16.1 | 14.8 | 16.8 | 16.0 | 18.0 |
| France | 10.6 | 12.2 | 13.6 | 13.1 | 16.0 | 16.1 | 18.1 | 14.7 | 12.1 | 14.0 |
| Ireland | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Italy | 12.1 | 13.6 | 15.5 | 9.1 | 11.8 | 9.7 | 12.1 | 10.6 | 9.5 | 9.6 |
| Luxemburg | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Netherlands | 12.9 | 16.1 | 18.0 | 17.9 | 18.9 | 17.6 | 17.4 | 14.7 | 12.3 | 13.3 |
| Austria | 8.5 | 10.7 | 10.9 | 11.1 | 9.2 | 9.7 | 14.7 | 10.8 | 10.5 | 10.2 |
| Portugal | 10.6 | 12.5 | 14.2 | 14.5 | 16.8 | 19.5 | 16.9 | 17.6 | 15.9 | --- |
| Finland | 9.2 | 11.5 | 13.9 | 16.2 | 16.6 | 21.6 | 15.4 | 15.7 | 13.1 | 13.8 |
| Sweden | 11.5 | 13.2 | 14.8 | 14.1 | 16.7 | 21.8 | 17.5 | 13.8 | 14.9 | 17.7 |
| United Kingdom | 11.8 | 13.1 | 16.1 | 16.3 | 15.2 | 15.8 | 16.1 | 11.9 | 12.0 | 12.1 |
| | | | | | | | | | | |
| Czech Republic | 19.4 | 13.8 | 15.5 | 12.3 | 14.2 | 12.7 | 14.8 | 15.9 | 17.3 | 16.7 |
| Cyprus | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Estonia | 13.3 | 7.8 | 8.2 | 9.5 | 8.2 | 3.5 | 2.3 | 3.9 | 5.7 | 6.0 |
| Latvia | 8.7 | 10.8 | 8.0 | 8.0 | 7.1 | 5.2 | 5.7 | 5.4 | 4.4 | 5.1 |
| Lithuania | 5.5 | 4.8 | 6.7 | 5.5 | 3.5 | 2.6 | 1.6 | 1.9 | 4.2 | 5.6 |
| Hungary | 10.3 | 9.8 | 8.9 | 9.9 | 10.2 | 10.3 | --- | --- | --- | --- |
| Malta | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Poland | 22.1 | 20.7 | 19.7 | 18.7 | 15.4 | 13.3 | 11.0 | 10.2 | 9.7 | 9.4 |
| Slovenia | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Slovakia | 22.6 | 16.4 | 14.6 | 14.5 | 12.5 | 12.3 | 10.0 | 11.7 | 11.7 | --- |

Source: Ameco: update 24 April 2006, Eurostat – authors' calculations
Notes: '---' denotes lack of data

## 4. Testing tax competition

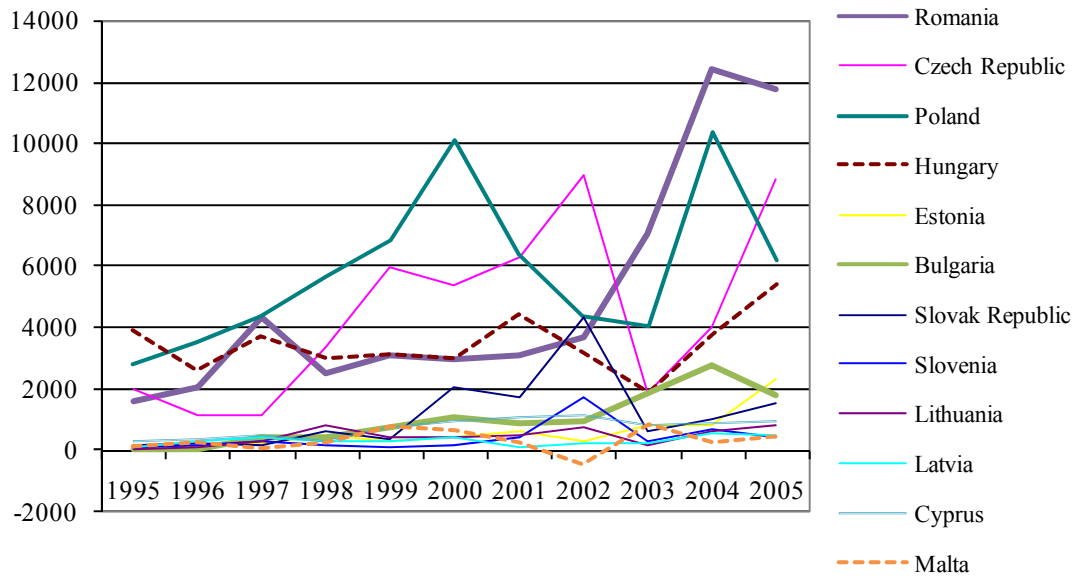
The issue of tax competition can be examined indirectly by looking for the responsiveness of foreign investment to corporate tax rates. It is also possible to estimate direct interdependence in tax setting behaviour as an indicator of tax competition. In this paper we test both.

The empirical literature on the effects of taxes on FDI focuses almost exclusively on the US and the EU-15 data. There are only a few studies on FDI determinants in the NMS and only one of them applies effective taxation. Carstensen and Toubal (2004) apply difference between statutory rates of two countries as variable determining FDI flows for the sample of 1993-1999 and CEECs and conclude that estimated parameter value is small and not significant at the 5% level. The potential explanation was that they did not take into account special tax regimes designed to attract FDI. Application of effective tax rates would address these shortcomings. Tax rates were also examined as FDI determinant by Edmiston et al (2003) who apply two variables: number of special tax rates and the highest statutory profit tax rate. The results indicate that imposition of an additional special tax rate reduces FDI as a percent of GDP and higher tax rates lead to lower inflows of FDI in FSU and CEECs. Again, the variable applied is statutory rate. Lahreche-Revil (2006) adds data on some of the current new members to their EU15 sample, and tries to separate the effects of corporate taxation in the new members for the sample 1990-2002. Tax measure determines the sample: statutory rate (8NMS without Malta and Cyprus), implicit tax rates (Czech, Hungary and Poland) and EATR (Czech, Hungary, Poland and Slovakia). The only strong and general conclusion of the Lahreche-Revil (2006) paper is that taxation may drive relocation, but only within EU15. This factor is rather irrelevant when outflow of FDI from old to new members are considered. Anyway, the approach seems to be very useful in analyzing capital flows from old to new member states. And it is worth to extend the dataset, adjust for the transition economies, and focus exclusively on the "North-South" types of FDI flows. This is what we try to do in this paper.

### *FDI inflows into new member states*

Along with progress in development, foreign investment flows into NMS boosted in 2005, in some countries reaching over EUR10 billion a year (see Figure 5). UNCTAD reports that even in 2000-2002, when overall FDI flows were shrinking each year reflecting slowdown in world largest economies, inflows to NMS increased (UNCTAD, 2004). Indeed, these inflows have been steadily increasing year after year. In the euro terms, the average annual dynamics during 1995-2004 was 9%.[2]

Figure 5: FDI inflows into EU-10+2 in millions of ecu/euro, 1995-2005



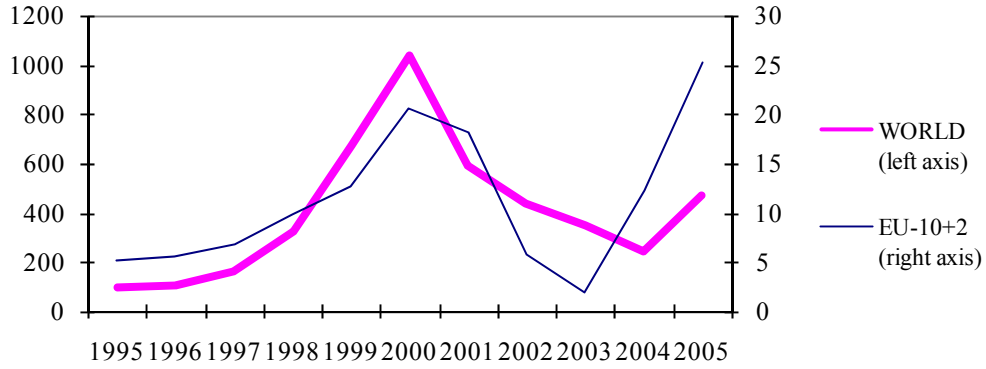

Source: UNCTAD data converted into USD/EUR at average exchange rate

EU-15 countries have been very active in acquiring assets in NMS until 2001, often winning large privatization tenders. FDI from old member states going to the eight largest new members totalled over EUR20 billion in 2000. New inflows have been declining from that year. However, it seems that the accession of the new members in 2004 boosted FDIs from the EU-15 (see Figure 6). What more, it seems that the increased flows into NMS in 2004 were at the expense of other FDI outflows from "old Europe". FDI flows into the NMS increased even more dynamically in the following year.

Nevertheless, the significance of direct investment flows to the NMS was negligible for all outward FDI of Western European economies. Even the high results of 1995-2001 and 2004-2005 were only about 3-5% of total outward FDI investment into equity capital and loans of the EU-15 (see Figure 6). In 2002-2003, EU-15 investment into equity capital and loans in NMS were only around 1% of total outward EU-15 FDI.

[2] On the basis of UNCTAD data. This is the sum of individual inflows into new members depicted on the Figure 5.

Figure 6: EU-15 FDI outflows to twelve new member states, equity investment and loans only, in billions of ecu/euro, 1995-2005




Source: EUROSTAT

Germany is the largest EU investor in the group of EU-8[3], with reported FDI outward stock in 2003 of nearly EUR37 billion in 2004, followed by the France (EUR25 in 2004), the Netherlands (EUR18 billion in 2005), Austria (EUR13 billion in 2003), United Kingdom (EUR8 billion) and Sweden (EUR7 billion). Inflows of direct investment from Western Europe constituted around 75% of total incoming FDI to EU-8+2[4] in 2001-2002 (see Table 4), and in the case of smaller countries have been significant part of overall investment outlays.

Table 4: FDI inward stock in EU-8+2 by largest investing countries, in millions of ecu/euro, 1995-2005

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Germany | 5752 | 7541 | 10288 | 14661 | 18109 | 23763 | 27947 | 29241 | 29964 | 36712 | : |
| France | 1397 | 1858 | 2415 | 3152 | 5248 | 9343 | 13161 | 10789 | 16341 | 24882 | : |
| Austria | 2459 | 2786 | 3376 | 3998 | 4952 | 7238 | 9863 | 12373 | 13122 | : | : |
| Netherlands | 1871 | 2749 | 3557 | 4667 | 7408 | 9114 | 10126 | 10957 | 13853 | 14636 | 18396 |
| UK | 440 | 794 | 2204 | 2573 | 1792 | 2285 | 6861 | 9209 | 9116 | 7346 | 8468 |
| Sweden | : | 232 | 573 | 1055 | 1752 | 3248 | 4922 | 5476 | 4511 | 7220 | 7085 |
| Denmark | : | 523 | : | 1628 | 1324 | 2469 | 3115 | 3201 | 3432 | 3669 | 3920 |
| Italy | : | : | : | : | : | 3550 | 3752 | 3462 | 3736 | 4267 | 4979 |
| Portugal | : | 2 | 17 | 55 | 179 | 271 | 653 | 419 | 392 | 562 | : |
| Finland | 16 | 60 | 70 | 224 | 819 | 1370 | 1512 | 1660 | 2153 | 2355 | 3433 |
| Greece | : | : | : | 464 | 533 | 0 | 705 | 1266 | 1663 | : | : |
| Ireland | : | : | : | : | : | : | : | 7 | : | 15 | : |
| EU15/world | 71% | 75% | 36% | 36% | 72% | 78% | 57% | 62% | 63% | 77% | 75% |
| Intra-EU8+2/ World | 2% | 2% | 1% | 1% | 1% | 1% | 1% | 1% | 2% | 2% | 3% |

Source: calculations on the basis of the EUROSTAT investment position data

Notes: No data on Irish, Belgian, Spanish and Luxemburg FDI outward stocks for EU-8+2 were available.
No data for Malta and Cyprus.
* Last row shows the share of FDI inward stock in all EU-8+2 in percent of total FDI

FDI flows among new member countries are still small (3% of total FDI stock in the CEE region in 2005), yet increased in recent years.

[3] EU-8 denotes all countries that entered the EU in 2004 less Cyprus and Malta.
[4] EU-8 plus Romania and Bulgaria that entered in 2007.

### *Reactions of investors to differences in corporate taxes - gravity model*

The issue of tax competition is examined with the use of the gravity model. Bilateral flows from the source to the destination countries are regressed on the set of potential determinants of FDI flows, traditional gravity variables and taxation.

The gravity equations have been traditionally used in determining trade flows (see for example McCallum, 1995 or Bergstrand, 1989). The assumption was that the bilateral flows are heavily influenced by the structure of two trading economies and by the distance between them. In more recent years, the gravity setting has been increasingly used also in studying the determinants of capital flows (Eaton and Tamura, 1996, Bloningen and Davies, 2000, 2002, Portes and Rey, 2000; after Lahreche-Revil, 2006). The obvious advantage for using the gravity model here, is that we get relatively large number of observations, while examining the period of ten years only.

The only paper that we found so far and that study the similar subject, *i.e.* tax competition between the old and new member states with the use of the gravity setting, is the working paper by Lahreche-Revil (2006, described in section 4 above). Here, we follow the approach of Lahreche-Revil (2006), yet depart from it in several dimensions.

Our starting regression equation is the following:

$$\log(fdi_{ijt}) = \alpha + \beta_1(t_{it}/t_{jt}) + \beta_2(eff_{it}/eff_{jt}) + +\beta_3\log(GDP_{jt}) + \beta_4\log(GDP_{it}) + \beta_5\log(dist_{ij}) +$$
$$+ \beta_6 border_{ij} + \beta_6(ulc_{it}/ulc_{jt}) + \beta_7\log(ginv_{jt}) + \varepsilon_{ijt}$$

where $fdi_{ijt}$ denotes the flow of direct investments from country $i$ to country $j$ observed as of period $t$. While estimating bilateral investment flows, we considered FDI outward flows financed with equity and other capital. As "other" flows consist mainly of loans and repayments from/to mother companies and Eastern European subsidiaries, there is a possibility of obtaining negative flows (when repayments are large and larger than loans and equity inflows). This means that some observations have to be excluded, because they cannot be logarithmically transformed. In our sample, this approach resulted in the exclusion of 6% of observations on FDI flows. Data on FDIs were taken from EUROSTAT. EUROSTAT compiles data mainly from the member states' balance of payments, making necessary adjustments so the statistics are more comparable than national data.

*Tax variables*

The tax variables of our interest that can potentially influence capital flows are the ratios of respective tax rates between the old and the new member states, represented as $t_{it}/t_{jt}$ and $eff_{it}/eff_{jt}$. $t_{it}/t_{jt}$ are the ratios between the statutory tax rates between the source ($i$) and the destination country ($j$). $eff_{it}/eff_{jt}$ are the similarly computed differences in effective tax rates. These two measures are not correlated (see Appendix 3), so it is possible to examine their effects simultaneously. The slope parameters $\beta_1$ and $\beta_2$ capture the relationship between fiscal incentives and FDI flows. If there is some tax competition observed these parameters will be positive and significant (for example large difference in tax rates between the old and the new member states should motivate FDI into new members). The effective tax rates were calculated for the whole sample with macro-backward approach (see section 3 of this paper).

*Traditional FDI determinants*

When deciding about control variables, we looked through the factors suggested by the theory of the determinants of foreign direct investment (usually reflecting determinants of "North-North" type of investment) and on available evidence on FDI determinants specific for transitional countries. Moreover, there was a need for parsimonious specification. With few observations the number of control variables had to be reduced to the ones of critical importance.

Along the lines of "eclectic theory of FDI" by Dunning, direct investment goes where it can possess specific advantages (ownership, location, internalization). Later works of the same author

suggest that FDI flows can be characterized according to the predominant motives of investors as ones that seek markets, resources, and/or efficiency (Dunning, 1993, after Kinoshita, 2004). Assuming that all these motives have influenced FDI flows into NMS, they should influence aggregate FDI figures as well.

Thus, we decided to include market size variable, as the one that motivates horizontal FDI flows into NMS. We expected that this variable should positively and significantly influence FDI inflows, as most of this kind of investment that has been flowing into NMS since mid-1990s has been of the horizontal nature and as larger countries are expected to attract more inflows. $GDP_{jt}$ - GDP expressed in euro – measures the size of the destination country.

The resource-seeking motive and the empirical works on FDI determinants suggest that low-cost labour should also influence aggregate investment flows. Hence, we included labour cost variable in our model, measuring also the relative abundance of labour in each of the host countries vis-à-vis the home countries[5]. $ulc_{it}/ulc_{jt}$ are the ratios of unit labour costs that are supposed to capture the resource-seeking FDI motive. Lower cost of factors of productions should attract vertical FDIs, once the transport and transaction costs are low enough (like in the new members where the transport and transaction costs vis-à-vis the EU15 should have decreased).

The relative cost of capital was ignored, as it has been often found as insignificant even in the "North-North" type of FDI (see: de Santis *et. al*, 2004). Similarly, we do not expect human capital neither R&D achievements of NMS relative to old member states to play any role while locating investment in 1995-2003.

As these are bilateral flows that are considered, a variable measuring the size and the economic potential of the sending country was also included ($GDP_{it}$, sending country's GDP). Following Lahreshe-Revil (2006), there is evidence that large countries are expected to invest more abroad. Hence, the positive sign was also expected here.

We also included $ginv_{jt}$ – public capital expenditures in percent of GDP; in the host country. It is expected that if governments of the NMS are spending more on public investment (improving infrastructure), it is going to attract FDI. The positive sign is expected. However, we feel that at present the variable is yet the imperfect approximation of infrastructure improvements.

We also tried to introduce "transition index" measuring the general level of development. However, it was highly correlated with our market size variable, and was excluded from the model.

Last but not least, we checked what have been the motivations of foreign investment decisions in the NMS over the last years. The predominant drive, as declared by foreign investors, has been – at that time – future EU membership (UNCTAD, 2004), followed by other factors that we included in the model. The perspectives of EU membership are controlled here by the choice of host countries, with all of them having the prospects of EU membership during the considered period. On the top of it, the date of the EU entry of some of the majority of the NMS was controlled with the use of time dummies.

*Traditional gravity variables*

Traditional gravity variables measuring distance from capital cities between the sending and receiving countries ($dist_{ij}$) and the existence of common border ($border_{ij}$) were also included. The variable $border_{ij}$ is a dummy that takes the value of 1 if there exists a common border, and 0 otherwise.

[5] For details on construction of variables see Appendix 1.

### *Results*

#### Basic specification

Panel data technique with time fixed effects was applied. We consider flows between the old and new member countries (both ways) as well as intra-NMS flows. Data covered the period 1996-2005. Due to missing data, some observations had to be dropped, so at the end the estimations were performed on 97 bilateral flows (out of 492 possible). This was primarily due to the fact that FDI outflows from NMS are low and infrequent.

The estimation of our basic equation suggests that "traditional" gravity variables and differences in statutory tax rates have directed FDI flows to and from NMS (see Table 5). It suggests that investors – apart from the economic potential and distance – look at the nominal taxation when deciding about moving capital to and from the region. It is possible that this is the information that is easily available upfront, and perhaps it can be a motive. On the other hand, it is a bit surprising that differences in effective taxation do not seem to matter. Perhaps the backward looking measure is the reason for that.

The result stays robust after the sample is prolonged to include the observations from 2005. However, in this case the information on effective tax rates had to be skipped, as this data ends in 2004.

Table 5: Estimation results for intra- and extra-NMS FDI flows, basic specification, 1996-2005

| Estimation period | 1996-2004 | | 1996-2005 | |
|---|---|---|---|---|
| Relative nominal CIT rates | 1.00381* | (0.55077) | 0.73377* | (0.44461) |
| Relative effective CIT rates | -0.11674 | (0.20722) | | |
| Sending country GDP | 0.34007* | (0.19403) | 0.56966** | (0.16552) |
| Receiving country market size | 0.52897** | (0.21718) | 0.42603** | (0.19957) |
| Differences in labour costs | 1.22445 | (1.17233) | 0.44616 | (0.44616) |
| Public investment in % of GDP | 0.81649* | (0.46982) | 0.08710 | (0.08710) |
| Distance | -0.96637* | (0.54870) | -0.99004* | (0.52176) |
| Common border | -0.41609 | (0.79636) | -0.46844 | (0.79610) |
| AR(1) | 0.61622** | (0.04887) | 0.69231** | (0.039188) |
| Constant | 4.81398 | (3.95901) | 5.58393 | (3.73742) |
| Time dummies | Yes | | No | |
| Adjusted R2 | 0.59835 | | 0.61632 | |
| Number of observations | 239 | | 380 | |
| Number of cross sections used | 97 | | 137 | |

Notes:

(1) Dependent variables = logarithm of bilateral FDI flows from a given sending to a given receiving country

(2) Standard errors are in parentheses; * and ** denote 10% and 5% significance, respectively

#### Effects of tax differentials of old EU states vis-a-vis the new members

It is also possible that FDI flows react differently to large and small labour costs differentials. And it has been argued that cheap labour force of the Central and Eastern European states has influenced decisions to move production. Therefore coefficients of old vs. new MS labour costs are differentiated from intra-NMS labour costs differentials. Technically, it was done by introducing a dummy taking the value of 1 if a sending country *i* was an old member, and 0 if flows originated in any of the NMS. Differences in labour costs between the OMS and NMS were supposed to be significantly larger in the old member states. Labour costs differences among NMS were supposed to be negligible on average. Nevertheless, even accounting for the diversity in the labour costs differentials do not seem to influence overall FDI flows in new member states (see Table 6).

Other results changed, but in a way that is difficult to explain at a first glance. Now effective taxation in the old vis-a-vis new EU countries seem to direct FDI flows. But the sign of the influence is surprising. It is negative, which means that large differences in effective tax rates seem to hamper FDI outflows from old to new member states. At the same time, governments' capital investments in a destination market seem to encourage FDI. After differentiating for the costs of labour between old and new EU members, the results do not change. Even still large differences in the labour costs seem not to motivate investors from the old member states.

Prolonging the estimation period until 2005 does not seem to change the picture. FDI flows in the new part of the EU seem to react mainly to the origin and destination production potentials and distance between them. Differences in statutory tax rates do not seem to matter.

Table 6: Separating tax effects from old member states, estimation results, 1996-2005

| Estimation period | 1996-2004 | | 1996-2004 | | 1996-2005 | |
|---|---|---|---|---|---|---|
| $t_{it}/t_{jt}$ if $i$=EU15 | 0.66639 | (0.83421) | 0.66615 | (0.83615) | 0.65142 | (0.65806) |
| $t_{it}/t_{jt}$ if if $i$≠EU15 | 0.96674 | (0.79975) | 0.96929 | (0.83864) | 0.77664 | (0.64760) |
| $eff_{it}/eff_{jt}$ if $i$=EU15 | -0.46268* | (0.23751) | -0.4630* | (0.23855) | | |
| $eff_{it}/eff_{jt}$ if $i$≠EU15 | 0.53527 | (0.47901) | 0.53518 | (0.48136) | | |
| $GDP_{it}$ | 0.27751 | (0.20110) | 0.27734 | (0.20000) | 0.58280* | (0.17553) |
| $GDP_{jt}$ | 0.42655* | (0.22556) | 0.42629* | (0.23500) | 0.42785* | (0.20330) |
| $ulc_{it}/ulc_{jt}$ | 1.39915 | (1.16001) | | | | |
| $ulc_{it}/ulc_{jt}$ if $i$=EU15 | | | 1.40459 | (1.16256) | 0.355015 | (1.03302) |
| $ulc_{it}/ulc_{jt}$ if $i$≠EU15 | | | 1.38719 | (2.03387) | 0.549420 | (1.52069) |
| $ginv_{jt}$ | 0.83682* | (0.46126) | 0.837056 | (0.45783) | 0.074628 | (0.35847) |
| Distance | -0.85356* | (0.50585) | -0.85350* | (0.50697) | -0.97101* | (0.53668) |
| Common border | -0.62140 | (0.76043) | -0.62091 | (0.77151) | -0.46546 | (0.79747) |
| AR(1) | 0.59800** | (0.04910) | 0.59797** | (0.04988) | 0.69230** | (0.04018) |
| Constant | 4.95785 | (3.63809) | 4.95757 | (3.64432) | 5.43111 | (3.86517) |
| Time dummies | yes | | yes | | No | |
| Adjusted R2 | 0.60303 | | 0.60123 | | 0.61429 | |
| Number of observations | 239 | | 239 | | 380 | |
| Number of cross sections used | 97 | | 97 | | 137 | |

Notes:

(1) Dependent variables = logarithm of bilateral FDI flows from a given sending to a given receiving country

(2) Heteoskedasticity-consistent standard errors are in parentheses; * and ** denote 10% and 5% significance, respectively

### Responsiveness to higher differences in relative tax rates

The proposition that the estimated function may be concave is of Derevoux et al (2002). The suggestion is that the sending country *i*'s investors may respond stronger than it was assumed up to this point to changes in the destination country *j* tax rates. In this paper this is done as in Lahreche-Revil (2006) by including tax variable to the power of three in spite of the usual tax variable.

The result is that nominal tax differentials do not matter. However, investors from NMS that consider moving capital to another EU country seem to react to higher effective tax differentials, while being neutral to an ordinary difference in effective tax rates.

Table 7: Controlling for higher differences in tax rates, estimation results, 1996-2005

| Estimation period | 1996-2004 | | 1996-2005 | |
|---|---|---|---|---|
| $t_{it}/t_{jt}$ if $i$=EU15 | 1.46442 | (0.96568) | 0.83998 | (0.71162) |
| $(t_{it}/t_{jt})^3$ if $i$≠EU15 | -0.65120 | (1.07779) | -0.20811 | (0.77345) |
| $eff_{it}/eff_{jt}$ | -0.38551 | (0.30742) | | |
| $(eff_{it}/eff_{jt})^3$ if $i$=EU15 | 0.01068 | (0.06758) | | |
| $(eff_{it}/eff_{jt})^3$ if $i$≠EU15 | 0.27156** | (0.11530) | | |
| $GDP_{it}$ | 0.28229 | (0.19013) | 0.57695** | (0.17014) |
| $GDP_{jt}$ | 0.49930** | (0.22671) | 0.42965** | (0.20254) |
| $ulc_{it}/ulc_{jt}$ if $i$=EU15 | 1.29318 | (1.16810) | 0.33662 | (1.03906) |
| $ulc_{it}/ulc_{jt}$ if $i$≠EU15 | 1.73264 | (1.95452) | 0.55895 | (1.46165) |
| $ginv_{jt}$ | 0.84122* | (0.46981) | 0.08675 | (0.36177) |
| Distance | -1.06696** | (0.51862) | -0.98237* | (0.53183) |
| Common border | -0.63551 | (0.78148) | -0.46355 | (0.79462) |
| AR(1) | 0.59665** | (0.05062) | 0.69160** | (0.04107) |
| Constant | 5.97541 | (3.78534) | 5.49557 | (3.82944) |
| Time dummies | Yes | | No | |
| Adjusted R2 | 0.60125 | | 0.61433 | |
| Number of observations | 239 | | 239 | |
| Number of cross sections used | 97 | | 97 | |

Notes:

(1) Dependent variables = logarithm of bilateral FDI flows from a given sending to a given receiving country

(2) Heteoskedasticity-consistent standard errors are in parentheses; * and ** denote 10% and 5% significance, respectively

### Separating effects of positive and negative tax differentials

It is also possible that firms react in other ways to positive and negative tax differentials. For example, it is possible that an investor takes into account tax rates in the destination country if they are lower than at home. However, if the difference is negligible or if they are higher, investment decisions can be motivated by other factors. In order to account for this, we introduced a dummy $POS_{ijt}$ taking a value of 1 if a destination country $j$ has lower CIT rate than a sending country $i$, and 0 otherwise (after Lahreche-Revil 2006).

Ordinary differences in tax rates – be it positive or negative – do not seem to determine FDI flows (see Table 8). FDI remain determined by the economic masses of partner countries and the distance that separates them. However, the picture changes when distinguish for the economic potential of "big" vs. "small" country, which generates FDI. In this setting, this is the economic potential of OMS, the economic potential of a destination country and the relative closeness that encourages FDI flows. On the top of it, statutory and effective corporate tax rates matter, although in an asymmetric way If investors can pay lower taxes at home than in a destination country, it hampers FDI flows to such destinations. For effective taxation, the result is especially strong if flows originate in a NMS.

However, now the sending country market potential does not seem to be important. The situation does not change when we distinguish between OMS and NMS origin of investing companies, GDP of the country of origin loses significance.

### Robustness and endogeneity checks

The results seem to be robust to changes in estimation period. However, it is possible that even though investors do not take into account corporate tax rates when thinking of moving or expanding their production in one of the NMS, the NMS compete among themselves to attract more foreign capital. Or it may be the case that once big foreign firms are established, they can effectively lobby for lower taxes or additional investment incentives. This is to say that the examined regression may suffer from reverse causality. For these reasons, equations where either nominal or effective taxes were regressed on FDI flows and other structural or fundamental variables were estimated. Indeed, both nominal and effective tax rates differentials seemed to be dependent on capital flows. The coefficients had expected signs and indicated that relatively lower taxes in a destination country were likely to be a result of high FDI inflows. On the top of it, corporate taxes seemed to be pro-cyclical and cheaper (and abundant) labour force seemed to enhance lower taxation of capital.[6] Also for this reason, we now turn to more direct estimates of tax competition.

[6] Results are not reported here but are available on request

Table 8: Effects of positive and negative tax differentials, estimation results, 1996-2005

| Estimation period | 1996-2004 | | 1996-2004 | | 1996-2005 | | 1996-2004 | |
|---|---|---|---|---|---|---|---|---|
| $POSt_{ij} \cdot (t_{it}/t_{jt})$ | 0.62073 | (0.77197) | 0.46579 | (0.71805) | 0.58440 | (0.64202) | | |
| $(1\text{-}POSt_{ij}) \cdot (t_{it}/t_{jt})$ | 1.34546 | (0.86524) | 0.55362* | (0.90292) | 0.23769 | (0.73849) | | |
| $POSeff_{ij} \cdot (eff_{it}/efft_{jt})$ | -0.42339 | (0.29350) | -0.49257* | (0.26468) | | | | |
| $(1\text{-}POSeff_{ij}) \cdot (eff_{it}/eff_{jt})$ | 0.43211 | (0.44838) | 0.73351* | (0.42877) | | | | |
| $POSt_{ij} \cdot (t_{it}/t_{jt})$ if $i$=EU15 | | | | | | | 0.81078 | (0.85305) |
| $POSt_{ij} \cdot (t_{it}/t_{jt})$ if if $i$≠EU15 | | | | | | | 1.06674 | (1.86779) |
| $(1\text{-}POSt_{ij}) \cdot (t_{it}/t_{jt})$ if $i$=EU15 | | | | | | | 2.30678 | (4.90373) |
| $(1\text{-}POSt_{ij}) \cdot (t_{it}/t_{jt})$ if $i$≠EU15 | | | | | | | 0.97236 | (0.88925) |
| $POSeff_{ij} \cdot (eff_{it}/eff_{jt})$ if $i$=EU15 | | | | | | | -0.48558 | (0.31621) |
| $POSeff_{ij} \cdot (eff_{it}/eff_{jt})$ if if $i$≠EU15 | | | | | | | -0.32113 | (0.68208) |
| $(1\text{-}POSeff_{ij}) \cdot (eff_{it}/eff_{jt})$if $i$=EU15 | | | | | | | -0.43433 | (0.50630) |
| $(1\text{-}POSeff_{ij}) \cdot (eff_{it}/eff_{jt})$ if $i$≠EU15 | | | | | | | 1.23797** | (0.58008) |
| $GDP_{it}$ | 0.37374** | (0.18834) | | | | | 0.231967 | (0.21528) |
| $GDP_{it}$ if $i$=EU15 | | | 0.33847** | (0.1550) | 0.51627** | (0.15585) | | |
| $GDP_{it}$ if $i$≠EU15 | | | -0.15440 | (0.2216) | 0.20518 | (0.24121) | | |
| $GDP_{jt}$ | 0.48669** | (0.23329) | 0.60779** | (0.1892) | 0.51627** | (0.15585) | 0.43532** | (0.23747) |
| $ulc_{it}/ulc_{jt}$ | | | | | | | | |
| $ulc_{it}/ulc_{jt}$ if $i$=EU15 | 1.25639 | (1.13280) | 0.03958 | (1.08148) | -0.35293 | (0.97966) | 1.30510 | (1.22024) |
| $ulc_{it}/ulc_{jt}$ if $i$≠EU15 | 0.81862 | (2.20399) | 0.52595 | (1.82785) | 1.07161 | (1.38947) | 0.6039 | (2.08350) |
| $ginv_{jt}$ | 0.78140* | (0.46887) | 0.54694 | (0.42618) | 0.29969 | (0.37994) | 0.69562 | (0.47458) |
| Distance | -1.07004** | (0.52218) | -1.29304** | (0.42462) | -0.96703** | (0.47826) | -1.03541** | (0.48643) |
| Common border | -0.39887 | (0.79247) | -0.13648 | (0.60990) | -0.18222 | (0.69523) | -0.58455 | (0.76941) |
| AR(1) | 0.60395** | (0.04944) | 0.51794** | (0.05005) | 0.64263** | (0.04538) | 0.58569** | (0.05289) |
| Constant | 5.87993 | (3.78033) | 8.18659 | (3.14434) | 5.41721 | (3.61830) | 6.61340* | (3.51767) |
| Time dummies | Yes | | Yes | | No | | Yes | |
| Adjusted R2 | 0.59778 | | 0.61428 | | 0.61638 | | 0.59889 | |
| Number of observations | 239 | | 239 | | 380 | | 239 | |
| Number of cross sections used | 97 | | 97 | | 137 | | 97 | |

Notes:

(1) Dependent variables = logarithm of bilateral FDI flows from a given sending to a given receiving country

(2) Heteoskedasticity-consistent standard errors are in parentheses; * and ** denote 10% and 5% significance, respectively

### *Tax reaction function*

Tax competition may be also tested by checking interactions between national tax policies. The tax reaction function relates tax rates to the general characteristics of the country and tax rates among competitors. Several empirical studies estimating tax reaction function between countries support the hypothesis of strategic interactions of national tax policies (i.e. Brueckner et al 2001 or Devereux et al 2002). In this part we will apply the model developed by Devereux et al (2002) to the sample of enlarged Europe.

After Devereux et al (2002), the following equation is estimated:

$$T_{it} = \alpha + \beta_1 T_{it-1} + \beta_2 \overline{T}_{j \neq i,t} + \beta_3 X_{it} + \varepsilon_i + \varepsilon_t$$

Where $T_{it}$ stands for corporate tax rates in the home country $i$, $\overline{T}_{j \neq i,t}$ represents tax rates set by other countries, averaged over a given period, and $X_{it}$ is a vector of control variables that may influence taxes. We include the following in $X_{it}$: home country GDP ($GDP_{it}$) and shares of incoming and outward FDI in GDP ($FDIinward_{it}$ and $FDIoutward_{it}$).

Similar equation is estimated for both statutory and effective tax rates. The mechanism behind setting the statutory rates in response to the neighbouring countries' rates is obvious. Information on statutory rates widely available and usually extensively advertised by reformist governments. Besides, they are direct instruments of the fiscal policy. And it is possible that if a neighbouring country lowers corporate rate, the other similar country may follow.

However, the EU governments often used various investment incentives that lowered paid corporate income taxes. These incentives are reflected in the effective CIT measure. Therefore, it is possible that countries will follow other neighbours either by granting generous investment incentives or setting lower nominal tax rates. Therefore, we estimate two equations in which either nominal or effective tax rates are explained by other countries' nominal and effective tax rates. This is to say that the equation above becomes either:

$$t_{it} = \alpha + \beta_1 t_{it-1} + \beta_2 \bar{t}_{j \neq i,t} + \beta_3 \overline{eff}_{j \neq i,t} + \beta_4 X_{it} + \varepsilon_i + \varepsilon_t$$

or:

$$eff_{it} = \alpha + \beta_1 eff_{it-1} + \beta_2 \overline{eff}_{j \neq i,t} + \beta_3 \bar{t}_{j \neq i,t} + \beta_4 X_{it} + \varepsilon_i + \varepsilon_t$$

Where $t_{it}$ and $eff_{it}$ stand, as before, for the statutory and effective tax rates (of country $i$). We expect positive signs of all slope coefficients of tax variables.

Basic specification yielded expected results. Nominal tax rates tend to be highly correlated with their previous levels and react to the corporate tax rates set in other countries. They react both to the nominal tax rates of others (which are known immediately, hence the similar coefficient on $\bar{t}_{j \neq i}$ in both the contemporaneous and lagged specification) and to the effectively paid corporate taxes in other counties (here we consider only the result from the lagged specification, since the effectively paid taxes are known only after some time[7]). The relation has a positive sign. This is to say that if the group of other countries lowers their corporate tax rates, country $i$ will most likely lower its own by 0.2-0.3%.

[7] And we disregard for the moment the negative sign on $\overline{eff}_{j \neq i,t}$ in the contemporaneous specification.

Effective tax rates at home seem to decrease along with lower nominal taxes paid in the other countries. It seems that if a government cannot compensate with lowering statutory rates, it can nevertheless offer some deductions, so that at the end corporate taxes paid effectively are lower. However, now lower effective taxes in other countries seem to effective tax rates at home, even one period later. This result is puzzling, since the reverse sign was expected.

Higher GDP seem to encourage higher effectively paid taxes (taxes are pro-cyclical). Also higher FDI outflows and inflows support higher effective tax rates.

Table 9: Tax reaction function in the EU25, estimation results for nominal tax rates, 1996-2005

| Estimation period | 1996-2004 | | 1996-2004 | | 1996-2005 | | 1996-2005 | |
|---|---|---|---|---|---|---|---|---|
| $t_{i,t-1}$ | 0.8326** | (0.0685) | 0.8993** | (0.0812) | 0.7679** | (0.0526) | 0.8037** | (0.0574) |
| $\bar{t}_{j\neq i,t}$ | 0.2423** | (0.1215) | 0.2375* | (0.1337) | | | | |
| $\overline{eff}_{j\neq i,t}$ | -0.7667* | (0.3986) | -0.7976* | (0.4067) | | | | |
| $\bar{t}_{j\neq i,t-1}$ | | | | | 0.2631** | (0.1155) | 0.2904** | (0.1020) |
| $\overline{eff}_{j\neq i,t-1}$ | | | | | -0.0230 | (0.3334) | 0.0470* | (0.1116) |
| $GDP_{it}$ | -0.1156 | (0.1186) | -0.1095 | (0.1155) | -0.0746 | (0.0831) | -0.0813 | (0.0720) |
| $FDIinward_{it}$ | | | -0.0051 | (0.0056) | | | -0.0072* | (0.0043) |
| $FDIoutward_{it}$ | -0.0052 | (0.0060) | | | -0.0053 | (0.0056) | | |
| Time dummies | Yes | | Yes | | Yes | | No | |
| Fixed effects | Yes | | Yes | | Yes | | Yes | |
| Adjusted $R^2$ | 0.9425 | | 0.9228 | | 0.9272 | | 0.9266 | |
| Number of observations | 158 | | 159 | | 177 | | 179 | |
| Number of cross sections used | 23 | | 23 | | 23 | | 23 | |

Notes:

(1) Dependent variables = logarithm of nominal tax rates

(2) Heteoskedasticity-consistent standard errors are in parentheses; * and ** denote 10% and 5% significance, respectively

Table 10: Tax reaction function in the EU25, estimation results for effective tax rates, 1996-2005

| Estimation period | 1996-2004 | | 1996-2004 | | 1996-2004 | | 1996-2004 | |
|---|---|---|---|---|---|---|---|---|
| $eff_{i,t-1}$ | 0.5520** | (0.0766) | 0.5779** | (0.0809) | 0.5652** | (0.0860) | 0.5654** | (0.0891) |
| $\bar{t}_{j\neq i,t}$ | 1.2971** | (0.3336) | 1.1735** | (0.3499) | | | | |
| $\overline{eff}_{j\neq i,t}$ | -3.6848** | (0.9444) | -3.2151** | (0.9930) | | | | |
| $\bar{t}_{j\neq i,t-1}$ | | | | | 1.2231** | (0.3250) | 1.2377** | (0.3383) |
| $\overline{eff}_{j\neq i,t-1}$ | | | | | -1.3877** | (0.5584) | -1.7849** | (0.6132) |
| $GDP_{it}$ | 0.9276 | (0.3237) | 0.9728** | (0.3352) | 0.8559** | (0.3101) | 0.9068** | (0.2999) |
| $FDIinward_{it}$ | | | 0.0275 | (0.0186) | | | 0.0376* | (0.0208) |
| $FDIoutward_{it}$ | 0.0416 | (0.0173) | | | 0.0402** | (0.0176) | | |
| Time dummies | Yes | | Yes | | Yes | | Yes | |
| Fixed effects | Yes | | Yes | | Yes | | Yes | |
| Adjusted $R^2$ | 0.8875 | | 0.8847 | | 0.8752 | | 0.8784 | |
| Number of observations | 142 | | 143 | | 142 | | 143 | |
| Number of cross sections used | 21 | | 21 | | 21 | | 21 | |

Notes:
(1) Dependent variables = logarithm of effective tax rates
(2) Heteoskedasticity-consistent standard errors are in parentheses; * and ** denote 10% and 5% significance, respectively

### Separating effects of positive and negative tax differentials

We also introduced the possibility of a reaction to positive and negative differences in tax rates of others (after Lahreche-Revil 2006 and Devereux 2002). Technically, it was done by multiplying "average" tax variable ($\bar{t}_{j\neq i,t}$ or $\overline{eff}_{j\neq i,t}$) either by $POS_{ij}$ (taking value 1 if taxes at home are higher than average taxes abroad) or by ($1\text{-}POS_{ij}$). In order to avoid problems with endogeneity, instrumental variables approach was used in order to obtain values of $POS_{ij}$ (as in Devereux 2002).[8]

Basic result is the following. There seems to be no asymmetry in responding to others' tax rates. If other EU countries raise their nominal tax rates, home tax rates (both effective and nominal) will go up as well. If other countries lower their nominal tax rates, home country tax rates (again, both nominal and effective) are also likely to be lowered. Other results remain broadly unchanged. So there is a need to look somewhere else for an explanation of why own effective tax rates respond negatively to others' effective tax rates.[9]

### Controlling for old and new EU members

Similarly as in the model explaining responsiveness of FDI flows to corporate taxation, we checked whether home taxes respond differently to changes in the taxation policy of new and old EU

[8] $t_{it}$ (and separately $eff_{it}$) was regressed on their lags and control variables. Then projected values of $t_{it}$ (and separately $eff_{it}$) were used to calculate average tax rates of the other countries ($\bar{t}_{j\neq i,t}$, $\overline{eff}_{j\neq i,t}$). Then, these projected average tax rates were compared with actual tax rates at home in order to get $POS_{ij}$.

[9] Since the results are similar to those from Tables 9 and 10, we do not repeat them here. They are available on request.

members. This was done by the introduction of a dummy variable taking value of 1 if a home country *i* was an old member, and 0 otherwise.

Nominal tax rates seem to be influenced by the nominal tax rates of others, as before. This stays true for both new and old EU members (see Table 11). However, it seems that new members are more sensitive than the old EU countries to the dynamics of corporate tax rates in other countries. Separating effects of past effective taxation in other countries on new and old members made the coefficients on $\overline{eff}_{j\neq i,t}$ loose significance. This is to say that we cannot observe any regular reaction on statutory tax rates caused by the perceptions of – separately – old and new EU members of taxes paid effectively in other countries a year earlier. What is interesting, though, is that higher FDI inflows in NMS seem to support lower taxes in NMS.

Perceptions about effectively paid taxes by others induce reverse changes in effectively paid taxes by new member states only (see Table 12). In other words, if a new member country sees that effectively paid corporate taxes in other counties decreased a year ago, it is going to offer less investment incentives or other deductions, therefore increasing effectively paid taxes at home. So far, we find it difficult to explain. And this result stays robust to controlling for positive and negative tax differentials (between own tax rates and the rates of others).[10] Similarly, as it was the case of nominal taxes, it seems that fiscal authorities of NMS are more sensitive to changes in nominal tax rates of the others. Moreover, effective tax rates tend to be higher in larger and richer countries, and in those with higher capital outflows.

[10] We do not show this last result here, but can show it on request.

Table 11: Tax reaction function in the EU25, estimation results for nominal tax rates, controlled for old and new member states, 1996-2005

| Estimation period | 1996-2004 | | 1996-2004 | | 1996-2005 | | 1996-2005 | | 1996-2005 | |
|---|---|---|---|---|---|---|---|---|---|---|
| $t_{i,t-1}$ | 0.8897** | (0.0847) | 0.8428** | (0.0647) | 0.7948** | (0.0703) | 0.7820** | (0.0560) | 0.7994** | (0.0693) |
| $\bar{t}_{j\neq i,t}$ if $i$=EU15 | 0.1895 | (0.1255) | 0.1764 | (0.1289) | | | | | | |
| $\bar{t}_{j\neq i,t}$ if $i\neq$EU15 | 0.9228** | (0.3558) | 1.1264** | (0.3352) | | | | | | |
| $\overline{eff}_{j\neq i,t}$ if $i$=EU15 | -0.4368 | (0.4040) | -0.2053 | (0.4265) | | | | | | |
| $\overline{eff}_{j\neq i,t}$ if $i\neq$EU15 | -0.8780** | (0.4216) | -0.9503** | (0.3812) | | | | | | |
| $\bar{t}_{j\neq i,t-1}$ if $i$=EU15 | | | | | 0.2849** | (0.1242) | 0.3198** | (0.1183) | 0.2982** | (0.1262) |
| $\bar{t}_{j\neq i,t-1}$ if $i\neq$EU15 | | | | | 0.6144* | (0.3377) | 0.6523* | (0.3162) | 0.6639* | (0.3521) |
| $\overline{eff}_{j\neq i,t-1}$ if $i$=EU15 | | | | | 0.2232 | (0.3906) | 0.1561 | (0.3845) | 0.2295 | (0.3917) |
| $\overline{eff}_{j\neq i,t-1}$ if $i\neq$EU15 | | | | | 0.4660 | (0.3644) | 0.4135 | (0.3886) | 0.5529 | (0.3715) |
| $GDP_{it}$ | 0.1291 | (0.1842) | 0.1090 | (0.1868) | 0.1533 | (0.1479) | 0.1615 | (0.1473) | 0.1728 | (0.1530) |
| $FDIinward_{it}$ | -0.0083 | (0.0052) | | | -0.0056 | (0.0046) | | | | |
| $FDIinward_{it}$ if $i$=EU15 | | | | | | | | | 0.0000 | (0.0049) |
| $FDIinward_{it}$ if $i\neq$EU15 | | | | | | | | | -0.0202* | (0.0112) |
| $FDIoutward_{it}$ | | | -0.0053 | (0.0057) | | | -0.0008 | (0.0053) | | |
| Time dummies | Yes | | Yes | | Yes | | Yes | | Yes | |
| Fixed effects | Yes | | Yes | | Yes | | Yes | | Yes | |
| Adjusted $R^2$ | 0.9245 | | 0.9313 | | 0.927125 | | 0.928828 | | 0.9274 | |
| Number of observations | 159 | | 158 | | 179 | | 177 | | 179 | |
| Number of cross sections used | 23 | | 23 | | 23 | | 23 | | 23 | |

Notes:

(1) Dependent variables = logarithm of nominal tax rates

(2) Heteoskedasticity-consistent standard errors are in parentheses; * and ** denote 10% and 5% significance, respectively

Table 12: Tax reaction function in the EU25, estimation results for effective tax rates, controlled for old and new member states, 1996-2005

| Estimation period | 1996-2004 | | 1996-2004 | | 1996-2004 | | 1996-2004 | |
|---|---|---|---|---|---|---|---|---|
| $eff_{i,t-1}$ | 0.5524** | (0.0996) | 0.5333** | (0.0986) | 0.4313** | (0.1105) | 0.4309** | (0.1052) |
| $\bar{t}_{j\neq i,t}$ if $i$=EU15 | 0.9500** | (0.3407) | 1.0681** | (0.3362) | | | | |
| $\bar{t}_{j\neq i,t}$ if $i\neq$EU15 | 2.4618** | (0.8626) | 3.2095** | (0.7922) | | | | |
| $\overline{eff}_{j\neq i,t}$ if $i$=EU15 | -2.1251* | (1.0788) | -2.3298** | (1.1613) | | | | |
| $\overline{eff}_{j\neq i,t}$ if $i\neq$EU15 | -3.9392** | (1.2846) | -4.3818** | (1.1318) | | | | |
| $\bar{t}_{j\neq i,t-1}$ if $i$=EU15 | | | | | 0.8780** | (0.3879) | 0.8710** | (0.3620) |
| $\bar{t}_{j\neq i,t-1}$ if $i\neq$EU15 | | | | | 2.8568** | (0.9666) | 3.5032** | (1.0418) |
| $\overline{eff}_{j\neq i,t-1}$ if $i$=EU15 | | | | | -0.5990 | (1.1054) | 0.2884 | (1.1191) |
| $\overline{eff}_{j\neq i,t-1}$ if $i\neq$EU15 | | | | | -2.9074** | (1.1255) | -2.5338** | (1.1900) |
| $GDP_{it}$ | 1.2373** | (0.4517) | 1.3117** | (0.4669) | 1.1213** | (0.4613) | 1.2262** | (0.5085) |
| $FDIinward_{it}$ | 0.0202 | (0.0168) | | | 0.0248 | (0.0195) | | |
| $FDIoutward_{it}$ | | | 0.0370* | (0.0193) | | | 0.0343* | (0.0185) |
| Time dummies | Yes | | Yes | | Yes | | Yes | |
| Fixed effects | Yes | | Yes | | Yes | | Yes | |
| Adjusted $R^2$ | 0.8858 | | 0.8904 | | 0.8850 | | 0.8858 | |
| Number of observations | 143 | | 142 | | 143 | | 142 | |
| Number of cross sections used | 21 | | 21 | | 21 | | 21 | |

Notes:

(1) Dependent variables = logarithm of effective tax rates

(2) Heteoskedasticity-consistent standard errors are in parentheses; * and ** denote 10% and 5% significance, respectively

## 5. Conclusions

It is commonly believed that the observed fall in nominal corporate tax rates among the EU countries is an indicator of tax competition, which could have a welfare costs for the member countries. This fear is based on tax competition theory assuming that fall in statutory tax rate in one country causes the capital inflow there. At the same time other countries collecting fewer taxes have to limit the amount of public goods provided. The fall in nominal rates has been widely observed in the EU, yet the consequences are not very well researched. The NMS have lower tax rates and have decreased them much faster than the old EU-15 countries in recent years. It is not clear whether these actions have brought some results measured in additional investments inflows and to what extent countries respond to their neighbour's tax policies. This is what was examined in this paper.

The first approach concentrates on the influence of taxation on the location decisions measured by the FDI flows between countries. The research question is: whether the NMS are able to increase the amount of FDI inflows to their countries decreasing their corporate tax levels?

The available empirical research, which mostly refers to the EU-15 countries confirm that the influence of corporate taxation on FDI flows is robust and negative. In this paper the question was examined in the gravity framework, where bilateral flows from the pairs of source and destination countries were regressed on the set of potential determinants of investments, taxation and traditional gravity variables such as distance or common border.

The basic specification confirms that statutory tax rate differences between countries influence investment flows overall, whereas effective rates are not statistically significant. It suggests that on average investors – apart from the economic potential and distance – look at the nominal taxation when deciding about moving capital to and from the region.

In the next step we tried to differentiate between two investors: from old and new member states. There, we found no significant response originating separately from old and new member states nominal taxes. Effective rates matters for investors originating in the EU-15. However, the sign is negative, which means that the higher the tax rate of sending to receiving country the lower the investment inflow. This result is puzzling.

It was also tested if investors respond stronger to higher differences in relative tax rates. Only investors from the NMS seems to react stronger to higher tax differences. This result is surprising as the investment flows from NMS to other EU countries are rather limited.

It is also possible that firms react in other ways to positive and negative tax differentials. For example, it is possible that an investor takes into account tax rates in the destination country if they are lower than at home. However, if the difference is negligible or if they are higher, investment decisions can be motivated by other factors. In this case statutory corporate tax rates matter, if an investor is obliged to pay higher taxes at home than in a destination country Response of FDI flows to relative tax rates seems to be asymmetric. Higher than at home statutory and effective tax rates discourage FDI outflow. This effect is especially visible in case of relatively small capital flows originating in new EU countries.

Concluding, the evidence was found that statutory tax rates differences influence the investments flows, but not in a way that one might have expected. Basically, we do not find any proof that FDIs flowing from OMS to NMS is motivated by lower tax rates. These investments are driven by other factors.

How does the results correspond to the research on the subject? Empirical research on EU-15 confirms significant role played by effective taxation in allocation of cross-country investments. Gorter and Parikh (2000) conclude that an EU country (EU-15 in this case) typically increases its FDI position in another EU country by approximately four percent if the latter decreases its effective corporate income tax rate by one percentage point relative to the EU mean. The same conclusions are reported by Buettner (2002). Lahreche-Revil (2006) find that implicit taxation is significant determinant of FDI flows, while statutory and ex-ante taxation fail to significantly explain location decisions. Tax incentives are significantly affecting FDI decisions only within the EU-15 countries. These results may be driven by the fact that for the NMS only Czech R., Hungary and Poland are included and the implicit tax measure is calculated in a way that GDP serves the proxy of the tax base.

Tax competition was also tested by estimating tax reaction function, which illustrates the responsiveness of tax rates to the average of tax rates of competitors. The results confirm the existence of strategic interactions in tax setting policies among the EU countries. Lower statutory and effective tax rates of other countries seem to motivate governments to cut their own statutory CIT rates. This effect is stronger for NMS. The results are not that straightforward in case of

reactions of effective tax rates. Although it seems that own effective tax rates react positively to statutory tax rates of others.

This research shows that when talking about tax harmonization within Europe, the discussion should not be limited to the statutory CIT rates. The investors observe the effective tax rates and the relative tax burden between two countries also matters.

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**Appendix 1: Description of variables**

Description of variables, gravity model of FDIs

| | |
|---|---|
| FDI flows | FDI outflows from old member states to a given new member state in millions of euro, intra-CEE flows<br>FDI flows are only investment in equity and/or loans, without reinvested earnings<br>FDIs are taken from EUROSTAT |
| Relative nominal/effective CIT rates | Effective CIT rate of a given sending country divided by effective CIT average rate for the whole European Union<br>Data on effective CIT rates are calculated by authors with data extracted from EUROSTAT and AMECO database |
| Relative labour costs | Ratios of unit labour costs: sending country's ULC divided by receiving country ULC (ULC- share of labour costs in GDP)<br>Data are from EUROSTAT |
| Receiving/sending country market size | GDP, in millions of euro<br>Data are from AMECO database |
| Public investment in percent of GDP | Public capital investment in percent of GDP, general government |
| Distance | Distance between capital cities of a new and an old EU member, in kilometres |
| Common border | Dummy. If common border exists = 1, 0 otherwise |

FDI flows, relative labour costs, market size, public expenditures and distance variables are in logarithms.

Description of variables, tax reaction function

| | |
|---|---|
| Nominal tax rates | Top corporate statutory tax rates<br>Data are from EUROSTAT |
| Effective tax rates | CIT revenues over gross operating surplus of corporations Data are from EUROSTAT |
| Other countries' average tax rates | Either effective or statutory average tax rates in other countries (simple averages)<br>Own calculations on the basis of data from EUROSTAT and AMECO |
| FDI in percent of GDP | Either inward or outward FDI stock in percent of GDP<br>Data are from EUROSTAT |
| GDP | GDPs in purchasing power standards, constant prices<br>Data are from EUROSTAT |

All variables (except dummies) are in logarithm

**Appendix 2: Correlation matrices**

Correlation table, gravity model of FDI flows

| | $fdi_{ijt}$ (equity+loans) | $t_{it}/t_{jt}$ | $eff_{it}/eff_{jt}$ | $GDP_{it}$ | $GDP_{jt}$ | $dist_{ij}$ | $ulc_{it}/ulc_{jt}$ | |
|---|---|---|---|---|---|---|---|---|
| $fdi_{ijt}$ (equity+loans) | | | | | | | | |
| $t_{it}/t_{jt}$ | 0.24128 | | | | | | | |
| $eff_{it}/eff_{jt}$ | -0.06079 | 0.52364 | | | | | | |
| $GDP_{it}$ (sending) | 0.44314 | 0.44864 | 0.42889 | | | | | |
| $GDP_{jt}$ (receiving) | -0.06855 | -0.44864 | -0.42889 | -0.31105 | | | | |
| $dist_{ij}$ | -0.12291 | 0.00000 | 0.00000 | 0.05459 | 0.05459 | | | |
| $ulc_{it}/ulc_{jt}$ | 0.23963 | 0.57502 | 0.54511 | 0.59784 | -0.59784 | 0.00000 | | |
| $ginv_{ij}$ | 0.18575 | 0.12167 | -0.05818 | 0.11537 | -0.25525 | 0.04321 | 0.20049 | |
| $bor_{ij}$ | 0.06680 | 0.06680 | 0.00000 | -0.00288 | -0.00288 | -0.70079 | 0.00000 | -0 |

Correlation table, fiscal reaction function

| | $t_{i,t}$ | $t_{i,t-1}$ | $eff_{i,t}$ | $eff_{i,t-1}$ | $\bar{t}_{j\neq i,t}$ | $\overline{eff}_{j\neq i,t}$ | $GDP_{it}$ | FD |
|---|---|---|---|---|---|---|---|---|
| $t_{i,t}$ | | | | | | | | |
| $t_{i,t-1}$ | **0.966557** | | | | | | | |
| $eff_{i,t}$ | 0.266638 | 0.229542 | | | | | | |
| $eff_{i,t-1}$ | 0.273963 | 0.266638 | **0.860629** | | | | | |
| $\bar{t}_{j\neq i,t}$ | 0.322613 | 0.296336 | 0.060048 | 0.050596 | | | | |
| $\overline{eff}_{j\neq i,t}$ | 0.073558 | 0.138923 | -0.17055 | -0.19838 | 0.439275 | | | |
| $GDP_{it}$ | 0.292197 | 0.29326 | 0.282576 | 0.283669 | -0.15976 | -0.0832 | | |
| $FDIinward_{it}$ | -0.003884 | 0.036802 | 0.19225 | 0.137718 | -0.11708 | -0.08647 | 0.495974 | |
| $FDIoutward_{it}$ | 0.003388 | 0.04032 | 0.393335 | 0.32348 | -0.12265 | -0.10079 | 0.546502 | **0** |

## Appendix 3: Summary statistics

Summary statistics, gravity model of FDI flows

| | Mean | Maximum | Minimum | Std. Dev. | Observations | Cross sections |
|---|---|---|---|---|---|---|
| $fdi_{ijt}$ *(equity+loans)* | 76.59 | 4669 | -1434 | 357.14 | 789 | 214 |
| $t_{it}/t_{jt}$ | 1.09 | 2.89 | 0.35 | 0.44 | 789 | 214 |
| $eff_{it}/eff_{jt}$ | 1.55 | 13.53 | 0.07 | 1.71 | 789 | 214 |
| $GDP_{it}$ *(sending)* | 382.59 | 2207 | 5 | 615.85 | 789 | 214 |
| $GDP_{jt}$ *(receiving)* | 341.68 | 2207 | 5 | 579.97 | 789 | 214 |
| $dist_{ij}$ | 1361.90 | 3990 | 70 | 737.09 | 789 | 214 |
| $ulc_{it}/ulc_{jt}$ | 1.07 | 1.97 | 0.51 | 0.32 | 789 | 214 |
| $ginv_{ij}$ | 2.96 | 4.9 | 1.2 | 0.89 | 789 | 214 |

Note: statistics are for the unbalanced sample. Smaller number of cross-sections was used in the estimations due to missing data. Statistics are for raw data.

Summary statistics, fiscal reaction function

| | Mean | Maximum | Minimum | Std. Dev. | Observations | Cross sections |
|---|---|---|---|---|---|---|
| $t_{i,t}$ | 32.22 | 56.80 | 15.00 | 7.18 | 160 | 21 |
| $eff_{i,t}$ | 12.02 | 27.54 | 0.00 | 4.85 | 160 | 21 |
| $\bar{t}_{j\neq i,t}$ | 31.65 | 35.46 | 26.97 | 2.63 | 160 | 21 |
| $\overline{eff}_{j\neq i,t}$ | 12.52 | 14.29 | 11.04 | 0.78 | 160 | 21 |
| $GDP_{it}$ | 0.80 | 1.16 | 0.29 | 0.27 | 160 | 21 |
| $FDIinward_{it}$ | 0.04 | 0.22 | -0.04 | 0.04 | 160 | 21 |
| $FDIoutward_{it}$ | 0.03 | 0.19 | -0.05 | 0.04 | 160 | 21 |

Note: statistics are for the unbalanced sample. Smaller number of cross-sections was used in the estimations, due to missing data. Statistics are for raw data.