Intercompany Loans and Profit Shifting – Evidence from Company-Level Data

Thiess Buettner
(Ifo Institute and Munich University (LMU))[1]

Georg Wamser
(Ifo Institute)

February 2007

Abstract: This paper is concerned with tax-planning strategies of multinational corporations. A theoretical analysis discusses the choice of the capital structure in a setting where intercompany loans can be used to shift profits to low-tax countries. Empirical evidence is provided using micro-level panel data of virtually all German multinationals made available by the Bundesbank. This comprehensive dataset allows us to exploit differences in taxing conditions of almost eighty countries during a period of nine years. The empirical results confirm a robust impact of tax-rate differences within the multinational group on the use of intercompany loans, supporting the profit-shifting hypothesis. However, the implied tax-revenue effects are rather small, suggesting that costs related to adjusting the capital structure for profit-shifting purposes are substantial.

Keywords: Corporate Taxation; Multinational Corporations; Tax Planning; Intercompany Loans; Tax Haven; FDI; Micro-Level Data

JEL Classification: H25; F23; G32

[1]Address: Ifo Institute for Economic Research
Poschingerstr. 5
D-81679 Munich
Germany

Phone: +49 89 9224 1319
Fax: +49 89 9224 2319
E-mail: buettner@ifo.de

1 Introduction

Much of the discussion about international tax competition is centered around the impact of taxes on multinational corporations' location and investment decisions (for surveys see Hines, 1999, and de Mooij and Ederveen, 2003). However, it is often neglected that there are many more dimensions along which the multinational corporation can structure its activities internationally, and that decisions related to production and trade are only part of the story. From a taxation perspective, the fact that those corporations hold affiliates in different countries opens up many opportunities for tax planning with the aim to minimize their overall tax burden. This might be quite important for the tax revenue from corporation taxes and, furthermore, may significantly alter the way taxes affect location and investment decisions and the business sector as a whole.

As is well noted in the literature (*e.g.,* Hines and Rice, 1994, Gresik, 2001), a multinational corporation has several ways to engage in tax planning other than choosing location and level of investment. One important determinant of the tax burden is the transfer price for goods and services traded within the corporation (for a theoretical discussion see *e.g.*, Haufler and Schjelderup, 2000; for empirical evidence see *e.g.*, Swenson, 2001, Clausing, 2003). Apart from transfer pricing, multinationals have enhanced opportunities with respect to tax planning as they can use external as well as internal funds in order to adjust their capital structure. This allows multinationals not only to arbitrage more easily across different lending markets. It also opens up opportunities for tax planning by means of 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 (Mintz and Smart, 2004).

While several papers document some significant degree of profit shifting of multinationals (*e.g.*, Grubert and Mutti, 1991, or Hines and Rice, 1994), the empirical literature so far does not provide conclusive evidence that intercompany loans actually play an important role in

this respect. Several papers show that the leverage of multinationals' affiliates is sensitive to the tax rate in the host country (*e.g.*, Jog and Tang, 2001, Mintz and Smart, 2004). However, the tax shelter from debt gives rise to a tax-rate sensitivity of the leverage of any corporation, including multinationals' affiliates as well as domestic corporations. For instance, Gordon and Lee (2001) find a strong tax sensitivity of the leverage of US corporations.

Only some recent papers explicitly consider intercompany loans. Desai, Foley, and Hines (2004a) analyze the capital structure of US multinationals and report a significant tax sensitivity of both external and internal debt. Mintz and Weichenrieder (2005) and Buettner *et al.* (2006) confirm their findings for German multinationals. As the main result of Desai *et al.* is that internal debt serves as a substitute to external debt, it is, however, not clear whether the tax sensitivity of intercompany loans reflects profit shifting or the standard tax shelter from debt. In fact, as shown by Mintz and Smart (2004), profit shifting by means of intercompany loans should not be sensitive to the local tax rate but to the *tax-rate difference* between the lending and the borrowing affiliate within the multinational group.

This paper, therefore, studies how those tax-rate differences within the multinational group affect the capital structure of multinationals and, in particular, the use of intercompany loans. For this purpose we use a large micro-level panel database of virtually all German multinationals made available for research by the German Bundesbank. This comprehensive dataset allows us to exploit tax-rate differences in 79 countries, among those many low-tax or tax-haven countries. For each affiliate within the multinational group the appropriate tax-rate difference is calculated relative to the lowest tax rate observed among all affiliates. The empirical results strongly support a significant impact of this tax-rate differential on intercompany loans, implying that intercompany loans are indeed used to shift profits from high- to low-tax countries. However, the implied tax revenue effects are rather small. This finding is indicative for substantial costs of adjusting the capital structure for profit-shifting purposes.

The paper is organized as follows. In Section 2 we model a corporation which is active at

different locations, including low-tax countries. The corporation is assumed to maximize profits by optimally allocating internal funds with respect to differences in international taxation. From the optimality conditions we obtain testable empirical implications, which are discussed in Section 3. Section 4 gives a short description of the dataset and discusses the investigation approach. Section 5 provides descriptive statistics. The basic results are presented in Section 6. Some further evidence showing how the results change with the share of ownership is presented in Section 7. Section 8 provides our conclusion.

2 Theoretical Considerations

Consider a multinational group with affiliates at N locations. For simplicity, let us assume that each location is situated in a different country such that the tax system varies between locations. The profit function of the group is given by

$$\begin{aligned}
\pi &= \sum_{i=1}^{N} f(k_i)(1-\tau_i) \\
&- \sum_{j=1}^{N}\sum_{i=1}^{N} [i_j \lambda_{ji} k_i](1-\tau_i) \\
&- \sum_{j=1}^{N}\sum_{i=1,i\neq j}^{N} [i_j \mu_{ji} k_i](1-\tau_i) \quad + \quad \sum_{j=1,i\neq j}^{N}\sum_{i=1}^{N} [i_j \mu_{ji} k_i](1-\tau_j) \\
&- r\sum_{i=1}^{N}\left(1-\sum_{j}\lambda_{ji}\right)k_i \\
&- \sum_{i=1}^{N} c_i(\lambda_{1i},...,\lambda_{ji},...,\lambda_{N,i},\mu_{1i},...,\mu_{ji},...,\mu_{Ni})\,k_i, \quad \text{with} \quad \mu_{ii}=0.
\end{aligned}$$

Let us briefly discuss the components of this profit function. The first line captures the contribution of output, $f(k_i)$, taking account of the fact that a part of the corresponding profit is taxed away. The host country statutory tax rate is denoted with τ_i. The second line shows the interest costs which, similarly, enter profits only after tax deduction. i_j is

the corresponding lending rate at location j. Note that this term captures also the interest costs related to intercompany loans, provided the corporation raises a credit at country j and transfers the money to the affiliate in country i such that $\lambda_{ji} > 0$. The third line is also concerned with intercompany loans but reports the contribution of pure profit shifting where some financial capital is shifted from one location to the other, without increasing outside debt. The fourth line reports the cost of capital financed with equity. The fifth line, finally, captures cost of borrowing in addition to the market lending rate which are assumed to increase with the various types of debt in the model.[2,3] Note that the general specification used here assumes that the additional cost of borrowing of affiliate i are increasing not only in the share of capital financed with external debt λ_{ji}. In fact, the analysis follows Mintz and Smart (2004) and assumes that the additional cost of borrowing will also increase in the share financed with internal debt μ_{ji} as this also implies a decline in the equity share of the lending affiliate. Note that the cost function is indexed with the host country to reflect the potential role of this country's credit-market regulations for the underlying conflict between debtors and creditors.[4]

[2]The additional cost of borrowing function is assumed to be convex. More specifically, we assume $\frac{\partial c_i}{\partial \lambda_{ji}} > 0$, $\frac{\partial c_i}{\partial \mu_{ji}} > 0$, $\frac{\partial^2 c_i}{\partial \lambda_{ji}^2} > 0$, $\frac{\partial^2 c_i}{\partial \mu_{ji}^2} > 0$.

[3]The corporate finance literature (see Tirole, 2006, for an overview) justifies the existence of those additional cost of debt on several grounds. A first set of arguments refers to the possible cost of financial distress including bankruptcy as well as agency costs related to the conflict between debtors and creditors (*e.g.*, Myers, 2001). Another strand of the literature (*e.g.*, Aghion and Bolton, 1989, and Hart, 1988), emphasizes the role of agency costs between shareholders and management. From this perspective, some debt might be useful to ensure control rights of investors in bad states, for instance, if a firm goes bankrupt. But, since equity allows the manager to control the corporation in good states, a tax-induced increase in the debt-asset ratio relative to the optimal level would imply an inefficiency which contributes to the additional cost of borrowing.

[4]Note that increasing additional cost of intercompany loans would also arise if the host country imposes restrictions on the use of intercompany loans for profit shifting (see below).

The optimality conditions are

$$\frac{\partial \pi}{\partial \lambda_{ji}} = -i_j \left(1 - \tau_i\right) k_i + r k_i - \frac{\partial c_i}{\partial \lambda_{ji}} k_i \stackrel{!}{=} 0$$

$$\frac{\partial \pi}{\partial \mu_{ji}} = -i_j \left(1 - \tau_i\right) k_i + i_j \left(1 - \tau_j\right) k_i - \frac{\partial c_i}{\partial \mu_{ji}} k_i \stackrel{!}{=} 0.$$

In the general case, the loan from affiliate j to affiliate i financed with a credit from country j is, among other determinants, a function of the corresponding after-tax rate of interest

$$\lambda_{ji} = g_i \left(\quad r - i_j \left(1 - \tau_i\right), \ldots \quad \right) \quad \text{with } \frac{\partial g_i}{\partial i_j \left(1 - \tau_i\right)} < 0. \tag{1}$$

The loan from affiliate j to affiliate i financed with equity depends on the tax-rate difference

$$\mu_{ji} = h_i \left(\quad i_j \left(\tau_i - \tau_j\right), \ldots \quad \right) \quad \text{with } \frac{\partial h_i}{\partial i_j \left(\tau_i - \tau_j\right)} > 0. \tag{2}$$

If we impose somewhat more structure on the analysis, we can generate more specific predictions:

A restrictive case is provided by Buettner *et al.* (2006), who are concerned with the leverage of a single foreign affiliate held by a German parent. In this case, the fact that Germany is a high-tax country makes it rather unlikely to observe a positive tax-rate differential that gives an incentive to shift profits from foreign affiliates into Germany. Thus, with $t_j > t_i$, μ_{ji} is zero, and all intercompany loans from j to i reflect external debt for the lending affiliate. Therefore, in this case, the leverage is determined by the corresponding after-tax cost of interest according to Equation 1.

Mintz and Smart (2004) consider another case where all intercompany loans relate to profit shifting. In our approach this case is obtained if $r < i_j(1 - \tau_i)$ and, hence, λ_{ji} is zero. In this case, the leverage is determined by the tax-rate difference between the affiliates located

in i and j evaluated with the lending rate.

For our purposes let us consider a slightly more general case with a simplified cost function where we aggregate among different kinds of loans. If we assume that loans of the same kind are perfect substitutes the cost function can be written as

$$c_i = c_i \left(\lambda_{ii}, \sum_{j \neq i} \lambda_{ji}, \sum_{j \neq i} \mu_{ji} \right). \tag{3}$$

This cost function distinguishes three kinds of debt. As a consequence, the first-order conditions for all intercompany loans of the same kind involve the same marginal cost. If interest rates differ, this implies that the leverage related to intercompany loans refinanced with external capital $\sum_{j \neq i} \lambda_{ji}$, is determined by the local tax rate and the lowest lending rate among all locations

$$\lambda_{ji} > 0, \quad \text{where} \quad j = \arg\min_k i_k, \quad \text{and zero otherwise.} \tag{4}$$

With this condition, λ_{ji} follows from Equation 1. In contrast, the other kind of intercompany loans $\sum_{j \neq i} \mu_{ji}$, which are not refinanced externally, is determined by the largest tax-rate difference evaluated at the lending rate

$$\mu_{ji} > 0, \quad \text{where} \quad j = \arg\max_k i_k \left(\tau_i - \tau_k \right), \quad \text{and zero otherwise.} \tag{5}$$

With this condition, the optimal level of μ_{ji} is determined by Equation 2.

3 Empirical Implications

The analysis below aims at testing the empirical implications of the above model. Basically, our analysis is concerned with the implications of the first-order conditions and considers the empirical determinants of the debt-asset ratio where we focus on intercompany loans.

The debt-asset ratio L_i of each affiliate i consists of three components

$$L_i \quad \equiv \quad \lambda_{ii} \quad + \quad \underbrace{\sum_{j \neq i} \lambda_{ji} \; + \sum_{j \neq i} \mu_{ji}}_{ICL_i}, \tag{6}$$

where the first component is the amount of debt directly raised from external creditors, the second and third components together make up the amount of intercompany loans (ICL_i). The theory distinguishes intercompany loans re-financed with external credit, which are used to arbitrage across capital markets (λ_{ji}), from loans not externally re-financed (μ_{ji}), which are used to shift profits. However, this distinction is generally not observable empirically. Instead, balance-sheet data, like those used in the current study, usually provide some figures for L_i and ICL_i.

Abstracting from possible differences in the lending rate, the optimality conditions for λ_{ij} and μ_{ij} suggest that the share of capital of an affiliate financed with intercompany loans should not only be affected by the local tax rate but also by a positive tax-rate differential with regard to other locations where the multinational holds affiliates.[5] As we have seen above, the empirical implications of the theory depend on the function for the additional cost of borrowing. Assuming that this cost function follows (3) such that intercompany loans of the same kind but from different locations are perfect substitutes, the share of capital of an affiliate i held by corporation k financed with intercompany loans $ICL_{i,k}$ should be a function of the local tax rate τ_i and the maximal tax-rate difference $(\tau_i - \tau_k^{min})$ with regard to all other affiliates in the multinational group (τ_k^{min} is the lowest local tax rate among all affiliates of the group as implied by Equation 5). In other words, the theory suggests not only

[5]We abstract from differences in the lending rate since our basic database does not provide corresponding information and external data sources are not available for the large number of countries involved. In our empirical analysis, however, we control for differences in the lending rate driven by country characteristics such as country risk, creditor rights, and the size of the credit market by including country fixed effects. Firm specific differences in the lending rate are controlled by variables such as the turnover and by company- and group-specific fixed effects.

to take account of the local tax rate faced by an affiliate in order to capture the traditional tax shelter of debt finance. Instead, we should also take account of the tax-rate difference to the lowest tax rate among all affiliates of a multinational group as this determines the potential tax savings from profit shifting.

4 Data and Investigation Approach

A basic problem in the empirical analysis of the tax effects on corporate decisions is to formulate an approach with sufficient empirical variation in the incentives generated by the tax system. In the current study we utilize a micro-level panel dataset of German multinationals which offers substantial variation in three dimensions:

1. A first dimension relates to the international perspective, as the dataset reports the capital structure of each of the foreign affiliates of a multinational that operates in various countries. While the database considers the multinational's activities globally, the empirical analysis is based on a sample of 79 countries for which reliable information with regard to corporate income taxation is available.

2. Another dimension that offers variation in the taxing conditions is the time dimension. The panel data covers each multinational's activities as well as the taxing conditions on an annual basis in the period from 1996 until 2004.

3. The third dimension is related to the heterogeneity of the affiliates that vary in the tax-rate difference relative to the lowest level of the tax rate observed among all affiliates in the group. Note that this type of variation refers to each individual affiliate in the dataset.

In order to test the empirical implications as outlined in the previous section, we employ a micro-level dataset for German multinationals (MiDi) provided by the Bundesbank. This contains a comprehensive annual database of foreign direct investment positions of German enterprizes held abroad. The data provides information about each foreign affiliate's balance sheet and some further information about the ownership and about the German investor. In its current version, firm-level panel data for foreign affiliates are available for the period 1996 to 2004.[6] Each German multinational has to report its foreign assets, including both directly and indirectly held FDI, conditional on some lower threshold level for mandatory reporting.[7] Basically, the estimation sample comprises balance-sheet information of virtually all German outbound investments from 1996 to 2004, regardless of the legal form, of whether directly or indirectly held, and of whether subsidiaries are wholly or only partly owned. While the dataset reports the capital share of intercompany loans received by foreign affiliates, comparable information is not available for the German parent. As a consequence, the focus of our study is on the capital structure of foreign affiliates.

With regard to the lending part of intercompany loans, the dataset distinguishes intercompany loans received from the parent as well as intercompany loans received from other foreign affiliates.[8] This allows us to restrict the focus of the empirical analysis even more closely

[6]Data collection is enforced by German law, which determines reporting mandates for international transactions as part of the Law on Foreign Trade and Payments and corresponding regulations.

[7]Since 2002 FDI has to be reported if the participation is 10% or more and the balance-sheet total of the foreign object is above 3 million euro. For details see Lipponer (2006). Though previous years showed lower threshold levels, we apply this threshold level uniformly for all years in the panel.

[8]The corresponding position is "...liabilities to affiliated enterprizes ... outside of Germany" (see Lipponer, 2006).

to intercompany loans granted as well as received by foreign affiliates, since, as Germany is a high-tax country, there is little reason to expect German parents to issue intercompany loans to their foreign affiliates for profit-shifting purposes.

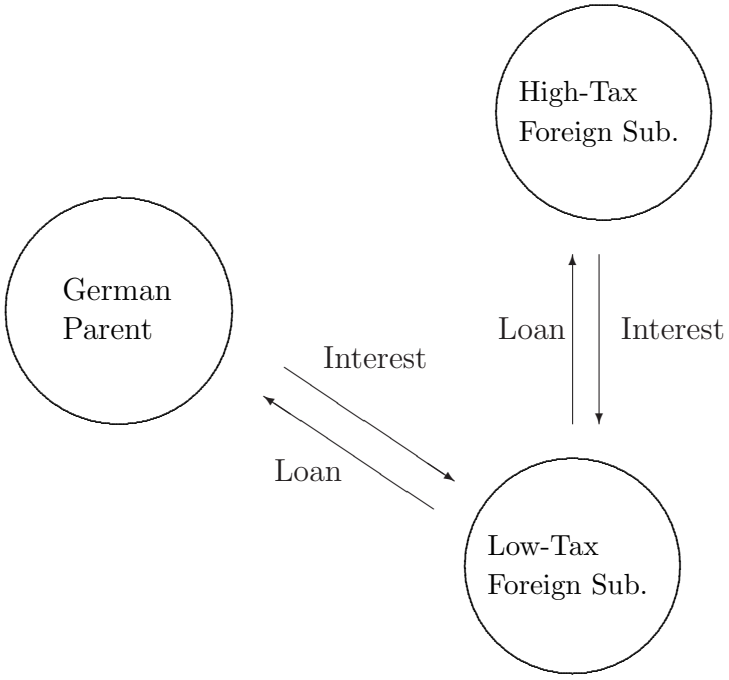
Figure 1 provides a graphical illustration of the focus of the analysis by depicting a multinational corporation with two foreign affiliates, where the parent as well as one of the affiliates are located in high-tax countries but a third affiliate is located in a low-tax country.[9] In this setting, intercompany loans granted by the foreign affiliate in the low-tax country might be used to shift profits into this country. While this might involve loans to the parent as well as to the foreign affiliate in the high-tax country, as discussed above, the focus of the current paper is only on the latter relationship, depicted by the vertical arrows in the figure. As a consequence, the empirical analysis is concerned with multinational corporations with affiliates in more than one foreign country – binational corporations are excluded.

As we focus on intercompany loans granted as well as received by foreign affiliates, we implicitly assume that the taxing conditions for these foreign affiliates are decisive for the company group. This might be questioned in a context where the parent company would have to pay taxes on worldwide profits, as in a regime of foreign tax credit. However, note that for German multinationals as well as for most other European multinationals the exemption principle applies. This could be different in the U.S. case, where foreign earnings are taxed subject to a foreign tax credit. However, recent literature argues that the anti-abuse controlled foreign corporation (CFC) provisions are not effective (*e.g.*, Mutti and Grubert, 2006). Thus, tax planning of U.S. corporations might be similar.

Since taxing conditions vary in more than one dimension, we can further exploit the micro-level structure of the dataset and explore the capital structure of multinationals using panel-data techniques. Following our discussion of the empirical implications, the analysis is based

[9]The company structure can be, of course, much more complicated in the data. On average, we observe about five foreign subsidiaries per multinational in our basic estimation sample.

Figure 1: Intercompany Loans in a Stylized Multinational Group



on regressions of the following type

$$ICL_{i,k,t} = a_1(\tau_{i,t} - \tau_{k,t}^{min}) + a_2\tau_{i,t} + a_3 x_{i,k,t} + \varphi_t + \gamma_k + \varepsilon_{i,k,t}, \tag{7}$$

where $(\tau_{i,t} - \tau_{k,t}^{min})$ is the affiliate-specific tax-rate difference and $\tau_{i,t}$ is the statutory tax rate applicable to affiliate i. The dependent variable, ICL, is defined by the amount of intercompany loans received by a foreign affiliate i from other foreign affiliates within the multinational group k divided by total capital.

Note that the basic specification includes time effects, φ_t, possibly capturing differences in the treatment of foreign earnings in the home country (Germany) of the multinational and other aggregate shocks. The specification also takes account of a specific effect for each multinational group, γ_k. This is important in the current context since group-specific risk would affect the lending rate and the additional cost of borrowing (Desai, Foley, and Hines, 2004a).

Using group-specific fixed effects also allows us to condition on the international structure of each group. This is important since we exploit the differences in the group structure in order to identify tax incentives but do not model the choice of the group structure. We also employ affiliate-specific control variables, $x_{k,i,t}$, which capture some heterogeneity in the borrowing costs across affiliates. Borrowing costs might also be related to country-specific conditions in the lending market such as bankruptcy laws, creditor rights, etc. This would suggest to further include country-specific effects. Finally, since borrowing costs may also vary with the branch of the affiliate, sector-specific effects could also be included.

5 Descriptive Statistics

Table 1 provides some information about the basic characteristics of the sample of multinationals. Three different samples are distinguished: the full sample comprises all foreign-direct-investment observations available. A reduced sample excludes all binational corporations, where a structure as in Figure 1 cannot be observed, obviously, and considers only affiliates where information about the local tax rate is available. Whereas we use information from the second sample in order to compute the lowest tax rate within the group, the third is the ultimate estimation sample where some further restrictions apply (see below).

The last two columns report the capital of all considered affiliates where a significant share is held by the reporting multinational. Comparing the aggregate stock of capital in the first and second sample, we see that, even if many countries are excluded, still between 80% and 90% of all reported capital is covered by the second sample. This is different with the third sample, which is the basic sample for the regression analysis below. This sample further excludes affiliates with zero turnover. While this restriction implies a considerable decline in the number of observations, the reason is to focus on the capital structure of productive affiliates as in the above theoretical model.[10]

[10]Note, however, that our estimation results proved to be robust against the inclusion of affiliates with

Table 1: Sample Characteristics

Sample		Obs.	Countries	Capital (in bn. €)	Share
1	all available observations	173,473	162	4,133.33	1
2	if tax data available & excl. binational corp.	133,159	79	3,555.56	0.86
3	as in sample 2 excl. zero turnover	109,300	79	981.11	0.24

Capital consists of registered capital, capital reserves, profit reserves, as well as internal and external debt. The total capital figure is an unweighted annual average for the period from 1996 to 2004. Sample 1 comprises all foreign direct investment observations (outbound investment), Sample 2 employs all affiliates where corporate tax rate information is available and excludes binational corporations, Sample 3 further excludes all observations with zero turnover.

As has been discussed above, we employ affiliate- and group-specific indicators of the tax incentives for profit shifting. More specifically, we proceed in two steps. First, we determine for each multinational the lowest corporate income-tax rate observed among all of its foreign affiliates based on Sample 2. (For ease of exposition we will refer to the corresponding affiliate as the lowest-tax affiliate.) In a second step, we use this group-specific minimum tax rate as the benchmark for the group and compute the tax-rate differential of the local tax rate to this benchmark for each of the affiliates. As a consequence, high-tax affiliates will show large positive tax-rate differentials, whereas the tax-rate differential for the lowest-tax affiliate is zero.

Let us emphasize once more that the tax-rate differential with regard to the lowest-tax affiliate is not determined on basis of the estimation sample but on basis of the more comprehensive Sample 2 of Table 1. In other words, while we focus on the finances of the productive entities of multinational corporations, we take into account in a much more comprehensive way the incentives for profit shifting and include the incentives for using intercompany loans in order to shift profits to foreign affiliates, including purely non-productive tax-haven

zero turnover.

affiliates.

Table 2 provides some information about which countries typically host the lowest-tax affiliates. The second column lists the number of all affiliates reported in each of the countries. The third column, denoted with $\Delta\tau = 0$, lists all observations where the respective country hosts the lowest-tax affiliate. While we see that most affiliates are reported in the U.S., in the U.K., and in France, the lowest-tax affiliate is quite often found in Switzerland, Hungary, Poland, and Austria.

Table 3 displays descriptive statistics for variables used in the empirical analysis. While the tax-rate variable is measured at the level of the country, all other variables including the tax-rate differential vary by affiliate. A first impression of the relative importance of debt as a means of profit shifting as compared to the standard tax shelter from debt is given by the three different borrowing variables. While the total leverage is almost 60%, intercompany loans make up only a capital share of 24.2%. This figure still includes intercompany loans from the German parent to foreign affiliates which, given Germany's high tax rate, is quite unlikely related to profit shifting. Intercompany loans received from other foreign affiliates amount only to an average capital share of 10.6%.

Table 4 provides further descriptive evidence for the impact of taxes on intercompany loans. It displays the share of capital financed with different kinds of debt for the basic sample as well as for various sub-samples. For ease of comparison, column (1) repeats the mean values as reported above. Columns (2) and (3) report the share of intercompany loans observed among the affiliates of those multinational corporations which hold at least one affiliate in a low-tax country. Column (2) defines the low-tax country as a country with a tax rate below the 10% percentile of the tax-rate distribution, column (3) uses the even stricter definition based on the 5% percentile of the tax-rate distribution. If corporations use intercompany loans for profit shifting, we should expect the mean to be higher for those multinational corporations. In fact, the capital share of intercompany loans (excluding those obtained from the German parent) is higher by about 30 to 40%, indicating that the use of

Table 2: Geographical Distribution of Affiliates

Country	obs.	$\Delta\tau = 0$	τ	Country	obs.	$\Delta\tau = 0$	τ
Albania	6	0	.273	Korea (Republic of)	1,045	198	.301
Argentina	774	54	.346	Latvia	132	53	.229
Australia	2,384	190	.338	Lithuania	134	75	.232
Austria	7,356	1,326	.340	Luxembourg	1,910	349	.356
Bahamas	16	16	.000	Malaysia	878	197	.283
Bangladesh	42	0	.350	Malta	79	11	.350
Belgium	4,058	233	.388	Mexico	1,576	76	.343
Belize	0	0	.279	Netherlands	7,268	946	.348
Bermuda	187	187	.000	New Zealand	385	11	.330
Bolivia	23	1	.250	Norway	1,026	273	.280
Brazil	2,767	617	.321	Pakistan	123	7	.347
Bulgaria	250	66	.293	Panama	78	0	.353
Canada	2,176	75	.418	Papua New Guinea	0	0	.263
Cayman Islands	490	490	.000	Paraguay	33	12	.300
Chile	474	261	.157	Peru	160	11	.297
China	2,944	260	.330	Philippines	300	16	.328
Columbia	275	2	.350	Poland	4,482	1,828	.311
Costa Rica	55	4	.307	Portugal	1,688	355	.321
Croatia	353	81	.265	Romania	500	126	.308
Cyprus	323	72	.228	Russia	932	258	.301
Czech Republic	4,137	947	.333	Serbia&Montenegro	0	0	.193
Denmark	1,821	279	.318	Singapore	1,928	516	.250
Dominican Republic	51	10	.250	Slovak Republic	968	280	.319
Ecuador	99	10	.322	Slovenia	333	113	.250
El Salvador	36	7	.250	South Africa	1,177	34	.397
Estonia	127	116	.116	Spain	6,598	254	.395
Fiji	0	0	.336	Sri Lanka	49	11	.359
Finland	759	96	.286	Sweden	2,357	666	.280
France	11,473	880	.372	Switzerland	6,922	4,339	.246
Greece	831	63	.350	Taiwan	545	81	.250
Honduras	23	7	.284	Thailand	502	75	.300
Hong Kong	1,840	1,173	.163	Turkey	1,020	66	.367
Hungary	3,126	2,199	.178	Turks&Caicos Isl.	0	0	.000
Iceland	13	1	.267	UK	11,425	3,560	.308
India	951	45	.364	Ukraine	197	19	.290
Indonesia	429	67	.300	Uruguay	143	34	.311
Ireland	1,546	1,271	.106	USA	14,376	1,599	.412
Israel	160	7	.360	Venezuela	255	27	.340
Italy	6,887	254	.405	Vietnam	65	1	.294
Japan	2,317	15	.457	*Total*	*133,159*	*27,854*	*.288*

obs.: total number of affiliates (pooled in the period from 1996 until 2004); $\Delta\tau = 0$: number of affiliates with a tax-rate difference equal to zero, *i.e* number of observations identified as low-tax affiliates; τ: average host country statutory tax rate.

Table 3: Descriptive Statistics

Variable	Mean	Std. Dev	Min	Max
Statutory tax rate	.334	.073	0	.532
Tax-rate diff. within comp. group	.124	.106	0	.532
Total leverage	.588	.272	0	1
Intercompany loans				
– total	.242	.251	0	1
– excluding loans				
from German parent (ICL)	.106	.197	0	1
Loss carry-forward	.310	.463	0	1
Majority-owned affiliate	.158	.365	0	1
Wholly-owned affiliate	.721	.449	0	1
ln(Turnover)	9.79	1.40	[a])	[a])

Panel comprises 9 years, 109,300 observations. Tax-rate differential is the difference between the statutory tax rate at the affiliate's location and the minimum tax rate within the multinational group. [a]) confidential data.

Table 4: Leverage and Intercompany Loans

	basic sample	multinationals with an affiliate in a low-tax country		lowest-tax affiliates
		10%-percentile	5%-percentile	$\Delta\tau = 0$
Variable	(1)	(2)	(3)	(4)
Total leverage	.588	.570	.547	.576
External debt	.346	.312	.313	.366
Intercompany loans				
– total	.242	.259	.234	.210
– excluding loans				
from German parent	.106	.138	.149	.077
Observations	*109,300*	*38,400*	*16,061*	*22,908*

10 % percentile (5%-percentile): all groups with an affiliate located in one of the low-tax countries, where a low-tax country is defined as a country with a statutory tax rate below the 10% (5%) percentile; $\Delta\tau = 0$ refers to all those foreign affiliates with the lowest tax rate within the group.

intercompany loans is much more prevalent among multinationals with affiliates in low-tax countries. Conversely, the affiliate experiencing the lowest tax rate within the group should display a much lower capital share of intercompany loans. As reported in column (4), the mean capital share for those affiliates is lower by about 25%. This confirms the theoretical view, as there should be little incentive to shift profits out of those countries.

6 Basic Results

Table 5 reports basic regression results following Equation 7. In order to control for group-specific risks, all estimations employ fixed effects for the company group. Moreover, time dummies are included in order to capture differences in the taxation of the parent. Given the limited information in the balance sheet of the affiliates, only two direct control variables are included. Since the effective tax reduction from using debt might be zero if an affiliate carries forward any losses for tax purposes (see MacKie-Mason, 1990), we include a variable indicating whether some loss carry-forward is reported. Some specifications will also include the turnover of the affiliate, since a larger cash-flow might be associated with less credit-market constraints and, hence, might facilitate access to external credits.

Throughout the different specifications, the tax-rate differential shows a significantly positive effect, whereas the host-country tax rate proves insignificant. This confirms the theoretical prediction in the sense that corporations use intercompany loans to shift profits. At the same time, the insignificance of the tax rate indicates that the intercompany loans between foreign affiliates do not play an important role in minimizing the cost of capital by engaging in arbitrage across lending conditions of affiliate locations. Given the magnitude of this other type of intercompany loans, this function might well be carried out by loans from the German parent (*cf.* Table 3).

Qualitatively, there is not much difference between specifications. Column (4) includes a

Table 5: Basic Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Tax-rate diff. within comp. group	.069 **		.069 **	.067 **	.068 **	.068 **	.068 **	.065 **	.065 **
	(.017)		(.019)	(.019)	(.019)	(.018)	(.018)	(.018)	(.018)
Statutory tax rate		.065 **	-.001	-.007	.001	-.006	-.004	-.034	-.037
		(.021)	(.027)	(.026)	(.026)	(.025)	(.025)	(.027)	(.027)
Loss carry-forward				.031 **	.030 **	.033 **	.033 **	.033 **	.032 **
				(.003)	(.003)	(.003)	(.003)	(.002)	(.002)
(ln)Turnover					-.004 **		-.001		-.005 **
					(.001)		(.001)		(.001)
R-squared	.001	.001	.001	.007	.008	.032	.032	.050	.050
Industry effects	no	no	no	no	no	yes	yes	yes	yes
Host-country effects	no	no	no	no	no	no	no	yes	yes

Dependent variable: share of internal debt related to loans from other, non-German affiliates. Robust standard errors allowing for country-year cluster effects in parentheses. An asterisk denotes significance at 10% level, two asterisks denote 5%. 109,300 observations, 4,215 firms. All estimates include a full set of group-level and time fixed effects.

control for a loss-carry forward as the incentive to save taxes is reduced in this case. The positive sign possibly reflects the desire of shareholders to get more control of an affiliate's management if the performance is weak. It might also simply reflect the substitutive relationship to external debt (Desai *et al.*, 2004a). This could also explain the negative sign for turnover which is taken into account in column (5). The specifications in columns (6) to (9) additionally employ industry-level dummies following a classification of affiliates according to 71 industries. This might help to further control for differences in the financial risk related to an affiliate's activities. Columns (8) and (9), finally, use controls for the host country in order to make sure that no country-specific characteristics are driving the results. While the results prove to be robust, some part of the variation is swallowed up by the country-specific dummies. Hence, we would consider column (7) of Table 5 as the preferred specification.

Since in many cases the amount of intercompany loans received by an affiliate is zero, Table 6 reports results where those observations are excluded. However, the results show only minor differences.

Quantitatively, we see from the preferred specification (7) of Table 5 that a ten percentage point increase in the tax-rate difference to the group-specific lowest-tax affiliate leads to an approximately 0.68 percentage point higher internal-debt ratio. Expressed as a semi-elasticity, a tax-rate difference by ten percentage points triggers a response in the corresponding capital share by 6.4 percent. This figure is not much different from existing estimates of the tax-rate sensitivity of debt. Corresponding calculations based on the estimates by Desai *et al.* (2004a) yield a semi-elasticity of 10.2% (5.5%) for the sensitivity of an affiliate's capital share of internal (external) debt. The findings of Buettner *et al.* (2006) suggest a corresponding semi-elasticity of 6.2% (5.1%).

In order to get an impression of the magnitude of the effect on the tax base, consider the case of an affiliate i with a stock of capital of \$1 million. Suppose (pre-tax) profits are \$200,000. From the mean value of the leverage we would expect the affiliate to receive an intercompany loan of about \$106,000. Furthermore, let us assume a lending rate of 20%.

Table 6: Results for Non-Zero Observations

	(1)	(2)	(3)	(4)	(5)	(6)
Tax-rate diff. within comp. group	.043 *	.046 *	.056 **	.057 **	.055 **	.056 **
	(.025)	(.025)	(.024)	(.024)	(.023)	(.023)
Statutory tax rate	.013	.055	.009	.038	-.027	-.030
	(.036)	(.037)	(.034)	(.035)	(.040)	(.040)
Loss carry-forward	.044 **	.039 **	.046 **	.042 **	.044 **	.039 **
	(.003)	(.004)	(.003)	(.004)	(.003)	(.003)
(ln)Turnover		-.018 **		-.012 **		-.018 **
		(.001)		(.001)		(.001)
R-squared	.010	.020	.050	.054	.073	.082
Industry effects	no	no	yes	yes	yes	yes
Host-country effects	no	no	no	no	yes	yes

Dependent variable: share of internal debt related to loans from other, non-German affiliates. Robust standard errors allowing for country-year cluster effects in parentheses. An asterisk denotes significance at 10% level, two asterisks denote 5%. 66,781 observations, 3,146 firms. All estimates include a full set of group-level and time fixed effects.

Deduction of interest costs reduces the tax base by \$21,200, or 10.6%. Suppose now that the corporation opens up a tax-haven affiliate j, where the corporation tax equals zero. Then, assuming affiliate i's previous tax-rate difference is equal to the sample mean (12.4%) and the statutory tax rate in country i is also equal to the mean (33.4%), the tax-rate difference increases by 21 percentage points (33.4%–12.4%). Our estimate suggests that in this case the intercompany loan would be increased by \$14,280 (0.068×0.21×\$1,000,000). Consequently, the affiliate i's tax base further declines by \$2,856, or 1.6%.

Consider another example, where we observe a tax reform in the host country of affiliate i. Let us assume that the tax rate declines by ten percentage points and, thus, that also the tax-rate differential declines by ten percentage points. Then, the intercompany loan would decrease by \$6,800 (0.068×0.1×\$1,000,000). In this case, under the above assumptions, affiliate i's tax base increases by \$1,360, or 0.8%.

7 Results for Different Shares of Ownership

The rather small revenue effects might indicate that there are some important costs or restrictions which prevent corporations from using profit-shifting loans more aggressively. For instance, host countries might enact specific policies which restrict the use of intercompany loans. However, it is difficult to quantify the role of those restrictions. In fact, it proved impossible to augment the current analysis based on almost 80 countries with information about the existence and nature of corresponding rules such as thin-capitalization or earnings-stripping rules. But, there might be other reasons why firms experience high costs in adjusting the capital structure. While additional costs of using intercompany loans are basically not observed in the dataset, some of their potential determinants are. Desai *et.al* (2004b) argue that shared ownership of foreign affiliates is associated with coordination costs which impede tax efficient structuring of worldwide operations. This view is supported by Mintz and Weichenrieder (2006) who find a higher tax-rate sensitivity of intercompany loans

for wholly-owned subsidiaries. In terms of the above theoretical framework, this could imply that the additional costs related to intercompany loans are lower and exhibit a smaller gradient when the ownership share is higher. Thus, we might expect to find that intercompany loans are used more if the ownership share is higher. We might also expect to find that the sensitivity of intercompany loans to the tax-rate differential with regard to the lowest-tax affiliate is increased when taking into account only majority holdings or wholly-owned subsidiaries.

In order to test for differences in the sensitivity of intercompany loans to profit-shifting opportunities captured by the tax-rate differential, we augment the above estimation approach (7) by interaction terms with dummies capturing the ownership share.[11]

Table 7 shows results for our basic sample. For ease of comparison, the first column repeats the basic result as displayed in column (7) of Table 5. Column (2) reports results where we augment the basic approach with dummy variables for the ownership share. Both dummy variables are highly significant, pointing at an increased use of intercompany loans by majority- and wholly-owned subsidiaries. Note that the definition of majority-owned subsidiaries does not include wholly-owned subsidiaries. Thus, the results indicate that wholly-owned (partly-owned) subsidiaries show an about 5 (2) percentage points higher capital share of intercompany loans than affiliates without a majority participation.

Column (3) reports results where also the tax-rate differential is interacted with the two dummy variables for the ownership share. The results support significant differences in the tax-rate sensitivity. While the sensitivity with regard to the tax-rate differential shows a negative effect for minority participation, a positive effect is supported for majority-owned subsidiaries. The tax rate sensitivity for wholly-owned subsidiaries, however, is substantially higher. Adding up coefficients we find that the coefficient of the tax-rate differential is about

[11]Dummies are preferred against a continuous interaction term for the ownership share since the distribution of the ownership share shows strong concentration at the 51% and 100% thresholds. However, qualitatively, the results of corresponding estimates show no differences.

Table 7: Intercompany Loans and Ownership

	(1)	(2)	(3)	(4)	(5)
Tax-rate diff. within comp. group	.068 **	.065 **	-.099 **	-.110 **	-.105 **
	(.018)	(.018)	(.022)	(.022)	(.022)
Tax-rate diff.×majority owned			.114 **	.117 **	.127 **
			(.020)	(.023)	(.023)
Tax-rate diff.×wholly owned			.203 **	.220 **	.208 **
			(.018)	(.020)	(.020)
Statutory tax rate	-.004	.007	.005	.028	.006
	(.025)	(.024)	(.023)	(.030)	(.037)
Statutory tax rate×majority owned				.026	.010
				(.033)	(.033)
Statutory tax rate×wholly owned				-.038	-.052
				(.035)	(.033)
(ln)Turnover	-.001	-.001	-.001	.001	-.003 **
	(.001)	(.001)	(.001)	(.001)	(.001)
(ln)Turnover×majority owned				-.005 **	-.005 **
				(.002)	(.001)
(ln)Turnover×wholly owned				-.002	-.002
				(.001)	(.001)
Majority owned (share $\geq$ 51%)		.020 **	.003	.047 **	.052 **
		(.002)	(.003)	(.018)	(.018)
Wholly owned (share = 100%)		.051 **	.022 **	.049 **	.049 **
		(.002)	(.003)	(.018)	(.018)
Loss carry-forward	.033 **	.034 **	.031 **	.031 **	.031 **
	(.003)	(.003)	(.003)	(.003)	(.002)
R-squared	.032	.040	.042	.042	.057
Industry effects	yes	yes	yes	yes	yes
Host-country effects	no	no	no	no	yes

Dependent variable: share of internal debt related to loans from other, non-German affiliates. Robust standard errors allowing for country-year cluster effects in parentheses. An asterisk denotes significance at 10% level, two asterisks denote 5%. 109,300 observations, 4,215 firms. All estimates include a full set of group-level and time fixed effects.

0.104 for wholly-owned subsidiaries. This indicates that a ten percentage point increase in the tax-rate difference with regard to the lowest-tax affiliate leads to an approximately 1 percentage point higher internal-debt ratio. Expressed as a semi-elasticity evaluated at the mean capital share for wholly-owned subsidiaries (0.120), a tax-rate change by ten percentage points triggers a response in the corresponding debt ratio by about 8.7 percent.

From the theoretical discussion we know, however, that the additional cost function may affect not only the sensitivity with regard to the tax-rate differential but also the sensitivity with regard to all other indicators of the relative cost of equity and intercompany loans. Therefore, columns (4) and (5) report results where the other determinants are interacted with the ownership-share dummy variables as well. However, some of these interaction terms are insignificant and the results on the sensitivity with regard to the tax-rate differential prove to be robust.

In order to get an impression of how much the magnitude of the effect on the tax base is increased with wholly-owned subsidiaries, let us again consider a case of a subsidiary with a stock of capital of \$1 million. From the mean leverage for wholly-owned corporations, we would expect such a subsidiary to receive an intercompany loan of about \$120,000. At a lending rate of 20%, deduction of interest costs reduces the tax base by \$24,000, or 12%. Suppose now that the tax rate, and, therefore, the tax-rate difference, is decreased by 10 percentage points. Our preferred estimate of column (3) suggests that, in this case, the intercompany loan would be reduced by \$10,400 ($0.104 \times 0.1 \times \$1{,}000{,}000$). Consequently, the tax base in the high-tax country would increase by \$2,080, or 1.2 %. Although this is a stronger effect than the one obtained for the whole sample, it still appears to be rather small.

8 Conclusion

We have set up a model of a multinational corporation which uses intercompany loans for two purposes. The first is to minimize cost of capital by making use of external credit and engaging in arbitrage across affiliate locations. The second is to shift profits to low-tax jurisdictions. The theoretical analysis shows that the first purpose suggests that the use of intercompany loans will be affected by the local tax rate. The second purpose, however, causes intercompany loans to depend on the tax-rate differences between the lending and the borrowing companies within the multinational group. Only this latter relationship is indicative of profit shifting. Therefore, existing empirical evidence on the tax-rate sensitivity of debt even if related to multinationals and intercompany loans does not reveal the importance of profit-shifting activities.

Our empirical investigation studies whether the tax-rate differences within a multinational group will help to predict intercompany loans. The analysis makes use of a large micro-level panel dataset of virtually all German multinationals made available for research by the Bundesbank. This comprehensive dataset allows us to exploit differences in the taxing conditions in 79 countries, including many low-tax countries, in a period of nine years. For each affiliate within the multinational group, we calculate the appropriate tax-rate difference relative to the lowest tax rate observed among all foreign affiliates.

The empirical results confirm a robust significant impact of tax-rate differences within the multinational group on the use of intercompany loans, supporting the profit-shifting hypothesis. Nevertheless, our findings suggest that the implied magnitude of tax-revenue losses is rather modest even for wholly-owned firms. To conclude, our findings are indicative for substantial costs of adjusting the capital structure for means of profit shifting. As a consequence, if profit-shifting is important as the literature suggests, multinationals seem to take resort to alternative strategies of tax-planning. This would imply that further restrictions imposed by tax policy on the capital structure of multinationals would not substantially curb profit-shifting.

Datasources and Definitions

Firm-level data are taken from the micro-level dataset of the Bundesbank, see Lipponer (2006) for an overview. The dependent variable, ICL, is determined by a balance-sheet position capturing liabilities of foreign affiliates to other foreign affiliates within the multinational group divided by the total stock of capital. The latter is defined as the sum of registered capital, capital reserves, profit reserves, as well as internal and external debt.

Corporate taxation data are taken from the International Bureau of Fiscal Documentation, and from surveys provided by the tax advisory companies Ernst&Young, PwC, and KPMG. The statutory tax rate variable contains statutory profit-tax rates modified by applicable restrictions on interest deductions. The data covers a group of 79 countries in a period of nine years from 1996 until 2004.

References

Aghion, P. and P. Bolton (1989): The financial structure of the firm and the problem of control, *European Economic Review* 33, 286 – 293.

Buettner, T., M. Overesch, U. Schreiber, and G. Wamser (2006): Taxation and the choice of capital structure - Evidence from a panel of German multinationals, *CESifo Working Paper* 1841, Munich.

Clausing, K.A. (2003): Tax-motivated transfer pricing and US intrafirm trade, *Journal of Public Economics* 87, 2207 – 2223.

De Mooij, R. and S. Ederveen (2003): Taxation and foreign direct investment: a synthesis of empirical research, *International Tax and Public Finance* 10, 673 – 693.

Desai, M.A., C.F. Foley, and J.R. Hines (2004a): A multinational perspective on capital structure choice and internal capital markets, *Journal of Finance* 59, 2451 – 2487.

Desai, M.A., C.F. Foley, and J.R. Hines (2004b): The costs of shared ownership: Evidence from international joint ventures, *Journal of Financial Economics* 73(2), 323 – 374.

Gresik, T. A. (2001): The taxing task of taxing transnationals, *Journal of Economic Literature* 39, 800 – 838.

Grubert, H. and J. Mutti (1991): Taxes, tariffs and transfer pricing in multinational corporate decision making, *The Review of Economics and Statistics* 73, 285 – 293.

Gordon, R.H. and Y. Lee (2001): Do taxes affect corporate debt policy? Evidence from U.S. corporate tax return data, *Journal of Public Economics* 82, 195 – 224.

Hart, O. D. (1988): Capital structure as a control mechanism in corporations, *Canadian Journal of Economics* 21, 467 – 476.

Haufler, A. and G. Schjelderup (2000): Corporate tax systems and cross country profit shifting, *Oxford Economic Papers* 52, 306 – 325.

Hines, J.R. (1999): Lessons from Behavioral Responses to International Taxation, *National Tax Journal* 52, 305 – 322.

Hines, J.R. and E.M. Rice (1994): Fiscal paradise: foreign tax havens and American business, *Quarterly Journal of Economics* 109, 149 – 182.

Jog, V. and J. Tang (2001): Tax reforms, debt shifting and tax revenues: multinational corporations in Canada, *International Tax and Public Finance* 8, 5 – 26.

Lipponer, A. (2006): Microdatabase Direct Investment - MiDi. A brief guide, *Bundesbank Working Paper*, Frankfurt.

MacKie-Mason, J. (1990): Do taxes affect corporate financing decisions? *The Journal of Finance* 45, 1471 – 1493.

Mintz, J. and M. Smart (2004): Income Shifting, investment, and tax competition: theory and evidence from provincial taxation in Canada, *Journal of Public Economics* 88, 1149 – 1168.

Mintz, J. and A.J. Weichenrieder (2005): Taxation and the financial structure of German outbound FDI, *CESifo Working Paper* 1612, Munich.

Mutti, J. and H. Grubert (2006): *New Developments in the Effects of Taxes on Royalties and the Migration of Intangible Assets*, Paper prepared for a NBER/CRIW Conference, Washington, D.C.

Myers, S. (2001): Capital Structures, *Journal of Economic Perspectives* 15, 81 – 102.

Swenson, D.L. (2001): Tax reforms and evidence of transfer pricing, *National Tax Journal* 54, 7 – 25.

Tirole, J. (2006): *The Theory of Corporate Finance*, Princeton.