Foreign (in)direct investment and corporate taxation

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Abstract:

This paper investigates the role of corporate taxation with respect to a multinational's investment decision, in which the multinational can pursue either a direct or an indirect investment strategy. The latter involves at least three corporate entities and opens up enhanced opportunities for international tax planning. The existence of preferential tax treatment for conduit or intermediate corporate entities presumably changes the role of corporate taxation in destination countries, because it supports multinationals in avoiding taxes. The empirical findings of this study are consistent with theoretical predictions and suggest that tax effects differ, depending on the investment regime. The endogeneity of the structural choice—direct versus indirect—is taken into account by a switching regression approach.

Keywords: multinational company, business taxes, firm-level data, switching regression

JEL Classification: H25, F23

Non technical summary

This study investigates how taxes affect the affiliate-level investment decision of German multinationals, taking into account that a significant share of outbound investments are indirect rather than direct. While we consider direct investments as simple bilateral structures (a parent firm investing in a foreign affiliate), indirect strategies involve at least three companies, where the parent is investing via a conduit or intermediate entity in another foreign enterprise. Indirect investment structures possibly open up enhanced opportunities for multinationals to avoid taxes, and hence, presumably change the role of corporate taxation in destination countries.

A theoretical model, distinguishing between direct and indirect structures, yields different corporate tax effects, depending on the respective regime. The empirical analysis, based on the MiDi data of the Bundesbank, follows the theoretical model and empirically confirms our expectations. If we consider tax wedges we obtain from the theoretical analysis, we find adverse effects on affiliate-level investment for both regimes. The empirical results, where we take into account the endogeneity of the regime choice (direct versus indirect) by a switching regression approach, suggest that an increase in the cost of capital reduces indirect investments more than direct effects.

The findings suggest also that income can be transferred to the German parent without tax deduction, implying that multinationals actually exploit indirect investment structures to avoid taxes. This may imply that the existence of conduit structures and low-tax conduit countries reduces the downward pressure on tax rates. However, since tax competition is a phenomenon which is not confined to one specific aspect, tax competition for intermediate entities may well be intensified.

Nicht-technische Zusammenfassung

Die vorliegende Arbeit untersucht die Investitionstätigkeit von Auslandstöchtern, die von deutschen multinationalen Konzernen gehalten werden. Dabei berücksichtigt die Untersuchung, ob es sich um eine direkte oder um eine indirekte Beteiligung handelt. Bei einer direkten Beteiligung investiert die deutsche Muttergesellschaft direkt in eine ausländische Tochtergesellschaft während bei einer indirekten Beteiligung mindestens eine dritte Unternehmenseinheit involviert ist. Die Auslandstochter wird dann über eine zwischengeschaltete Gesellschaft gehalten. Dies eröffnet zusätzliche Möglichkeiten zur Steuerplanung. Falls diese genutzt werden und indirekte Strukturen steuerlich motiviert sind, ändert sich dementsprechend auch der Charakter des steuerlichen Einflusses im Zielland.

Die Studie zeigt zunächst anhand theoretischer Überlegungen, dass sich die Steuereffekte in der Tat unterscheiden, je nachdem, ob das Investitionsobjekt direkt oder indirekt gehalten wird. Zur empirischen Analyse werden Direktinvestitionsdaten der Bundesbank herangezogen. Die Ergebnisse bestätigen unsere theoretischen Vorhersagen: Der tarifliche Steuersatz des Ziellandes wirkt erwartungsgemäß negativ auf die Investitionstätigkeit. Im Falle der indirekten Investitionen wird dagegen zunächst ein positiver Effekt gefunden. Sobald jedoch auf die theoretisch relevanten Kapitalkosten kontrolliert wird, finden sich negative Steuereffekte für beide Beteiligungsmodelle. Dabei zeigt sich, dass eine Erhöhung der steuerlich relevanten Kapitalkosten die Investitionen bei indirekter Beteiligung deutlich stärker dämpft als bei einer direkten Beteiligung. Die empirische Analyse berücksichtigt dabei, dass die Wahl der Investitionsstruktur nicht zufällig erfolgt. Vielmehr kann diese Entscheidung durch beobachtbare Charakteristika des multinationalen Konzerns beschrieben werden.

Die empirischen Ergebnisse legen darüber hinaus nahe, dass im Ausland generiertes Einkommen praktisch ohne steuerliche Belastung zurück zur deutschen Muttergesellschaft transferiert werden kann. Daraus könnte man folgern, dass indirekte Beteiligungsstrukturen den Steuerwettbewerb mildern. Allerdings beschränkt sich das Phänomen Steuerwettbewerb nicht nur auf eine Dimension. In der Tat könnte der Wettbewerb um Zwischen- oder Holdinggesellschaften gleichzeitig zunehmen.

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Foreign (In)Direct Investment and Corporate Taxation*

1 Introduction

Economists agree that corporate taxation influences both the location choice and the investment decision of multinational firms (for a survey, see De Mooij and Ederveen, 2003). However, as companies become ever more international, another aspect is that multinational enterprises also find it increasingly easier to shift profits from high- to low-tax jurisdictions. Differences in national tax systems and the complexity of the international tax law open up additional opportunities to avoid taxes. This implies that multinationals may set up sophisticated firm structures to exploit tax-avoidance opportunities.

In this paper we analyze how taxes affect the affiliate-level investment decision of German multinationals, taking into account that a significant share of outbound investments are indirect rather than direct. While we consider direct investments as simple bilateral structures (a parent company investing in a foreign affiliate), indirect strategies involve at least three companies, where the parent is investing via a conduit or intermediate entity in another foreign enterprise. Indirect investment structures possibly support multinationals in reducing taxable income on a worldwide basis, because profits can be shifted from high- to low-tax (or even zero-tax) conduit locations. Moreover, tax-efficient indirect

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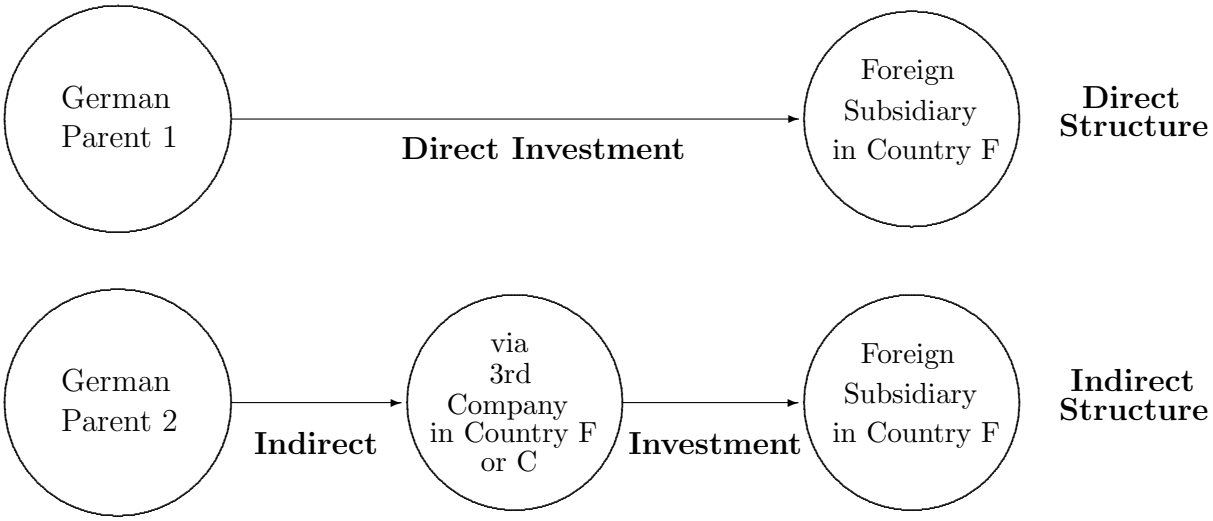
financing structures allow payments to be channeled from affiliates to parent companies, possibly without any tax deduction. Mintz (2004) shows in a theoretical model that the analysis of investment decisions made by multinationals should explicitly differ between direct and indirect investment regimes. In contrast to the existing literature, this paper follows this structural distinction and empirically confirms that tax effects indeed differ: while direct investments are negatively affected by the national statutory tax rates, indirect investments are positively related to statutory tax rates in host countries. If we follow theoretical predictions and adjust tax wedges for indirect structures, we find adverse effects on affiliate-level investment. The potential endogeneity of the structural choice (direct versus indirect) is taken into account by a switching regression approach.

The empirical investigation is based on the Microdatabase Direct Investment (MiDi), a comprehensive dataset of all German outbound investment positions provided by the Deutsche Bundesbank (the German central bank, see Lipponer, 2007). The current version is available from 1996 to 2005 as panel data. The data provide information on companies' balance-sheet positions and further characteristics, e.g. whether the investment is held directly or indirectly.

The paper is organized as follows. Section 2 provides a general overview of direct and indirect investment structures, including some descriptive statistics. In Section 3, we set up a model that distinguishes between direct and indirect investments. Section 4 proposes an empirical estimation approach. Subsequently, Section 5 provides information about the data. Section 6 presents the empirical results, and Section 7 examines the sensitivity of the results. Section 8 is the conclusion.

Figure 1: Direct versus Indirect Investment Structure



2 Direct versus Indirect Investment Structures

While the majority of foreign investments are direct, a considerable proportion of multinational outbound activities are indirect. Figure 1 shows a stylized model which points out that multinationals can, in principle, follow both investment regimes. Either the multinational decides to invest directly in the destination country (F) or it chooses an indirect structure and establishes a conduit entity, possibly in a third country (C).[1] The choice of this organizational structure is presumably not random; it may depend on destination-country characteristics, single firm preferences or strategies, as well as on the company-specific potential.

Figure 2 presents the annual number of German outbound investments from 1996 to 2005. There has been a significant increase in the number of investment objects in both regimes. Moreover, focusing on indirect observations, the left panel of Figure 3 shows the three

[1]We mostly refer to 'conduit' entities. This emphasizes that the firm is in between the German parent and the foreign subsidiary. Alternatively, we may refer to intermediate or holding companies.

most important conduit locations for German multinationals. The Netherlands attract more than a fourth of German conduit entities. Together with Switzerland and Austria, these three countries host almost 60% of all German conduit entities. The right-hand side of the bottom panel displays the three most important destination countries for indirect structures. The observations are more evenly distributed across countries, and about one-fifth of German indirect outbound investment goes to Italy, France, and Spain.[2]

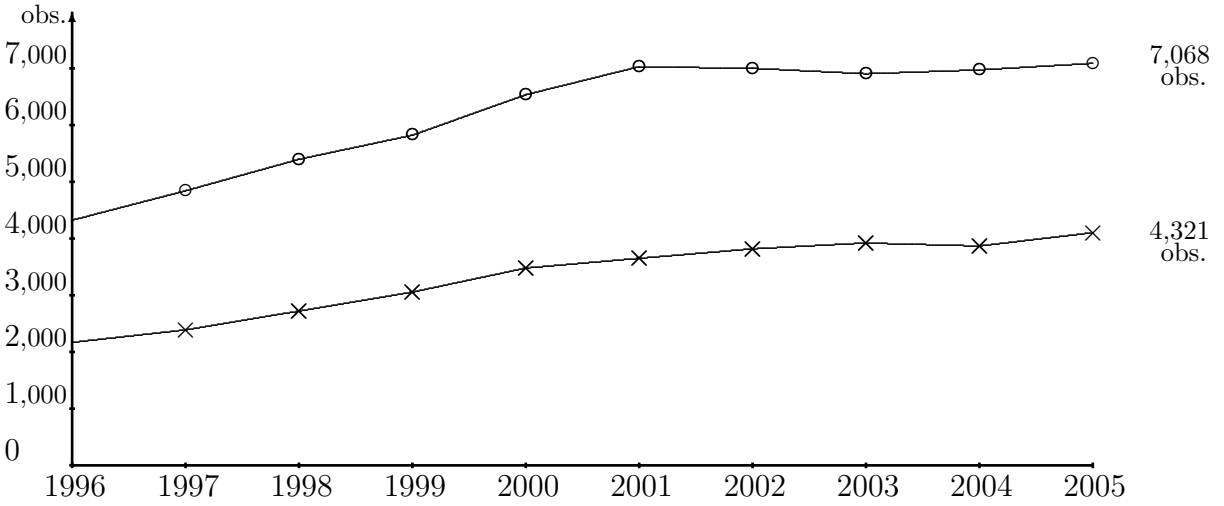
While this paper argues that differences in international taxation can explain why indirect structures exist at all, the classical case of an indirect entity may be associated with non-tax reasons. Indeed, headquarters or holding companies may provide services which it is useful to bundle centrally for legal or efficiency reasons. With regard to taxation, Weichenrieder and Mintz (2006) identify three potential roles of conduit entities. First, a conduit entity can be used for so-called treaty shopping, because some countries do offer preferential treatment with respect to withholding taxes.[3] Second, conduit entities in low-tax countries provide high-tax affiliates with intercompany loans. Borrowing from affiliates located in low-tax countries and lending to affiliates in high-tax locations will allow the latter to deduct interest payments from profits and save taxes. Under certain conditions, this structure even allows for two interest deductions for one investment. Indeed, if an indirect structure involves two high-tax countries, the multinational can gain twice.[4] Fi-

[2]Note that this descriptive statistic (Figure 3) only considers three-country structures, i.e., structures where the destination country is different from the conduit country. If observations were included that allow host and conduit country to be identical, the United States would have been an important host as well as conduit country, because many US affiliates are held via US holding companies.

[3]Note that the conduit entity is not necessarily located in a third country. Some countries may provide special tax treatment for some firms, depending, for instance, on the legal form. The special treatment of holdings in the Netherlands, financial holdings in Luxembourg, or headquarters of foreign multinationals in Belgium (*co-ordination centers*) are well-known examples. Even a holding in the same country is then possibly tax motivated. Profit and loss consolidation, which is often allowed on a national basis only, can also explain tax motivated conduit entities where no third country is involved (Weichenrieder and Mintz, 2006).

[4]This is called a double-dip structure. Some important tax attributes encourage this double-dip situation in the case of indirect investments (see Mintz, 2004). First, parent country and host country do not limit interest deduction; second, the parent country exempts conduit income; third, the conduit country allows for special tax treatment of intermediate companies or is a low-tax country; fourth, the conduit country (the host country) imposes little or no withholding tax on income paid to the parent (conduit).

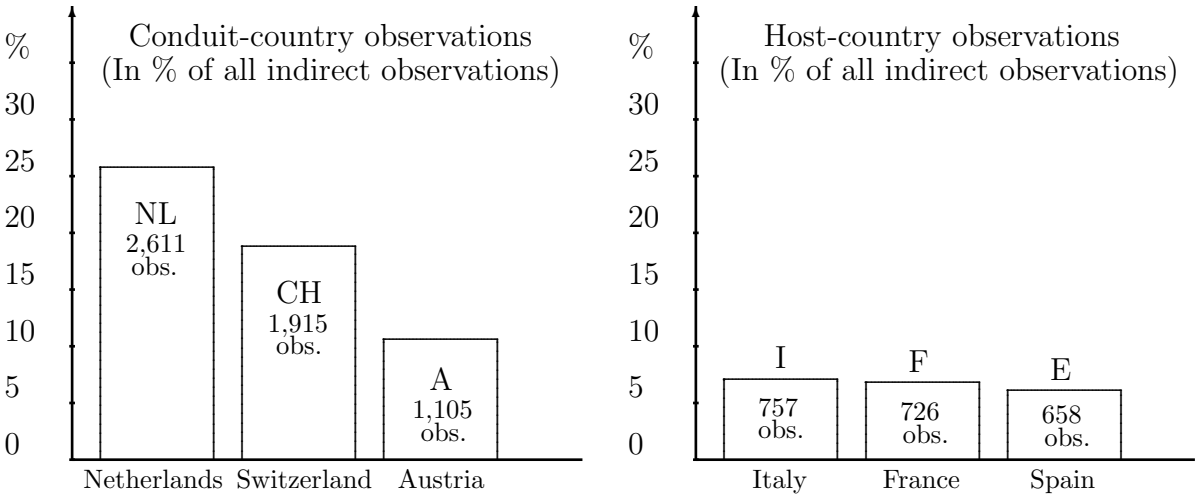
Figure 2: Number of (In)Direct German Outbound Investments



Annual number of (in)direct investments over all countries (1996 to 2005). The figure reflects the number of affiliates in host countries. Direct is defined as direct participation interest in non-holding companies. Indirect as participation interest held by holding and non-holding companies. While we restrict the sample for below regression analysis on the producing sector (see Appendix B), we include all observations for descriptive purposes with the exception of minority holdings, partnerships, and financial services. Source: Deutsche Bundesbank, MiDi.

Direct Investments Indirect Investments

Figure 3: Three Main Conduit & Host Countries (Indirect Investments)



Indirect three-country structures are the only structures considered, i.e., conduit countries are always different from host countries. The left panel shows the three most important conduit countries for German indirect outbound investments (1996-2005). The Netherlands, Switzerland, and Austria account for 56.76% of all observations. The right side depicts the three most important destination countries for indirect investments (1996-2005). Italy, France, and Spain account for 21.58% of all observations. Minority holdings, partnerships, and financial services are excluded. Source: Deutsche Bundesbank, MiDi.

nally, the low-tax conduit can reinvest income and defer any payments to the parent. This last point is especially relevant for outbound investments from countries using a tax credit system. However, income deferral of passive income may collide with controlled foreign company (CFC) rules, depending on the type of income (for further information about the US Subpart F legislation, see Hines, 1999; Weichenrieder, 1996, for the German rule). Desai, Foley, and Hines (2003) confirm that tax deferral is an important strategy for US multinationals, because of the US tax system.[5] They show that indirectly owned affiliates are more sensitive to foreign tax-rate differences, because chains of ownership can mitigate the effects of the US foreign tax credit system by expanding opportunities to defer US tax liabilities. Incentives under ownership chains are then comparable to incentives under exemption systems, because multinationals can avoid repatriation taxes.

3 Theoretical Analysis

Consider a German multinational enterprise. The company is active in Germany (G) and in a foreign location (F). Production is determined by a concave production function with standard properties, where $f_G(K_G)$ denotes production in Germany, and $f_F(F_F)$ denotes production in the foreign country.[6] We abstract from other input factors such as labor. The model follows the analysis of Mintz (2004) and distinguishes two regimes, where regime I (II) is the direct (indirect) investment regime.

[5]The US system is called a tax credit system. It taxes companies on their worldwide income, irrespective of where it was earned. Afterwards, to avoid double taxation, a company receives a credit for the taxes it paid to a foreign government up to the amount it would have paid had it remained in the US. In contrast, the method used by Germany and other countries is called a territorial or exemption system. Here, only profits earned in the home country are taxed.

[6]$f'(\cdot) > 0, f''(\cdot) < 0$.

3.1 Direct Structure (Regime I)

Profits are determined by output, $f_G(K_G)$ and $f_F(K_F)$. Both countries, Germany and the foreign country, tax profits at rates of τ_G and τ_F, respectively. There is no difference between interest rates in the model. We further assume that foreign-source income is tax exempt.[7] Moreover, we abstract from depreciation allowances and any other taxes (e.g., withholding taxes). Overall profits of the multinational (home and foreign profits) are given by

$$\begin{aligned} \pi &= (1-\tau_G)(f_G(K_G) - iB_G) + iE_F \\ &+ (1-\tau_F)(f_F(K_F) - iB_F) - iE_F. \end{aligned} \tag{1}$$

The first line captures the profits of the German parent company. B_G refers to external debt finance. Accordingly, interest expenses iB_G are deductible from the tax base. Note that we abstract from opportunity costs for own capital iE_G. We may, however, define profits inclusive of iE_G. The second line refers to the profits of the foreign affiliate. The affiliate in F can finance with local debt B_F or with parent equity E_F. The parent receives dividends iE_F without tax deduction. We keep E_F in the model—albeit it would cancel out in this first case—because it emphasizes one crucial difference compared to the indirect structure (see below). The firm maximizes profits subject to the following constraints:

$K_G + E_F = B_G$,
$K_F = E_F + B_F$,
$B_G \geq 0$, $B_F \geq 0$.

Note that the first constraint implies that the parent also raises funds to finance the foreign affiliate; actually more than necessary for its own investment K_G. We further impose nonnegativity constraints on B_G and B_F. Another assumption is that the host-country tax

[7] Germany basically exempts foreign earnings from domestic taxation.

rate is always lower than the home-country tax rate ($\tau_G > \tau_F$). If we maximize the model with respect to K, taking into account all relevant restrictions, we obtain the following marginal conditions:

$$\begin{aligned} f'(K_G) &= i, \\ f'(K_F) &= i\frac{(1-\tau_G)}{(1-\tau_F)}. \end{aligned}$$

The first optimality condition points out that the decision of the parent company is not distorted. Abstracting from i, we refer to the second expression as the tax related cost of capital or the tax wedge.[8] If we assume that the German tax rate always exceeds the foreign tax rate, new investment is exclusively parent-debt financed.[9] The equity transfer to the affiliate, therefore, is refinanced with external debt. Assuming that the parent's profits are positive (the parent is not tax-exhaust), overall profits of the multinational enterprise are maximized. While the optimality condition for the German part of the multinational implies tax neutrality, the required rate of return for the foreign investment is below i, because of simple tax arbitrage.

For a variation in the foreign statutory tax rate, we obtain the comparative static effect which is unambiguously negative: a higher foreign tax rate τ_F implies higher cost of capital and less investment

$$\frac{dK_F}{d\tau_F} = \frac{i(1-\tau_G)}{(1-\tau_F)^2 f''(K_F)} < 0.$$

[8]The term tax wedge simply reflects that the optimality condition is distorted, i.e. $f'(K_F) \neq i$. The tax wedge in the case of the foreign affiliate implies a reduction of the cost of capital.

[9]We obtain this extreme result—complete debt finance—because we do not introduce any costs associated with debt (and because $\tau_G > \tau_F$). While these costs are neglected in this model, the corporate finance literature refers to concepts where debt finance is associated with additional costs (for surveys, see Myers, 2001; Graham, 2003).

3.2 Indirect Structure (Regime II)

We rely on one structural difference when introducing the conduit structure: the parent company still transfers equity funds to a foreign affiliate, but now to the conduit entity. Subsequently, the conduit provides the foreign affiliate F with internal debt. The meaning of the above notation slightly changes: E_F now refers to an internal credit if we consider the foreign affiliate; it refers to equity if we consider the parent firm. Any further activity of the conduit is not modeled, because we are only interested in investment activities of the affiliate F. The multinational's profits are determined by

$$\begin{aligned} \pi &= (1-\tau_G)(f_G(K_G) - iB_G) + iE_F \\ &+ (1-\tau_F)(f_F(K_F) - iB_F - iE_F). \end{aligned} \tag{2}$$

We assume that transfers, including interest payments to the conduit, can be channeled from the affiliate to the parent without any tax deduction. The model then describes the so-called double-dip structure, because the multinational can deduct interest payments in the host country and in the home country.[10] We maximize the model subject to the above constraints and obtain two expressions for the cost of capital

$$\begin{aligned} f'(K_G) &= i, \\ f'(K_F) &= i\frac{(1-\tau_G-\tau_F)}{(1-\tau_F)}. \end{aligned}$$

The foreign affiliate's cost of capital are further reduced, because of the additional interest deduction. A variation in the foreign tax rate yields the following positive expression

$$\frac{dK_F}{d\tau_F} = \frac{-i\tau_G}{(1-\tau_F)^2 f''(K_F)} > 0.$$

[10]Intuitively, the German parent takes up more capital than necessary to finance its own investment. Interest expenses in Germany are deductible for corporate tax purposes. The foreign affiliate is internal debt financed, and associated interest expenses are again deductible. Hence we have two interest deductions for the same investment.

The prediction of a positive tax effect is the result of the double-dip interest deduction, because a higher foreign tax rate implies that interest deductions are even more valuable.

3.3 Indirect Structure (Extended)

We extend the indirect model with respect to one critical assumption. While equation (2) implies that interest payments received by the conduit are tax exempt, we introduce a tax τ_C on interest payments to the conduit. Profits can then be written as

$$\begin{aligned} \pi &= (1-\tau_G)(f_G(K_G) - iB_G) + iE_F \\ &+ (1-\tau_F)(f_F(K_F) - iB_F - iE_F) - \tau_C iE_F. \end{aligned} \tag{3}$$

τ_C may denote withholding taxes as well as the conduit-country tax rate. The marginal decision is then determined by

$$f'(K_F) = i\frac{(1-\tau_G-(\tau_F-\tau_C))}{(1-\tau_F)}.$$

There is no longer any tax advantage compared to the direct structure if τ_F equals τ_C. If $\tau_C < \tau_F$, the tax wedge ranges somewhere between the direct and the indirect solution.

To sum up, theory suggests two different regimes with two (three) different measures for the tax related cost of capital. Hence, tax wedges T for respective regimes follow:

$$T_1 = \frac{(1-\tau_G)}{(1-\tau_F)}, \tag{4}$$

$$T_2 = \frac{(1-\tau_G-\tau_F)}{(1-\tau_F)}, \tag{5}$$

$$T_2^* = \frac{(1-\tau_G-\tau_F+\tau_C)}{(1-\tau_F)}. \tag{6}$$

T_1 applies to the direct structure (Regime I), T_2 is the relevant tax measure for the indirect structure (Regime II), and T_2^* relates to the extended indirect structure, where τ_C is also considered.

4 Investigation Approach

The purpose of the empirical analysis is to estimate affiliate-level investment. The theoretical analysis suggests two different regimes, depending on whether investments are direct or indirect. One way to approach this problem is to consider direct and indirect investments as two separate samples, simply split observations, and estimate two distinct equations. However, firms do not randomly choose one or the other regime, and a simple split does not fully account for this endogeneity.[11]

To address this endogeneity problem we follow the literature and estimate an endogenous switching regression model, where the switching rule is observed (Lee, 1978). Maddala (1983) suggests a two-step procedure: first, estimate the binary variable I, indicating whether the investment is directly or indirectly held. Subsequently, estimate affiliate investment in a second stage and condition on the regime choice.

From a taxation perspective, conduit structures should generally be dominant, empirically.

[11] We can think of endogeneity in this context in many different ways. First, there are some firms switching from one regime to the other. The ultimate regression sample contains exactly 50 affiliates switching at least once over the whole time span. Firms switching and immediately switching back, however, do not contribute new information if they come up as single observations in the panel data regressions with affiliate-specific effects. Second, firms' potentials to cushion shocks differ, depending on the regime. Hence, the regime is correlated with these shocks. Third, the variable of interest, affiliate investment, may also differ structurally with respect to all control variables. Fourth, regime choice and investment level may be simultaneously determined.
Another intuitive way to think about endogeneity is to look at the decision to set up an indirect structure. The existence of preferential tax treatments, or generally differences in international taxation, presumably distort the decision to set up a conduit structure. If the heterogeneity in multinationals' potentials ultimately determines the regime, we have a problem of self selection, or selection into the regime.
Any fixed-effects approach may account for time-invariant preferences (e.g., Vella, 1998). Yet the proclivity of multinationals to choose a specific regime can vary over time.

However, descriptive statistics show that the majority of investments are direct. It is certainly true that indirect structures can be efficient, but they are also costly. While every foreign activity is associated with costs (e.g., Markusen, 1995), a conduit entity involves additional control and information problems, and hence, additional costs which reduce the probability to choose the indirect structure. We summarize the decision to establish a conduit entity with the following equations

$$I_{ijkt} = \begin{cases} 1 & \text{if } IND^*_{ijkt} > 0, \\ 0 & \text{otherwise.} \end{cases}$$

$$IND^*_{ijkt} = f[c_{ijkt}(X_{ijkt}, \gamma_i)].$$

I_{ijkt} is a binary variable indicating whether the multinational j is investing in country k at time t in an affiliate i via a conduit entity or not. IND^*_{ijkt} is the corresponding unobserved propensity and c_{ijkt} represents the company-specific costs associated with the conduit firm. These costs are determined by affiliate and company-group variables and also by host-location factors, e.g. the host-country tax rate τ_{kt}. Hence, a vector X_{ijkt} of observable host-country characteristics as well as affiliate- and company-group-specific characteristics determines costs. Finally, γ_i captures unobserved preferences of affiliates, which may be important, for instance, because of affiliate-specific management strategies. First-step estimation equations are then specified as

$$I_{ijkt} = a_1 BST_{jt} + a_2 PRO_{jt} + a_4 X_{ijkt} + \xi_t + \gamma_i + u^I_{ijkt}. \tag{7}$$

The respective regime choice is determined by the company-group specific variables BST_{jt} and PRO_{jt}, which reflect the group-specific ability, and also preference, as regards establishing a conduit entity. BST_{jt} is the balance-sheet total of the multinational group; PRO_{jt} refers to the profitability of the multinational.[12] Moreover, all relevant second-

[12]For further data and variable definitions see Section 5 and the Appendix. Note that empirical identi-

stage explanatory variables are included. From first-stage regressions we obtain estimates for an additional selection term $\hat{\lambda}$. Including $\hat{\lambda}$ in the equations of interest allows us to consistently estimate

$$\text{Regime 1:} \quad Y_{1,ijkt} = \alpha_1 + \alpha_2 T_{1,kt} + \alpha_3 X_{ijkt} + \hat{\lambda}_{1,ijkt} + \psi_t + \varphi_i + \epsilon_{1,ijkt} \quad \text{iff } I_{ijkt} = 1,$$

$$\text{Regime 2:} \quad Y_{2,ijkt} = \beta_1 + \beta_2 T_{2,kt} + \beta_3 X_{ijkt} + \hat{\lambda}_{2,ijkt} + \psi_t + \varphi_i + \epsilon_{2,ijkt} \quad \text{iff } I_{ijkt} = 0.$$

Y denotes affiliate-level investment. X_{ijkt} is a vector of affiliate- and country-specific control variables. To control for selection, we include estimated selection terms, $\hat{\lambda}_1 = \frac{\phi(X\hat{a})}{\Phi(X\hat{a})}$ and $\hat{\lambda}_2 = \frac{\phi(X\hat{a})}{1-\Phi(X\hat{a})}$, as additional regressors (Maddala, 1983).[13] Finally, T_1 and T_2 are the tax-related cost of capital for direct and indirect structures as defined in (4) and (5), respectively.

The empirical implementation of this two-step approach in context of panel data and unobserved heterogeneity in both equations requires further considerations. We follow the procedure suggested by Wooldridge (1995) for panel data selection models.[14]

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fication requires at least one variable that explains the regime choice. We may refer to this variable as an instrument. The nonlinearity of the probability model can already be sufficient to identify the regime. Yet this can cause collinearity among regressors since we condition on the regime choice in the second stage (Wooldridge, 2002). Note also that we do not aim to explain which countries are preferable conduit-entity locations. Rather, we are interested in the multinational's regime choice, i.e., the first-stage decision to establish a conduit structure at all, where the company can choose any potential conduit location.

[13] ϕ denotes the standard normal density function, Φ the distribution function. The ratio $(\frac{\phi(X\hat{a})}{\Phi(X\hat{a})})$ is also known as the inverse Mills ratio.

[14] The Appendix contains further details concerning the Wooldridge (1995) estimator and, especially, the procedure for correcting standard errors.

5 Data and Descriptive Statistics

For the empirical analysis, we use the Microdatabase Direct Investment (MiDi) provided by the Deutsche Bundesbank. This is an affiliate-level database of German multinationals' foreign investments. The data provide information about the investment object's balance sheet, including further information on the type of investment and on the investor. A favorable aspect of the data is that the current version provides affiliate-level panel data for the period 1996 to 2005. Moreover, data collection is enforced by German law, which sets reporting obligations for certain international transactions and positions.[15] As a crucial variable for this analysis, MiDi includes the information on whether the German multinational invests directly or indirectly via a conduit entity.

Below regressions analyze the determinants of affiliate-level investment. Investment is defined as the logarithmic difference in the balance-sheet item 'fixed assets'. While we can also interpret this variable as a growth rate, we mostly refer to 'investment' in the following. Explanatory variables are tax wedges T as defined above. This variable is expected to be negatively related to affiliate-level investment. In order to control for country characteristics, we employ the local *GDP*, local *labor cost* in manufacturing, and the local *lending rate*.[16] Furthermore, we control for the *present value of depreciation allowances* defined by the countries' tax code. Besides, we condition on the affiliate-specific variables *sales* and *loss carryforward*. We expect a positive sign for sales, because this is an indicator for the affiliate's size and cash flow. The dummy variable loss carryforward indicates whether some loss carryforward is reported. The existence of losses in the previous periods may capture characteristics of the current decision problem of the company such

[15] Aussenwirtschaftsgesetz (Foreign Trade and Payments Regulation) in connection with Aussenwirtschaftsverordnung (Foreign Trade and Payment Regulations). Each German multinational has to report its foreign assets including both direct and indirect FDI, conditional on some lower threshold level for mandatory reporting. Since 2002, investments have to be reported if the participation is 10% or more and the balance-sheet total of the foreign object is above 3 million euros. Though previous years showed lower thresholds, this level is uniformly applied for all years in the panel. For details see Lipponer (2007).

[16] MiDi does not provide information on affiliate-specific labor costs, or interest payments, etc.

as the expected performance of an affiliate. Loss carryforward is expected to be negatively related to investment.

Table 1 summarizes all relevant regression variables and respective mean values. The estimation sample is restricted to majority holdings. Moreover, financial services, partnerships, and nonproductive observations are excluded (see the Appendix for a detailed classification). According to theory, we remove observations if the German tax rate is below the statutory tax rate of the destination country.[17] Tax wedges are defined according to equations (4), (5), and (6). Since withholding taxes are often negotiated in double tax treaties, the withholding tax rate τ_C depends on the location of the conduit entity and potential treaties of host countries with conduit countries.[18] To check the sensitivity of the analysis, we further define T^*_{2a}, T^*_{2b}, and T^*_{2c}, where we set τ_C at 10%, 20%, and 25%, respectively, for all observations (see also Section 7). The consideration for this is that we change the composition of the sample, because the maximization problem in Section 3.3 requires that τ_C is below the host-country tax rate. If this condition is not fulfilled, the observation is removed. Additionally, we change the variation of the nonlinear tax wedge. Whereas tax wedges differ by construction, a comparison of other variables' mean values already indicate structural differences. As we would expect, the mean statutory tax rate is higher in Regime II. Market size, reflected by GDP, is on average twice as high in Regime II. Moreover, investments are much bigger in the case of the indirect structures—in terms of fixed assets and also in terms of sales. Another aspect is that labor costs differ on average. One may speculate whether this indicates that direct investments are also predominantly vertical FDI.

[17]The relevant German statutory tax rate is adjusted for the non-deductibility of interest expenses, because this is the relevant measure for this basic arbitrage condition.

[18]Withholding tax rates on interest payments refer to 2005.

Table 1: Variable Description

		Mean Values (Standard Errors) Regime I	Regime II
Tax Variables	Statutory Tax Rate	.308	.327
		(.073)	(.072)
	Tax Wedge (T_1 & T_2)	.839	.345
		(.095)	(.171)
	Tax Wedge (T_2^*)		.351
			(.173)
	Tax Wedge (T_{2a}^*)		.495
			(.159)
	Tax Wedge (T_{2b}^*)		.634$^{(b)}$
			(.144)
	Tax Wedge (T_{2c}^*)		.695$^{(c)}$
			(.135)
Country Level	Country GDP (in US$ bill.)	951	1,790
		(1,993)	(2,839)
	Labor Cost (in US$)	13.79	16.89
		(8.78)	(7.55)
	Lending Rate	.076	.066
		(.046)	(.034)
	Present Value of Depreciation	.806	.802
		(.052)	(.049)
Affiliate Level	Fixed Assets (in € mill.)	15.62	27.22
		(86.93)	(133.26)
	Sales (in € mill.)	55.50	91.42
		(255.17)	(434.64)
	Loss Carryforward (binary)	.304	.326
		(.460)	(.469)
	Observations	14,487	5,949

Affiliate-level data are taken from MiDi (see Lipponer, 2007). Corporate taxation data are taken from the International Bureau of Fiscal Documentation (IBFD), and from tax surveys provided by Ernst&Young, PwC, and KPMG. The lending rates refer to credits to the private sector and are taken from the IMF International Financial Statistics Yearbook (2006) augmented with corresponding OECD figures. GDP in U.S. dollars, nominal, is taken from World Bank World Development Indicators (2006). Hourly labor costs in U.S. dollars for production workers in manufacturing are taken from the U.S. Bureau of Labor Statistics and Eurostat. T_1 and T_2 refer to (4) and (5). T_2^* refers to equation (6), where τ_C corresponds to the relevant withholding tax rate for interest payments. τ_C is equal to 10% (T_{2a}^*), 20% (T_{2b}^*), and 25% (T_{2c}^*) for all observations. Different sample size: $^{(b)}$ 5,554 observations, $^{(c)}$ 5,030 observations.

6 Regression Analysis

First regression results, where we simply split the sample and estimate the respective regimes, are reported in Table 2. As expected, we find a negative impact of the statutory tax rate and of the tax wedge on direct investments. While we partially confirm theory by finding a positive, but not significant, tax rate effect on indirect investments, we confirm the negative effect of the tax wedge as defined in equation (5) (column (4)). We additionally include control variables such as the affiliate-specific sales, or the dummy variable for the loss carryforward. Both affiliate-specific variables show the expected sign, and the negative loss carryforward is also significant. The fixed effects approach removes all cross-section variation between affiliates and also nests country fixed effects. In this sense, it is not surprising that country-specific variables, for example local GDP or labor cost, are statistically insignificant. We find, however, a significant positive effect of the local lending rate for some specifications. The positive coefficient may reflect the comparative advantage of multinationals compared to domestic firms, because multinationals can rely on internal capital markets. According to the model in Section 3, external lending conditions in Germany are relevant. We control for the variation of German lending conditions by including a full set of time dummies. Thereby, we also capture general taxing conditions in Germany which are the same for all German parent firms.

Since we condition on affiliate-specific effects in this sample split, estimates are consistent if sample selection—the choice of the regime—depends on the constant affiliate-specific component (e.g., Vella, 1998). If this affiliate-specific effect does not fully capture selection, or if the selection effect varies over time, our estimates are not consistent. Table 3 reports the results from switching regressions, where we additionally condition on the selection effect $\hat{\lambda}$.[19] Basically, the results confirm findings in Table 2. The positive tax rate effect for

[19]See the Appendix for the first-stage regression results and interpretation. Results are robust with respect to the inclusion of regime-identifying variables. However, all regressions in Table 3 use specification (2) from Table 6 for identification.

Table 2: Direct and Indirect Investment

	(1)	(2)	(3)	(4)	(5)
Statutory Tax Rate	-.533*	.828			
	(.285)	(.580)			
Tax Wedge (T_1)			-.448*		
			(.249)		
Tax Wedge (T_2)				-.949*	
				(.499)	
Tax Wedge (T_2^*)					-.152
					(.722)
(log) Sales	.030	.046	.030	.046	.046
	(.020)	(.050)	(.020)	(.050)	(.050)
Loss Carryforward	-.034**	-.060*	-.034**	-.059*	-.059*
	(.016)	(.035)	(.016)	(.035)	(.035)
(log) GDP	-.200	.031	-.218	.004	.056
	(.201)	(.118)	(.200)	(.120)	(.125)
(log) Labor Cost	.027	-.210	.035	-.188	-.231
	(.199)	(.197)	(.198)	(.200)	(.201)
(log) Lending Rate	.107***	.079	.108***	.083	.095
	(.042)	(.064)	(.042)	(.061)	(.061)
Present Value Depr.	-.140	.024	-.140	.007	.015
	(.229)	(.559)	(.233)	(.565)	(.546)
Regime	I	II	I	II	II
Firms	3,377	1,627	3,377	1,627	1,627
Observations	14,487	5,949	14,487	5,949	5,949
Host Countries	32	33	32	33	33

Dependent variable is investment, defined as the logarithmic difference in the balance-sheet position fixed assets. Time and affiliate-level fixed effects are included but not reported. Standard errors (in parentheses) are robust and clustered (year-country cell). (***) (**) (*) indicate significance at the (1%) (5%) (10%) level. T_1 is defined according to equation (4). T_2 follows (5). T_2^* corresponds to equation (6).

the indirect investments is now significant. The estimated coefficient in column (3) implies that a 1 percentage point higher tax wedge is associated with -.38% less new investment in fixed assets. The regression in column 4 suggests that a 1 percentage point higher indirect tax wedge is associated with -.99% less new investment. The results confirm that the double-dip structure is relevant, because T_2 is calculated accordingly. In a further step, we consider that host countries possibly impose withholding taxes. T_2^* now refers to

Table 3: Direct and Indirect Investment (Switching Regression)

	(1)	(2)	(3)	(4)	(5)
Statutory Tax Rate	-.450**	.900*			
	(.229)	(.530)			
Tax Wedge (T_1)			-.383*		
			(.210)		
Tax Wedge (T_2)				-.994**	
				(.484)	
Tax Wedge (T_2^*)					-.184
					(.816)
(log) Sales	.029	.044	.030	.044	.043
	(.019)	(.055)	(.019)	(.055)	(.055)
Loss Carryforward	-.035**	-.060	-.035**	-.059	-.059
	(.016)	(.038)	(.016)	(.038)	(.038)
(log) GDP	-.233*	.027	-.248*	-.001	.052
	(.133)	(.097)	(.135)	(.157)	(.146)
(log) Labor Cost	.043	-.254	.050	-.233	-.274*
	(.129)	(.163)	(.136)	(.167)	(.165)
(log) Lending Rate	.111***	.075	.112***	.080	.091
	(.029)	(.056)	(.030)	(.101)	(.097)
Present Value Depr.	-.109	.059	-.113	.042	.045
	(.187)	(.530)	(.195)	(1.21)	(1.11)
Regime	I	II	I	II	II
Firms	3,377	1,627	3,377	1,627	1,627
Observations	14,487	5,949	14,487	5,949	5,949
Host Countries	32	33	32	33	33

Dependent variable is investment, defined as the logarithmic difference in the balance-sheet position fixed assets. Time dummies and linearized affiliate-level fixed effects are included but not reported. All estimations take into account the endogeneity of the regime choice. Standard errors (in parentheses) are robust for any form of heteroscedasticity and autocorrelation, and account for the two-step estimation (Wooldridge, 1995). (***) (**) (*) indicate significance at the (1%) (5%) (10%) level. All reported results refer to specification (2) of the probit equation (see the Appendix). T_1 is defined according to equation (4). T_2 follows (5). T_2^* corresponds to (6).

equation (6), where τ_C corresponds to the bilateral withholding tax for interest payments between the host country and the conduit country. The insignificant coefficient in column (5) may indicate that multinationals can avoid withholding taxes, for example, by using sophisticated conduit chains, or by benefiting from favorable tax treatment.

Table 4 summarizes the estimated selection effects (specifications refer to columns (1) and (2) of Table 3). A test on the joint significance of the 9 selection terms confirms a bias for both samples. There is no well-defined expectation about the sign of the selection variables. Selection can basically depend on the general economic environment, for example cyclical fluctuations, and how multinationals are able to cope with it; and this can vary over time. We estimate a significant positive effect for most years of the direct sample. This is, intuitively, what we would expect: a higher probability to invest directly implies less new investment. Yet the findings for the indirect sample are ambiguous.

Table 4: Selection Tests

	Regime I	Regime II
Selection 1997	.405*	-1.17**
	(.249)	(.571)
Selection 1998	-.011	-.030
	(.020)	(.055)
Selection 1999	-.001	.005
	(.019)	(.042)
Selection 2000	.372*	.410
	(.209)	(.550)
Selection 2001	-.085	.227
	(.130)	(.165)
Selection 2002	.247*	-.012
	(.133)	(.097)
Selection 2003	-.059*	-.018
	(.032)	(.058)
Selection 2004	.145	.236
	(.096)	(.194)
Selection 2005	.098	.239**
	(.065)	(.117)
Wald-test (χ^2_9)	23.80	15.72
p-value	.005	.073
Observations	14,487	5,949

Selection variables ($\hat{\lambda}$) are obtained from first-stage estimates. Coefficients refer to specifications (1) and (2) in Table 3. Standard errors (in parentheses) are robust for any form of heteroscedasticity and autocorrelation, and account for the two-step estimation (see Wooldridge, 1995). (***) (**) (*) indicate significance at the (1%) (5%) (10%) level.

7 Sensitivity Analysis

Finally, we test the robustness of the regression analysis. Table 5 shows estimations for both regimes. Columns (1) and (4) refer to 27 European Union (EU) member countries. Columns (2) and (5) refer to the EU 15. The reason for this sample restriction is that we possibly cannot capture relevant withholding tax rates, because conduit chains are complex and income is channeled through different conduit countries. Moreover, there is preferential tax treatment for some firms in many countries. Preferential tax treatment depends, for instance, on the legal form of the affiliate. If we restrict countries on the European Union, however, we can test the robustness of the findings, because the EU parent-subsidiary directive, the EU interest and royalties directive, and existing double-tax treaties often rule out withholding taxes. All results from above regressions are confirmed in Table 5. In a next step, we only analyze affiliates from the manufacturing sector (columns (3) and (6)). Findings are also robust with respect to this sample restriction. Finally, columns (7), (8), and (9) employ tax wedges, where the tax rate τ_C equals 10%, 20%, and 25%, for all observations. This changes the variation of the nonlinear tax term, and imposes a further restriction on the sample. Accordingly, all observations are removed where the host tax rate is above 10%, 20%, or 25% (the maximization problem in Section 3.3 requires that the host-country tax rate is higher than taxation in the conduit country). All findings confirm the negative tax wedge effect, but the last specification is no longer significant.

8 Conclusions

This paper has investigated the affiliate-level investment decision of German multinationals. A theoretical model yields different corporate tax effects, depending on whether the multinational follows a direct or an indirect investment strategy. According to theory, we estimate a switching regression model with observed switching for two structurally differ-

Table 5: Sensitivity Analysis (Switching Regression)

	(EU 27)	(EU 15)	(Manufact.)	(EU 27)	(EU 15)	(Manufact.)	($\tau_C = 10\%$)	($\tau_C = 20\%$)	($\tau_C = 25\%$)
Tax Wedge (T_1)	-.513**	-.332	-.356*						
	(.210)	(.316)	(.207)						
Tax Wedge (T_2)				-.806*	-1.08**	-.788*			
				(.449)	(.489)	(.455)			
Tax Wedge (T^*_{2a})							-1.22**		
							(.620)		
Tax Wedge (T^*_{2b})								-1.25*	
								(.720)	
Tax Wedge (T^*_{2c})									-.939
									(.969)
(log) Sales	.026	.081**	-.001	.050*	.051	.033	.044	.038	.032
	(.021)	(.038)	(.020)	(.062)	(.078)	(.067)	(.055)	(.061)	(.066)
Loss Carryforward	-.034**	-.029	-.040**	-.039	-.051	-.066	-.059	-.067*	-.078*
	(.017)	(.025)	(.017)	(.032)	(.038)	(.043)	(.038)	(.040)	(.044)
(log) GDP	-.096	.212	-.172	.079	.018	.026	-.007	.066	.092
	(.149)	(.234)	(.135)	(.096)	(.126)	(.144)	(.152)	(.118)	(.120)
(log) Labor Cost	-.076	-.932***	-.014	-.225	-.365	-.151	-.236	-.416*	-.424**
	(.137)	(.254)	(.140)	(.190)	(.260)	(.174)	(.167)	(.221)	(.203)
(log) Lending Rate	.090***	.086	.100**	.095	.045	.087	.081	.115*	.111*
	(.033)	(.057)	(.030)	(.079)	(.116)	(.088)	(.085)	(.061)	(.062)
Present Value Depr.	-.186	-.545	-.060	.343	.790	.146	.047	.463	.598
	(.195)	(.538)	(.185)	(.727)	(.901)	(.948)	(1.02)	(.859)	(1.00)
Sample	1	2	3	1	2	3	4	5	6
Regime	I	I	I	II	II	II	II	II	II
Firms	2,884	1,681	2,887	1,288	1,037	1,387	1,627	1,544	1,449
Observations	12,716	6,750	12,454	4,841	3,796	5,137	5,949	5,554	5,030

Dependent variable is investment, defined as the logarithmic difference in the balance-sheet position fixed assets. Time dummies and linearized affiliate-level fixed effects are included but not reported. All estimations take into account the endogeneity of the regime choice. Standard errors (in parentheses) are robust for any form of heteroscedasticity and autocorrelation, and account for the two-step estimation (Wooldridge, 1995). (***) (**) (*) indicate significance at the (1%) (5%) (10%) level. All reported results refer to specification (2) of the probit equation (see the Appendix). T_1 is defined according to equation (4). T_2 follows (5). T^*_{2a} corresponds to (6), where τ_C corresponds to 10% for all observations. T^*_{2b} assumes $\tau_C = 20\%$, T^*_{2c} assumes $\tau_C = 25\%$ for all observations.

ent regimes. This approach allows us to control for the endogeneity of the regime choice. The empirical results confirm theoretical predictions: corporate tax effects are negative for direct investments, but positive for indirect observations. Tax related costs of capital are confirmed to be negatively related to investment in both regimes. In particular, according to specifications (3) and (4) in Table 3, we find a semi-elasticity of -.38 for direct and -.99 for indirect investments.

The empirical analysis supports the hypothesis that income can be transferred to the German parent without any tax deduction. This may be reasonable, given that many conditions promoting the double-dip structure are fulfilled. First, Germany is a high-tax country (in the empirical analysis we drop all observations where the German tax rate is below the tax rate of the foreign affiliate). Second, Germany exempts dividend income almost completely. Third, the major conduit countries (see Section 2) are well-known conduit locations, often with preferential tax regimes.[20] Fourth, real conduit structures can be more complicated. Indeed, indirect structures often involve not only one conduit entity, but complex multi-country ownership chains. This opens up extensive financing opportunities and opportunities to repatriate profits untaxed (treaty shopping).

One remarkable aspect of the findings is the implication for tax competition: the existence of conduit structures and low-tax conduit countries reduces the downward pressure on tax rates. One may speculate whether this explains why some countries can stick to higher taxes. We should, however, interpret this conclusion with considerable caution, because tax competition is a phenomenon which is not confined to one specific aspect. In fact, tax competition for conduit entities may well be intensified.

[20]Special tax regimes often apply to holding companies (e.g., in Belgium, the Netherlands, Switzerland, UK). In some cases, tax rates are even negotiable. Tax authorities and single firms agree on special arrangements for certain time periods, which have to be renegotiated afterwards.

Appendix A: Selection Correction for Panel Data Models under Conditional Mean Independence Assumption

Wooldridge (1995) suggests a flexible two-stage regression approach to correct for sample selection bias in panel data models. We apply his estimation strategy on the above switching regression model, which allows us to perform robust statistical inference. Appendix A summarizes the main points of the estimator, with an emphasis on standard error correction. For details and consistency proofs, please consult the Wooldridge (1995) paper. The estimator allows for arbitrary correlation between the unobserved effects (γ_i, φ_i) and observable explanatory variables.[21] Furthermore, the error distribution in the second-stage equation remains unspecified; the idiosyncratic errors can be arbitrarily serially dependent and can have any form of heterogeneity.

We proceed with a version of the above switching regression model, where we slightly change notations for simplicity and stick closer to Wooldridge (1995). We start the analysis by first estimating a probit model

$$P(I_{it} = 1|\mathbf{x}_i) = \Phi(\mathbf{x}_i\delta_t). \tag{8}$$

Equation (8) is estimated by standard probit techniques,[22] however for each time period. Subsequently, we obtain estimates for the selection terms, $\hat{\lambda}_{1,i} = \phi(\mathbf{x}_i\hat{\delta}_t)/\Phi(\mathbf{x}_i\hat{\delta}_t)$ and $\hat{\lambda}_{2,i} = \phi(\mathbf{x}_i\hat{\delta}_t)/(1 - \Phi(\mathbf{x}_i\hat{\delta}_t))$, which are then included as control variables in the second-stage regressions (Maddala, 1983).

$$\text{Regime 1:} \qquad y_{1,it} \;=\; \theta_1\hat{\mathbf{w}}_{1,it} + u_{1,it} \quad \text{iff } I = 1. \tag{9}$$

[21] An important part of the variation in y is explained by unobserved heterogeneity between firms. This unobserved effect is likely to be correlated with other control variables. Hence, consistent coefficients require a fixed effects approach.

[22] $(\mathbf{x})$ is a vector of control variables, including all second-stage regressors and also some additional regime-identifying variables.

$$\text{Regime 2:} \qquad y_{2,it} \;=\; \theta_2 \hat{\mathbf{w}}_{2,it} + u_{2,it} \text{ iff } I = 0. \tag{10}$$

Here, $\hat{\mathbf{w}}$ is defined as $\hat{\mathbf{w}}_{R,it} = (1, x_{R,it}, \overline{x}_i, 0, ..., 0, \hat{\lambda}_{R,it}, 0, ..., 0)$, for R = 1,2. Note that we additionally include the estimated probability terms $\hat{\lambda}_R(R = 1, 2)$ from first-stage regressions and also firm-specific means to control for unobserved heterogeneity.[23] Subsequently, we obtain the coefficient vector $\theta_R(R = 1, 2)$ from a pooled OLS regression:

$$\hat{\theta}_R \equiv (\sum_{i=1}^{N}\sum_{t=1}^{T} \hat{\mathbf{w}}'_{R,it}\hat{\mathbf{w}}_{R,it})^{-1}(\sum_{i=1}^{N}\sum_{t=1}^{T} \hat{\mathbf{w}}'_{R,it}\hat{y}_{R,it}), \quad R = 1, 2.$$

Finally, we have to account for the two-stage estimation procedure. We obtain Avar($\hat{\theta}$) by first defining OLS residuals, $\hat{e}_{R,it} \equiv y_{it} - \hat{\mathbf{w}}_{it}\hat{\theta}$ for R_{it} = 1,2; i = 1,...,N; t = 1,..., T. To estimate Avar($\hat{\theta}$), we further define $\hat{\mathbf{D}}$:

$$\hat{\mathbf{D}}_R \equiv N^{-1}\sum_{i=1}^{N}\sum_{t=1}^{T} \hat{\mathbf{w}}'_{R,it}\hat{\theta}'_R\mathbf{G}_{R,it} \text{ for R} = 1, 2, \tag{11}$$

$$\text{where G is} \quad \hat{\mathbf{G}}_{R,it} = \begin{pmatrix} \mathbf{0} & \mathbf{0} & \dots & \mathbf{0} & \mathbf{0} & \dots & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \dots & \hat{\mathbf{Z}}_{R,it} & \mathbf{0} & \dots & \mathbf{0} \end{pmatrix}. \tag{12}$$

The matrix $\mathbf{Z_{it}}$ is $\mathbf{Z}_{it} = (0'0'...0'\ \hat{v}_{it}\mathbf{x}_i\ 0'...0')'$. $\hat{v}_{it}$ is the derivative of $\lambda(\cdot)$ evaluated at $\mathbf{x}_i\hat{\delta}_t$. For simplicity, we continue without the regime identifier R and estimate Avar($\hat{\theta}$) for the

[23] Following Wooldridge (1995), we linearize the unobserved effects according to the Chamberlain (1980, 1982) method, who suggests to include all leads and lags of explanatory variables in order to model the relationship between the unobserved effect and the exogenous variables. To save degrees of freedom, however, we apply the Mundlak (1978) approach that imposes time-constant coefficients and include mean values of explanatory variables ($\overline{x}_i$).

respective regime. To obtain $\text{Avar}(\hat{\theta})$ as $\hat{\mathbf{A}}^{-1}\hat{\mathbf{B}}\hat{\mathbf{A}}^{-1}/N$, we further define

$$\hat{\mathbf{A}} \equiv N^{-1}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{\mathbf{w}}_{it}'\hat{\mathbf{w}}_{it}, \tag{13}$$

$$\hat{\mathbf{B}} = N^{-1}\sum_{i=1}^{N}\hat{\mathbf{p}}_i\hat{\mathbf{p}}_i', \tag{14}$$

$$\hat{\mathbf{p}}_i = \hat{\mathbf{q}}_i - \hat{\mathbf{D}}\hat{\mathbf{r}}_i, \;\; i = 1, ..., N, \tag{15}$$

$$\hat{\mathbf{q}}_i \equiv \sum_{t=1}^{T}\hat{\mathbf{w}}_{it}'\hat{e}_{it}, \;\; i = 1, ..., N, \tag{16}$$

$$\hat{\mathbf{D}} \equiv N^{-1}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{\mathbf{w}}_{it}'\hat{\theta}'\nabla_{\delta}\hat{\mathbf{x}}_{it}(\hat{\delta})', \tag{17}$$

where $\nabla_{\delta}\hat{\mathbf{x}}_{it}(\hat{\delta})'$ is the gradient of $\hat{\mathbf{x}}_{\mathbf{it}}(\hat{\delta})'$, evaluated at $\hat{\delta}$; $\hat{\mathbf{r}}_{it}$ is defined for each t as minus the inverse of the average estimated Hessian times the estimated score of the probit log-likelihood function for observation i, where we use the standard results for the first- and second derivatives for the probit model (e.g. Maddala, 1983). Finally, we estimate $\text{Avar}(\hat{\theta})$ as $\hat{\mathbf{A}}^{-1}\hat{\mathbf{B}}\hat{\mathbf{A}}^{-1}/N$ and obtain valid standard errors.

Appendix B: First-Stage Regression Results

The empirical analysis follows Maddala (1983), who suggests a two-stage method for estimating the switching regression model. The first-stage regression is concerned with the estimation of a probit model, where group-specific variables can identify the respective regime. The results for pooled probit regressions are reported in Table 6.[24] All coefficients are in line with theoretical considerations. A higher balance-sheet total of the whole company group is associated with a higher probability of setting up an indirect structure. We may speculate whether these companies have the required expertise to do so. The procliv-

[24]Note that we follow Wooldridge (1995) and estimate probits for single years t to obtain $\hat{\lambda}$.

ity to think in terms of tax planning may also be higher considering big multinationals. All regression results in Tables 3 to 5 are reported according to specification (2), where another identifying variable is included.[25] The findings indicate that a higher profitability of the company group is associated with a higher propensity to invest indirectly.[26] We argue that both the balance-sheet total and the profitability on the multinational-group level are valid identifying variables. While the second-stage regressions consider affiliate-level variation, where we also control for affiliate-specific heterogeneity, the balance-sheet total and the profitability vary at the group level. If we were considering variation between countries—we actually remove it by conditioning on affiliate-specific heterogeneity—we would also expect the local tax rate to be a crucial determinant.

To sum up, the estimations suggests that, after conditioning on affiliate-specific heterogeneity, company-specific variables are the only relevant factors affecting the choice of the regime.

[25]Specification tests indicate that results are robust, irrespective of whether specification (1) or (2) is used.

[26]Profitability is defined as total profits of the multinational (after taxes, prior to profit distribution, and offsetting of losses carried forward), relative to the balance-sheet total of the group.

Table 6: Regime Identification

	(1)	(2)
(log) Balance-Sheet Total	-.111***	-.113***
	(.019)	(.019)
Profitability		-.006***
		(.002)
Statutory Tax Rate	-.007	-.009
	(.363)	(.363)
log(Sales)	.000	-.000
	(.011)	(.011)
Loss Carryforward	.008	.008
	(.017)	(.017)
(log) GDP	-.075	-.072
	(.113)	(.113)
(log) Labor Cost	-.030	-.032
	(.134)	(.134)
(log) Lending Rate	.002	.002
	(.034)	(.034)
Present Value of Depr.	.065	.062
	(.296)	(.296)
LogL.	-9,179	-9,179
Observations	20,436	20,436

Dependent variable is the binary indicator for direct/indirect (1/0) investment. Probit estimation including time-specific effects and linearized unobserved affiliate-specific effects. Robust standard errors (in parentheses). (***) (**) (*) indicate significance at the (1%) (5%) (10%) level. *Balance-sheet Total* is the annual aggregate at group level. *Profitability* is the profitability of the multinational group, defined as total profits of the multinational (after taxes, prior to profit distribution, and offsetting of losses carried forward), relative to the balance-sheet total of the company group.

Table 7: Data Sources, Variable Descriptions, Sample Restrictions

Firm-level Data	*Source:* Microdatabase Direct Investment (MiDi), Deutsche Bundesbank (see Lipponer, 2007). *Definition:* Investment is the logarithmic difference in the balance-sheet item fixed assets.
Corporate Tax Rates	*Source:* International Bureau of Fiscal Documentation (IBFD), tax surveys provided by Ernst&Young, PwC, and KPMG. *Definition:* Statutory Corporate Tax Rates.
Withholding Tax Rates	*Source:* Worldwide Corporate Tax Guide provided by Ernst&Young. Withholding tax rates refer to 2005. *Definition:* Withholding taxes on interest payments.
GDP	*Source:* World Bank World Development Indicators (2006). *Definition:* Gross domestic product in U.S. dollars, nominal.
Labor Cost	*Source:* U.S. Bureau of Labor Statistics and Eurostat. *Definition:* Hourly compensation costs in U.S. dollars for production workers in manufacturing.
Lending Rate	*Source:* IMF International Financial Statistics Yearbook (2006), augmented with corresponding OECD figures. *Definition:* Interest rate for credits to the private sector.
Present values of depreciation allowances	*Source:* Depreciation rules from above tax-data references *Definition:* Calculated for investments in machinery, discount rate 7.1 percent.
Sample Restrictions	According to the model, we drop all observations where the German statutory tax rate is below the foreign statutory tax rate, $\tau_G < \tau_F$. Tax rates account for the non-deductibility of interest expenses with respect to the German local business tax. Minority holdings and partnerships are excluded, as well as the following non-producing sectors: education, health, veterinary and social care, financial services, holding companies, other services, recreational, cultural and sporting activities, retail and wholesale trade, real estate and renting, research and development, telecommunication and post, private households with employees activities of other membership organizations, nonprofit organizations serving households, general government, sewage and refuse disposal, compulsory social security, agriculture, hunting and forestry (see Lipponer, 2007). Note that restrictions do not apply on Fig. 2 and 3.
Sensitivity Analysis	Table 5 refers to the following sample definitions: Sample 1 (2): only EU 27 (EU 15) member countries Sample 3: only manufacturing industries (see Lipponer, 2007) Sample 4: sets τ_C at 10% for all observations. The basic arbitrage condition then requires that host-country tax rates are higher than 10% Sample 5: sets τ_C at 20% for all observations. The basic arbitrage condition then requires that host-country tax rates are higher than 20% Sample 6: sets τ_C at 25% for all observations. The basic arbitrage condition then requires that host-country tax rates are higher than 25%

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