# The Impact of Non-Profit Taxes on Foreign Direct Investment: Evidence from German Multinationals

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**Abstract:** This paper provides an empirical analysis of the impact of taxes other than profit taxes on both investment and location decisions of multinationals. Besides effects of corporate income taxes the results confirm significant adverse effects of non-profit taxes such as property taxes, sales taxes and VAT, and import duties on the level of FDI. However, once country-specific fixed effects are included, most of the effects of non-profit taxes vanish. This is supported by the analysis of location decisions, where taxes other than corporate income taxes are not found to exert any adverse effects on the location probability in a setting with country-specific fixed effects.

**Key Words:** FDI; Capital Input; Location Decision; Corporate Income Taxes; Indirect Taxes; Multinational Company

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# 1 Introduction

Numerous studies have shown that international differences in the taxation of corporate income exert an impact on location, investment, and financing decisions of corporations. Multinational corporations, in particular, engage in substantial tax-planning activities using their internal linkages in terms of intermediates, factor flows, and finance. Given the corporations' search for favorable tax treatment, governments aim at attracting multinationals' productive activities or taxable resources by means of special tax schemes that can be exploited for savings on corporate income taxes. Even though corporate tax revenues remained stable (*e.g.*, Devereux, Griffith, Klemm, 2002), governments are tempted to rely on other tax instruments in order to raise fiscal revenue. However, it is often overlooked that the impact of tax policy on corporate decisions is not necessarily confined to corporate income taxes. A recent study by Desai, Foley, and Hines (2004) documents that tax payments related to indirect taxes including sales and value added taxes, excises, import duties, property taxes, *etc.*, are usually much larger than payments related to corporate income taxes for U.S. multinationals. Each of those taxes will potentially influence corporate decisions, and, again, it might be multinationals, which are most sensitive to those taxes as they are carrying out production and sales in several countries. However, little is known about the consequences of taxes other than income taxes on decisions of multinationals. Desai, Foley, and Hines (2004) provide empirical evidence for the case of U.S.multinationals pointing at a rather strong sensitivity of corporate decisions to differences in indirect taxes – roughly at the same degree as the sensitivity to differences in corporate income taxes.

This paper reconsiders the empirical evidence of the impact of taxes other than income taxes on corporate decisions. It considers multinationals' investment decisions where the impact of corporate income taxes is well established (for a survey see deMooij and Ederveen, 2003). Given the heterogeneity between the various types of potentially relevant taxes other than corporate income taxes, the analysis uses a variety of tax indicators capturing general sales and property taxes, excises, import duties as well as taxes on skilled labor. While most studies focus on investment, it is well recognized (*e.g.*, Devereux and Griffith, 1998) that taxes might have different effects on location choice, *i.e.* on the decision of where to locate production. The analysis, therefore, considers both investment and location decisions.

The empirical analysis employs a large panel of German multinationals that enables us to study investment and location decisions in 22 countries on an annual basis in the period from 1996 to 2004. The German case is of particular interest as this country usually follows the exemption principle of corporate income taxation. This offers some interesting comparisons with the U.S. case studied by Desai, Foley, and Hines (2004), where the tax credit system might result in a relatively low sensitivity of FDI to corporate income taxes in the host countries of foreign affiliates.

With regard to investment the results confirm a strong impact of the cost of capital and also indicate some further significant adverse effects of other taxes on the stock of capital of a foreign affiliate. However, if country-specific fixed effects are included, most of these effects vanish. This is supported by the analysis of location decisions, where taxes other than corporate income taxes are not found to exert adverse effects in a setting with country-specific fixed effects.

The paper is organized as follows. The next section provides some theoretical background on the determinants of investment and location. This background allows us to formulate predictions about the potential impact of various taxes. Based on this discussion, Section 3 develops the empirical investigation approach and shows that further assumptions are needed to identify tax effects. The data is described in Section 4 before the results are presented and discussed in Section 5. Section 6 provides our conclusions.

## 2 Theoretical Background

Foreign direct investment activities of a multinational basically involve the *location decision*, *e.g.*, the decision of where to locate production, and the *investment decision* of how much to invest at each location. Following the standard theory of investment, the latter decision may be considered as a factor input decision. The corresponding view is that, given output, the firm adjusts its inputs in order to maximize the profits at a given location subject to the substitution possibilities of production. In difference to the traditional investment literature (*e.g.*, Hassett and Hubbard, 2002), however, the investment decision in the context of FDI is often interpreted more broadly in the sense that the decision to adjust inputs is combined with the output decision (*e.g.*, Grubert and Mutti, 1991). Taxes in this more general view would affect the amount of capital invested

in the production, directly, by their influence on the choice of the input combination, as well as indirectly, by their influence on the choice of the output level of an affiliate. Following the seminal contribution by McFadden (1974), location decisions are usually considered as a choice among alternative locations based on the expected profits of an investment in each of these locations. This comparison involves not only cost including tax payments but also sales and market conditions for the company's products.

Various taxes could affect investment as well as location decisions. A useful classification distinguishes *corporate income taxes*, *taxes on specific goods and services used as inputs* including property taxes and taxes on labor, *import duties*, and *general sales taxes* - a category that includes VAT. All of these taxes may affect investment and location in a variety of ways, depending on the details of the tax, the production technology as well as on the market conditions under which the firm operates on its input and its output side. Given the complexity of the tax effects it seems useful to derive testable predictions from a somewhat more structured theoretical consideration of corporate location and investment decisions.

Let us first consider the investment decision starting with a cost function of company $k$'s production in country $i$

$$C_{k,i} \;=\; C\left(\; w_i' \;,\; v_i' \;,\; \rho_{k,i} \;,\; q_i' \;,\; Y_{k,i} \;\right),$$

where $w_i', v_i'$ is the effective wage rate for unskilled and skilled personnel, respectively, $\rho_{k,i}$ measures the effective cost of capital, $q_i'$ is the effective price of intermediate inputs, and $Y_{k,i}$ is the level of output. Following Devereux and Griffith (1998), $w_i', v_i'$, and $q_i'$ are defined net of corporate income taxes as the cost of those inputs are assumed to be fully deductible in corporate income taxation. For instance, if the gross wage rate paid is $w_i$ the argument in the cost function is $w_i' = (1 - \tau_i)\, w_i$, where $\tau_i$ is the statutory corporate income tax rate. For simplicity, we abstract from corporate debt and assume that all returns to capital are not deductible in corporate income taxation. Taking account of tax depreciation the cost of capital is defined as

$$\rho_{k,i} \equiv (r_{k,i} + \delta_k)\,(1 - d_i \tau_i)\,,$$

where the double index to the discount rate $r_{k,i}$ reflects the assumption that it is subject to some

common factors at the level of the company and at the level of the host country. If the multinational has an internal capital market where one affiliate can borrow from the other, the common factor at the level of the company might dominate the discount rate such that $r_{k,i} = r_k$. If capital markets were completely separated, the common factor at the level of the country would dominate the discount rate $r_{k,i} = r_i$. Economic depreciation $\delta_k$ is assumed to be equal across locations and $d_i\tau_i$ denotes the tax savings from the present value of depreciation allowances $d_i$.

Capital demand is obtained from the derivative with respect to the cost of capital and will, basically, depend on the same arguments as the cost function

$$K_{k,i} = K\left( w_i' , v_i' , \rho_{k,i} , q_i' , Y_{k,i} \right) \equiv \frac{\partial C_{k,i}}{\partial \rho_{k,i}}.$$

Making use of the demand function's zero homogeneity in factor prices, we can rewrite this expression to obtain

$$K_{k,i} = K\left( w_i , v_i , c_{k,i} , q_i , Y_{k,i} \right), \tag{1}$$

where $c_{k,i}$ denotes the usual term of the cost of capital (*e.g.*, Hall and Jorgenson, 1967)

$$c_{k,i} \equiv (r_{k,i} + \delta_k)\left(\frac{1 - d_i\tau_i}{1 - \tau_i}\right),$$

where the second part is the tax wedge imposed by corporate income taxation.

Following Devereux and Griffith (1998), the location decision will depend on the evaluation of profits at possible locations j=1,...,n

$$y_{k,i} \;=\; 1, \;\; \text{if } \Pi_{k,i} > \Pi_{k,j}, \; \forall j \neq i, \;\; \text{and} \;\; y_{k,i} = 0 \;\; \text{otherwise}, \tag{2}$$

where $y_{k,i} = 0, 1$ is a binary variable indicating whether or not the multinational holds an affiliate at location $i$, and $\Pi_{k,i}$ is the profit at location $i$ from firm k's perspective. Making use of the unit homogeneity of the cost function in prices, the level of profits at location $i$ is determined by

$$\Pi_{k,i} \;=\; (1 - \tau_i)\left[p\left(Y_{k,i}\right) Y_{k,i} - C\left( w_i , v_i , c_{k,i} , q_i , Y_{k,i} \right)\right], \tag{3}$$

where $p(Y_{k,i})$ is the price for the firm's output net of any sales taxes. Note that the profit equation as well as the capital input equation (1) include the level of output. Of course, the level of output is a choice variable of the company. It is usually determined by the optimality condition that marginal revenue equals marginal cost

$$p(Y_{k,i})\left[1 - 1/\eta(Y_{k,i})\right] - \frac{\partial C(\, w_i\ ,\ v_i\ ,\ c_{k,i}\ ,\ q_i\ ,\ Y_{k,i})}{\partial Y_{k,i}} \ =\ 0, \tag{4}$$

where $\eta(Y_{k,i})$ is the price elasticity of demand. The optimal level of output, hence, depends on all input prices that affect the marginal cost as well as on the demand conditions. Note that corporate income taxes exert an impact on output only via their influence on the cost of capital.

Equations (1) and (4) can be used to determine output and capital input and thus provides a theoretical background for the analysis of the investment decision. Equation (3) defines the profits. Evaluated at all possible locations together with equations (2) and (4) it can be used to analyze the location decision. Let us discuss in the next two subsections how each of these decisions is affected by taxes.

### 2.1 Taxes and FDI

Conditioning on a positive location decision, equations (1) and (4) will allow us to determine the capital input at location $i$. We see that there are two ways in which the capital input is potentially affected by taxes. The first relates to the substitution possibilities in production, the second relates to the output effects.

*Corporate income taxation* will increase the cost of capital relatively and, hence, will cause a substitution away from capital. This effect is discussed and analyzed in the traditional literature on investment which has emphasized that not only the tax rate but also depreciation allowances matter and that the tax burden will differ for different sources of finance.

*Taxes on goods and services used as inputs* in this setting might induce substitution effects towards capital. However, this is, first of all, a matter of tax incidence. If the inputs are supplied inelastically, changes in taxes would not affect the cost of production and, thus, would not affect investment or

location decisions. But if taxes on goods and services are not born by the suppliers, they might raise prices and affect the cost of production which in turn will cause factor substitution within the constraints of the production possibilities. Consider the case of a land tax. If land is supplied inelastically, one might expect that land owners will carry the full burden of the tax such that the gross of tax price of land is unaffected by the tax. Then, taxes on land would not affect investment. However, property taxes often tax not only land but real estate including structures. Depending on the relative importance of the latter, those taxes might raise the cost of capital and cause substitution away from capital. Another example is labor taxation. If labor is supplied inelastically, because workers do not alter participation decisions or if workers are immobile, the burden of taxes on labor would fall on workers. Gross wages would be unaffected by the tax. A different prediction could be obtained under conditions of wage bargaining: if unions oppose to compensate higher labor taxes with lower after-tax wages, tax increases might raise the cost of labor and induce substitution towards capital. Taxes on labor would also affect the cost of labor if workers are mobile internationally and demand a competitive after-tax income. This might be relevant particularly in the case of skilled labor. Due to the relatively high international mobility of the skilled (OECD, 2002), companies might need to compensate those employees for differences in personal income taxes and social security contributions experienced across locations. These taxes, then, would potentially cause substitution effects towards or against capital, depending on the degree of capital-skill complementarity.

With regard to *import duties* we may note that for vertical FDI, with important intermediate input linkages between affiliates, the consequences are similar to those of taxes on goods and services used as inputs. If the foreign affiliate relies on imports of intermediate inputs, these taxes would affect factor demand depending on the substitution possibilities.

For *general sales taxes* no effect is expected on the input decisions if business to business transactions remain untaxed, which is, however, not always the case as the discussion of the U.S. states' sales tax shows (Ring, 1999).

Taxes might also exert a secondary impact on capital input as they affect the output decision of the firm. *Corporate income taxes* will raise the cost of capital and, therefore, lead to lower levels of output. This, in turn, exerts an adverse impact on capital demand. Of course, this also depends

on the substitution possibilities. Generally, the output effects will be strongest with fixed input coefficients where the producer has little possibilities to avoid taxation.

*Taxes on goods and services used as inputs* are expected to have similar effects on output decisions. However, for these taxes the adverse output effect works against possible substitution effects such that the total impact on capital input is ambiguous. For taxes on skilled labor, if one is willing to assume some degree of capital-skill complementarity (see, for instance, Duffy, Papageorgiou, and Perez-Sebastian, 2004), a tax increase unambiguously exerts adverse effects on capital input.

For taxes on intermediate inputs such as *import duties* we should also expect some adverse impact on output, because it is more costly to produce. With horizontal FDI, however, the effects could be different. Here, import duties might represent costs of entering a market from abroad that provide an incentive to expand production within the protected markets.

Since *general sales taxes* may affect output prices and market conditions the imposition of those taxes might affect marginal revenue in equation (4) and, therefore, the output decision of the firm. More specifically, we might expect sales taxes or the value-added tax (VAT) to affect the net-of tax price for the affiliate's output and, hence, exert a depressing impact on output. A further issue in this context is whether the product of a foreign affiliate is sold in the foreign country or exported somewhere else. Under the destination principle which prevails in cross-border transactions following longstanding GATT/WTO rules (Hufbauer, 2000), the adverse impact on output is confined to the case where output is intended to be sold within the foreign country (horizontal FDI). If it is intended just to produce in a foreign country and then to export to other places (vertical FDI), general sales taxes should not matter for output. One might even argue that the effect for multinationals could also be positive under these conditions as they experience some advantage against local producers.

## 2.2 Taxes and Location Choice

As we have discussed above, location choice is affected by taxes due to their impact on the rate of profit earned at each location. *Corporate income taxation* exerts direct and indirect effects on profits. The direct effect is simply the reduction of profits after taxes, which makes a location

less attractive. The indirect effect is related to the impact on the cost of capital. A reduction in depreciation allowances, for instance, will tend to raise the unit cost and thereby further reduce the profits of an investment project. Therefore, both the statutory as well as the marginal tax rate on investment will affect location decisions. Provided the financial structure and the rate of profit are given, the effects may be combined using the effective average tax rate put forward by Devereux and Griffith (1998).

As in the above analysis of taxes and FDI, *taxes on goods and services used as inputs* will matter only if the tax burden is not shifted to suppliers. Thus, if taxes tend to raise input prices, the cost may rise and the location probability declines. Even if land taxes are completely born by land owners, property taxes might still exert an adverse impact on location if the tax is also imposed on structures. Taxes on labor would affect the cost of production and, thus, location decisions, if workers are mobile internationally, and demand a competitive after-tax income, or if other conditions allow labor to shift the tax burden to the employer.

Location decisions will also be affected by *general sales taxes*. Let us assume, for simplicity, that business to business transactions are untaxed, those taxes should not affect the demand for capital given output. But, if they reduce marginal revenue, profits will decline. Hence, these taxes should have a dampening effect on the location probability. Whether general sales taxes will affect location decisions is again further depending on whether production is intended to be sold within the foreign country (horizontal FDI) or exported to other places (vertical FDI). In the latter case, general sales taxes should not exert adverse effects on location decisions under the destination principle.

For vertical FDI with important intermediate input linkages between affiliates the consequences of taxes on imports or *import duties* are similar to those of taxes on goods and services used as inputs. If the foreign affiliate relies on imports of intermediate inputs, these taxes would raise the cost of production and we would expect an adverse effect on location. With horizontal FDI, however, the effects will be different. Here, import duties might constitute costs of serving a market from abroad. This points at an incentive to locate production into the protected markets.

# 3 Investigation Approach

While the impact of corporate income taxes is explicitly taken into account, the impact of other taxes is only implicit in the above modeling of investment and location decisions. The discussion clarified that additional assumptions are needed in order to identify corresponding tax effects. What kind of assumptions are reasonable and useful, however, also depends on the investigation approach taken. Therefore, let us postpone for a moment the issue of how to incorporate tax effects and first consider the empirical approach to investment and location decisions.

Following the capital demand equation (1), an empirical analysis should relate the stock of capital of an affiliate of multinational $k$ in country $i$ to its theoretical determinants. In the cross-sectional context, in order to distinguish parent from country-level effects, it is useful to evaluate this relationship using pooled cross sections. A linearized empirical specification is

$$\begin{aligned} \log K_{k,i,t} &= \alpha_1 \log w_{i,t} + \alpha_2 \log v_{i,t} + \alpha_3 \log c_{i,t} + \alpha_4 \log q_{i,t} \\ &+ \alpha_5 \log Y_{k,i,t} + \gamma_k + \zeta_t + \epsilon_{k,i,t}, \end{aligned} \tag{5}$$

where $\gamma_k$ is a parent-specific fixed effect and $\zeta_t$ is a fixed time effect. $w_{i,t}$, $v_{i,t}$, $c_{i,t}$ and $q_{i,t}$ refer to labor cost, skilled labor cost, cost of capital, and cost of other inputs, respectively. This specification includes output on the right hand side. However, as is depicted by optimality condition (4), the output itself is chosen in the light of both demand and cost conditions. This suggests to employ instrumental variables or a reduced-form specification where output is dropped on the right-hand side and replaced by some indicators of the market size. Since we do not observe the affiliate's output in the dataset used below, we follow the latter approach and capture the market size by the host country's GDP and the amount of sales of the multinational company $k$ in country $i$

$$\begin{aligned} \log K_{k,i,t} &= \beta_1 \log w_{i,t} + \beta_2 \log v_{i,t} + \beta_3 \log q_{i,t} + \beta_4 \log c_{i,t} \\ &+ \beta_5 \log \mathrm{GDP}_{i,t} + \beta_6 \log \mathrm{SAL}_{k,i,t} + \gamma_k + \zeta_t + \epsilon_{k,i,t}. \end{aligned} \tag{6}$$

It is important to note, however, that actual sales may partly reflect the local output decisions of the multinational. The empirical analysis, therefore, would have to deal with possible problems of

simultaneity, for instance, by using instrumental variables.

While the focus of equation (6) on the distribution of the stock of capital among foreign affiliates corresponds with the empirical literature on taxes and FDI (*e.g.*, Hines, 1999, for an overview) it neglects adjustment costs that play a prominent role in the empirical literature on business investment. With adjustment costs, however, the capital stock would display some degree of autocorrelation, *i.e.* the stock of capital in period $t$ would partly result from previous periods' investment decisions. While the analysis below uses firm-level panel data where the time-series dimension is too small to estimate sophisticated dynamic models, we will also explore whether the results are robust against the inclusion of a lag in the capital stock by means of dynamic panel data techniques.

In comparison to capital demand, the modeling of the location decision is more complex as it involves the evaluation of expected profits across investment alternatives. In order to estimate location probabilities most of the empirical literature on location decisions employs a variant of the conditional logit model developed by McFadden (1974) (*e.g.*, Bartik, 1985, Coughlin et al., 1992). Also Devereux and Griffith (1998) employ a nested conditional logit specification that captures the relationship with other decisions reflecting a firm's strategy towards the international markets. However, the conditional logit approach is limited to the cross-sectional differences in the determinants of location and conflicts with the observation that many companies, every second company in the dataset used below, hold more than just one affiliate abroad, the location of which are hardly independent. Therefore, the analysis below follows Buettner and Ruf (2007) and employs a panel data approach that proved useful to identify the effects of changes in local characteristics on the location probability. More specifically, we study location decisions by estimating a linearized equation for the propensity of company $k$ to hold an investment at $i$, which includes a full set of company-specific location effects $\gamma_{k,i}$. We apply the same considerations that led to (6) and obtain the following model

$$\begin{aligned} y_{k,i,t} &= 1, \text{ if } \pi^*_{k,i,t} > 0, \text{ and } y_{k,i,t} = 0 \text{ otherwise,} \\ \pi^*_{k,i,t} &= \delta_1 \log w_{i,t} + \delta_2 \log v_{i,t} + \delta_3 \log q_{i,t} + \delta_4 \log c_{i,t} \\ &+ \delta_5 \log \mathrm{GDP}_{i,t} + \delta_6 \log \mathrm{SAL}_{k,i,t} + \gamma_{k,i} + \zeta_t + \epsilon_{k,i,t}, \end{aligned} \tag{7}$$

where $\epsilon_{k,i,t}$ is an error term and $\zeta_t$ is a fixed time effect.

The estimation follows Chamberlain's (1984) fixed effects logit estimator and models the probability of observing an investment in a specific country in a given year conditional on the observed frequency of corresponding investments in all years, *i.e.* conditional on the value of $\sum_{t=1}^{n} y_{k,i,t}$. Conditioning on this value removes the influence of the cross-sectional differences in the attractiveness of each location without strong distributional assumptions. Note that even though the model does not address the consequences of adjustment costs, it supports a persistence in location decisions that arises if the unobserved propensity of firm $k$ to hold an investment at $i$ is relatively high or low in all periods.

As discussed above, the impact of other taxes is only implicit in the two estimation equations. Consider first the case of *taxes on goods and services used as inputs*. Since the prices for inputs are defined as gross prices they would include taxes and, provided the tax incidence is on the demand side, differences in taxes would be reflected in these prices. In order to identify tax effects directly, we might replace the gross price of a factor input by a measure of the tax burden placed on this input. But, if not only taxes but also other country-specific conditions have an impact on gross prices, estimation might suffer from omitted variable bias. A restrictive albeit powerful assumption in this situation is that the net-of-tax prices of the inputs are equal across countries due to trade or mobility. Thus, if $q_{i,t} = \left(1 + \tau_{i,t}^{q}\right) q_t$, we could replace $\log q_{i,t}$ in the two estimation equations by the tax rate on the input $\tau_{i,t}^{q}$ in combination with the time fixed effect. The same approach might be taken in the case of skilled labor, if we are willing to assume that mobility is sufficient in order to ensure equal net-of-tax earnings for skilled workers. This would allow us to replace $\log v_{i,t}$ by the tax rate on skilled labor $\tau_{i,t}^{h}$, again, in combination with the time fixed effect. *Import duties* might be captured in the same way as taxes on goods and services used as inputs assuming that net-of-tax import prices are equal across countries. Note that in all those cases where identification relies on trade and mobility it is useful to introduce some distance variable if no country-level fixed effects are imposed. The conditions for the identification of the effects of *general sales taxes* are somewhat more straightforward. So far, the estimation equations above only use GDP and sales in order to capture the demand conditions in the host country and we can include a further indicator for the tax burden on sales to capture adverse impacts on output and profitability. However, whether or not an impact of taxes can be identified empirically, also depends on the data available. We will come back to this issue in the following data section.

# 4 Data

The empirical analysis employs a micro database for FDI provided by the German Bundesbank, which includes a comprehensive annual database of German multinationals' foreign direct investment positions. This database allows us to study investment and location decisions in 22 countries for which sufficient data on taxes and other relevant local conditions is available over a period of 9 years (1996-2004). The collection of the data is enforced by German law, which determines reporting mandates for certain international activities. For further description, the interested reader might consult Lipponer (2006) and Buettner and Ruf (2007). In order to focus on foreign firms that are controlled by the German multinational we restrict attention to majority-owned subsidiaries. We exclude FDI in the financial sector as well as investments in holdings, because we are basically interested in the tax effects on productive capital. We also exclude firms that report zero investment or zero sales. Also branches or partnerships are excluded because different tax rules apply in these cases. Table 1 provides some descriptive statistics on the size and distribution of FDI stocks of the affiliates in the sample.

Tax data are taken from a variety of sources. Statutory tax rates for corporate income taxation are taken from Devereux, Griffith, and Klemm (2002). We augment this data with information from the International Bureau of Fiscal Documentation (IBFD) and from tax surveys provided by Ernst&Young, PricewaterhouseCoopers (PwC), and KPMG. Another variable taken from these sources is the present value of depreciation allowances. As discussed above we can combine this with the statutory tax rate to obtain an indicator of the cost of capital. Because the relevant rate of return and the depreciation rate are not known, it seems useful not to employ the cost of capital variable ($c_{k,i}$), but to separate out the tax wedge $\left(\frac{1-d_{i,t}\tau_{i,t}}{1-\tau_{i,t}}\right)$, and to exploit the panel-data property of the data: since we consider sets of affiliates that share the same parent, the parent fixed effect will capture the company-specific component to the rate of return; industry effects at the level of the affiliate will help capturing differences in the depreciation rate. A further variable related to corporate income taxes is an indicator of whether a special tax credit is available for research and development. The corresponding binary variable (R&D Tax Credit) is taken from a recent IBFD survey augmented with further information from the International Tax and Business Guides of Deloitte. While we follow standard practice in capturing the corporate income tax burden by some

Table 1: FDI and Sales of German Multinationals by Country

| Country | Affiliates | PPE (in € 1000) | PPE Share | Sales (in € 1000) |
|---|---|---|---|---|
| Australia | 106.44 | 493351 | 0.01 | 3104536 |
| Austria | 412.56 | 3536722 | 0.07 | 19060095 |
| Belgium | 207.78 | 2493245 | 0.05 | 15170383 |
| Czech Rep. | 281.67 | 4355083 | 0.09 | 12153587 |
| Denmark | 96 | 630453 | 0.01 | 3218333 |
| Finland | 39.44 | 399093 | 0.01 | 2172643 |
| France | 606.22 | 3753459 | 0.07 | 28357450 |
| Great Britain | 413.11 | 2959196 | 0.06 | 23759158 |
| Greece | 43.67 | 243369 | 0.00 | 1863809 |
| Hungary | 176.56 | 3612177 | 0.07 | 9058894 |
| Ireland | 40.44 | 300195 | 0.01 | 974003 |
| Italy | 412.67 | 3108609 | 0.06 | 18351592 |
| Japan | 121.78 | 1689671 | 0.03 | 9555174 |
| Luxembourg | 25.11 | 207402 | 0.00 | 785631 |
| Netherlands | 261.56 | 1762700 | 0.03 | 11451416 |
| Norway | 41.11 | 557177 | 0.01 | 1333297 |
| Poland | 312.67 | 2681570 | 0.05 | 10787115 |
| Slovak Rep. | 51.67 | 1040652 | 0.02 | 1649995 |
| Spain | 339.89 | 3765216 | 0.07 | 18366282 |
| Sweden | 115.78 | 905214 | 0.02 | 3812739 |
| Switzerland | 326.11 | 1547246 | 0.03 | 13390178 |
| USA | 492.22 | 10489046 | 0.21 | 40664593 |
| *Total* | *4924.46* | *50530846* | *1* | *249040903* |

Affiliates: annual average number of affiliates reported in the period 1996 to 2004 in the considered countries. PPE: average stock of capital in terms of property, plant, and equipment. PPE Share: fraction of PPE allocated to the respective country or group of countries. We only take into account direct investments where the majority is held by the German parent. Holdings are excluded as well as financial corporations; also companies reporting zero PPE or zero sales are removed.

key parameters reflecting the tax law to obtain what is commonly referred to as forward-looking indicators (*e.g.*, Sørensen, 2004), for means of comparison with the other tax variables that are generated from revenue data we also employ an indicator of corporate income tax revenues. For this purpose, we use *Corporate Profit Taxes* in percentage of GDP obtained from OECD Revenue Statistics.

With respect to other taxes there is not much choice of what kind of data can be used to compute tax indicators: in most cases only revenue data from OECD Revenue Statistics is available for the current analysis. The analysis employs four corresponding variables which are all expressed in percentage of GDP. *Sales Taxes & VAT* include sales taxes on goods and services as well as value added taxes (VAT). While there are important differences between VAT and sales taxes, we use the combined variable. Only few countries employ significant sales taxes. At the same time, however, these countries often do not impose a VAT. Even worse, some countries such as Australia switched from sales taxes to VAT in the time period covered by the analysis. As a consequence, the attempt to empirically distinguish between VAT and sales taxes suffers from the existence of influential observations. *Excises* comprise taxes on particular products, in particular, taxes on energy sources. *Import Duties* are customs and duties on imported products. *Property Taxes* capture taxes on the use, ownership, or transfer of property – mainly of real-estate. Of course, the tax indicators capture only some potential determinants of output prices and input cost, which may or may not affect corporate decisions, depending on the tax incidence. Whether or not the empirical specification is able to detect the effects of these taxes also hinges on the problem whether there are further conditions that cause international differences in prices. For excises and import duties this may not be a big problem if the former is mainly related to fuel prices and the latter refers to traded goods both of which might show similar pre-tax prices across countries. The approach, however, might be less convincing with regard to property taxes given the strong heterogeneity in the markets for real estate.

With regard to labor taxes it seems particularly difficult to argue that gross-wage differences are only driven by differences in the tax burden. For instance, unions or social security might exert further important effects on the gross wages. Hence, with regard to labor we do not attempt to identify the impact of labor taxes in general, and instead use a comprehensive indicator of

Table 2: Descriptive Statistics

| Variable (def.) | | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| FDI | (PPE, stocks in million €) | 10.26 | [a] | [a] | [a] |
| Labor Cost | (in US dollar) | 16.95 | 7.32 | 2.73 | 36.41 |
| GDP | (in bill. US dollar) | 1671 | 2857 | 17.5 | 11750 |
| Lending Rate | (local lending rate) | .068 | .040 | .018 | .273 |
| Distance | (flying distance in km) | 1838 | 3065 | 190 | 16431 |
| Corruption | (corruption percep. index) | 6.92 | 1.72 | 3.42 | 10 |
| Sales | (in million €) | 50.57 | [a] | [a] | [a] |
| Statutory Tax Rate | (statutory corp. tax rate) | .343 | .069 | .100 | .532 |
| Tax Wedge | (tax wedge from corp. taxation) | 1.10 | .038 | 1.03 | 1.29 |
| R&D Tax Credit | (binary) | .766 | .424 | 0 | 1 |
| Sales Taxes & VAT | (in percentage of GDP) | 6.31 | 2.08 | 1.49 | 10.93 |
| Excises | (in percentage of GDP) | 2.82 | .911 | 1.07 | 5.65 |
| Import Duties | (in percentage of GDP) | .191 | .325 | -.058 | 3.58 |
| Property Taxes | (in percentage of GDP) | 2.18 | 1.10 | .421 | 8.42 |
| Corp.Profit Taxes | (in percentage of GDP) | 2.56 | 1.40 | -.030 | 9.96 |
| Taxes on Skilled Labor[b] | (effective tax rate) | .427 | .078 | .308 | .605 |

Statistics refer to 44320 observations pooled across affiliates and time. [a]: confidential data. [b]: 30379 observations.

labor cost taken from the U.S. Bureau of Labor Statistics. It reports hourly compensation costs for production workers in manufacturing including taxes paid by the employer. However, while controlling for the average cost of labor, the analysis below tests for an impact of taxes on skilled labor. Here, the assumption is that skilled labor may receive rather similar remuneration after taxes across countries or locations. This is justified by a much higher mobility of the skilled, in particular, within multinational corporations (expatriates). Building on this hypothesis, Elschner *et al.* (2006) develop an indicator of the effective average tax rate on skilled labor. The measurement method is comparable to the OECD (1992) *Taxing Wages* approach and is based on the difference between labor cost to the employer and a uniform level of net income of the employee. In doing so, the method combines effects of personal income taxes, unemployment insurance, and public pensions.

Apart from tax data, the analysis uses controls for GDP, sales, distance, and the level of corruption in order to capture other potentially relevant determinants of investment and location. See Appendix for further description.

# 5 Results

The empirical analysis is concerned with the determinants of the stock of FDI captured by the value of PPE (property, plant, and equipment) of the foreign subsidiaries of German multinationals as well as with the underlying location decisions. Consider first the determinants of the stock of PPE following equation (6). Table 3 reports corresponding results.

In Column (1) the impact of corporate income taxes is captured by the tax wedge reflecting the corporate income tax rate and the present value of depreciation allowances. As the tax-wedge variable imposes a restriction on the relationship between depreciation allowances and the tax rate, Column (2) provides results where, separately, the tax rate is included, which is, however, insignificant. Similarly, the backward-looking corporate profit tax variable in Column (3) proves insignificant.

In all three specifications labor cost and the lending rate exert significant negative effects supporting the hypothesis that input costs matter. However, the lending rate might also just pick up effects of inflation. Distance shows a positive effect which may reflect export vs. production decisions, in particular, since the estimation controls for sales.

Because the inclusion of sales may introduce some simultaneity bias reflecting the endogenous output decision, Columns (4) and (5) report results employing instrumental variables. Column (4) reports results where the sum of the sales (in logs), reported for all affiliates belonging to the same multinational group, is used as an instrument that captures demand shifts. Column (5) reports results where only the sum of sales (in logs) of the other affiliates within the multinational group are used as an instrument. Note that these two specifications focus on multinationals with more than one foreign affiliate; this explains the lower number of observations. In both cases, the instruments are significant in the first-step regression. However, the results do not show much differences. Also formal Hausman tests fail to indicate significant differences with respect to Column (1). This suggests that we can neglect a possible simultaneity bias with regard to the sales variable.

Since the variation in taxing conditions results from variation across countries and time, it is important to check whether the results hold even if we control for country-specific fixed effects. As is evident from Column (6), some of the results differ once country effects are included. Only

Table 3: Taxes and FDI, Basic Results

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Tax Wedge | -1.63 ** | -1.46 ** | -1.63 ** | -1.66 ** | -1.60 ** | -1.11 ** |
| | (.410) | (.511) | (.394) | (.556) | (.606) | (.338) |
| R&D Tax Credit | .053 | .055 | .052 | .064 | .057 | |
| | (.039) | (.04) | (.040) | (.045) | (.048) | |
| Statutory Tax Rate | | -.181 | | | | |
| | | (.254) | | | | |
| Corp. Profit Taxes | | | -.001 | | | |
| *Tax Variables* | | | (.008) | | | |
| log GDP | .003 | .006 | .003 | .020 | .001 | .412 ** |
| | (.011) | (.012) | (.011) | (.052) | (.054) | (.144) |
| log Labor Cost | -.262 ** | -.258 ** | -.262 ** | -.268 ** | -.274 ** | .062 |
| | (.035) | (.035) | (.035) | (.043) | (.042) | (.143) |
| log Lending Rate | -.057 * | -.058 * | -.058 * | -.078 * | -.070 | .080 ** |
| | (.031) | (.031) | (.032) | (.045) | (.052) | (.030) |
| log Distance | .070 ** | .069 ** | .071 ** | .062 ** | .068 ** | |
| | (.016) | (.016) | (.016) | (.024) | (.024) | |
| log Corruption | .168 ** | .151 ** | .169 ** | .178 ** | .184 ** | .096 |
| *Control Variables* | (.060) | (.061) | (.064) | (.077) | (.075) | (.066) |
| log Sales | .743 ** | .742 ** | .743 ** | .683 ** | .762 ** | .735 ** |
| | (.013) | (.013) | (.013) | (.206) | (.218) | (.012) |
| $R^2$ | .409 | .409 | .409 | .430 | .432 | .419 |
| Observations | 44320 | 44320 | 44320 | 33144 | 33144 | 44320 |
| Country fixed effects | no | no | no | no | no | yes |

Dependent variable: stock of capital (PPE) in logs. All specifications include fixed time, parent, and industry effects. Column (6) also includes country fixed effects. Heteroskedasticity robust standard errors clustered at the level of country-year cells (in parentheses). **(*) indicate significance at the 5%(10%) level. Columns (1)-(3) and (6) report OLS results, Columns (4) and (5) are instrumental variables estimates where the sales variable is instrumented using total sales of the multinational company or the total sales in all other affiliates. In both cases the instruments are significant at 5% level in the first stage regression. A Hausman specification test shows no systematic differences in comparing specification (1) with (4) and (5), respectively.

the tax wedge and the level of sales show similar effects. Labor cost as well as corruption are no longer significant. Note that the R&D Tax Credit variable is dropped entirely because it does not display any time-series variation. GDP shows positive effects. Given country-level fixed effects, this might pick up cyclical or growth effects. The specification with country-level fixed effects also shows a positive impact of the local lending rate. This is somewhat puzzling at first sight, but we should note that multinationals may use intercompany loans in order to circumvent adverse lending conditions in host countries (Desai, Foley, and Hines, 2004b).[1] One might speculate whether this gives multinationals an advantage against local firms. However, as with GDP in presence of country fixed effects, the lending rate might also just pick up macro-economic effects such as inflation.

Table 4 provides estimates including various indirect taxes – without including country-level fixed effects. Property taxes, sales taxes and VAT, but also excises exert significant negative effects. Even with joint inclusion of the tax indicators (5), most effects are confirmed; also import duties exert a significant adverse effect in this specification. With regard to R&D Tax Credit the results are somewhat mixed but tend to show positive effects. Columns (6) and (7) report results where, in addition, the tax burden on skilled labor is included. Note that this variable is not available for the whole sample; several countries had to be excluded resulting in a considerable loss of variation in taxes. However, the results support a significant adverse effect of this tax rate while labor cost no longer exert a significant effect. This is confirmed also when included jointly with all other tax variables. These results suggest that the adverse effect of labor cost is essentially driven by the labor taxes. However, it should be noted that the labor tax variable is not available for some of the low labor cost countries. The loss of significance of labor cost might, therefore, just reflect the change in the estimation sample.

Let us briefly consider the magnitude of effects. Evaluated at the mean, the elasticity of the stock of PPE with regard to the tax wedge implied by specification (5) is about -2.11. Since doubling the tax rate would raise capital cost by about 29.8% on average, the implied tax-rate elasticity is about 0.63, which is in accordance with the average FDI elasticity of 0.6 found in the literature (*cf.*, Hines, 1999). The elasticity with regard to Sales Taxes & VAT is at 0.58. However, it should be noted

[1]This finding is supported for the case of German multinationals by Buettner et al. (2006).

Table 4: Taxes and FDI: Results Including Other Taxes

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Tax Wedge | -1.64 ** | -1.49 ** | -1.88 ** | -1.73 ** | -1.91 ** | .317 | -.551 |
| | (.399) | (.404) | (.383) | (.429) | (.357) | (.441) | (.462) |
| R&D Tax Credit | .047 | .100 | .210 ** | .056 | .225 ** | .282 ** | .287 ** |
| | (.041) | (.039) | (.035) | (.039) | (.032) | (.043) | (.042) |
| Property Taxes | -.036 ** | | | | -.073 ** | | -.074 ** |
| | (.015) | | | | (.015) | | (.035) |
| Excises | | -.082 ** | | | .038 * | | .072 ** |
| | | (.016) | | | (.022) | | (.028) |
| Sales Taxes & VAT | | | -.069 ** | | -.092 ** | | -.082 ** |
| | | | (.008) | | (.012) | | (.014) |
| Import Duties | | | | .071 | -.091 ** | | -.122 |
| | | | | (.057) | (.043) | | (.016) |
| Tax. on Skill. Lab. | | | | | | -1.52 ** | -.900 ** |
| *Tax Variables* | | | | | | (.199) | (.216) |
| log GDP | .028 * | -.016 | -.046 ** | .006 | -.005 | -.015 | .033 |
| | (.016) | (.013) | (.011) | (.012) | (.016) | (.014) | (.039) |
| log Labor Cost | -.272 ** | -.325 ** | -.286 ** | -.236 ** | -.319 ** | .103 | .002 |
| | (.036) | (.038) | (.032) | (.038) | (.035) | (.073) | (.086) |
| log Lending Rate | -.046 | -.037 | -.006 | -.071 ** | .042 | -.228 ** | -.205 ** |
| | (.031) | (.031) | (.034) | (.034) | (.037) | (.041) | (.044) |
| log Distance | .061 ** | .048 ** | .010 | .067 ** | -.016 | .062 ** | -.017 |
| | (.015) | (.015) | (.015) | (.016) | (.015) | (.017) | (.030) |
| log Corruption | .222 ** | .273 ** | .211 ** | .131 ** | .334 ** | .147 ** | .219 ** |
| *Control Variables* | (.064) | (.067) | (.058) | (.066) | (.064) | (.082) | (.098) |
| log Sales | .741 ** | .740 ** | .741 ** | .743 ** | .739 ** | .753 ** | .752 |
| | (.012) | (.012) | (.012) | (.013) | (.012) | (.016) | (.016) |
| $R^2$ | .409 | .410 | .412 | .409 | .413 | .419 | .419 |
| Observations | 44320 | 44320 | 44320 | 44320 | 44320 | 30379 | 30379 |

Dependent variable: stock of capital (PPE) in logs. All specifications include fixed time, parent, and industry effects. Heteroskedasticity robust standard errors clustered at the level of country-year cells (in parentheses). **(*) indicate significance at the 5%(10%) level.

that this tax variable relates to revenue data, which makes it difficult to compare the magnitudes.[2] With this caveat, the results support the finding of Desai, Foley, and Hines (2004) that indirect taxes exert effects on FDI which are as strong as those of the corporate income tax. With regard to R&D Tax Credit the empirical magnitude seems substantial, suggesting that the stock of PPE is about 23% higher in the preferred specification if a R&D Tax Credit is granted. However, we should interpret this large effect with considerable caution since the variable only captures cross-sectional variation and since the effect is sensitive to the set of control variables used in the specification. The R&D Tax Credit variable, therefore, might just pick up some country-specific effects.

In order to test whether the results are robust against unobserved country effects, Table 5 provides the same set of specifications augmented with country-level fixed effects. The consequence is striking: all of the tax effects except for the tax wedge turn insignificant. This is remarkable for two reasons. First, the insignificance of taxes in a specification with fixed country effects suggests that the above results are entirely driven by the cross-sectional variation in taxation. Second, the finding that corporate taxes still prove significant points at substantial variation in corporate taxation over time. Taken together this implies that the recent changes in corporate tax policy (*e.g.*, Devereux, Griffith, and Klemm, 2002) were not accompanied by substantial changes in other taxes. As a further implication this suggests that tax competition has mainly been confined, so far, to corporate taxation.

To check for the robustness of the results we also estimated alternative specifications taking account of possible dynamics of adjustment in the capital stock. To avoid dynamic panel data bias, the estimations were carried out in first differences, exploiting the moment conditions related to lagged levels of the dependent variable as suggested by Arellano and Bond (1991). Given that the panel covers a time period of nine years, we employ a parsimonious GMM specification exploiting only the moment conditions with the stock of PPE two periods ago. While the lagged stock of PPE proves significant, the results in Columns (1) to (5) of Table 6 broadly confirm the above findings in the presence of country-level fixed effects: while corporate income taxes are found to exert significant adverse effects, most other taxes prove insignificant. Only import duties show a significant adverse effect which conforms with the view that for vertical FDI import duties would add to the cost of

[2] As there are always difficulties to enforce the tax code and since agents typically adjust their activities in order to avoid taxation, we might expect that the use of revenue data underestimates the tax-rate elasticities.

Table 5: Taxes and FDI: Results with Country-Level Fixed Effects

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Tax Wedge | -1.11 ** | -1.07 ** | -1.13 ** | -1.04 ** | -1.04 ** | -.783 ** | -.841 ** |
| | (.339) | (.334) | (.338) | (.331) | (.331) | (.283) | (.292) |
| Property Taxes | -.003 | | | | -.008 | | -.002 |
| | (.009) | | | | (.009) | | (.019) |
| Excises | | .029 | | | .024 | | .057 |
| | | (.029) | | | (.030) | | (.042) |
| Sales Taxes & VAT | | | -.015 | | -.024 | | -.002 |
| | | | (.017) | | (.018) | | (.023) |
| Import Duties | | | | -.042 | -.046 | | -.076 |
| | | | | (.039) | (.040) | | (.058) |
| Tax. on Skill. Lab. | | | | | | -.226 | -.144 |
| *Tax Variables* | | | | | | (.305) | (.323) |
| log GDP | .418 ** | .420 ** | .422 ** | .408 ** | .444 ** | .293 | .381 * |
| | (.148) | (.143) | (.145) | (.144) | (.149) | (.198) | (.219) |
| log Labor Cost | .058 | .063 | .059 | .031 | .013 | .376 * | .290 |
| | (.146) | (.141) | (.144) | (.147) | (.148) | (.198) | (.112) |
| log Lending Rate | .080 ** | .086 ** | .075 ** | .090 ** | .087 ** | .062 * | .071 ** |
| | (.030) | (.030) | (.030) | (.029) | (.030) | (.036) | (.034) |
| log Corruption | .097 | .103 | .101 | .110 * | .127 ** | .082 ** | .065 |
| | (.066) | (.063) | (.065) | (.063) | (.063) | (.057) | (.055) |
| log Sales | .735 ** | .734 ** | .735 ** | .734 ** | .734 ** | .754 ** | .754 ** |
| *Control Variables* | (.012) | (.012) | (.012) | (.012) | (.012) | (.016) ** | (.016) |
| $R^2$ | .419 | .419 | .419 | .419 | .419 | .424 | .424 |
| Observations | 44320 | 44320 | 44320 | 44320 | 44320 | 30379 | 30379 |

Dependent variable: stock of capital (PPE) in logs. All specifications include fixed time, parent, industry, and country effects. Heteroskedasticity robust standard errors clustered at the level of country-year cells (in parentheses). **(*) indicate significance at the 5%(10%) level.

production. Columns (6) and (7) provide results of specifications including taxes on skilled labor. As above, the lack of available data results in a significant reduction of observations. Moreover, possibly related to some influential observations in the skilled labor tax variable, this specification is less satisfying: the Chi-squared specification test now proves significant. Therefore, we should not overemphasize the results that include the taxes on skilled labor.

Let us finally turn to location decisions and the corresponding results in Table 7. The table displays, basically, the same set of determinants as employed in the analysis of the stock of PPE. Only sales are excluded because they are not reported for countries where no affiliate is located. It is important to note that the fixed effects logit approach removes the cross-sectional differences including also differences in the locational attractiveness in the view of firm $k$. As discussed above this estimator seems more appropriate in this context as it does not treat the location decisions of a company as being entirely independent. However, the assumption of country-level fixed effects limits our ability to detect significant effects, since the available variation is reduced.

As above, standard errors are robust against group effects and heteroscedasticity. Comparing Columns (1) and (2) we see that the tax wedge related to corporate taxation does not show significant effects. Only the statutory tax rate proves significant. This is, to some extent, in accordance with Devereux and Griffith (1998) who argue that location decisions are not driven by the marginal tax rate but by the effective average tax rate, which is a combination of marginal and statutory tax rates. This result is also in accordance with Buettner and Ruf (2007) who find that the statutory tax rate has a stronger predictive power for location decisions than effective tax rates. As is documented in Column (3) the inclusion of corporate profit taxes yields a significant positive effect. This points at substantial problems with this backward-looking tax indicator that might just capture the variation of the level of profits rather than of the tax burden.

The basic set of control variables shows expected results: not only is the level of corruption found to exert adverse effects on the location probability, but also the labor cost exert negative effects. Moreover, GDP shows positive effects (Distance and R&D Tax Credit are removed as these variables show only cross-sectional variation). With regard to the other tax indicators the fixed effects logit estimation does not support any adverse effects. A weakly significant effect is only found for sales taxes and VAT, which is, however, positive.

Table 6: Taxes and FDI: Dynamic Specifications

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| log $PPE_{(t-1)}$ | .378 ** | .378 ** | .380 ** | .398 ** | .393 ** | .524 ** | .527 ** |
| | (.111) | (.110) | (.110) | (.112) | (.111) | (.086) | (.086) |
| Tax Wedge | -.988 ** | -.982 ** | -1.01 ** | -.702 ** | -.738 ** | -.330 | -.220 |
| | (.294) | (.292) | (.300) | (.299) | (.303) | (.327) | (.331) |
| Property Taxes | .003 | | | | .002 | | .000 |
| | (.022) | | | | (.022) | | (.025) |
| Excises | | .007 | | | -.036 | | .048 |
| | | (.034) | | | (.035) | | (.053) |
| Sales Taxes& VAT | | | .019 | | .005 | | -.001 |
| | | | (.018) | | (.019) | | (.031) |
| Import Duties | | | | -.206 ** | -.212 ** | | -.134 ** |
| | | | | (.032) | (.035) | | (.067) |
| Tax. on Skill. Lab. | | | | | | .081 | -.212 ** |
| *Tax Variables* | | | | | | (.340) | (.035) |
| log GDP | .679 ** | .681 ** | .685 ** | .726 ** | .737 ** | 1.28 ** | 1.20 ** |
| | (.181) | (.176) | (.178) | (.180) | (.182) | (.324) | (.314) |
| log Labor Cost | -.179 | -.179 | -.177 | -.309 ** | -.319 ** | -.711 ** | -.618 ** |
| | (.141) | (.141) | (.141) | (.143) | (.143) | (.298) | (.284) |
| log Lending Rate | .131 ** | .133 ** | .134 ** | .122 ** | .115 ** | .115 ** | .112 ** |
| | (.033) | (.033) | (.033) | (.033) | (.034) | (.037) | (.035) |
| log Corruption | -.026 | -.024 | -.020 | -.013 | -.010 | -.038 | -.025 |
| | (.095) | (.094) | (.095) | (.095) | (.096) | (.125) | (.128) |
| log Sales | .165 ** | .166 ** | .165 ** | .161 ** | .162 ** | .148 ** | .148 ** |
| *Control Variables* | (.025) | (.025) | (.025) | (.025) | (.028) | (.028) | (.028) |
| Chi-squared(6) | 2.49 | 2.46 | 2.30 | 2.06 | 2.15 | 11.7 | 11.7 |
| Observations | 25936 | 25936 | 25936 | 25936 | 25936 | 17049 | 17049 |
| Affiliates | 6434 | 6434 | 6434 | 6434 | 6434 | 4607 | 4607 |

Dependent variable: stock of capital (PPE) in logs. GMM estimation in first differences on the affiliate level. Specifications include fixed time, and industry effects. **(*) indicate significance at the 5%(10%) level. Robust standard errors following Windmeijer (2005) in parentheses.

Table 7: Taxe

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| STR | -2.17 ** | -1.98 * | -2.05 ** | -2.16 |
| | (.902) | (1.11) | (.931) | (.905) |
| Tax Wedge | | -.245 | | |
| | | (.964) | | |
| Corp. Profit Taxes | | | .075 ** | |
| | | | (.029) | |
| Property Taxes | | | | -.019 |
| | | | | (.056) |
| Excises | | | | |
| Sales Taxes & VAT | | | | |
| Import Duties | | | | |
| Tax. on Skill. Lab. | | | | |
| *Tax Variables* | | | | |
| log GDP | 2.16 ** | 2.15 ** | 1.52 ** | 2.19 |
| | (.705) | (.707) | (.736) | (.711) |
| log Labor Cost | -1.91 ** | -1.91 ** | -1.25 * | -1.93 |

# 6 Conclusions

This paper has reconsidered the empirical evidence for an impact of taxes other than corporate income taxes on FDI using a large panel of German multinationals. Based on a standard theoretical framework of investment and location decisions, the paper has discussed the potential impact of various taxes on factor demand, output, as well as location decisions. The discussion emphasized the role of tax incidence for the consequences of taxes other than corporate income taxes and noted the necessity to make further assumptions in order to identify corresponding tax effects empirically. The discussion also shows that an important distinction refers to horizontal vs. vertical FDI, which might be quite differently affected by some of the indirect taxes, for instance, by sales taxes and VAT.

The panel data analysis of the stock of capital invested in property, plant, and equipment of German multinationals' foreign affiliates in 22 other OECD countries adds some support to the findings of Desai, Foley, and Hines (2004) who found significant effects not only of direct but also of indirect taxes for the case of U.S. multinationals. The results for corporate income taxes are consistent with the conventional view that their impact is basically due to an increase in the cost of capital. Moreover, the results indicate some further significant adverse effects of indirect taxes, such as sales taxes and VAT, excises, property taxes, and import duties. The magnitude of the effects, for instance, of sales taxes and VAT on the stock of capital, is found to be comparable to that of the corporate income tax. Another tax variable that proves significant is the indicator of taxes on skilled labor. This result is in accordance with theoretical predictions if we assume that skilled labor is mobile internationally, and if there is some capital-skill complementarity.

Most of the effects of non-profit taxes, however, disappear once fixed country effects are included. Also the analysis of location decisions by means of a fixed-effects logit approach does not reveal any adverse effects from taxes other than corporate income taxes.

The remarkable differences between the results without and with country-level fixed effects suggest that the adverse effects of other taxes are entirely driven by the cross-sectional variation in taxation. Since corporate taxes prove significant in all specifications, this implies that corporate tax policy changes among OECD countries were not accompanied by substantial changes in other taxes. As

a further implication, this suggests that tax competition has been confined, so far, to corporate taxation.

We cannot preclude, however, that some of the other tax variables used in the investigation fail to show adverse effects in the fixed-effects regressions not because they were irrelevant for location and investment but because these taxes are measured using revenue data rather than being precise indicators of the tax laws. This view is supported by the finding that also the corporate income tax fails to show adverse effects if it is captured by a backward-looking indicator of the corporate tax burden that is generated from revenue statistics.

## Datasources and Definitions

**Firm-level data** are taken from the micro dataset MiDi of the Deutsche Bundesbank, see Lipponer (2006) for an overview.

**GDP** in U.S. Dollars, nominal. Source: OECD.

**Labor cost** are captured by the hourly compensation of workers in U.S. Dollars for production workers in manufacturing. Source: U.S. Bureau of Labor Statistics.

**Corporate income tax** data are taken from Devereux, Griffith, and Klemm (2002). The data are kindly provided by the authors at the IFS website including an update of the figures. Additional tax variables are taken from the International Bureau of Fiscal Documentation (IBFD) and from tax surveys provided by Ernst&Young, PricewaterhouseCoopers (PwC), and KPMG.

**Excises, sales taxes and VAT, import duties, property and corp. profit taxes** refer to revenue in terms of GDP and are taken from OECD revenue statistics. *Sales Taxes & VAT* (OECD category: 5110) include all taxes levied on production, leasing, transfer, delivery or sales of goods and services. *Excises* (OECD category: 5121) are all taxes on particular products other than general sales taxes and import or export duties, respectively. *Import Duties* (OECD category: 5123) are customs and duties on imported products. Not included are, however, general sales taxes or excises. *Property Taxes* (OECD category: 4000) comprises taxes on the use, ownership or transfer of property. *Corporate Profit Taxes* (OECD category: 1210) refer to income taxes on corporations.

**Taxes on skilled labor** have been kindly provided by the authors of Elschner *et al.* (2006).

**Distance** is taken from "www.etn.nl/distance.htm".

**Research and development tax credits** are taken from IBFD study *Tax Treatment of Research and Development Expenses* (2004) available at:
*http* : *//europa.eu.int/comm/taxation_customs*. Information for non-EU countries is taken from the International Tax and Business Guides of Deloitte.

**Lending rate** is the lending rate for credits to private sector taken from the IMF International Financial Yearbook (2005) augmented with corresponding ECB figures.

**Corruption perception index** is published annually by Transparency International. It ranks countries in terms of perceived levels of corruption, as determined by expert assessments and opinion surveys. The scores range from 10 (country perceived as virtually corruption free) to 0 (country perceived as almost totally corrupt).

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