SOME FURTHER EVIDENCE ON THE ROLE OF EFFECTIVE CORPORATE INCOME TAXES AS DETERMINANTS OF FOREIGN DIRECT INVESTMENT IN CENTRAL AND EAST EUROPEAN COUNTRIES*

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INTRODUCTION

FOREIGN DIRECT INVESTMENT (FDI) ACTIVITY of multinational enterprises (MNEs) has grown substantially during the last decades. In line with this trend, a substantial interest to empirically investigate the determinants of FDI has emerged (Bloningen, 2005). Clearly taxes, corporate income taxes in particular, are among the many possible drivers of FDI. Conceptually the profitability of an investment is expected to decrease with increases in taxes. Empirically, the negative relationship between the corporate income tax burden and FDI has been broadly confirmed. Empirical evidence for FDI between the most advanced OECD countries is summarized by DeMooij and Ederveen (2003, 2005). From these two studies, a median tax rate elasticity (semi-elasticity) of around -3 can be derived. However, the magnitude of the effect of taxes on FDI usually varies substantially depending on the measure of corporate income tax burden (e.g., statutory tax rate, backward-looking effective tax rate, forward-looking effective tax rate), the measurement of FDI (e.g., aggregate FDI data from balance of payments, property, plant and equipment) and the type of dataset (time series, cross-section, panel data, discrete choice models) used (DeMooij and Ederveen, 2005; Devereux and Griffith, 2002). Concerning the choice of FDI data one has to rely on official data (see Devereux, 2006 for an overview) but with respect to proxies for the corporate income tax burden one has to calculate measures according to theoretical guidelines (see OECD 2000 for an overview of approaches).

Empirical evidence concerning FDI and taxation in the Central and East European Countries (CEECs) is much scarcer than for the more advanced OECD countries. In Bellak et al. (2005), we survey existing studies on the role of taxes as a driver of FDI in CEECs and find a median tax rate elasticity of about -1.5. A notable feature of the studies surveyed is that they rely on statutory tax rates, clearly a second best measure when dealing with FDI (see e.g., OECD, 2000; Devereux, 2006). In Bellak and Leibrecht (2005), we use effective average tax rates on a bilateral basis (BEATR) following closely Devereux and Griffith (1998b) to explain bilateral FDI flows between eight CEECs and their seven -- in terms of bilateral FDI-stock -- main home countries of FDI.[1] We estimate economically and statistically significant tax rate elasticities ranging between -4 and -5. Hence, using a better measure of the corporate income tax burden than statutory tax rates indeed leads to a substantial increase (in absolute value) of the tax rate sensitivity of FDI in CEECs. This result is also in line with the DeMooij and Ederveen studies. We also find that proximity and real unit labor costs impact significantly negatively and the privatization process, as well as host market size and home country size, impact significantly positively on FDI. Host market size and proximity are the most important determinants of FDI.

This paper extends the analysis in Bellak and Leibrecht (2005). Besides using updated data, this paper includes two additional features:

1. We include, in addition to the BEATR, the bilateral effective marginal tax rate (BE-MTR) on corporate income as right-hand side variables because aggregate FDI may finance both, infra-marginal (i.e., profitable) as well as marginal investments (Devereux and Griffith, 2002; Hajkova et al., 2006; Egger et al., 2006).

2. We use contemporaneous as well as 1-year lagged values of the right-hand side variables varying over time and cross sections to cope with considerations that FDI is explained by one-year lagged exogenous variables rather than contemporaneous explanatory variables (e.g., Bevan and Estrin, 2004; Egger et al., 2006).

This study shows that the main result of Bellak and Leibrecht (2005), namely that the BEATR is a statistically and economically significant determinant of FDI in CEECs, is robust with respect to these extensions. The remainder of the paper is structured as follows. The second section provides some conceptual background on the appropriate choice of the corporate income tax burden used when dealing with FDI in CEECs. The third section briefly discusses the development of the corporate income tax burden in the CEECs included in the analysis. The fourth section briefly describes the empirical specification and methodology used in the estimation and presents the estimation results. The fifth section provides a summary of our main findings.

WHICH TAX RATE FOR ANALYZING FDI IN CEECS?

It is well established in the literature (e.g. Devereux and Griffith, 1998a; Devereux, 2006) that for analyzing the incentive effects of taxes on a firm's investment decision, which consist of cash-flows in the present and the future, forward-looking tax rates that are based on the net present value of these cash flows are the proper choice.[2] Measures of this type are in the spirit of King and Fullerton (1984) and Devereux and Griffith (1998b). Devereux and Griffith (1998b) derive forward-looking effective tax rates for marginal and for infra-marginal investment decisions of domestic as well as foreign firms. Following Devereux and Griffith (1998a, 1998b), infra-marginal investment decisions of firms are directly determined by the effective average tax rate (EATR) and only indirectly via the optimal scale of investment by the effective marginal tax rate (EMTR). Therefore, when analyzing infra-marginal investment decisions, the EATR must be used in the empirical model as the measure of corporate income tax burden.

FDI decisions of MNEs often are infra-marginal (e.g. Devereux and Hubbard, 2003; Devereux and Griffith, 2002; Markusen, 2002), and therefore the EATR should primarily drive FDI decisions. Moreover, for FDI decisions, EATRs on a bilateral basis (the BEATRs) should be used not only as host country tax law but also as home country tax law, and international, as well as supra-national, tax law determine the effective tax burden on profits from FDI (e.g., Bloningen, 2005; Bellak et al., 2005). Using EATRs seems to be especially important for the CEECs, as these are relatively young economies. Hence, FDI is a relatively recent phenomenon in these countries and it is particularly plausible that it primarily finances new and infra-marginal investments. Moreover, it is important to use tax rates on a bilateral level as some of the CEECs only recently signed double taxation agreements (e.g., Slovenia with Austria and the United States; or Hungary with several countries) or have changed withholding taxes on repatriated profits during the last several years (e.g., the new member states of the European Union (EU) due to the adoption of the EU parent-subsidiary directive). Finally, there are substantial differences in the overall withholding tax rates on dividends between the various home countries of FDI. These changes and differences are well captured by BEATRs.

Hence, the BEATR is the tax variable of main interest when dealing with FDI in CEECs. But as aggregate FDI data may include both types of investment, marginal as well as infra-marginal, both measures of effective corporate tax burden, BEATRs and BEMTRs, should be applied in an empirical model (Devereux and Griffith, 2002), with the prior expectation that only the average tax rate matters (see e.g., Auerbach et al., 2006). This can be done in two ways: (1) the two measures are included in the empirical model separately (e.g., Hajkova et al., 2006; Egger et al., 2006) or (2) both tax rates enter the model simultaneously (e.g., Devereux and Griffith, 1998a). While the first way is straightforward,[3] the second is confronted with possible problems. Including both measures simultaneously raises the problem of interpretation of the slope estimates, which relies on the *ceteris paribus* condition. But as BEATRs and BEMTRs are conceptually closely linked (see below), changing the BEMTR probably also changes the BEATR. Put differently, the BEATRs and BEMTRs may be highly multi-collinear, which may lead to identification problems (Pindyck and Rubinfeld, 1998).

DEVELOPMENT OF CORPORATE INCOME TAX BURDEN IN CEECS

Figure 1 summarizes the development of the BEATRs and BEMTRs of eight CEECs vis-à-vis the seven home countries included in the analysis for the years from 1995 to 2004.[4] The rates were calculated following the Devereux and Griffith approach (see Devereux and Griffith, 1998b for details).

Figure 1 reveals first, that the CEECs started with relatively high rates in 1995. Second, as expected, the marginal tax rates are below the

Figure 1: **Development of Corporate Income Tax Burden in CEECs[5]**
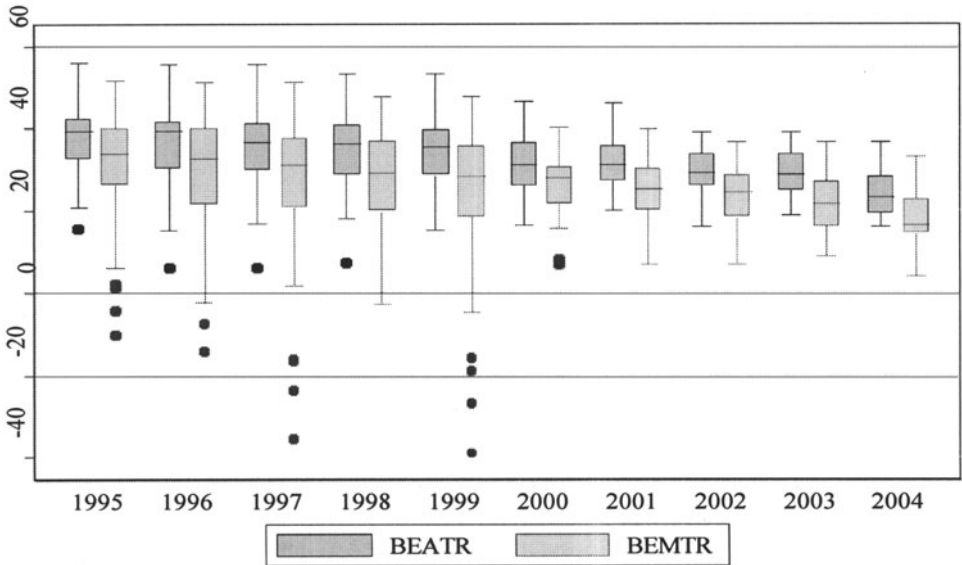
Severe Outliers in BEMTR distribution in 2000 (HR: very high notional rate of return) are not included

Host countries included: Czech Republic, Poland, Hungary, Slovenia, Slovakia, Romania, Bulgaria, Croatia. Home countries included: Austria, United States, United Kingdom, Germany, France, Italy, Netherlands

corresponding average tax rates. Third, there is a remarkable fall in the median of both rates between 1995 and 2004. Fourth, the bilateral rates of the various country pairs converge as indicated by the falling width of the boxes. Finally, the plot shows the impact of the allowance for corporate equity (ACE) in Croatia until the year 2000 which results in negative BEMTRs, shown as outliers in the figure.[6]

The latter point is indicative for the impact of tax allowances on the marginal effective tax rates. Effective average tax rates on the other hand are much more determined by the development of statutory tax rates on corporate income and withholding taxes on dividends. Specifically, the BEATR actually is a weighted average of the BEMTR and an adjusted statutory tax rate (depending *inter alia* on the statutory tax rate on corporate income of the host country as well as the overall withholding tax rate on dividends; see Devereux and Griffith, 1998b for details). This implies also that the usual *ceteris paribus* interpretation of slope estimates does not apply when both tax rates are included simultaneously in an empirical model.

Moreover, the BEATR approaches the adjusted statutory tax rate with an increasing pretax financial rate of return of the investment (see Devereux and Griffith, 1998b for details).

For example, BEATRs are strongly influenced by the abolishment of the corporate split-rate system in Germany in 2001, which results in an increase of the BEATRs for German outbound investments (also see European Commission, 2001 on this issue) or by the adoption of the EU-parent-subsidiary directive by some of the CEECs considered here in 2004. Hence, it is plausible that CEECs with comparably high statutory tax rates like Croatia (until 2000) or Slovenia (since 2000) receive little FDI despite having high tax allowances and therefore relatively low BEMTRs (also see Devereux and Sørensen, 2005).

EMPIRICAL SPECIFICATION AND RESULTS

Empirical Specification

As in Bellak and Leibrecht (2005), we base our empirical model upon a panel gravity setting, since

gravity models seem to be successful in explaining bilateral FDI flows (e.g., Bénassy-Quéré et al., 2005). Moreover, one advantage of a typical gravity model in our context is that it already includes host country market size (*lngdphost*), home country size (*lngdphome*) and distance (*lndist*), which are standard candidates also in non-gravity and more theory-based models aiming to explain FDI-flows (e.g. Markusen and Maskus, 2002). The basic panel gravity model is augmented by the measures of the corporate tax burden described previously (*beatr* and *bemtr*) and by other location factors as control variables. The control variables are standard proxies for openness of a country (tariffs in percent of imports; *tar*), political risk (indicator from Euromoney: *risk*), macroeconomic risk (increase in producer prices, *infl*), for labor costs (real unit labor costs in common currency, *ulc*), and, especially relevant for countries in transition, the privatization process (privatization revenues, *priv*). We also include a common border dummy (*combord*) as well as time dummies. For the variables of main interest, the tax measures, we expect a significant negative impact on FDI.

The data used constitute a panel data set including the eight CEECs as host countries and the seven home countries mentioned previously. The time span is from 1995 to 2003. We apply a general-to-specific modelling approach with the aim of bringing correlation closer to causation. Moreover, this methodology shows the robustness of the elasticity estimates with respect to right-hand side variables included in the empirical model. A further robustness analysis is carried out via a "jackknife analysis," (i.e., by excluding countries or years and reestimation of the model with the reduced sample size).[7]

Table 1 shows the correlation matrix of the right-hand side variables included in the analysis. It reveals several aspects. First, the table shows that all correlation coefficients are below 0.80 in absolute value, which is often used as a benchmark value for high multi-collinearity in empirical studies (see Kennedy, 2003 for details). More importantly, however, the correlation coefficient between *beatr* and *bemtr* is low (0.53), which may be explained by the inclusion of countries with low BEMTRs and relatively high BEATRs (notable Croatia). Indeed, dropping Croatia leads to an increase in the correlation coefficient to about 0.80. Hence, dropping Croatia from the

sample is likely to lead to multi-collinearity problems if both measures of corporate income tax burden are included simultaneously in the model.

Table 2 shows some descriptive statistics for the variables used in the analysis. Relatively large values are present for *infl* and *bemtr*. These values represent country-specific heterogeneity (*infl*: Bulgaria and Romania; *bemtr*: Croatia), which we are exploiting in the estimation process.[8]

Results

Presentation of results is divided in two parts. Part one gives the results of the general-to-specific modeling approach separated by the specifications including contemporaneous right-hand side variables and those with lagged variables. The second part shows the results of a "jackknife analysis".

1. Results of the general-to-specific modeling approach

Results are shown in Table 3. M1 and m2 give the results for the model including the *beatr* only, m1 for one-period lagged (excluding *lndist*) and m2 for contemporaneous right-hand side variables. Both models are estimated using the random-effects estimator, as the Hausman-Wooldridge test does not reject the null hypothesis (see Wooldridge, 2002 for this test). The models show that the estimated coefficients and their corresponding statistical significance are robust with respect to using current or one-period lagged variables. Only the coefficient of *ulc* drops somewhat when contemporaneous variables are used. These results are in line with Bevan and Estrin (2004), who use a similar specification as well as the random effects estimator.[9]

The estimated tax rate elasticity is about -5.9. This value is slightly higher than the corresponding tax rate elasticity shown in Bellak and Leibrecht (2005), which is due to the data update. Hence, the semi-elasticity is again in line with DeMooij and Ederveen (2003, 2005) and substantially higher than implied by studies using statutory tax rates. Moreover, the same variables as in Bellak and Leibrecht (2005) are significant determinants of FDI in CEECs. Thus, these estimates broadly confirm the general conclusions drawn in Bellak and Leibrecht (2005), who find that taxes – BEATRs – do matter for FDI in CEECs as do the privatization

Table 1
Correlation Matrix

	lngdphome	lngdphost	lndist	beatr	bemtr	ulc	lnpriv	combord	tar	risk	infl
lngdphome	1.00										
lngdphost	0.03	1.00									
lndist	0.75	-0.01	1.00								
beatr	-0.02	0.05	0.08	1.00							
bemtr	-0.13	0.22	-0.07	0.53	1.00						
ulc	0.02	0.11	-0.12	-0.35	-0.31	1.00					
lnpriv	0.03	0.65	0.00	0.04	0.22	-0.26	1.00				
combord	-0.28	0.09	-0.58	0.01	0.13	0.20	0.00	1.00			
tar	-0.05	-0.58	0.14	0.01	-0.16	-0.33	-0.38	-0.18	1.00		
risk	0.04	0.52	-0.18	-0.13	0.10	0.51	0.31	0.27	-0.67	1.00	
infl	-0.02	-0.23	0.08	0.13	0.10	-0.25	-0.06	-0.07	0.30	-0.26	1.00

process, high real unit labor costs, and especially host market size and proximity. Political and macroeconomic risk, although carrying the expected signs, do not impact significantly, probably because the majority of the CEECs included in the analysis are relatively low-risk countries throughout the period, and because the effect of high inflation may be captured by the time dummies (see e.g., Egger and Pfaffermayer, 2005). *Tar* is not significant as tariffs are low throughout the period considered. The insignificance of the common border dummy (positively signed) signals that geographic distance (*lndist*) is sufficient to capture the effective distance between countries. This is plausible because the capital cities of the two most important home countries of FDI, Germany and Austria, are close to the borders of some of the CEECs considered here.[10]

M3 substitutes the *beatr* by the *bemtr*. It shows that a low *bemtr* does not lead to FDI inflows. This is plausible because the two countries with the lowest *bemtr* in our sample, Croatia and Slovenia, received relatively little FDI throughout the period studied. Furthermore, the coefficients of the remaining variables do change only slightly. These results are broadly confirmed with current variables with the exception that *ulc* becomes highly insignificant. Excluding *ulc* does not change the results (*bem*tr: -0.0024 (z-value of -0.44)). Therefore, in case of a model including *bemtr*, the lagged-specification is preferred. More importantly, however, m1 to m4 signal that FDI in CEECs indeed is not determined by the BEMTR but by the BEATR.

M5 and m6 extend models m1 and m2 by inclusion of *bemtr*. This can be done here as the correlation coefficient is relatively low (0.53, cf. Table 1). Nevertheless, one has to bear in mind that the usual *ceteris paribus* interpretation of coefficients might not hold as *beatr* and *bemtr* are conceptually closely linked.[11] The most striking result is that only the *beat*r impacts significantly negatively on FDI as asserted previously. The *bemtr* carries a small positive coefficient in m3 and a small negative coefficient in m4. In both cases it is insignificant at conventional significance levels.

A distinct feature of m6 is that it is estimated by the fixed-effects estimator as the Hausman-Wooldridge test rejects the null hypothesis. As shown by m6, this again leads to a significant impact of *beatr* and an insignificant impact of

Table 2
Descriptive Statistics

	Variable	Mean	Std.Dev	Min	Max	Variable	Mean	Std.Dev	Min	Max
overall	*lnfdi*	4.09	1.81	-0.43	8.44	*ulc*	26.32	9.42	10.42	51.90
between			1.45					9.04		
within			1.13					3.13		
overall	*lngdphome*	13.90	1.11	12.12	16.24	*lnpriv*	-0.40	1.28	-2.86	2.13
between			1.13					1.05		
within			0.14					0.76		
overall	*lngdphost*	10.43	0.80	8.96	12.27	*infl*	24.82	103.39	-1.80	971.08
between			0.77					40.74		
within			0.21					95.31		
overall	*lndist*	6.99	0.98	4.04	9.15	*tar*	4.34	3.79	0.50	18.45
between			1.00					3.06		
within			0.00					2.26		
overall	*beatr*	33.36	8.15	6.12	56.20	*risk*	13.91	3.30	5.32	19.82
between			6.71					2.89		
within			4.87					1.64		
overall	*bemtr*	25.02	17.55	-129.99	51.70	*combord*	0.14	0.34	0.00	1.00
between			13.70					0.33		
within			11.14					0.00		
N= 450	n = 56	T = 8.00								

Table 3
Estimation Results

	m1 (lagged)	m2 (current)	m3 (lagged)	m4 (current)	m5 (lagged)	m6 (current)	m6(1) (current)	m7 (lagged)
lngdphome	0.28**	0.33**	0.34**	0.37**	0.29**	1.09*	0.33***	0.30**
	(2.04)	(2.3)	(2.06)	(2.31)	(2.16)	(1.77)	(2.67)	(2.05)
lngdphost	1.05***	1.06***	0.95***	0.95	1.01***	0.80*	1.027***	1.07***
	(5.11)	(6.76)	(4.24)	(4.66)	(4.98)	(1.77)	(5.81)	(5.06)
lndist	-0.65***	-0.68***	-0.71***	-0.74	-0.63***	-	-0.67***	-0.69***
	(-4.27)	(-4.12)	(-3.96)	(-4.24)	(-4.38)	-	(-4.95)	(-4.34)
beatr_20%	**-0.059***	**-0.059***	-	-	**-0.066***	**-0.041***	**-0.066***	beatr_15%: **-0.056***
	(-5.73)	(-5.51)	-	-	(-6.21)	(-2.92)	(-6.66)	(-4.90)
bemtr	-	-	**-0.001	**-0.003	**0.007	**-0.003	**0.006	-
	-	-	(-0.24)	(-0.53)	(1.53)	(-0.72)	(1.22)	-
ulc	-0.03***	-0.02*	-0.02	-0.007	-0.03***	-	-0.02*	-0.03***
	(-2.95)	(-1.93)	(-1.57)	(-0.57)	(-2.76)	-	(-1.80)	(-2.96)
lnpriv	0.24**	0.28***	0.24***	0.30***	0.24**	0.28***	0.28***	0.24**
	(2.49)	(4.21)	(2.56)	(3.51)	(2.52)	(4.11)	(3.37)	(2.49)
cons	-3.27	-4.15*	-4.60	-5.09*	-3.04	-17.79***	-3.89*	-3.51
	(-1.28)	(-1.93)	(-1.64)	(-1.95)	(-1.23)	(-2.83)	(-1.78)	(-1.34)
Obs.	402	450	402	450	402	450	450	402
TD sign.?	YES	YES	YES	YES	YES	**NO**	YES	YES
HWT	REM	REM	REM	REM	REM	**FEM**	REM'''	REM
AR(1)?	NO	NO	NO	NO	NO	NO	NO	NO
HET?	YES	NO	YES	YES	YES	NO	YES	YES
R^2	0.52	0.55	0.44	0.47	0.53	0.28	0.56	0.50

* / ** / *** sign. at 10 percent, 5 percent, 1 percent; z values in parentheses; HWT = result of Hausman Wooldridge test (REM = random effects; FEM = fixed effects); AR(1) = serial correlation according to Wooldridge AR(1) test; HET = heteroscedasticity according to test based on Verbeek, 2004; TD = time dummies; R^2 = overall R^2 in case of REM and within-R^2 in case of FEM; all test results are based on a 10 percent significance level (details are available upon request); if HET = YES, heteroscedasticity robust standard errors are used; '" = REM used due to economic reasoning despite rejection of null hypothesis by HWT; coefficients of *beatr, bemtr,* and *ulc* have to be multiplied by 100 to get the corresponding semi-elasticities.

Table 4
Jackknife Results

	m1 *(beatr)*	
Host	Home	Year (1996 – 2002)
MIN / MAX	MIN / MAX	MIN / MAX
Poland: -5.30*** / Hungary: -6.60***	Germany: -3.80*** / France: -7.10***	1998: -5.50*** / 2000: -6.60***
	m3 *(bemtr)*	
Host	Home	Year (1996 – 2002)
MIN / MAX	MIN / MAX	MIN / MAX
Bulgaria: 0.06 / Croatia: -1.48 (p-value > 0.30)	Austria: -0.07 / France: -0.40	1997: -0.01 / 2001: -1.00 (p-value > 0.30
	m6 *(beatr* and *bemtr)*	
Host	Home	Year (1996 – 2003)
MIN / MAX	MIN / MAX	MIN / MAX
beatr	*beatr*	*beatr*
Czech Republic: -3.30*** / Hungary: -4.82***	Germany: -2.77 / United Kingdom: -4.90***	2002: -2.92** / 2003: -4.83***
bemtr	*bemtr*	*bemtr*
Bulgaria: -0.29 / Croatia: +2.30 (p-value > 0.30)	UK: -0.01 / FR: -0.65	2002: -0.15 / 2000: -0.53

* / ** / *** significant at 10 percent / 5 percent / 1 percent

bemtr. But time dummies as well as *ulc* are not included in m6. Moreover, *lngdphost* is significant at the 10 percent significance level only. As the fixed-effects estimator drops the between country pair variation, it is therefore questionable if this estimator – given our small N and small T panel – is suitable for the research problem at hand (see Pesaran et al., 1999 on the choice between the fixed- and random-effects estimator), which is an MNE's FDI decision where the firm has to discriminate between several possible locations of the FDI. Therefore, m6(1) shows the results for the current specification estimated by the random-effects estimator.

As the assumed pretax rate of financial return (*p*) of 20 percent is somewhat arbitrary (Devereux and Griffith, 1998a), Table 3 (m7) shows results for *p* = 15 (lagged specification). Changing *p* to 15 percent does not alter the estimated tax-rate elasticity much.[12]

2. Results of the "jackknife analysis"

Table 4 shows the results for three different robustness checks – dropping (1) a host country or (2) a home country or (3) a particular year. The minimum, as well as the maximum, value of these experiments along with their statistical significance are given. For m1 and m3 Table 4 reveals the robustness of the estimates reported in Table 3. Note, that the semi-elasticity of the *bemtr* does increase in absolute value and gets negative when Croatia, the country with very low BEMTR, is dropped. But the estimate is far from being statistically significant, another indication of the minor role of the *bemtr* as driver of FDI in CEECs.

This last point is especially important as conducting a host-country jackknife for m5 (*beatr* and *bemtr* included) leads to unexpected results when Croatia is dropped (not shown). Specifically, the semi-elasticity of *beatr* increases to -11.1 and that of *bemtr* to +7.4, both statistically significant.[13] Neither is a tax rate elasticity of -11.1 plausible given the results reported here; and in Bellak and Leibrecht (2005); nor is a *positive* tax rate elasticity of FDI with respect to *bemtr* theoretically meaningful.[14] A high positive and significant value would be empirically implausible given the results in Tables 3 and 4, especially the negative and insignificant coefficient on *bemtr* when Croatia is dropped in m3. As mentioned above, the BEATR and the BEMTR are highly correlated when Croatia is dropped. One solution is to interpret the two estimates jointly. Adding the two coefficients leads to an estimate in line with the prior results.[15] Furthermore, the analysis on the current specification (m6) leads to jackknife results, which are broadly in line with the prior analysis. This also shows that the fixed-effects estimator is more robust to violations of regression assumptions (here: presence of high multi-collinearity) than the random-effects estimator is. Results for m6 are shown in table 4.

SUMMARY AND CONCLUSIONS

This paper shows that the main result established in Bellak and Leibrecht (2005), namely that FDI in CEECs is economically and statistically significantly driven by the BEATR, is robust with respect to two extensions: (1) inclusion of BEMTRs in the empirical model and (2) consideration that FDI is explained by 1-year lagged exogenous variables rather than contemporaneous explanatory variables. Specifically, we provide evidence that FDI in CEECs is not determined by the BEMTR. In line with theoretical predictions (e.g., Devereux, 2006; Devereux and Sørensen, 2005), the results indicate that the tax lowering strategies of CEEC governments focusing on the reduction of statutory tax rates on corporate income, as well as withholding taxes on dividends, had an impact on foreign firms' investment location decisions, whereas relatively generous tax allowances like in Croatia or Slovenia did not.

It should be mentioned, however, that for the foreseeable future there seems to be only a small scope for further cuts in statutory tax rates as these are already low in the CEECs. Moreover, withholding taxes on dividends are not allowed by the EU parent subsidiary directive. Hence, the CEECs should change their economic policies towards increasing quantity and quality of other location factors, especially towards production-related private and public infrastructure.

Notes

[1] The home countries of FDI included are Austria, France, Denmark, Netherlands, Italy, United States, and United Kingdom; the host countries are Czech Republic, Poland, Hungary, Slovenia, Slovakia, Bulgaria, Romania, and Croatia.

[2] Statutory tax rates are relevant when dealing with profit shifting of MNEs (e.g., Devereux, 2006). Backward-looking tax rates can be used as a starting point when dealing with distribution of the tax burden among various tax bases (e.g., OECD, 2000).

[3] As FDI is mainly financing infra-marginal investment, the prior expectation is that the tax rate elasticity with respect to the BEMTR should be substantially smaller in absolute value than that with respect to the BEATR.

[4] Overall BEATRs and BEMTRs for each country pair are calculated as weighted average of the BEATRs (BEMTRs) for investment in three investment goods (machinery, buildings, and inventories). Weights for the investment goods and for the various ways of financing the investment used are the same as described in Bellak and Leibrecht (2005). BEATRs are based on a pretax financial rate of return of 20 percent. Note, that local and state business taxes (e.g., Hungary, Germany, United States) are included. Thereby an average statutory tax rate over all local or state governments is used. Real estate taxes and net wealth taxes, which are of minor importance in the CEECs considered here (see also Finkenzeller and Spengel, 2004), are not included. Cost disallowance rules which were in force in the Netherlands until 2004 (see Sunderman, 2004 for details) and in Austria until 2005 (see Hirschler and Finkenzeller, 2004) and special equity allowances (esp. Croatia) are implemented. Furthermore, the rates applied do not capture any tax avoidance measures of MNEs (e.g., via transfer pricing or thin capitalization). Hence, they should be considered as the upper bound of the likely "true" effective tax burden of a particular firm.

[5] The first box-plot on the left-hand side of the figure is the BEATR for 1995, the second is the BEMTR for 1995, the third is the BEATR for 1996 etc.

[6] In including the ACE of Croatia, we closely follow Keen and King (2002) and Lammersen (2002). The "notional rates of interest" used were calculated as 5% plus increase in producer prices. The ACE results in negative effective marginal tax rates, especially for FDI from France in 2000. These values seem to be plausible for Italy, which grants a partial equity allowance; highly negative values are derived, too (e.g., Spengel, 2003; for example, Table 2.30 on p. 140 gives a BEMTR for France of about -40 percent). Besides Croatia, especially Slovenia, grants favorable tax allowances (also see Eichler et al., 2005).

[7] For further details on the empirical model used, the methodology applied, and the variables included in the analysis, see Bellak and Leibrecht (2005).

[8] Outlier values in a data set may be defined as observations that are inconsistent with the remaining observations (Sim et al., 2005). Following this definition, three FDI observations are dropped during the initial data inspection using box-plots and added variable plots.

[9] Furthermore, the lagged specification suffers from heteroscedasticity, whereas the current specification does not. Hence heteroscedasticity robust standard errors are used for the former. Both specifications are free of serial correlation according to the Wooldridge test for AR(1) in panel data (Wooldridge, 2002; xtserial in STATA).

[10] For a discussion of the estimates with respect to results from prior studies, see Bellak and Leibrecht (2005).

[11] It may hold if one assumes that the 1 percentage point change in *beatr* is due to a change in the statutory tax rate. This has a huge impact on the *beatr* but only a small one on the *bemtr*. The impact on the *bemtr* may be compensated for by the assumption of a simultaneous change in tax allowances, which has a huge impact on the *bemtr* but only a small one on the *beatr*.

[12] Reducing p to 10 percent has a somewhat stronger effect on the absolute value of the semi-elasticity. It drops by more than 2 percentage points to -3.7 but remains statistically significant (z-value of 2.89). This is plausible as the BEATR approaches the BEMTR with falling p. As shown by m3 and m4, the semi-elasticity of *bemtr* is low and insignificant.

[13] Dropping countries other than Croatia does not change the main result that the *bemtr* is insignificant with the *beatr* being significant.

[14] This suggests that a one-sided test with the alternative hypothesis that the slope coefficient is below zero should be applied instead of a two-sided test. In this case the coefficient of *bemtr* would be statistically insignificant.

[15] Note, this applies to m5, m6, and m6(1) as well.

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