

Competition from Low-Wage Countries and the Decline of Corporate Tax Rates - Evidence from European Integration

Michael Overesch*

Centre for European Economic
Research (ZEW), Mannheim

Johannes Rincke**

University of Munich

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Abstract

We exploit the rapid economic integration of Eastern and Western Europe after 1989 as a natural experiment to assess the effect of international competition for mobile capital on corporate tax rates. By means of a series of difference-in-difference estimations, we show that Western European countries which have been directly exposed to neighbors in Eastern Europe have reacted to the intensified competition by cutting their corporate tax rates by 8.1 to 9.8 percentage points relative to those countries which do not share a common border with countries in Eastern Europe. It seems that this effect has mainly worked through Eastern European countries offering lower wages and less through competition over corporate tax rates.

Keywords: Economic integration, corporate taxes, natural experiment

JEL Classification: H20, H25, H71

* Contact: Centre for European Economic Research (ZEW), L7,1, D-68163 Mannheim, +49 621 1235 394, overesch@zew.de

** Corresponding author. Contact: University of Munich, Department of Economics, Seminar for Economic Policy, Akademiestr. 1/II, D-80799 Munich, +49 89 2180 6753, johannes.rincke@lrz.uni-muenchen.de

1 Introduction

Both statutory and effective corporate tax rates in Europe have shown a significant downward trend over the past 25 years. The most common explanation for this phenomenon says that governments are forced to cut tax rates in order to retain a competitive position for their country in times of increasingly integrated capital markets. While this notion and the concern about a ‘race to the bottom’ in corporate income tax rates is widespread, previous research has found it difficult to provide conclusive evidence on how countries actually adjust their tax system to increased competitive pressures. Two strands of literature have emerged. The first one elaborates on the impact of a country’s openness in terms of trade and FDI flows or institutional characteristics that limit international capital mobility (see, e.g., Slemrod, 2004; Winner, 2005; Ghinamo et al., 2007; Schwarz, 2007). The second strand has focused on direct tax competition, assuming that governments compete over a mobile tax base such as capital or paper profits by setting the key parameters of their country’s tax system conditional on the respective choices in other countries (see, e.g., Redoano, 2007; Egger et al., 2007; Egger and Raff, 2007; Devereux et al., 2008). The former approach has largely ignored the endogeneity problem associated with using measures for openness that are either directly related to key parameters of a country’s tax system or institutional characteristics which are subject to the political process and, therefore, determined simultaneously with those parameters. On the other hand, the tax competition approach requires assumptions that help the researcher define a set of competitors for each jurisdictions and suffers from a general difficulty to identify the tax competition effect in the presence of severe endogeneity problems.

It is the aim of this study to provide evidence on the impact of international competition for mobile capital on corporate tax rates while avoiding some of the methodological problems of earlier contributions. Following the line of reasoning in Buettner and Rincke (2007), the idea is to look for a quasi-experimental setting where the position of a group of countries in terms of their competitiveness as locations for interna-

tionally mobile capital was significantly altered by forces which are unrelated to the respective countries' national tax policies. By comparing the change in corporate income tax rates in these countries (called the treatment group) in the aftermath of the shock to the change in tax rates in a control group of unaffected countries, we should be able to identify that part of tax adjustments in the treatment group which was ultimately caused by the exogenous change in the competitive environment. In recent European history, the breakdown of the communist regimes in Eastern Europe lends itself as such a quasi-experimental setting. It was arguably an unexpected, exogenous event with far-reaching consequences for the competitiveness of some Western European economies as locations for FDI. In particular, we argue that the rapid economic integration of a number of Eastern European countries after 1989/90 had strongly asymmetric effects on the economies of Western Europe: depending on their geographical location, some countries were directly affected by the integration shock, as they were getting exposed to neighbors which did not play a role as competitors for mobile capital before 1989. At the same time, other countries in Western Europe were geographically far away from Eastern Europe and, as a consequence, were far less economically affected by the integration of the former communist countries.

The claim that the breakdown of the communist regimes in Eastern Europe had a particularly strong impact on tax policies in neighboring Western European countries can be substantiated by a number of prominent examples. From 1989 until 1994, Finland and Sweden, for example, cut their statutory corporate tax rates in several steps by 17 and 33 percentage points, respectively. Within the same period, significant tax reductions took also place in other countries sharing a common border with countries in Eastern Europe. Germany, for instance, reduced its statutory corporate tax rate by about nine percentage points, and Austria by five percentage points. Motivated by these examples, our empirical setup follows the logic of a difference-in-difference approach that exploits the differences across Western European countries in terms of their geographical proximity to Eastern Europe: it compares the integration effect on tax levels in countries directly exposed to neighbors in Eastern Europe (called the border countries) to the effect on tax rates in Western European countries without

such direct links to the former communist countries (the non-border countries) by means of a simple regression analysis.¹

Using a comprehensive panel data set comprising up to 18 Western European countries observed from 1982 to 2005, we find evidence for a substantial impact of the integration of the former communist countries on tax policies in the border countries. Across a series of difference-in-difference estimations, our main result is that the countries directly exposed to neighbors in Eastern Europe have cut their statutory corporate income tax rates by 8.1 to 9.8 percentage points on average. Using the effective marginal tax rate, we still find an effect in the range of 6.5 to 8.3 percentage points. Hence, our empirical exercise supports the view that national governments strongly react to changes in the competitive environment with respect to the location of internationally mobile tax bases. Although our approach is silent with respect to the ultimate economic forces which were behind this effect, we offer some suggestive evidence. In particular, we show that the main part of the downward adjustment of corporate tax levels in the border countries was achieved between 1990 and 1994. Noting that the transition countries in Eastern Europe did not come up with competitive tax systems before 1995, we conclude that strategic interaction in key parameters of national tax schemes does not provide a consistent explanation for our findings. Quite naturally, this puts more emphasis on the alternative hypothesis, saying that corporate taxes in the border countries were driven down by the wage differential between Western and Eastern Europe.

The paper is organized as follows. Section 2 offers a preliminary look at the data and discusses the estimation approach. The empirical results are presented and discussed in Section 3, and Section 4 concludes.

¹For a general introduction to natural and quasi-experiments in economics see Meyer (1995).

2 Descriptive analysis and empirical approach

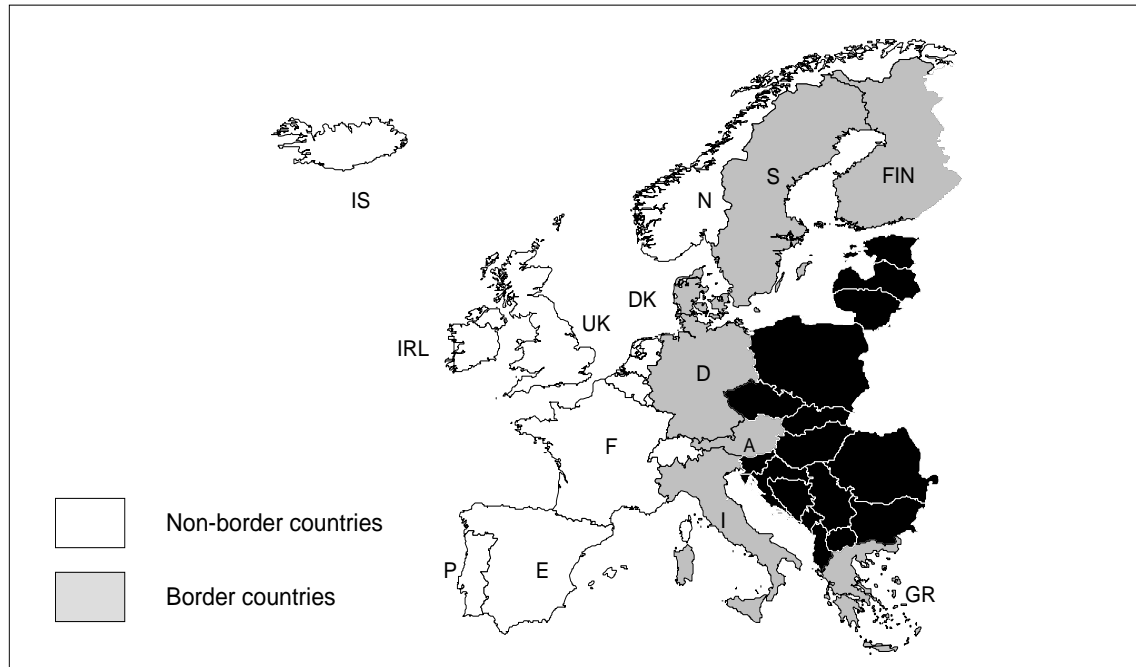
2.1 Empirical setup

It is the aim of our analysis to provide evidence on the impact of international competition for mobile capital on corporate tax rates. Our identification strategy makes use of the potential of the breakdown of the communist regimes in the countries of Eastern Europe in 1989/90 to asymmetrically affect the economies of Western Europe: depending on their geographical location, some countries got exposed to neighbors which did not play a role as competitors for mobile capital before 1989. At the same time, other countries in Western Europe were geographically far away from Eastern Europe and, as a consequence, were far less economically affected by the unexpected integration of the former communist countries.² Hence, the breakdown of the communist regimes in Eastern Europe and the subsequent integration of countries like Poland, the Czech and Slovak Republic, Latvia, Lithuania, Estonia and Slovenia provides a quasi-experimental setting for studying the effects of the integration of low-wage countries on national tax policies.

Throughout the empirical analysis, we will make use of an assignment of the Western European countries into two distinctive groups as depicted in Figure 1. The first group is made up of the countries located at the former borderline between Western and Eastern Europe and consists of Finland, Sweden, Denmark, Germany, Austria, Italy, and Greece. The second group contains those countries which are not directly exposed to former communist neighbors: Iceland, Norway, United Kingdom, Ireland, Netherlands, Belgium, Luxembourg, France, Switzerland, Spain, and Portugal.

²The role of geographical distance as a powerful force affecting particularly vertical FDI-flows is made explicit, e.g., by Carr (2001), and Markusen (2002).

Figure 1: Border and non-border countries in Western Europe.



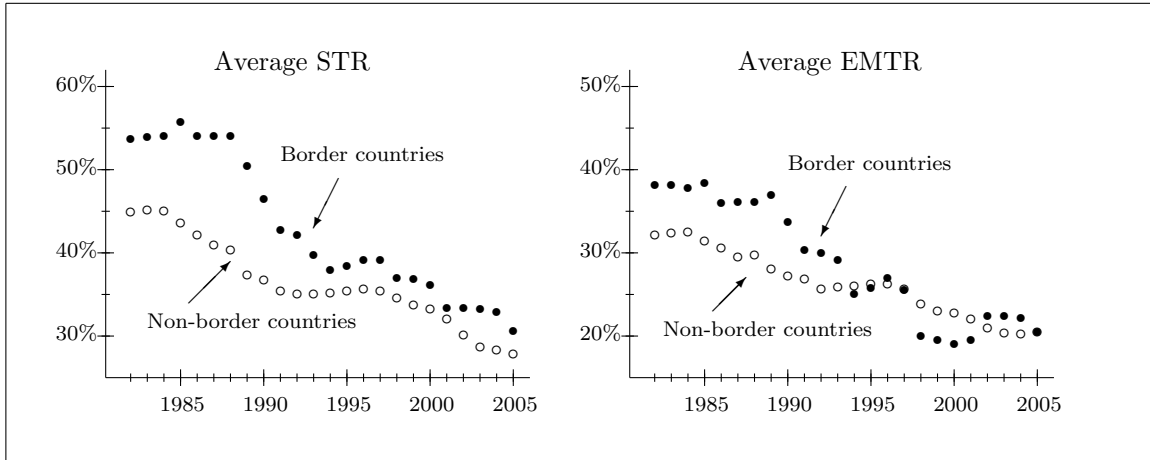
2.2 Descriptive analysis

Before turning to our estimation approach and a more formal discussion of how the integration of Eastern Europe might have affected corporate taxes in Western Europe, a brief descriptive analysis will prove helpful. Figure 2 displays average corporate income tax rates over time, separately for border and non-border countries.³ As in the regressions to be discussed later on, in the descriptive analysis we make use of two different tax rates which are commonly used as measures for the tax burden on corporate income: the statutory tax rate (STR) and the effective marginal tax rate (EMTR). While the STR is the statutory headline rate of the corporate income tax adjusted for surcharges and the average of local income tax rates, the EMTR reflects all relevant income and non-income taxes imposed on corporate investments as well as all rules that determine the tax bases.⁴ If the tax policies of both groups of

³The graphs are actually based on the 13 countries for which tax data are available for the whole period 1982-2005.

⁴We refer the reader to the following subsection for a detailed description of how the EMTR is actually calculated.

Figure 2: Corporate taxes in border and non-border countries, 1982-2005



Graphs for average tax rates show unweighted averages. Border countries in sample are: Austria, Denmark, Finland, Germany, Italy, and Sweden. Non-border countries are Belgium, France, Ireland, Luxembourg, Netherlands, Switzerland, and United Kingdom.

countries have been differently affected by the integration of Eastern Europe in any significant way, we should actually be able to see some difference in the evolution of tax rates after 1989.

The left panel of Figure 2 shows the average statutory tax rate for border and non-border countries between 1982 and 2005. While the mean statutory rates of both groups have substantially declined over the period considered, the graph reveals a significant gap between the mean tax levels of the two groups during the 1980s, with the average statutory rate of border countries exceeding that of non-border countries by 8.7 to 13.7 percentage points. Starting from 1990, this difference quickly gets diminished, reaching only 2.3 percentage points in 1994. From there on, average statutory rates in both groups remain at similar levels while showing a common downward trend. For the EMTR, the graph looks broadly similar. The difference in average tax levels between border and non-border countries is between 5.3 and 8.9 percentage points before 1990 and gets reversed to -1.5 percentage points by 1994. The average tax level in the border countries then closely follows that of non-border countries for most of the time, with some more substantial undercutting between 1998 and 2001.

2.3 Estimation approach and data

In the following, we present our formal estimation approach to identify the asymmetric impact of the integration of the former communist countries on national tax policies in Western Europe. By comparing the integration effect on tax levels between border and non-border countries, the approach closely follows the line of reasoning that was behind the descriptive analysis. With $i = 1, \dots, N$ indexing countries and $t = 1, \dots, T$ indicating years, our difference-in-difference setup is easily formalized by the estimation equation

$$\tau_{it} = \beta_{1990} BORDER \times 1990_{it} + \beta_{1991} BORDER \times 1991_{it} + \dots + x_{it}\gamma + \theta_t + c_i + u_{it}, \quad (1)$$

where τ is representing either the statutory or the effective marginal tax rate; $BORDER \times 1990$, $BORDER \times 1991$, etc. are interactions between an indicator for countries in the treatment group, $BORDER$, and indicators for the various years starting from 1990; x_{it} is a vector of exogenous country characteristics including a constant; θ_t is a period effect common to all countries; c_i is an unobserved country-specific effect; u_{it} is a residual; and β_{1990} , β_{1991} , \dots , and γ are (vectors of) coefficients to be estimated.

Note that in some estimations, instead of the series of period-specific interactions we will use just a single variable to account for the treatment effect, $BORDER \times 1990-2005$. Here, $BORDER$ is interacted with a single indicator for observations from post-integration years, 1990-2005. Naturally, $BORDER \times 1990-2005$ captures the difference in the corporate tax rate between border and non-border countries, averaged over all post-integration years considered. Note also that with a constant and a full series of country and year effects included in Equation (1), our model fully accounts for any (observable or unobservable) characteristic which might be common to either the border or the non-border countries as well as for any common impact of the integration shock on the countries of Western Europe.

In contrast to most of the previous research on the impact of international competition for mobile capital, our formal estimation approach will be silent on the economic

Table 1: Descriptive Statistics

Variable	Definition	Mean	Std.Dev.	Min	Max
<i>Dependent variables:</i>					
STR	Statutory corporate income tax rate	38.0	10.5	12.5	65.9
EMTR	Effective marginal tax rate	26.3	8.63	4.94	53.2
<i>Control variables:</i>					
GDP	GDP in billions (PPP)	409	477	4.68	2112
% POP<15	% population below 15 years	18.5	2.78	14.0	30.3
% POP>65	% population above 65 years	14.8	1.90	10.5	19.9
FDI INFLOWS/GDP	Inward FDI divided by GDP	0.065	0.375	-0.147	5.23

Unbalanced panel (18 countries, years 1982-2005), 370 observations. Tax variables based on own calculations. Underlying tax information is from several databases provided by the International Bureau of Fiscal Documentation (IBFD), Amsterdam, and from annual surveys by Ernst&Young, PwC and KPMG. Information on FDI flows is from the World Development Indicators of the World Bank. The other control variables are from Eurostat and the World Development Indicators of the World Bank.

forces that ultimately affect governments to adjust their corporate income tax levels. While such a reduced-form approach comes at the cost of being less explicit about the channels through which economic integration affects national tax policies, it also has advantages. Most importantly, our identification strategy does not require any specification or assumption regarding the relative importance of tax competition or wage differentials as the most important channels through which the integration of Eastern Europe might actually have affected corporate income tax rates in Western Europe. As any empirical setup which tries to explicitly model these channels is prone to miss-specification, a reduced form approach as suggested here might be seen as a complement to more refined structural analyses.

We estimate Equation 1 using data for up to 18 European countries for the period from 1982 until 2005.⁵ For all these countries, we have constructed our two measures for the tax burden on corporate income. The STR is the simplest forward-looking tax measure. However, it neglects any difference in the tax base and the existence of non-income taxes. The EMTR has been calculated according to the methodology

⁵The countries considered are (with first year with data on corporate tax rates given in parentheses): Austria (1982), Belgium (1982), Denmark (1982), Finland (1982), France (1982), Germany (1982), Greece (1990), Iceland (1990), Ireland (1982), Italy (1982), Luxembourg (1982), Netherlands (1982), Norway (1990), Portugal (1990), Spain (1990), Sweden (1982), Switzerland (1982), United Kingdom (1982).

proposed by Devereux and Griffith (2003). In general, effective tax rates are more complex and compress various aspects of the legal tax code at a respective location. The underlying idea is to determine the effective tax level of a hypothetical, standardized investment project. An advantage of using effective tax rates is that several relevant components of the tax system of a given country can be considered within one indicator. In particular, the EMTR reflects all relevant income and non-income taxes imposed on corporate investments, as well as all the rules determining the tax bases such as depreciation rules. Our specifications for computing the EMTR are similar to the assumptions in a comprehensive study about company taxation by the European Commission (2001).⁶

Regarding the control variables, our choice reflects the previous empirical literature on the determinants of corporate taxes at the country level. In particular, we follow the literature and include the log of GDP to control for country or market size. Furthermore, the age structure of the population could influence national tax policies. In particular, a large share of young and elderly people might drive up taxes for the reason of higher needs for public spending and income redistribution. We therefore consider the fraction of the population below 15 years and the fraction of those above 65 years as additional control variables.⁷ Finally, as it has often been argued that increased capital mobility as such exerts a depressing effect on corporate tax levels, we include the annual inflow of FDI (divided by GDP) as one of the common measures for openness. Table 1 depicts descriptive statistics of the variables used in the empirical analysis.

⁶The standardized project contains investments in the following five asset types: industrial buildings, machineries, intangible assets, inventories, and financial assets. The project is equally financed by retained earnings, the issue of new shares, and debt. We assume an incorporated company. Only domestic taxes and only income and non-income taxes imposed at the corporate level are considered. Due to data limitations, specific property taxes on real estate are not included. We also cannot take into account special tax regimes available only for specific firms. With regard to the definition of the taxable bases, we consider the relevant rules concerning depreciation allowances, valuation of inventories and interest deductibility in case of debt financing.

⁷We prefer to use arguable exogenous variables like the age structure over fiscal variables like accumulated debt or public consumption because of the likely endogeneity of the latter variables.

3 Results

3.1 Main results

The results of a first series of difference-in-difference estimations is displayed in Table 2. Throughout the table, the dependent variable is the statutory tax rate, and all reported estimations account for a full series of country and year effects. The reported standard errors are fully robust, accounting for heteroscedasticity as well as clustering on countries. The first column reports a baseline estimation that, apart from the control variables, accounts for the variable capturing the average treatment effect, $BORDER \times 1990-2005$. However, we have left out all observations from the years 1990-1993, as one might question the assignment of these observations to the post-shock period. For instance, one might argue that in the very first years after the breakdown of the communist regimes, the degree of integration of the economies of Eastern Europe with respect to Western Europe was very limited, leaving the relative position of the border countries in a situation similar to that before 1989. Excluding observations from 1990-1993 makes sure that our results are unaffected by a potentially misleading assignment of these years to the post-shock period. We note that the treatment effect carries a negative coefficient which is significantly different from zero at the 5% level. The coefficient indicates that the integration shock has lead the border countries to reduce their statutory tax rates by almost 10 percentage points relative to the non-border countries. This striking result confirms the preliminary finding from the descriptive analysis. In particular, it implies that the convergence in statutory tax rates cannot be explained by country-specific changes in characteristics such as GDP, openness, or the share of the economically active population.

Column 2 adds more details on this finding as it accounts for a series of year-specific interaction effects while keeping the sample from Column 1. The series of year-specific treatment effects reveals that the impact of the integration of Eastern Europe

Table 2: Effect of integration of Eastern European on statutory tax rates, 1982-2005

	(1)	(2)	(3)	(4)	(5)	(6)
BORDER×1990-2005	-9.82** (4.23)	-	-8.90* (4.50)	-	-8.11* (4.33)	-
BORDER×1990	-	-	-	-	-	-3.65 (3.61)
BORDER×1991	-	-	-	-	-	-5.98 (5.61)
BORDER×1992	-	-	-	-4.05 (5.83)	-	-3.77 (5.77)
BORDER×1993	-	-	-	-7.13 (5.89)	-	-6.85 (5.86)
BORDER×1994	-	-8.99 (5.89)	-	-8.87 (5.98)	-	-8.59 (5.93)
BORDER×1995	-	-8.42 (6.00)	-	-8.39 (6.09)	-	-8.08 (6.03)
BORDER×1996	-	-8.22 (5.82)	-	-8.13 (5.94)	-	-7.84 (5.88)
BORDER×1997	-	-8.50 (5.78)	-	-8.33 (5.90)	-	-8.06 (5.85)
BORDER×1998	-	-9.69* (4.73)	-	-9.49* (4.74)	-	-9.14* (4.72)
BORDER×1999	-	-10.1** (4.17)	-	-9.94** (4.25)	-	-9.68** (4.23)
BORDER×2000	-	-10.0** (4.25)	-	-9.69** (4.32)	-	-9.45** (4.29)
BORDER×2001	-	-11.9*** (3.48)	-	-11.5*** (3.55)	-	-11.3*** (3.51)
BORDER×2002	-	-10.5** (3.70)	-	-10.1** (3.74)	-	-9.92** (3.79)
BORDER×2003	-	-10.0** (3.54)	-	-9.58** (3.55)	-	-9.38** (3.59)
BORDER×2004	-	-10.1** (3.47)	-	-9.64** (3.44)	-	-9.46** (3.49)
BORDER×2005	-	-13.0*** (3.88)	-	-12.4*** (3.84)	-	-12.3*** (3.89)
log(GDP)	-9.12 (15.8)	-10.9 (15.7)	-4.79 (15.7)	-6.79 (15.3)	-5.89 (14.0)	-8.01 (13.7)
% POP<15	0.615 (1.23)	0.556 (1.24)	0.793 (1.28)	0.780 (1.28)	0.642 (1.06)	0.690 (1.07)
% POP>65	2.73** (1.13)	2.75** (1.14)	2.66** (1.08)	2.72** (1.07)	2.62** (1.08)	2.72** (1.05)
FDI INFLOWS/GDP	-1.48 (0.935)	-1.60 (1.01)	-1.21 (0.845)	-1.41 (0.890)	-1.10 (0.847)	-1.36 (0.803)
Years excluded	1990-'93	1990-'93	1990-'91	1990-'91	-	-
<i>N</i>	302	302	336	336	370	370
<i>R</i> ² (within)	0.71	0.72	0.68	0.68	0.66	0.67

Standard errors (robust to heteroscedasticity and clustering on countries) in parentheses. All estimations account for a full series of country and year effects. Significance levels: * 10%, ** 5%, *** 1%.

on statutory tax rates is estimated to be strongly negative in all post-shock years. From 1998 onwards, the effect is statistically significant at least at the 10% level, indicating a negative impact on tax rates among border countries (relative to non-border countries) of 9.7 to 13 percentage points.

Columns 3 and 4 extend the findings obtained so far by including the cross-sections from 1992 and 1993. Hence, we now only exclude observations from 1990 and 1991. We note that this change has little effect on our results. In absolute value, the point estimate of the average treatment effect (Column 3) is reduced by less than one percentage point. Similarly, we obtain only slightly lower coefficients for the year-specific interaction terms (Column 4). Finally, we report the results for estimations that make use of all available information, defining 1990 as the first post-shock year. Again, this does little to our main findings, leaving us with a still remarkable 8.1 percentage-points reduction in the statutory tax rate in the border countries relative to the control group with just a single treatment effect (Column 5) and a series of significant year-specific effects ranging from -9.1 to -12.3 from 1998 onwards (Column 6).

With respect to the control variables, we find that once we account for country and time-specific effects as well as the integration effect there remains little scope for an independent impact of country characteristics. Among our control variables, only the share of the elderly proves to be significant, with the estimated coefficients carrying the expected sign: the higher the share of those above 65 years, the stronger is the pressure for higher corporate income tax rates.

Table 3 repeats the same series of estimations with the only difference that the EMTR instead of the STR is now being used as the dependent variable. The findings are slightly weaker but broadly similar to those reported in Table 2. Irrespective of whether we use all cross-sections, exclude the years 1990-'91 or exclude the years 1990-'93, we again find a negative and statistically significant average impact on the tax rate among border countries relative to non-border-countries. However, the effect is now smaller in absolute terms, ranging from -6.5 to -8.3 percentage points (see

Table 3: Effect of integration of Eastern European on effective marginal tax rates, 1982-2005

	(1)	(2)	(3)	(4)	(5)	(6)
BORDER×1990-2005	-8.33** (3.49)	-	-7.15* (3.47)	-	-6.51* (3.66)	-
BORDER×1990	-	-	-	-	-	-2.08 (2.88)
BORDER×1991	-	-	-	-	-	-4.54 (5.02)
BORDER×1992	-	-	-	-1.86 (5.07)	-	-1.63 (5.07)
BORDER×1993	-	-	-	-3.74 (5.58)	-	-3.52 (5.65)
BORDER×1994	-	-7.45 (5.20)	-	-7.29 (5.33)	-	-7.08 (5.36)
BORDER×1995	-	-6.75 (5.47)	-	-6.69 (5.63)	-	-6.47 (5.65)
BORDER×1996	-	-5.76 (5.30)	-	-5.65 (5.48)	-	-5.45 (5.50)
BORDER×1997	-	-7.17 (4.82)	-	-6.99 (5.03)	-	-6.80 (5.06)
BORDER×1998	-	-12.0*** (3.58)	-	-11.8*** (3.49)	-	-11.5*** (3.54)
BORDER×1999	-	-11.1*** (3.34)	-	-10.8*** (3.31)	-	-10.7*** (3.37)
BORDER×2000	-	-11.5*** (3.78)	-	-11.2*** (3.71)	-	-11.0*** (3.75)
BORDER×2001	-	-10.6** (3.92)	-	-10.2** (3.89)	-	-10.1** (3.92)
BORDER×2002	-	-7.07* (3.77)	-	-6.65 (3.90)	-	-6.53 (3.98)
BORDER×2003	-	-6.56 (3.89)	-	-6.20 (3.98)	-	-6.13 (4.03)
BORDER×2004	-	-6.36 (3.96)	-	-5.97 (4.05)	-	-5.94 (4.08)
BORDER×2005	-	-8.09** (3.58)	-	-7.59* (3.66)	-	-7.58* (3.70)
log(GDP)	-5.76 (12.7)	-6.75 (12.9)	-2.47 (11.7)	-2.49 (12.4)	-1.37 (11.5)	-3.19 (11.5)
% POP<15	-0.646 (0.783)	-0.708 (0.821)	-0.496 (0.685)	-0.418 (0.837)	-0.393 (0.695)	-0.362 (0.729)
% POP>65	0.778 (1.32)	0.667 (1.37)	0.935 (1.24)	0.765 (1.19)	0.877 (1.17)	0.863 (1.13)
FDI INFLOWS/GDP	-1.22 (1.05)	-1.56 (1.03)	-0.974 (1.05)	-1.28 (0.900)	-0.646 (1.03)	-1.15 (0.786)
Years excluded	1990-'93	1990-'93	1990-'91	1990-'91	-	-
<i>N</i>	302	302	336	336	370	370
<i>R</i> ² (within)	0.60	0.61	0.56	0.57	0.53	0.56

Standard errors (robust to heteroscedasticity and clustering on countries) in parentheses. All estimations account for a full series of country and year effects. Significance levels: * 10%, ** 5%, *** 1%.

Columns 1, 3 and 5). Once we account for a full series of year-specific treatment effects, we still get negative estimates for all coefficients across all specifications, with at least the effects for the years 1998-2001 and 2005 to be significantly different from zero.

3.2 Robustness

Some robustness checks for the results reported so far are displayed in Table 4. First of all, one might argue that using a heavily unbalanced sample is inappropriate for our purpose. Note that our data contain information on tax rates only for the years starting from 1990 for five out of 18 countries: Greece, Iceland, Norway, Portugal and Spain. Our analysis might therefore be said to be misleading, as these countries do not contribute to the pre-shock part of the sample. As a straightforward robustness check, we exclude observations for the named five countries and repeat all estimations. Note that we now work with a cross-section of just 12 countries.⁸ Notwithstanding, we obtain results which are very similar to those discussed before, both in terms of the point estimates and in terms of statistical significance. For brevity, Table 4 depicts just two estimations, both with a single treatment effect and with the cross-sections from 1990 and 1991 excluded. Using the statutory tax rate as our dependent variable, we find an impact of the integration of Eastern Europe in the border countries of -9.4 percentage points.⁹ Using the EMTR as the dependent variable, the respective coefficient is -7.4 .

As pointed out by Bertrand et al. (2004), a further concern might be that the pronounced serial correlation in our dependent variables is not fully accounted for in the coefficients' standard errors, leading us to over-reject the null of no treatment effect. We address the issue by two additional estimations reported in Columns 3 and 4 of Table 4. The displayed coefficients are from the final step of a two-stage

⁸Luxembourg has missing values for FDI flows before 1990 and can therefore not be included.

⁹Note that, when using a full series of year-specific interaction effects, we still obtain coefficients which are significantly different from zero for all years starting from 1998.

Table 4: Robustness checks using only ‘core’ Western European countries

	(1)	(2)	(3)	(4)
Dependent variable	CITR	EMTR	CITR (residuals ^a)	EMTR (residuals ^a)
BORDER×1990-2005	-9.45*	-7.44*	-8.21*	-6.81*
	(4.58)	(3.62)	(4.21)	(3.74)
log(GDP)	-17.6	-10.4	-	-
	(21.9)	(17.1)		
% POP<15	-0.091	-1.03	-	-
	(1.56)	(0.912)		
% POP>65	2.24	0.508	-	-
	(1.41)	(1.69)		
FDI INFLOWS/GDP	-1.35	0.675	-	-
	(4.53)	(7.50)		
Years excluded	1990-'91	1990-'91	1990-'91	1990-'91
<i>N</i>	263	263	24	24
<i>R</i> ² (within)	0.70	0.58	0.28	0.26

Standard errors (robust to heteroscedasticity and clustering on countries in Columns (1) and (2), robust to heteroscedasticity in Columns (3) and (4)) in parentheses. Estimations in Columns (1) and (2) account for a full series of country and year effects. Estimations in Columns (3) and (4) account for a full series of country effects as well as an indicator for post-shock periods (see text for details). Significance levels: * 10%.

procedure that uses a fixed-effects regression of the tax rate on all explanatory variables except the treatment effect in the first stage. For each country, the residuals from this regression are then aggregated into just two average residuals, one for the pre-shock and one for the post-shock periods. In the second stage of the procedure, these average residuals are regressed on the interaction between *BORDER* and an indicator for the post-shock period, the indicator itself, and a full series of country effects. Effectively, the procedure thus aggregates the variation in tax rates for both the pre- and post-shock period after netting out the control variables, country and period effects, and estimates the treatment effect using the panel of $N \times 2$ averaged observations. As can be seen from the reported output in Columns 3 and 4, the procedure confirms our previous findings for both the statutory and the effective average tax rate.

We also performed several robustness checks with respect to the definition of the treatment group. Although the number of reasonable variations is limited because the assignment is rather obvious for most of the countries, all the tests we performed did lend support to all our findings. For instance, one might question the assignment of

Denmark into the group of border countries. However, changing this assignment and treating Denmark as a non-border country makes our results even stronger, both in terms of the magnitude of the treatment effect and in terms of statistical significance. To give an example, the respective coefficients and standard errors for the estimations reported in Table 2, Columns 1, 3, and 5 change to -11.3 (4.20), -10.1 (4.63), and -9.21 (4.56), respectively. Similarly, if we treat Greece as belonging to the group of non-border countries, the same set of results changes to -9.82 (4.23), -8.90 (4.50), and -8.11 (4.33).

3.3 Interpretation

As mentioned above, our empirical approach is silent with respect to the economic forces that are behind the significant reduction of corporate income tax rates among border countries in the aftermath of the breakdown of the communist regimes in Eastern Europe. Among the channels through which the integration shock might actually have worked, direct tax competition and competition for FDI through lower wage levels in Eastern Europe are certainly the most relevant to think about.

For tax competition as the first potential channel, the idea is that competition for mobile capital might have lead governments in border countries to reduce taxes on corporate income to keep up with the new competition from low-tax countries in Eastern Europe. With regard to the second potential channel, one might think of the economies in Eastern Europe as being attractive for FDI predominantly because of the lower wages compared to Western Europe. Since governments cannot directly affect the wage level of their economy, it is reasonable to think of border countries to reduce taxes on corporate income in order to prevent too much FDI going to the new competitors.

A detailed analysis concerned with the importance of the channels in driving down taxes in the countries most directly exposed to Eastern Europe is beyond the scope

of this study. However, we have some suggestive evidence to offer. In the early 1990s, the countries of Eastern Europe were certainly in a disadvantaged position with respect to a number of factors traditionally seen as driving the attractiveness of locations for FDI. Hence, direct tax competition could only be seen as a main force leading to the decline in corporate tax rates in parts of Western Europe if the transition countries of Eastern Europe had established competitive tax systems quickly after the breakdown of the communist regimes. This, however, was not the case. In 1992, the average statutory tax rate of Poland, Czechoslovakia, and Hungary was about 45%. By 1994, the average (then including both the Czech and the Slovak Republic as separate countries) had only decreased to 40.8%, and it was only from 1996 onwards that this group of countries had adopted statutory tax rates that were below 35% on average. Hence, although Eastern European countries offered several specific tax regimes such as tax holidays in case of multinational activities, the general tax systems of these countries were not particularly attractive during the first part of the 1990s. Recalling that the convergence of tax rates in the border countries towards the levels in the non-border countries was already achieved by 1994, it is hardly possible that direct tax competition by the countries of Eastern Europe was the main force for the process to start. Put simply, at the beginning of the 1990s, the tax systems of the economically most important countries in Eastern Europe were simply not attractive enough to provide us with a convincing explanation for the significant integration effect on corporate taxes in parts of Western Europe.

In contrast, the second hypothesis, saying that corporate taxes in the border countries were driven down by the wage differential between Eastern and Western Europe, is much more consistent. In 1995 (the first year with reliable data available), average hourly compensation costs in manufacturing were \$2.53 in the Czech Republic and \$2.69 in Hungary. At the same time, Germany and Austria had compensation costs of \$30.1 and \$25.3, respectively.¹⁰ Backed by the ongoing process of privatization of formerly state-owned companies and the associated displacement of workers, average

¹⁰Source: The Bureau of Labor Statistics: International comparisons of hourly compensation costs in manufacturing, 2006.

compensation costs remained at comparatively low levels in Eastern Europe throughout the 1990s, increasing to only \$3.0 in the Czech Republic, \$2.74 in Hungary and \$2.81 in Poland as of 2000. Finally, the notion that the striking wage differential between Western and Eastern Europe was putting tax policies in the countries directly exposed to the new competitors under substantial pressure is also supported by empirical findings on the sensitivity of FDI flows with respect to local wages (see, e.g., Carstensen and Toubal, 2004).

4 Conclusion

Over the past 25 years, Western European countries have significantly lowered their statutory and effective tax rates on corporate income. We have analyzed to what degree the appearance of new investment locations in Eastern Europe after the fall of the iron curtain has contributed to this process. Using a broad sample covering up to 18 Western European countries for the period from 1982 until 2005, we have analyzed whether the breakdown of the communist regimes in Eastern Europe in 1989/90 had asymmetric effects on the tax policies of Western European countries depending on their geographical location. Using a series of difference-in-difference estimations, we have shown that those Western European countries which were directly exposed to neighbors in Eastern Europe have significantly reduced their corporate income tax rates relative to countries which do not share a common border with a former communist country. Across various specifications, the striking result of our estimations is that on average the border countries in Western Europe did cut their statutory tax rates by 8.1 to 9.8 percentage points relative to non-border countries. Using effective marginal tax rates as the dependent variable, the effect is estimated to be in the range of -6.5 to -8.3 percentage points.

Previous literature predominantly referred to the increased integration of capital markets and direct tax competition for mobile capital and tax bases as an explanation

for the pronounced decline of corporate income tax rates. In contrast, our empirical strategy to identify the impact of the rapid economic integration of Eastern Europe after 1989 on national tax policies in Western Europe does not rely on any specific assumption about the channel through which the integration shock might actually have affected governments to adjust their countries' taxes. We have argued, however, that direct tax competition is not a plausible explanation for the pronounced relative decline in corporate taxes in those parts of Western European that were most strongly affected by the unexpected appearance of new locations for private investors. In contrast, the significant wage differential between Eastern and Western Europe provides a much more consistent explanation for the observed tax cuts: as the low-wage countries of Eastern Europe began to attract significant amounts of FDI in the aftermath of 1989, cutting corporate income taxes was perhaps the most effective policy reaction to retain a competitive position in an era of generally increased international mobility of capital.

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