

The Effects of Company Taxation in EU Accession Countries on German Multinationals *

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Abstract: This paper investigates the effects of company taxation in European Union (EU) accession countries on German multinational enterprises. In 2004 and 2007, 10 former socialist eastern European countries joined the EU. While EU integration is associated with increasingly favorable investment conditions, accession countries also pursue active strategies to attract foreign firms. In particular, taxes on corporate income have been significantly reduced during the last decade. We analyze whether corporate taxation significantly affects three aspects of multinational activity in eastern Europe: location decision, investment decision, and capital structure choice. We find that local taxes are negatively related to location decisions and investment levels. The analysis of the capital structure confirms that higher local taxes imply higher debt-to-capital ratios.

Key Words: FDI, eastern Europe, corporate taxation, multinational company

JEL Classification: F23, H25, P20

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Non-Technical Summary

In 2004 and 2007, 10 former socialist eastern European countries joined the European Union (EU). These accession countries are increasingly perceived as attractive locations for Foreign Direct Investment (FDI). This can be explained by several factors such as highly motivated workers, the growing local markets, and a higher planning reliability due to their new member status. Furthermore, the accession countries pursue active strategies to attract foreign firms. In particular, taxes on corporate income have been significantly reduced during the last decade.

This paper empirically analyzes whether corporate taxation is an important determinant of FDI projects in eastern European countries taking into account other important country characteristics. In particular, we analyze whether corporate taxation significantly affects three aspects of multinational activity in eastern Europe: location decisions, investment decisions, and capital structure choices. Our analysis is focused on FDI controlled by German multinationals. A study on German FDI may be of particular interest, because German multinationals are considered to be quantitatively the most important investors in eastern European accession countries. For the empirical analysis, we use the Microdatabase Direct Investment (MiDi) provided by the German central bank (*Deutsche Bundesbank*). This is a comprehensive annual micro database of nearly all direct investment stocks held by German investors abroad.

The empirical results confirm that taxes significantly affect German multinationals' decisions in the accession countries. We find that both location decisions and investment levels are negatively affected by local taxes. Moreover, the analysis of the capital structure confirms that higher local taxes imply higher debt-to-capital ratios. The size of the tax effects is comparable to existing literature. This is remarkable taking into account that some eastern European countries cut tax rates in half during the last decade. Consequently, tax policies have significantly contributed to the distribution and development of German FDI in eastern Europe. The policy implication of our results is obvious: from a single country's point of view, tax policies can be used as an active instrument to attract FDI.

1 Introduction

European Union (EU) accession countries are increasingly perceived as attractive locations for Foreign Direct Investment (FDI). This can be explained by several factors such as highly motivated workers, the proximity to customers in western Europe, the growing local markets, the elimination of trade barriers, and of course, a higher planning reliability due to their new member status. Much of the discussion in economic research, however, is centered around the impact of low wages on location and investment. The labor-cost-induced outsourcing of production facilities to eastern Europe, and the associated displacement of domestic workers is a major political issue in both western and eastern Europe. Current research papers analyzing German multinationals partially confirm public concerns (e.g., Becker et al., 2005; Marin, 2004; Buch and Kleinert, 2006). Nevertheless, there are reasons other than low wages, which drive firms to set up affiliates in these countries. In fact, accession countries seem to actively pursue the goal of attracting multinationals by establishing favorable taxing conditions. The average statutory corporate tax rate of the EU accession countries in eastern Europe, for instance, declined from 32.2% in 1996 to 19.2% in 2005.

This paper analyzes whether corporate taxation is an important determinant of FDI projects in eastern European countries taking into account other important country characteristics. Our analysis is focused on FDI controlled by German multinationals. A study on German FDI may be of particular interest, because German multinationals are considered to be quantitatively the most important investors in eastern European accession countries. In 2005, approx. 14.5% of all inbound FDI stocks of these countries were controlled by German investors.¹ For the empirical analysis of this paper, we use the Microdatabase Direct Investment (MiDi) provided by the German central bank (*Deutsche Bundesbank*). This is a comprehensive annual micro database of nearly all direct investment stocks held by German investors abroad, and provides information about each foreign subsidiary's

¹Own calculations based on aggregated FDI stocks taken from Eurostat.

balance sheet. Currently, data are available as a panel for the period from 1996 until 2005.

Unlike previous analysis considering EU accession countries (e.g., Bellak and Leibrecht, 2008), our data allows to analyze three different major aspects of multinationals' activities: location decision, investment decision, and financing decision. We investigate the first aspect from a country perspective by focusing on the number of German investments in eastern European countries. Given that the multinational has chosen a location, the company decides on the investment level. The analysis of the investment decision is central, because fixed capital formation not only contributes to countries' cyclical fluctuations, it also determines long-run growth. We test whether taxes affect the investment decision by using a dynamic estimation approach. In a final step, we consider the financing decision of the firm. The corporate finance literature points out that any corporation can use debt finance as a tax shelter, since interest payments for debt are deductible from profits. Multinational firms, however, are active at many locations, and therefore have opportunities to reallocate total company borrowing among their affiliates, taking into account local tax levels. While the first two aspects of our investigation reflect the competition among accession countries for economic activity, the third aspect also reflects the competition for reported profits.

The empirical results confirm the importance of typical FDI determinants, for example, local GDP. Furthermore, the data indicate that taxes significantly affect all three decisions. We find, with respect to the local statutory tax rate, a semi-elasticity of -0.97, considering the number of German investments in the accession countries. In addition, a one percentage point higher statutory tax rate is associated with -0.92% less investment in fixed assets. Finally, if local tax rates increase by one percentage point, affiliates' debt-to-capital ratios rise by 0.42%.

The paper is organized as follows. Section 2 provides some institutional information about the European integration process and about German FDI in eastern European accession countries. Subsequently, Section 3 discusses some theoretical aspects of the respective

decisions of multinational companies. The investigation approach in Section 4 presents three different econometric methods, depending on which decision we take into account. Thereafter, in Section 5, we describe the data used for the empirical analysis. Section 6 presents the empirical results. Section 7, finally, concludes.

2 Eastern European EU Accession Countries

The European Union (EU) was created in 1957, comprising six founding states. After several enlargements, the community has grown to 27 member states. With the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia, 8 former socialistic countries from eastern Europe joined the EU in 2004; in 2007, the EU was enlarged by Bulgaria and Romania. We subsume these accession countries as the EU10.²

The integration process itself and the improvement of the general institutional setting that is entailed, is probably the main reason why the EU10 countries have become an attractive location for multinational companies. Moreover, wages are still rather low, constituting approximately one sixth of German wages.³ This wage gap is presumably an important factor in explaining FDI, especially vertical FDI, to eastern Europe. Research papers in economics, however, have often neglected the fact that eastern European countries pursue active policy to attract FDI by providing favorable taxing conditions. Indeed, the mean statutory tax rate in the EU10 countries has decreased from 32.2% in 1996 to 19.2% in 2005.

In the following we will focus on German outbound FDI towards the new EU10. According to the MiDi data, which are provided by the German central bank and which we will use for

²In 2004, Cyprus and Malta joined the EU as well. However, we placed the focus of this paper on transformation economies of former socialistic countries.

³In 2005, the mean hourly labor costs in manufacturing were US\$ 5.46 in the EU10 countries and US\$ 33 in Germany (US Bureau of Labor Statistics).

Figure 1: Number of German Outbound Investments in the EU10 (1989 – 2005)

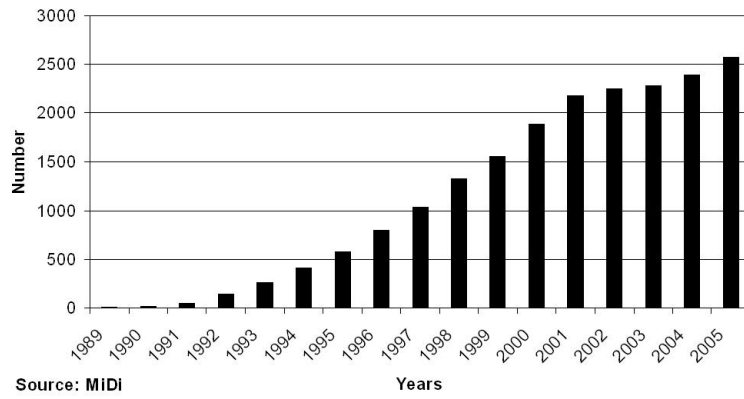


Figure 2: Stocks of German Outbound Investments in the EU10 (1989 – 2005)

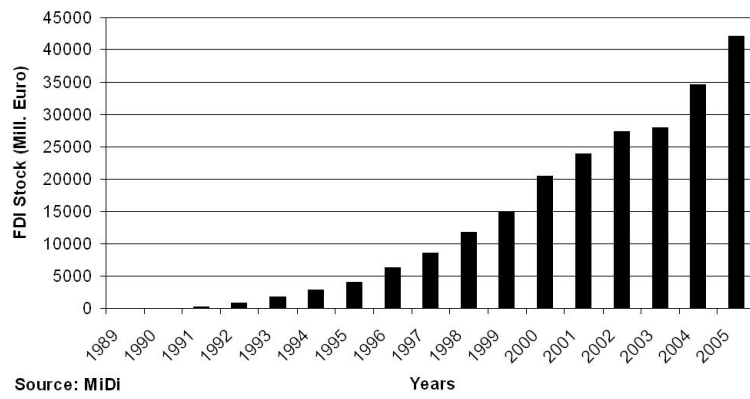
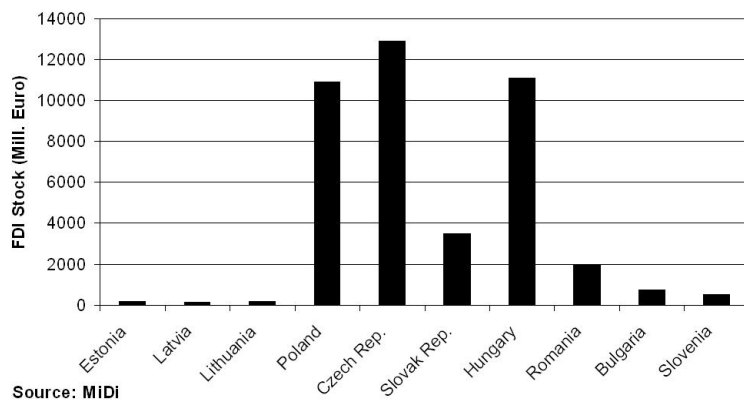


Figure 3: Stocks of German Outbound Investments in 2005



our analysis further on, both the number of German investment projects in EU10 countries as well as the FDI volume increased dramatically over the last 15 years. Figure 1 depicts the number of German wholly-owned investments from 1989 to 2005. As illustrated in Figure 2, the increase in the volume of German FDI to EU10 countries is even more remarkable.⁴ Figure 3 depicts the distribution of German controlled FDI among the considered accession countries in 2005. The most important locations are the Czech Republic, Poland, and Hungary.

There is no evidence that the investment process in eastern Europe is drawing to a close. According to the recent *Handelsblatt Business-Monitor International*,⁵ German managers increasingly focus on eastern Europe, rather than on Asia or North America. A remarkable 40% of them intend to predominantly increase their activities in eastern European countries.

3 Three Aspects of Multinational Activity and Corporate Taxation

Multinationals' activities are part of a rather complex process which involves various decisions and decision stages, for instance, export versus local production, direct investment versus licensing, production in country A versus production in country B, etc. This paper considers three decisions of multinational corporations: location decision, investment decision, and financing decision.

⁴The presented FDI stocks are based on the MiDi database, where the calculations of the aggregated stocks of direct investments refer to the OECD/IMF method (see Lipponer, 2007).

⁵Handelsblatt, a German leading business newspaper, and Droege & Comp., a consultancy, ask 409 German top managers about their strategies in their Business-Monitor (January 8th 2008; www.handelsblatt.com).

Location Decision: In a first step, a multinational firm decides where to set up affiliates. This can be considered as a choice among alternative countries taking into account expected profits at respective locations. Expected profits are determined by expected market conditions and costs, for example, labor costs. Corporate taxes reduce profits available for distribution, and hence, should affect the location decision. While the existing literature dealing with tax effects on location decisions predominantly assumes the multinationals' perspectives (e.g., Devereux and Griffith, 1998; Buettner and Ruf, 2007), we, on the other hand, consider the point of view of the host countries. We analyze the number of firms per country and per year in a count data model, and thus, focus on an aggregate country perspective. This contributes to the understanding of the distribution of the number of German investments among eastern European countries.

Investment Decision: Given a multinational's location decision, the company has to decide how much to invest. We follow a line of research that focuses on the distribution of real capital, rather than FDI. Real capital is measured, for example, by the stock of property, plant and equipment (e.g., Grubert and Mutti, 1991; Altshuler, Grubert, and Newlon, 2001). Our analysis uses the comparable balance-sheet item 'fixed assets' as a measure for real economic activity. The estimation approach differs slightly from previous research, because we additionally take the persistence in fixed assets into account by including lags of this variable, thereby capturing adjustment costs (e.g., Chirinko, 1993). We expect corporate income taxation to affect investment in fixed assets, because higher taxes imply higher costs of capital. This distorts the capital input choice, which leads firms to possibly substitute away from capital towards other input factors. Moreover, the overall production level may be affected by higher corporate taxes.

Financing Decision: A further aspect of multinational activity is the decision of how to finance investments. From a taxation perspective, a multinational optimizes the financial structure, considering the tradeoff between costs of debt finance, and benefits of interest

deduction. The tax deductibility of interest expenses from profits generates the incentive to use debt as a source of finance. If tax rates are high, the tax shield generated by interest deductions increases in value. The literature emphasizes, however, that debt finance is associated with additional costs, for example agency costs due to asymmetric information (Jensen and Meckling, 1976; Myers, 1977). Desai, Foley, and Hines (2004) emphasize a further aspect in context of multinational enterprises: the availability of internal capital markets. Multinational corporations that are active in many countries may use internal borrowing to shift profits. The corporation, thus, additionally benefits from tax-rate differentials. Tax-planning strategies, however, are not confined to intercompany loans. A recent study by Huizinga, Laeven, and Nicodème (2008) refers to the case where total borrowing is allocated among affiliates according to countries' taxing conditions.

4 Investigation Approach

The empirical analysis involves three different decisions, where the variable of interest differs accordingly. This implies that our econometric approach has to account for specific characteristics of outcome variables.

Location Decision: We are interested in the determinants of the number of German outbound investments during one year in eastern European countries. Hence, the dependent variable, the number of German subsidiaries at a respective location, is a count variable and only takes on nonnegative integer values. A natural starting point for count data is a Poisson regression model.

We model the number of German investments n_j in respective EU10 countries j . We are interested in the expected value of n_j , conditional on some control variables x_j , $E(n_j|x_j)$, where x_j contains, for instance, the country-specific tax rate. One way to express this is to use the exponential function as a functional form, $E(n|x_j) = \exp(x_j'\beta)$. To determine the

probability of some n_j given x_j , we further assume a Poisson distribution with expectation $\lambda_j \equiv \exp(x_j'\beta)$. This implies the following probability function:

$$f(n_j|x_j) = \frac{\exp(-\lambda_j)\lambda_j^n}{n!}, \quad n = 0, 1, 2, \dots$$

To obtain the Poisson regression model, the above functional form for the intensity parameter λ_j can be used to construct the loglikelihood function. Subsequently, the vector β can be estimated by using maximum likelihood methods (Cameron and Trivedi, 1998).

The Poisson distribution implies the so-called *equidispersion* or *Poisson variance assumption*. It imposes the equality of conditional variance and mean: $Var(n_j|x_j) = E(n_j|x_j)$. The Poisson model is robust to distributional misspecifications, provided that the conditional mean, $\lambda_j = \exp(x_j\beta)$, is correctly specified. We can use a quasi-maximum likelihood approach to consistently estimate β . However, if the equidispersion assumption is not valid, this model is not efficient (Cameron and Trivedi, 1998).

To anticipate later results, specification tests reveal that the equidispersion assumption does not hold empirically if we do not condition on country-specific effects, i.e. $Var(n_j|x_j) \neq E(n_j|x_j)$. If $Var(n_j|x_j) > E(n_j|x_j)$, we can alternatively estimate a negative binomial model which nests the Poisson model. This model differs in the specification of the conditional variance and allows for overdispersion (Cameron and Trivedi, 1998).⁶

Investment Decision: The next empirical test involves real investment activities of multinational companies. Our focus lies on analyzing the affiliate's balance-sheet item

⁶Specification tests indicate overdispersion for some specifications. Therefore, we apply a generalized form of the Poisson, the negative binomial model. While the so-called Negbin I model allows for overdispersion but imposes a constant variance-mean ratio, $V(n_j|x_j) = (1 + \alpha^2)\exp(x_j\beta)$, the Negbin II model allows for overdispersion that increases with the conditional mean, $V(n_j|x_j) = (1 + \alpha^2\exp(x_j\beta))\exp(x_j\beta)$ (Winkelmann, 2003). Ultimately, we apply the Negbin II model.

‘fixed assets’. We estimate the following equation

$$(\ln)K_{j,i,t} = \delta_1 \cdot (\ln)K_{j,i,t-1} + \delta_2 \cdot \tau_{j,t} + \delta_3 \cdot z_{j,i,t} + \gamma_i + \rho_t + \epsilon_{j,i,t}. \quad (1)$$

K refers to the balance-sheet item ‘fixed assets’ of subsidiary i . The main variable of interest is the host country tax rate $\tau_{j,t}$ of country j . $z_{j,i,t}$ is a vector of control variables, and ρ_t is a time-specific effect. Two aspects of estimating equation (1) are crucial. First, we have to control for affiliate-specific heterogeneity γ_i . If we neglect unobserved affiliate characteristics, we will certainly obtain biased coefficients. Our estimation approach, therefore, relies on first differences to remove unobserved affiliate-specific effects. Second, we include lags of the dependent variable to capture dynamic effects. Thus, we also take into account the heterogeneity in adjustment dynamics between firms. Since our time-series information is not sufficient to avoid the so-called Nickell bias (Nickell, 1981), we follow the literature and apply a generalized method of moment (GMM) estimator (Arellano and Bond, 1991). In particular, we estimate equation (1) in first differences and use lagged levels to instrument the lagged dependent variable.

Financing Decision: Previous empirical studies analyze the tax incentives on the capital structure choice of multinational firms.⁷ According to this line of research, we estimate the following equation

$$L_{j,i,t} = \mu_1 \cdot \tau_{j,t} + \mu_2 \cdot z_{j,i,t} + \gamma_i + \rho_t + \epsilon_{j,i,t}, \quad (2)$$

⁷For example, Desai, Foley, and Hines (2004) show that higher local tax rates imply higher debt-to-asset ratios of US controlled affiliates. Mintz and Weichenrieder (2005) use German outbound data and confirm this result.

where $L_{j,i,t}$ denotes the debt-to-capital ratio of affiliate i . More specifically, our dependent variable is defined by the ratio of total liabilities to total capital consisting of nominal capital, capital reserves, profit reserves, and total debt. We expect higher statutory tax rates $\tau_{j,t}$ to be associated with higher debt levels. Additionally, we condition on a vector of control variables $z_{j,i,t}$, firm-specific heterogeneity γ_i , and a time effect ρ_t .

5 Data and Descriptive Statistics

For the empirical analysis we use the MiDi database provided by the German central bank (*Deutsche Bundesbank*). This is a comprehensive annual micro database of investment positions of German enterprises held abroad, as well as of investment positions held in Germany by foreign companies. However, we employ only German outbound FDI data to eastern Europe. MiDi provides information about the investment object's balance sheet, including further information on the type of investment and on the investor. A favorable characteristic of the data is the possibility of tracing individual affiliates over time. The current version is available for the period from 1996 to 2005. The data collection is enforced by German law which requires reporting obligations for certain international transactions and positions.⁸ This last aspect of MiDi is worth emphasizing: we are able to observe virtually all German outbound investments in eastern Europe.

All dependent variables are taken from MiDi. We consider all wholly-owned, directly-controlled and incorporated subsidiaries during the period from 1996 to 2005. Observations from the financial sector, holding companies, and subsidiaries which may have specific taxing conditions, are excluded.⁹ With respect to the analysis of location choices, we

⁸Sec. 26 Law on Foreign Trade and Payments (Aussenwirtschaftsgesetz) in connection with Foreign Trade and Payment Regulations (Aussenwirtschaftsverordnung). Since 2002, FDI has to be reported if the participation is 10% or more and the balance-sheet total of the foreign investment in Germany exceeds 3 million Euros. For details see Lipponer (2007). Though previous years showed lower threshold levels, we apply this threshold level uniformly for all years in the panel.

⁹We exclude observations from mining, agriculture, non-profit organizations, and finally, membership

count the number of German subsidiaries for each of the 10 considered accession countries during the period 1996 to 2005. The analysis of the investment size at existing eastern European locations investigates the stock of fixed assets. Finally, we consider the debt-to-capital ratio as the dependent variable for the analysis of the capital structure. All dependent as well as independent variables are summarized in Table 1.

Explanatory firm-level variables include sales and a dummy variable indicating subsidiaries with a loss carryforward. Both variables are relevant factors for the capital structure choice and the analysis of fixed assets. For the former decision, sales is an indicator for the size of the subsidiary and the cash-generating potential. Therefore, we expect sales to be positively related to debt shares. We also expect a positive effect of sales on investment in fixed assets due to the fact that sales provide an indicator for market demand. If the affiliate carries forward any losses, the incentive for tax-planning behavior of the firm is reduced. This can offer an explanation for a negative effect on debt shares (MacKie-Mason, 1990). A loss carryforward also serves as a proxy for expected profitability and may negatively affect investment levels as well as access to external debt. If losses mean, on the other hand, that the affiliate cannot retain profits, the effect on debt is likely to be positive.

Tangibility, defined as the ratio of fixed assets to total assets, is a further determinant of the financial structure. The expected impact on the use of debt, however, is ambiguous. Higher tangibility, on the one hand, may imply an easier access to additional debt because firms can easily borrow against fixed assets. Agency costs of debt are then reduced by the value of collateral. On the other hand, the value of interest deduction may be crowded out by the non-debt tax shields generated by depreciation and investment tax credits related to tangible assets (DeAngelo and Masulis, 1980).

We capture the size of the local market by using the host country's GDP as a control variable for the location- as well as the investment decision. We expect that a higher GDP

organizations, because special tax regimes may be available. Furthermore, we exclude observations whose German parent is not an incorporated and legally independent entity, as well as subsidiaries which are not legally independent enterprises.

results in more location decisions and higher investment levels (e.g., Brainard, 1997). A further variable to condition on is distance. Previous empirical studies typically find negative distance effects on FDI (e.g., Carr, Markusen, and Maskus, 2001; Blonigen, Davies, and Head, 2003). Geographic distance is associated with higher transport costs, but may also include *cultural* distance. The latter implies the necessity for a higher degree of communication, information and organization costs. For the empirical analysis, we use the flight distance between Germany (Frankfurt) and the host country's capital. We expect negative effects of distance on location decisions, especially if vertical FDI is dominant.

Factor price differences are captured by controlling for hourly labor cost in manufacturing.¹⁰ We expect a negative effect on the location choice. However, the country-specific labor cost variable should be interpreted with considerable caution if we consider the investment decision, because the effect crucially depends on the underlying production function. Higher labor costs may cause substitution towards capital. If capital and labor are complements, though, the effect should be negative. As another factor price variable, we include the local inflation rate. Inflation may reflect the relative price of debt, depending on how nominal interest rates are affected by inflation.

Given the remarkable transformation process of the economic, political and legal system of the former socialistic countries, we explicitly control for several aspects of the transition process. First, we include an indicator for country-specific risk. We expect adverse risk effects on investment and location decisions. Second, we use several transition indicators provided by the European Bank for Reconstruction and Development (EBRD) to cover the following fields: privatization, financial-market reforms, infrastructure, and free trade. The privatization of formerly state-owned enterprises may attract German multinationals (see Carstensen and Toubal, 2004). Therefore, we control for the privatization volume relative to GDP as a possible determinant of location and investment choices. Furthermore,

¹⁰Recent empirical FDI literature recommends the consideration of measures of the local endowment with skilled labor (see Carr, Markusen, and Maskus, 2001). Unfortunately, no comprehensive data on school enrollment or comparable measures are available for all eastern European countries and the time span from 1996 to 2005.

the development of the local financial market should directly affect financial decisions of the subsidiaries, and thus, indirectly location and investment decisions. Moreover, the improvement in infrastructure may positively affect location and investment decisions (see Bénassy-Quéré, Goyalraja, and Trannoy 2007; Bellak, Leibrecht, and Damijan, 2007). Finally, openness to trade is expected to be positively related to both investment and location decisions. We consider all transition indicators for the location and the investment choice. Besides, the indicators for country risk and the financial sector may be of some relevance for the financial decision.

With respect to tax measures, we consider the local statutory tax rate (*STR*) as a reliable indicator for the expected tax payments at host locations. *STR* is the headline tax rate of the corporate income tax adjusted for surcharges and local profit taxes. However, it neglects all rules that determine the tax base, e.g., the opportunity to depreciate fixed assets. If tax base determinants are less relevant, e.g., in case of tax planning by means of company finance, the statutory tax rate is the sufficient measure.

Additionally, we capture other important aspects of the tax system by using effective tax rate measures. Effective tax rates are complex and compress various aspects of the legal tax code at a respective location. We calculate effective tax rates according to the methodology proposed by Devereux and Griffith (2003).¹¹ The underlying idea of this measure is to determine the effective tax payments of a hypothetical, standardized investment project, whilst taking into account the legal tax code. An obvious advantage of using effective tax rates is that several relevant components of the tax system are considered within one indicator. These tax measures reflect all relevant income and non-income taxes imposed on corporate investments as well as all the rules determining the tax bases such as depreciation

¹¹An alternative approach of computing effective tax rates is to use firm-level information about current tax payments (e.g., Desai, Foley and Hines, 2001). Indicators according to this approach are called backward-looking measures. However, MiDi does not contain any detailed information about affiliates' tax payments. Furthermore, Devereux and Lockwood (2006) point at various conceptual problems if effective tax rates are used that are based on historical tax payments. Therefore, we rely on indicators referred to as forward-looking measures.

Table 1: Descriptive Statistics

	Observations	Mean	Std. Dev.	Min	Max
Affiliate-Level Variables:					
Debt Share	9,243	.606	.265	<i>a</i>	<i>a</i>
Fixed Assets (in €1,000)	9,243	11,952.61	57,216.89	<i>a</i>	<i>a</i>
Sales (in €1,000)	9,243	37,985.83	196,812.88	<i>a</i>	<i>a</i>
Tangibility	9,243	.427	.284	<i>a</i>	<i>a</i>
Loss Carryforward	9,243	.408	.491	<i>a</i>	<i>a</i>
Number of Affiliates per Host Country	91	114.62	151	<i>a</i>	<i>a</i>
Tax Variables:					
Statutory Tax Rate (STR)	91	.263	.066	.15	.4
Effective Average Tax Rate (EATR)	91	.228	.057	.124	.370
Effective Marginal Tax Rate (EMTR)	91	.160	.057	.051	.319
General Country Characteristics:					
GDP	91	48.68	55.75	4.65	246.21
Labor Cost	91	3.78	2.61	1.14	13.39
Distance	91	975.55	360.83	409	1452
Inflation Rate	91	8.23	8.37	.1	45.8
Transformation Indicators:					
Country Risk	91	3.13	1.25	2	6
Privatization	91	12.12	9.81	0	35.1
Financial Sector	91	25.9	12.70	7.2	67.4
Infrastructure	91	2.87	.476	1.67	3.67
Trade	91	2.24	2.95	0	13.9

Affiliate-level variables are taken from the MiDi database provided by the Deutsche Bundesbank. ^a contains confidential information, and is therefore not reported. The *tax variables* are based on databases provided by the International Bureau of Fiscal Documentation (IBFD), and tax surveys provided by Ernst&Young, PwC and KPMG. *Statutory tax rate* is the statutory corporate tax rate adjusted for surcharges and local profit taxes. *Effective average tax rate* and *effective marginal tax rate* are calculated in accordance with the methodology introduced by Devereux and Griffith (2003). *General country characteristics* are taken from various sources: *GDP* in billion US dollars, nominal, and the *Inflation Rate* are taken from World Bank's World Development Indicators (2007). *Labor Cost* is the hourly compensation cost in U.S. dollars for production workers in manufacturing taken from U.S. Bureau of Labor Statistics and Eurostat. *Distance* contains flight distance (in km) between Frankfurt (Germany) and the capital of the respective foreign country. *Country Risk* is the country-risk classification for export credits by the OECD; the score ranges from 1 (low risk) to 7 (high risk). The *transformation indicators* are taken from the Structural and Institutional Change Indicators provided by the European Bank for Reconstruction and Development (EBRD). *Privatization* refers to the cumulative privatization revenues as share of GDP. *Financial Sector* is defined as domestic credit to private sector relative to GDP. *Infrastructure* is the EBRD index of infrastructure reform. *Trade* refers to tariff revenues relative to imports.

allowances.

We use two different effective tax measures. The effective marginal tax rate (*EMTR*) reflects the tax burden on a marginal project which only earns the cost of capital. The effective average tax rate (*EATR*) is calculated by assuming a higher profitability of the underlying investment project. Our calculations assume a pre-tax rate of return of 20%.¹² We can interpret the *EATR* as the proportion of the underlying investment project's net present value which is reduced by tax payments. Previous empirical studies suggest that the *EATR*, rather than the *EMTR*, is a suitable indicator in case of location decisions (Devereux and Griffith, 1998; Devereux and Lockwood, 2006; Buettner and Ruf, 2007). Generally, we expect that tax measures negatively affect the location propensity as well as investment levels. The effect of statutory tax rates on debt ratios, however, is expected to be positive, because the incentive to deduct interest expenses should rise with an increasing statutory tax rate.

6 Results

Location Decision: The first analysis is concerned with the location decision. We count the number of German affiliates at respective EU10 locations. Therefore, we analyze the determinants of location choices from a country perspective rather than from one multinational's perspective. Table 2 presents the results for this first aspect. Columns (1) to (3) refer to a negative binomial model, because specification tests reject a Poisson distribution. Once we include country-specific effects, our specification analysis accepts a Poisson

¹²Basically, the assumptions follow the comprehensive company taxation study of the European Commission (2001). The standardized project contains an investment in the following five asset types: industrial buildings, machinery, intangible assets, inventories, and financial assets. The project is equally financed by retained earnings, new share issues, and debt. We assume an incorporated company. Only domestic taxes and only income and non-income taxes imposed at the corporate level are taken into account. With regard to the definition of the taxable bases, we consider the relevant rules concerning depreciation and capital allowances, valuation of inventories, and interest deductibility in case of debt financing.

Table 2: Location Decision

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STR	-4.86*** (1.57)	-4.01*** (1.44)	-1.13** (.569)	-1.84*** (.584)	-1.52** (.690)	-.967* (.576)				
EATR							-1.41*** (.644)	-.957* (.508)		
EMTR									-1.29*** (.651)	-.781 (.652)
(ln)GDP	1.31*** (.068)	1.21*** (.067)	1.19*** (.040)	1.43*** (.486)	.892* (.457)	.312 (.557)	.575 (.517)	.260 (.568)	.518 (.562)	.132 (.592)
(ln)Labor cost	-7.46*** (.264)	-.957*** (.257)	-7.15*** (.060)	-.737** (.423)	-.313 (.455)	.005 (.559)	-.004 (.542)	.075 (.569)	-.033 (.582)	.112 (.625)
(ln)Distance	-1.85*** (.241)	-1.63*** (.194)	-1.10*** (-.070)							
(ln)Inflation R.		.037 (.050)	-.004 (.012)		.008 (.020)	.013 (.019)	.018 (.020)	.019 (.017)	.018 (.019)	.019 (.017)
Country Risk		-.208** (.076)	-1.62*** (.053)		-.119* (.062)	-.111** (.055)	-.122** (.060)	-.115** (.053)	-.145** (.059)	-.127** (.054)
Privatization			.025*** (.001)			.005 (.008)		.003 (.009)		.005 (.009)
Financial Sect.			.003* (.002)			.004 (.003)		.002 (.004)		.003 (.004)
Infrastructure			.076* (.047)			.263** (.114)		.273*** (.103)		.273*** (.101)
Trade			-.017 (.012)			.005 (.025)		.004 (.026)		.003 (.028)
Pseudo LogLikelihood	-358.51	-351.16	-295.38	-288.79	-284.61	-280.76	-284.57	-279.85	-285.63	-280.44
Country Effects	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	91	91	91	91	91	91	91	91	91	91

Dependent variable is the number of German subsidiaries in the respective host country. Columns (1) to (3) refer to the so-called Negbin II model, since specification tests reveal overdispersion. The overdispersion parameter α is tested significantly different from zero, using a likelihood ratio test. Columns (4) to (10) refer to a Poisson model. All estimations include time dummies. Robust standard errors (in parentheses). Estimations clustered at the country level. (*), (**), (***) denote significance at the (10%), (5%), and (1%) level.

distribution (see specification (4) to (10)). The results in column (3) suggest that a one percentage point higher statutory tax rate is associated with 1.13% less affiliates. Standard FDI control variables show the expected signs: a higher GDP implies more investments; higher labor costs and a greater distance are associated with less affiliates; higher risk suggests less investments, whereas more privatization revenues, better infrastructure, as well as a sound financial sector promote German FDI.

In columns (4) to (10), we additionally control for unobserved country heterogeneity. Note that distance is removed as a time-constant variable. While some of the formerly relevant control variables are no longer significant, we are still able to identify robust tax effects. With an emphasis on time variation, we also find a stronger effect of the overall infrastructure reform index. With respect to different tax measures, the EATR, rather than the EMTR, constitutes a suitable indicator for the tax effect on location decisions (see columns (7)-(10)). This confirms findings of earlier studies.

Investment Decision: In the next step, we consider the impact of taxes on affiliate-level fixed assets. We use a dynamic framework, where we include the lagged dependent variable as an additional regressor. The results are summarized in Table 3. Affiliate-specific heterogeneity is removed by taking first differences. The lags of the dependent variable are instrumented by using own lags, and time-specific effects are taken into account by including year dummy variables. The first-differences approach removes all cross-section variation. In this sense, it is not surprising that country-specific variables, for example local GDP or inflation, are statistically insignificant. However, coefficients generally show the expected sign. The lagged dependent variable as well as sales are positively related to investment. Since we focus on eastern European countries, we additionally condition on the same set of transformation-specific factors we used for the analysis of the location decision. These variables, however, also prove insignificant.

In contrast, we find robust and highly significant tax effects. The estimated coefficient

Table 3: Investment Decision

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
STR	-1.01*** (.388)	-.987** (.393)	-.924** (.421)						
EATR				-1.06*** (.355)	-1.17*** (.371)	-1.24*** (.395)			
EMTR							-.711** (.359)	-.867** (.385)	-.790* (.411)
(ln)K _(t-1)	.481*** (.127)	.481*** (.126)	.484*** (.130)	.477*** (.127)	.479*** (.127)	.484*** (.130)	.482*** (.127)	.483*** (.128)	.487*** (.131)
(ln)Sales	.083** (.036)	.084** (.036)	.083** (.037)	.085* (.036)	.084** (.036)	.083** (.037)	.083** (.036)	.083** (.036)	.082** (.037)
Loss Carryf.	-.014 (.026)	-.014 (.026)	-.014 (.026)	-.015 (.026)	-.015 (.026)	-.014 (.026)	-.014 (.026)	-.014 (.026)	-.014 (.026)
(ln)GDP	.107 (.223)	.064 (.237)	.020 (.308)	-.020 (.223)	-.121 (.234)	-.078 (.304)	-.020 (.231)	-.156 (.246)	-.204 (.317)
(ln)Laborcost	.318 (.224)	.354 (.234)	.321 (.267)	.438* (.231)	.539** (.236)	.454* (.268)	.420* (.242)	.555** (.252)	.508* (.293)
(ln)Inflation R.		-.000 (.009)	.001 (.010)		.009 (.009)	.009 (.011)		.006 (.010)	.008 (.011)
Country Risk		-.017 (.029)	-.022 (.029)		-.022 (.029)	-.028 (.028)		-.032 (.029)	-.037 (.028)
Privatization			.001 (.005)			-.001 (.005)			.002 (.005)
Financial Sect.			-.000 (.002)			-.002 (.002)			-.000 (.002)
Infrastructure			.064 (.076)			.078 (.078)			.064 (.078)
Trade			.017 (.028)			.016 (.027)			.019 (.028)
Observations	5,048	5,048	5,048	5,048	5,048	5,048	5,048	5,048	5,048
Overid. ($\chi^2(7)$)	8.80	8.77	8.91	8.88	8.76	8.97	9.00	8.86	8.98
AR(1) (z-value)	-3.11	-3.11	-3.08	-3.11	-3.11	-3.08	-3.11	-3.11	-3.09
AR(2) (z-value)	-0.77	-0.77	-0.78	-0.75	-0.75	-0.77	-0.77	-0.76	-0.77

Dependent variable is the natural log of the fixed assets. Time-specific fixed effects included. Estimation in first differences follows Arellano and Bond (1991). Robust standard errors in parentheses, using the Windmeijer (2005) correction. (*), (**), (***) denote significance at the (10%),(5%), and (1%) level.

for the statutory tax rate in column (3) implies that a one percentage point higher local tax rate is associated with .924% less investment in fixed assets. Columns (4) to (6) of Table 3 show results where we replace the statutory tax rate by a measure for the effective average tax rate (EATR). We find a more pronounced semi-elasticity of -1.24 in specification (6). Unlike the tax impact on location decisions, we find evidence that a higher effective marginal tax rate (EMTR) also explains a smaller investment level in fixed assets. The estimated semi-elasticity, however, is comparatively small. One interesting aspect is the positive labor-cost coefficient in columns (4)-(9) which confirms theoretical considerations that firms substitute capital for labor.

Tax effects are not directly comparable to previous studies, because there is no existing study analyzing the tax impact on foreign investment in fixed assets using a dynamic framework. The findings are remarkable because they suggest that taxes are the only direct policy instrument which is relevant for the investment decision. Moreover, while the dynamic approach imposes strict assumptions on estimations, we still identify robust and significant tax effects.

Financing Decision: Finally, we consider the capital structure choice of affiliates. The number of observations differs compared to previous analysis because, firstly, we do not include the lagged dependent variable—thereby we lose one year of observations. Secondly, the set of control variables differs slightly. However, our choice of control variables follows existing studies (e.g., Buettner et al., 2008; Huizinga, Laeven, and Nicodème, 2008), and additionally conditions on variables which are possibly relevant in the context of transformation economies. Estimations also include affiliate-level fixed effects and a full set of time dummies. Regarding the non-tax determinants, we can confirm that higher sales are associated with an easier access to debt. Since firms that experience losses cannot retain profits, the coefficient of loss carryforward is positive. In line with DeAngelo and Masulis (1980), we find a statistically significant negative effect of tangibility. Inflation possibly captures the effect of higher nominal interest rates. Then, the positive coefficient implies

Table 4: Leverage Decision

	(1)	(2)	(3)	(4)	(5)	(6)
STR	.272** (.107)	.289*** (.109)	.274** (.107)	.271** (.109)	.295*** (.106)	.251*** (.088)
(ln)Sales		.017*** (.004)	.016*** (.004)	.015*** (.004)	.015*** (.004)	.016*** (.004)
Loss Carryf.		.026*** (.006)	.026*** (.006)	.026*** (.006)	.027*** (.006)	.026*** (.006)
Tangibility			-.069*** (.020)	-.069*** (.020)	-.069*** (.020)	-.069*** (.020)
(ln)Inflation R.				.005 (.003)	.004 (.003)	.005* (.003)
Country Risk					-.016** (.007)	-.009 (.008)
Financial Sect.						.001* (.000)
Adj. R ²	.7637	.7656	.7662	.7662	.7664	.7668
Observations	9,243	9,243	9,243	9,243	9,243	9,243

Dependent variable is the debt ratio, determined by the level of total debt divided by total capital consisting of nominal capital, capital reserves, profit reserves, and total debt. Estimations include time- and affiliate-fixed effects. Robust standard errors, clustered within country-year cells, in parentheses. (*), (**), (***) denote significance at the (10%), (5%), and (1%) level.

that interest deductions are more valuable. Moreover, we find that higher country risk is associated with lower debt shares, and finally, that financial development is positively related to total borrowing. The estimated tax-rate coefficient is robust and varies between .251 and .295. This highlights the role of debt for multinationals' tax planning. However, this finding is not exceptionally different from earlier results. In fact, the magnitude of the estimated coefficient is remarkably close to that of other studies. According to specification (3), a one percent increase in the statutory tax rate implies .415% higher debt shares. Desai, Foley, and Hines (2004) find a slightly higher effect of .471%; the analysis of Huizinga, Laeven, and Nicodeme (2008) suggests a semi-elasticity of .435.

7 Conclusions

In this paper we have investigated how eastern European countries' tax policy affect various decisions of German multinationals. In particular, we have analyzed three crucial aspects of multinational activity: where to locate; how much to invest; how to finance. Descriptive statistics highlight the impressive development of eastern European countries in attracting German FDI. Our regression analysis supports the hypothesis that tax policy is an important factor in explaining multinational activity in eastern Europe. The size of tax effects is comparable to existing literature, and we do not find any specific characteristics for this region. In fact, this finding—standard tax effects in line with the literature—is quite remarkable, because some eastern European countries cut tax rates in half during the last decade. On average, the statutory tax rate has been cut by 13 percentage points in the considered EU accession countries during the considered period from 1996 until 2005. With respect to location choices, the point estimator in Column (6) of Table 2 suggests 12.6 percent more subsidiaries due to this tax policy. Furthermore, Column (3) of Table 3 suggests that the investment level of each subsidiary increases by 12 percent. Consequently, tax policies have significantly contributed to the distribution and development of German FDI in eastern Europe.

The policy implication of our results is obvious: from a single country's point of view, tax policies can be used as an active instrument to attract FDI. If tax policy is used as an instrument to promote FDI, this may affect FDI in other competing locations, e.g., in Germany or other western European countries. FDI towards other countries might represent a substitute or a complement. Yet, estimating reliable substitution elasticities alone already poses an econometric challenge due to the complexities in multinational activity, ambiguity in theoretical predictions, and data restrictions. Our database, for instance, does not allow an assessment of how investments at the German parent companies are affected. This question, therefore, remains open for future research.

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