



# DISCUSSION PAPER

## **A note on the appropriate measure of tax burden on Foreign Direct Investment to the CEECs**

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## **A note on the appropriate measure of tax burden on Foreign Direct Investment to the CEECs**

### **ABSTRACT**

In this note we show that tax-rate elasticities of Foreign Direct Investment (FDI) to Central and East European Countries (CEECs) derived from statutory corporate income tax rates (STRs) are likely to be flawed. From a conceptual point of view STRs are problematic as they neither capture tax base effects, nor effects of the home country, the international or the supranational tax laws on the corporate tax burden. Concerning FDI, from an empirical point of view STRs are questionable as their behavior over time and between country-pairs may be very different from that of the conceptually superior bilateral corporate effective average tax rates (BCEATRs). We compare the variability of STRs and BCEATRs of seven major home countries of FDI in eight major CEEC host countries during the period 1995-2005 via Levene-tests, using a unique dataset. Results confirm that using STRs instead of BCEATRs in empirical investigations of FDI is likely to result in too low tax-rate elasticities.

**Keywords:** Corporate income taxation; Effective tax rate; Foreign Direct Investment; Multinational Enterprises

**JEL classification:** F2, H00, H25

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## **I INTRODUCTION**

The aim of this note is to investigate the underlying measures of tax burden when tax-rate elasticities of Foreign Direct Investment (FDI) to Central and East European Countries (CEECs) are derived empirically. The motivation for this analysis is the widespread use of the statutory tax rate (STR) in analyses concerning taxes as drivers of FDI to CEECs. Instead the conceptually superior bilateral corporate effective average tax rate (BCEATR), developed by Devereux and Griffith (1999) should be used. In this note we show that when dealing with FDI, the STR is not an appropriate measure of corporate tax burden - neither from a conceptual nor from an empirical point of view. We briefly review earlier results on taxes as drivers of FDI to CEECs (II), explain our criticism (III), compare the variability of STRs and BCEATRs for 56 bilateral country-relationships over a 10 year time span (IV) and conclude (V).

## **II TAXATION AND FDI: THE CASE OF CENTRAL AND EASTERN EUROPE**

Tax-rate elasticities are defined as the percentage change in FDI caused by a one percentage point change in the tax burden. Most studies dealing with taxation and FDI to CEECs use STRs as the measure of corporate tax burden. Following the approach of DeMooij and Ederveen (2003 and 2005), who deduced tax-rate elasticities from a meta-analysis of 25 (30, respectively) studies dealing with FDI mainly to industrialized countries of -1.2 and -2.05, we surveyed eight papers<sup>1</sup> on FDI and taxation in the CEECs which used STRs. We derive a median tax-rate elasticity of -1.45, which implies an inelastic response of FDI with respect to the tax burden in the CEECs.<sup>2</sup> Despite this value is in line with the tax-rate elasticities of DeMooij and Ederveen we question our own result both from a conceptual and from an empirical point of view.

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1 The papers are: Alfano (2004), Benassy-Quere and Lahreche-Revil (2005), Beyer (2002) ZWP, Carstensen and Toubal (2004), Edmiston, Mudd and Valev (2003), Clausing and Dorobantu (2005), Javorcik (2004) and Mintz and Tsiopoulos (1997; on European periphery countries).

2 The corresponding elasticity is derived by multiplying the semi-elasticity by the average STR of the host countries considered in the surveyed papers. As the latter is probably far below 69 percent, the derived elasticity is very likely to have a value below 1.

### III WHY EARLIER TAX ELASTICITIES ARE FLAWED – CONCEPTUAL ISSUES

STRs are a sufficient indicator of tax burden in case of pure financial investment and in case of tax planning measures like transfer pricing and thin capitalization. However, from a conceptual point of view STRs are not sufficient, if one wants to examine the tax burden levied upon FDI as these measures do not capture the tax base, which is an important determinant of the tax burden levied upon real investment (e.g. Devereux and Griffith 1999). Moreover, analysing the impact of taxes on FDI requires measures capturing all relevant tax-related aspects. In the case of FDI this implies that a measure which captures home country, host country, international as well as supranational tax rules is needed. Furthermore, these measures have to be forward-looking (i.e. capturing future tax laws) as investment decisions are forward-looking *per se* and appropriate tax rates capture the tax burden levied upon an infra-marginal investment (i.e. a profitable FDI) of a Multinational Enterprise (MNE). Devereux and Griffith (1999) derived *inter alia* BCEATRs which combine these features.<sup>3</sup>

Basically the BCEATR is based on the neoclassical investment theory and refers to the scaled difference between the pre- and the post-tax net present values of a FDI with a given pre-tax rate of return. The post-tax net present value is *inter alia* a function of different tax laws (for details see Devereux and Griffith 1999). Some of them are:

- *Host* country tax law: rules for tax allowances and stock valuation, corporate income tax rates on retained earnings as well as on distributed profits (i.e. host country split rate), withholding taxes on repatriated profits (dividend-tax) and taxes on interests paid to the parent company.

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3 Besides STRs and forward-looking effective tax rates backward-looking rates in the spirit of Mendoza et al. (1994) are used in empirical analysis. These are based on Revenue Statistics and National Accounts data. They are likely to suffer from endogeneity and hence are inferior to both STRs and BCEATRs in econometric analysis. For the CEECs backward-looking rates have been used recently in the studies by Benassy-Quere and Lahreche-Revil (2005) as well as by Jakubiak and Markiewicz (2005).

- *Home* country tax law: corporate income tax rates on retained earnings as well as on distributed profits (i.e. home country split rate).
- *International* tax law: double taxation agreements (exemption, credit or deduction systems for dividends and interest payments to the parent company).
- *Supranational* tax law: parent-subsidiary-directive, special rules of EC-Court of Justice (e.g. Bosal Holdings case).

Analysis shows that the BCEATR is especially sensitive to withholding taxes upon repatriated profits. Hence excluding them in a measure of corporate tax burden, results in biased estimates of the corporate tax burden.<sup>4</sup> Using only host country corporate income tax rates and allowances results in domestic corporate effective average tax rates (DCEATR).<sup>5</sup>

#### **IV WHY EARLIER TAX ELASTICITIES ARE FLAWED – EMPIRICAL RESULTS**

The conceptual differences between the STRs and the BCEATRs translate into a very different behavior of the two rates empirically. This is especially true for the CEECs as they are transition countries in the process of changing and revising their tax laws and adopting the *acquis communautaire* of the European Union. To show this, following Devereux and Griffith (1999), we calculated BCEATRs for seven home and eight CEEC host countries over the period 1995-2005.<sup>6</sup> The different behavior over time and

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4 This implies that studies using the *difference* in home and host country STRs as the measure of corporate tax burden are suffering from a measurement error, too.

5 Devereux and Griffith (1999) also derived marginal bilateral and marginal domestic effective tax rates.

6 Home countries are Austria (AUT), France (FR), Germany (GER), Italy (IT), the Netherlands (NL), United Kingdom (UK) and the United States of America (US). Host countries are Slovenia (SL), Hungary (HU), Poland (PL), Czech Republic (CZ), Slovak Republic (SK), Bulgaria (BU), Romania (RO) and Croatia (CRO). The assumptions made with respect to inflation, interest rate and pre-tax profitability follow other studies (e.g. European Commission 2001, Yoo 2003, Devereux and Griffith 1999). We depart from these studies only by using a different weighting-scheme of the three different investment goods. We give inventories less and investment in buildings more weight.

between country pairs is best shown via tests on variance homogeneity (Levene tests)<sup>7</sup> and graphically.

**TABLE 1: RESULTS OF THE LEVENE-TESTS**

<b>Summary: test of difference in <i>overall</i> variability</b>			
<i>Group</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Freq.</i>
BCEATR	31.61	8.71	616
STR	27.80	7.59	616
LEVENE-WM	9.26	df(1, 1230)	p-value = 0.00
<b>Summary: test of difference in <i>between</i> variability</b>			
<i>Group</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Freq.</i>
BCEATR	31.61	5.58	56
STR	27.80	4.22	56
LEVENE-WM	3.76	df(1, 110)	p-value = 0.05
<b>Summary: test of difference in variability for years 1995 - 1999</b>			
<i>Group</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Freq.</i>
BCEATR	36.06	8.55	280
STR	32.85	7.31	280
LEVENE-WM	3.53	df(1, 558)	p-value = 0.06
<b>Summary: test of difference in variability for years 2000 - 2005</b>			
<i>Group</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Freq.</i>
BCEATR	27.90	6.93	336
STR	23.60	4.72	336
LEVENE-WM	47.30	df(1, 670)	p-value = 0.00

The Levene-test on the *whole* sample of STRs and BCEATRs clearly rejects the null hypothesis of variance homogeneity (cf. table 1)<sup>8</sup>. Levene-tests on the two subsamples

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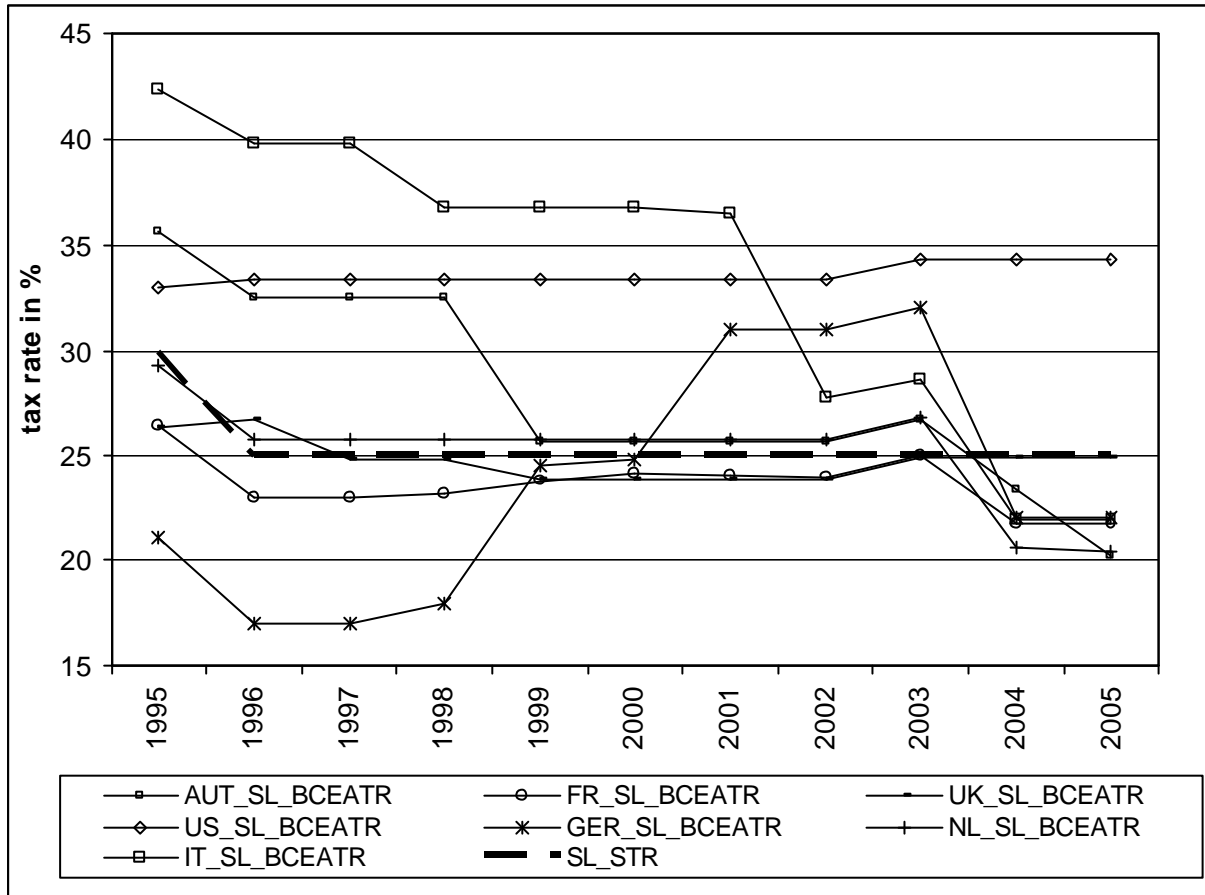
<sup>7</sup> A Levene-test is an alternative to the Bartlett test. It is less sensitive than the Bartlett test to departures from normality. As the distribution of the STRs is skewed we use the median version of this test (Conover 1999).

1995 to 1999 and 2000 to 2005 show that variance-homogeneity can be rejected for both time periods, more significantly for the period from 2000 onwards, which saw marked drops in STRs as well as the adoption of the parent-subsidiary directive by some host countries. This is a result of the closer integration of the new member states into the EU. Levene-tests for the between variance, that is on the time averaged data, in the STRs and the BCEATRs shows a similar picture – the null hypothesis is rejected. Finally, comparing the within variances of 56 bilateral relationships shows that the null hypothesis has to be rejected for about 28 percent (significance level of 10%) and 34% (significance level of 15%) of the country-pairs, respectively. Hence the results imply that using STRs instead of the conceptually superior BCEATR probably result in flawed estimates of tax-rate elasticities due to different behavior of the two rates over time and between country-pairs. Figure 1 visualizes the substantial differences between the behavior of the STRs and the BCEATRs for Slovenia.

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8 To reduce the probability of a Type II error in small samples a significance level of 10 percent is appropriate. This is especially important here as the median version of the Levene-test is conservative in case of relatively small sample sizes (Conover 1999).

**FIGURE 1: BCEATRS WITH SLOVENIA**



Slovenia had a constant STR in 1996–2005 at 25%. Despite the STR remained constant from 1996 onwards, the BCEATRs often change substantially over time. Furthermore, BCEATRs differ substantially between the home countries. The variability of the BCEATRs is caused by four factors:

1. Changes in the *host country* (Slovenian) taxation, where, for example, the reduction of allowances leads, *ceteris paribus*, to an increase in the bilateral tax burden from 2003 onwards.
2. Changes in the *international tax law* e.g., the double taxation agreement with Austria in 1999 or changes in the exemption method in Italy (2002) and Germany (1999).

3. Changes in the *supranational tax law*, notably the adoption of the parent-subsidiary directive (PSD) in 2004, which reduces the tax burden for countries which apply the exemption method. The PSD thus excludes the US but it includes the UK. Since the UK applies the credit method this does not affect the level of the BCEATR with the UK.
4. Changes in the STRs of the *home countries* of FDI, as e.g., in Germany 2001. Especially the abolishment of the split-rate system results in an increase of the BCEATR despite the drop in Germany's corporate income tax rate from 40% (retained earnings) and 30% (distributed profits) respectively, to 25%. (see also European Commission 2001).

## V CONCLUSION

Available studies on taxes as drivers of FDI to the CEECs almost exclusively use the STR as an indicator of the tax burden. We argue that this leads to flawed estimates of tax-rate elasticities as STRs exclude important aspects of taxation like withholding taxes on repatriated profits. This results in a different behavior of the STRs and the BCEATRs over time and between country-pairs. The median tax-rate elasticity of -1.45 derived from earlier studies should not be used for policy decisions unless this value is confirmed by studies using BCEATRs. Following the results of DeMooij and Ederveen (2003 and 2005) a substantial increase in the tax-rate elasticity should be expected. More specifically, using BCEATRs instead of STRs is likely to result in an elastic response of FDI with respect to taxation. Moreover, our results imply that future studies on the role of taxes as drivers of FDI should be based on bilateral FDI data rather than on aggregate data.

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