Profit Shifting in the EU: Evidence from Germany*

Alfons J. Weichenrieder

University of Frankfurt & CESifo

12 June 2006

Abstract

The paper takes several approaches to identify profit shifting behavior using data on German inbound and outbound FDI. Among other things, it looks at the correlation between the home country tax rate of a parent and the net of tax profitability of its German subsidiary. The finding is compatible with profit shifting behavior. For profitable subsidiaries that are directly owned by a foreign investor the evidence suggests that a 10 percentage point increase in the parent's home country tax rate leads to roughly half a percentage point increase in the profitability of the German subsidiary.

Keywords: foreign direct investment, profit shifting, tax avoidance, multinational enterprise

JEL classification: H25, F23

Alfons J. Weichenrieder
Johann Wolfgang Goethe University, Frankfurt
Faculty of Economics and Business Administration
60054 Frankfurt (Main)
Germany
Fax: ++49 69 798 22697
Email: a.weichenrieder@em.uni-frankfurt.de

* The hospitality and support by the Deutsche Bundesbank Research Center is gratefully acknowledged. I thank Ruud de Mooij and Chris Heady for excellent comments and suggestions. Additional comments from Oliver Busch and participants of the IFS/ETPF conference, London, 24 April 2006, were also highly appreciated.

1. Taxes and profit shifting

Tax competition between countries may be conceived of in different ways. A common conception is that countries or regions employ tax instruments to attract or keep firms. But even without firm relocation a country may benefit from lowering taxes if this induces multinational firms to shift taxable profits to this country. Firms may achieve such income shifting by using prices for intra-company sales that depart from arms' length conditions, by agreeing on excessive management and overhead fees, by setting non-market interest rates within a group, etc. There are also limits to profit shifting behavior. Governments, in particular in high tax countries, may try to limit the allowable transfer pricing strategies and this may even lead to a double taxation.[1] In addition, firms themselves may find it difficult to set tax efficient prices if this leads to confusion in the accounts of profit centers and problems in the remuneration of managers (Caves 1982, pp. 246-7), or if minority shareholders resist.

In this paper, I use the MiDi database of the Deutsche Bundesbank on German inbound and outbound FDI to empirically detect profit shifting. While there have been several attempts to empirically identify profit shifting behavior of multinationals, this paper is one of the first micro based study with non-U.S. data.

While there are many potential influences on firm profitability, a first hypothesis is that the lower the tax rate of a foreign parent is vis a vis the rate that is applicable to its German affiliate, the more profitable it will be to shift the profits of the affiliate to the home country of the parent. Therefore the profitability of the German affiliate may be positively correlated with the host country tax rate. The paper also looks at the effects that the foreign tax rate has on the profitability of German subsidiaries abroad. A problem here is that the database of German FDI does only record net-of-tax profits of subsidiaries, which at a given

[1] Cf. Schjelderup and Weichenrieder (1998), Elitzur and Mintz (1996), or Mansori and Weichenrieder (1999).

pre-tax profitability automatically react negatively to a tax rate increase. Therefore the paper will formulate hypotheses how co-ownership of foreign subsidiaries may influence profit shifting. Under certain conditions the testable hypothesis can be formulated that tax rate changes have a more pronounced effect on wholly-owned subsidiaries as compared to non-wholly owned ones.

The strongest evidence for profit shifting behavior is found for inbound FDI. For profitable subsidiaries that are directly owned by a foreign investor the evidence suggests that a 10 percentage point increase in the parent's home country tax rate leads to roughly half a percentage point increase in the profitability of the German subsidiary.

The remainder of the paper is organized as follows. In Section 2, I will give a brief account of the existing empirical literature on transfer pricing and cross-border profit shifting. Section 3 will briefly introduce the data used in this paper before Section 4 formulates a stylized model of profit shifting that will formulate testable hypotheses. Section 5 looks at a data set of German inbound FDI, while Section 6 takes on the outbound side. Finally, Section 7 specifically looks at German investment in the U.S. before Section 8 concludes.

2. A brief literature survey

Since the early 1990s, a growing literature has developed that tries to empirically identify tax induced profit shifting.[2] So far, the studies have almost exclusively concentrated on U.S. data. Much of the debate has been started off by Wheeler (1988) und Dworin (1990) with the simple observation that foreign-owned subsidiaries in the U.S. have a much smaller profitability than genuine U.S. firms. Grubert, Goodspeed und Swenson (1993) showed that at least 50% of the difference could be explained by the special characteristics of foreign-owned firms. For example, those firms on average are younger than domestic firms or may

[2] A useful survey on profit shifting and related aspects of international tax issues is contained in a recent paper by De Mooji (2005).

have special write-offs following a foreign takeover. The authors suggest that the reminder of the difference in profitability is due to profit shifting activities. Harris et al. (1993) analyze the profitability of U.S. parent firms. Interestingly, parents with subsidiaries in low-tax countries have a significantly lower return than parents with high-tax affiliates, which may reflect profit shifting activities. Grubert and Mutti (1991) use aggregated data from the Bureau of Economic Analysis. They find that profits on sales of U.S. subsidiaries are higher in low-tax countries than in high tax countries.

Collins and Shackelford (1998) estimate the flow of dividends, interest, royalties and management fees between U.S. affiliates in a cross section for the year 1990. They estimate how taxes affect the amount of payments made in these four categories. Tax costs, according to their study, significantly impinge on dividends and royalties and are also significant in explaining the direction of interest payments within the group, but have no power in explaining the amount of management fees.

Rousslang (1997) considers 1989 data on U.S. manufacturing affiliates. The author tries to identify the amount of income that is shifted between jurisdictions by estimating a departure of after tax profitability from average after tax profitability with the help of the local tax rate and the withholding taxes on profit distributions. Both the tax rate on repatriations and the local tax rate turn out to be significant in explaining the dependent variables "shifted income/sales" and "shifted income/assets". Rousslang's estimates suggest that a one percentage point increase in the local tax rate would reduce pre-tax reported profits of manufacturing subsidiaries by 0.3%.

Jacob (1996) uses a sample of more than 200 U.S. multinationals and observes them during two years prior to the 1986 tax reform and two years after the reform. His hypothesis is that firms with large transfers between countries (intra-firm trade) should be able to get away with smaller total taxes. According to Jacob, this is borne out by the data in the period before the 86-reform and thereafter. Jacob also shows that firms with large intra-firm transfers paid relatively low U.S. taxes before 1986 and relatively high U.S. taxes

afterwards. This finding is consistent with the hypothesis that the lowering of U.S. tax rates has reversed the incentives for profit shifting.

Klassen, Lang and Wolfson (1993) consider Compustat information on 191 U.S. multinationals during the period 1984-90 and try to explain the changes in the return on equity of subunits by changes in local tax rates for U.S. multinationals. The authors hypothesize that due to the overall development of corporate taxes multinationals should have had an incentive to shift profits from Canada to Europe during 1984-86 and into the U.S. during 1986-1987 and find evidence in favor of this. While suggestive, the study does not use tax rates in the regressions, which makes it difficult to predict the exact policy implications of tax changes.

One of the interesting empirical facts reported in Grubert, Goodspeed und Swenson (1993) was that in 1987, 37% of all non-financial foreign companies had a profitability in terms of total assets that was near to zero. Conversely, only 27% of the domestic firms fell into the same zero range from -2.5% to +2.5%. This issue is taken up in Collins, Kemsley and Shackelford (1997) who concentrate on a sample of foreign-owned and non foreign-owned wholesale firms. Their working hypothesis is that if foreign-controlled firms (unlike domestic firms) target zero profitability, then an (exogenous) increase in sales should go along with a smaller increase in profitability compared to domestic firms. The reason is that, while higher sales per se are good for profits, foreign firms would counteract by charging higher prices on intra-firm trade. The findings of Collins, Kemsley and Shackleford do not support the view that foreign controlled firms have a significantly weaker correlation between sales and profits. Based on this observation the authors suggest that systematic differences between domestic and foreign firms rather than income shifting may be the reason for the near zero profitability of many foreign-controlled U.S. firms.[3] Hines and Rice (1994) use 1982 country level data on U.S. affiliates. Their profit measure approximates

[3] A recent study that uses a quite different approach is by Bartelsman and Beetsma (2003). Instead of using specific data on multinationals, they consider aggregate industry data of OECD countries to detect tax effects on the size of value added.

earnings before interest and taxes (EBIT). The empirical results suggest that a one percentage point increase in the host country tax rate reduces reported EBIT of U.S. affiliates by some 3 percent. Finally, Huizinga and Laeven (2005) in a recent paper use a micro data set of European based subsidiaries. Like in Hines and Rice, they consider a cross-section (1999) of firms and study the effect of tax differentials on reported EBIT. Their findings suggest that, while the estimated tax effect is considerably smaller than in Hines and Rice, profit shifting implies a significant revenue loss for high tax countries, Germany in particular.

3. The data

This paper exploits the FDI database of the Deutsche Bundesbank (MiDi) to investigate profit shifting behavior.[4] German investors owning foreign affiliates are legally required to report on their foreign operations if it meets mild size and ownership requirements. Conversely, foreign-controlled affiliates that operate in Germany have to report on these German operations. The firm reports are the basis for MiDi.[5] Most of the information in the data refers to a set of balance sheet items. On the liability side there is information on paid-up plus not paid-up equity, capital reserves, loss carry-forwards, current profits net of taxes, debt, liabilities to affiliated companies, and other liabilities. On the asset side, information is collected on fixed assets plus intangibles, financial assets (shares, loans), current assets, and other assets. Important non-balance-sheet items that are collected by the Bundesbank are sales and employees.

An unusual feature of the balance sheets collected by the Deutsche Bundesbank is that they contain the yearly profit after taxes but before dividend distributions as a separate part of the equity of the firm. Therefore, the balance sheets provide information on

[4] Ramb and Weichenrieder (2005) use the Bundesbank data to analyze the financial structure of German inward FDI and Mintz and Weichenrieder (2005) look at the financing of outward FDI. Buettner and Ruf (2004) use the database to study taxes and location decisions of German multinationals.
[5] For a detailed description of MiDi see Lipponer (2003).

profitability despite the fact that the database does not contain formal profit and loss statements.

Microdata on foreign direct investment is currently available for the years 1989 to 2003 but firm identifiers that allow for the tracing of firms over time are available only from 1996 onwards. Nevertheless, the ability to trace firms over up to 8 years is an important advantage over other data sources on FDI and can be used to avoid possible biases from cross-section estimations.

For the purpose of this study, I dropped affiliates if these were either operating in not-for-profit sectors or were not incorporated. I also excluded subsidiaries in the banking and insurance industries and holding companies to avoid problems connected to the very different balance sheet structure of financial firms. On the outbound side, this leaves us with 116,632 firm-year observations during the period 1996-2003 and the data set includes 10,855 (16,123) firms in 1996 (2003). On the inbound side, we have for the same time span 55230 firm-year observations and 5791 (6988) firms in 1996 (2003).[6] Table 1 gives an impression of the total assets involved. The first two columns summarize the inbound side, while columns 3 and 4 inform about the magnitudes on the outbound side. In both cases I decided to follow the Bundesbank convention to separately account for directly and indirectly held affiliates. On the inbound side, the affiliate is indirectly held if the immediate investor is a foreign-owned intermediate company that is located in Germany. A subsidiary is directly held if the immediate owner is a foreign investor. The definitions differ a bit on the outbound side. Here a German-owned foreign affiliate is defined as an indirectly held participation if the ownership chain contains at least one foreign company between the German investor and the foreign affiliate. This foreign intermediate company may or may

[6] I also dropped a limited number of observations for which we failed to collect reliable tax rate information on the home country (host country) if the subsidiary was located in Germany (abroad). Finally, since the legally applied reporting thresholds varied between 1996 and 2003 I filtered the sample by imposing uniform size restrictions (total assets €3m for majority participations and €5.1m in the case of minority stakes) during this period.

not be in the country of the ultimate company. Conversely, the affiliate is directly held if no intermediate foreign company is used.

Table 1: Descriptive statistics of German inbound and outbound FDI (2003)

	Inbound FDI		Outbound FDI	
	Direct	Indirect	Direct	Indirect
No. of subsidiaries	3520	3468	10955	5167
Total assets (€ billion)	174	236	937	885
Total assets, average (€ million)	49.4	68.1	86.0	171.3

Figure 1 and Figure 2 summarize the distribution of net-of-tax returns on total assets. Each of the four graphs contains 5 lines that represent the return on total assets (ROA) in the 5th, 25th, 50th, 75th, and 95th centile of firms. Again the categories "direct" and "indirect" are reported separately. Indeed, firms in these categories show a sizeable difference in ROA when it comes to inbound German FDI. Indirectly held firms have a lower spread in returns and more often show near zero profitability. If we look at a "near-zero band" between -2.5% and +2.5% similar to Grubert, Goodspeed und Swenson (1993), we find that in 2003 from the total of all directly held subsidiaries (inbound) 37% fall in this range, while for the indirectly held firms it is even a majority of some 81%.[7]

[7] Grubert, Goodspeed and Swenson use taxable profits to total assets to define the band.

Figure 1.Net-of-tax return on total assets: inbound FDI

Figure 1a: Return on total Assets, directly-held subsidiaries

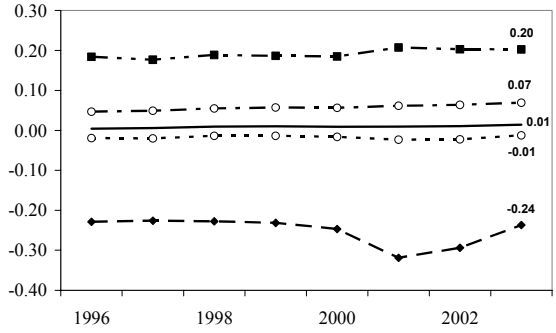
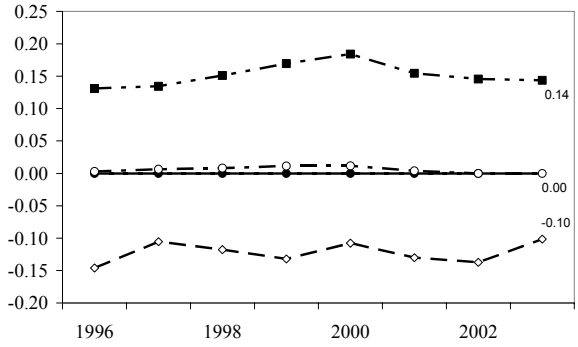


Figure 1b: Return on total Assets, indirectly-held subsidiaries



Annotation: In each graph, the bold line indicates the return on assets of the median non-financial firm. The two lines below the median line characterise the profitability of the 5th and 25th centile firms, the two lines above the median ratio indicate the 75th and 95th centiles. The left hand diagram refers to the subsample of firms that are directly held by a foreign firm, while the graph on the right hand refers to firms in Germany that are foreign held via a German intermediate company.

Figure 2. Net-of-tax return on total assets: outbound FDI

Figure 2a: Return on total Assets, directly-held subsidiaries

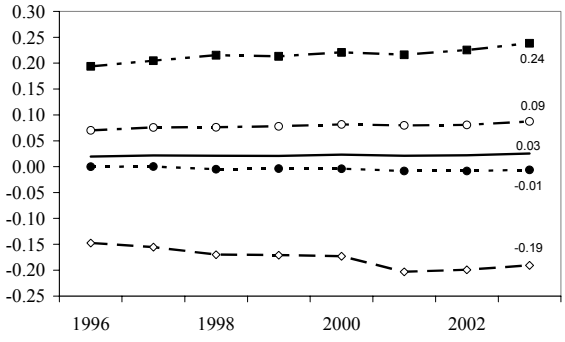
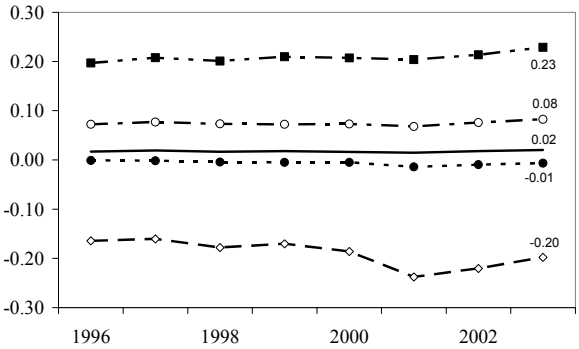


Figure 2b: Return on total Assets, indirectly-held subsidiaries



Annotation: In each graph, the bold line indicates the return on assets of the median non-financial firm. The two lines below the median line characterise the profitability of the 5th and 25th centile firms, the two lines above the median ratio indicate the 75th and 95th centiles. The left hand diagram refers to the subsample of firms that are directly held by a German parent firm, while the graph on the right hand refer to firms that are held via a German-owned intermediate company outside Germany.

The fact that this high fraction of firms with more or less zero profitability is pretty constant over the years may fuel the suspicion that advanced tax planning is the reason behind these figures. However, the high fraction of subsidiaries with zero profitability among indirectly held subsidiaries may also result from specific data problems. While the Bundesbank requests firms to report profits net of taxes but before distributions, some

indirectly held firms may fail to report profits that are transferred to the owner on the basis of a corporate contract. Under such a corporate contract the dependent company may agree to transfer all profits and losses to the upper-tier corporation in order to achieve profit and loss consolidation for tax purposes. Consolidation not only requires the existence of such a contract. Germany also restricts consolidation of profits and losses within a group to cases in which a German umbrella company (*Organträger*) is a majority owner of the dependent firms (*Organgesellschaften*). Since Germany for tax purposes does neither allow a contract of transfer of profits to a foreign corporation nor to a sister company, an ownership chain is necessary to establish a profit transfer agreement. While the Bundesbank requires firms to report their profits before distribution, it may simply be that many indirectly held firms report figures that are net of profit transfers to the umbrella company. Table 2 provides evidence in favor of this explanation. It reports the result of a simple Probit model that pools all firm years in our data set. The left hand side variable is an indicator variable that takes on the value one if the profit in a given year is exactly zero. Besides fixed year effects, there are two main explanatory variables. INDIRECT takes on the value one if the subsidiary under consideration is held via a German intermediate company (that in turn is foreign owned). INDIRECT*MINORITY is an interactive dummy variable that takes on the value one if an indirectly held firm is recorded as a minority ownership. The mere fact that a foreign-owned firm is indirectly held via a German intermediate company increases the probability of a zero reported profit by some 50 percentage points (evaluated at sample means). Conversely, the indicator variable INDIRECT*MINORITY significantly reduces the probability of reported zero profits. This latter result is consistent with the fact that profit and loss consolidation is not available for corporations with a minority stake, but is available if a corporation holds more than 50% in another German corporation. When profit and loss consolidation is not available, the probability for zero profit statements is reduced.

Table 2: Probit model to explain zero profitability (ROA), inbound

	dF/dX
INDIRECT	0.497
	[0.00]***
INDIRECT*MINORITY	-0.139
	[0.00]***
Observations	55230
Firms	13145
Pseudo R^2	25%

Annotations: ***significant at 1%-level, **significant at 5%-level, *significant at 10%-level. P-values in brackets are based on robust t-statistics (corrected for correlations within firm cells). The regression contained a full set of time fixed effects; coefficients are not reported.

These findings raise doubts about the reliability of the profit data for indirectly held firms and make it advisable to concentrate on directly held firms when analyzing the tax effects on the profitability of inbound FDI.

Unlike the data for indirect inbound FDI, the profit data for German outbound investment presented in Figure 2 show no bunching at zero profitability and "eyeball econometrics" does not suggest a difference between directly and indirectly held firms. To further analyze the question of whether profit and loss consolidation leads to reported zero profitability in outbound FDI the possibility of loss consolidation in recipient countries was evaluated for the year 2002 using PricewaterhouseCoopers (2002). The variable CONSOLIDATION that was derived from this survey takes on the value one if in a given country loss consolidation in principle is available (and a bias of the profit record may therefore occur) and the value zero when there is no possibility to consolidate losses and profits within a group of corporations. To allow that consolidation has a different effect on firms that are (i) directly owned by a German investor, (ii) indirectly held via a local intermediate firm, or (iii) indirectly held via an intermediate firm in a third country, the interactive variables CONS_DIRECT, CONS_INDIRECT, and CONS_THIRD take on the value one if CONSOLIDATION is one *and* the relevant ownership chain applies. The results presented in Table 3 show that indeed consolidation of profits may explain a

somewhat higher propensity of indirectly held firms to report zero profitability. Starting from sample means, the likelihood of such an event rises by a probability of some 6 percentage points if the firm under consideration is indirectly owned and located in a country that allows profit and loss consolidation. While this result is statistically significant, the impact of this effect is much smaller than the one for inbound firms and looks like an insufficient reason to drop indirectly held subsidiaries in the further analysis of German outbound FDI.

Table 3: Probit model to explain zero profitability (ROA), outbound

	dF/dX
CONS_DIRECT	0.023
	[0.13]
CONS_INDIRECT	0.056
	[0.00]***
CONS_THIRD	-0.002
	[0.83]
Observations	16918
Firms	16918
Pseudo R^2	1.3%

Annotations: ***significant at 1%-level, **significant at 5%-level, *significant at 10%-level. P-values in brackets are based on robust t-statistics (corrected for correlations within country cells). All observations are for the year 2002.

4. A stylized model of profit shifting

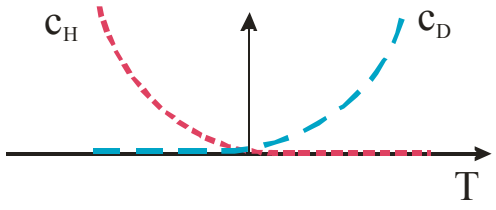
As mentioned, one characteristic of the MiDi database is that it collects net of tax profits, but no information on pre-tax profits. In the light of this feature, the following model is set up to provide hypotheses that indeed can be tested with the help of the German panel data set.

Consider a multinational with a parent firm in country H that owns a single subsidiary in the destination country D. Country D taxes reported profits at rate t_D. Country H is assumed to exempt foreign profits earned in country D, but taxes domestic profits (and any profits that are shifted into country H) at the rate t_H. Since Germany uses an exemption

system towards foreign dividends, this assumption is justified if we think of Germany as the home country H. In the case where Germany is acting as the host country (D) the assumption is obviously appropriate in the case of investing countries that also use an exemption system. If the investing country uses a credit system of taxation, then effective exemption still occurs if the parent in the home country is in an excessive credit position. An excessive credit position applies if the foreign taxes underlying the foreign dividends received by a parent are higher than the taxes that would apply had the parent earned the equivalent income at home. Since Germany is a high tax host country, such a situation is quite likely and a credit system in the home country of the multinational may then be approximated by an exemption system.

Let there be a level of "true" profits that would prevail in H and G in the absence of profit shifting activities (f_H , f_D). The only decision variable of the multinational shall be the net amount T of profits that is shifted from D to country H. A negative amount of T then indicates profit shifting into D. Shifting profits from a high tax jurisdiction to a low tax jurisdiction may save taxes but may also imply a cost for the multinational. For example, special activities may be necessary to hide the profit shifting. I assume that this cost is incurred by the plant that reduces its profitability. That is, the cost $c_H(T)$ falls on the parent if the profit is shifting from the home country into D and $c_D(T,\lambda)$ is incurred by the subsidiary if the shifting is out of the host country. Here λ denotes the fraction of shares of the host country subsidiary that are held by other investors. The respective cost is assumed to be convex in the absolute amount of shifting as illustrated by Figure 3.

Figure 3: Convex shifting cost



If the shifting is from D to H, then the existence of other investors (who may resist the manipulations) makes profit shifting increasingly costly, while this is not the case if the other investors gain from profit shifting. Therefore, c_H, unlike c_D, is taken to be independent of λ. The assumptions on the shifting cost may be summarized as follows:

$$
\begin{aligned}
& c_H(T) = 0 \ \textit{if} \ \ T \geq 0 \\
& \partial c_H / \partial T < 0,\ \partial^2 c_H / \partial T^2 > 0 \ \textit{if}\ T < 0 \\
& c_D(T) = 0 \ \textit{if} \ \ T \leq 0 \\
& \partial c_D / \partial T,\ \partial^2 c_D / \partial T^2 > 0, \partial^2 c_D / \partial T \partial \lambda > 0, \partial^3 c_D / \partial T^2 \partial \lambda > 0 \ \textit{if}\ T > 0 \\
& \partial c_i / \partial T\big|_{T=0} = 0
\end{aligned}
\tag{1}
$$

Global net of tax profits, which are assumed to form the objective function of the multinational, are given by

$$
P = (1-\lambda)\underbrace{(1-t_D)(f_D - T - c_D(T,\lambda))}_{\equiv \pi_D} + \underbrace{(1-t_H)((f_H + T - c_H(T))}_{\equiv \pi_H} \tag{2}
$$

Differentiation of P w.r.t. T at $T = 0$ indicates that the condition under which profit shifting from D to H (H to D) is profitable reads $(1-t_H) - (1-\lambda)(1-t_D) > (<) 0$ $\Leftrightarrow t_D > (<)\ [t_H - \lambda]/(1-\lambda)$. If the share λ equals zero, then the magnitude of the rates of the profit taxes determine the profit shifting incentives. When λ > 0, even with $t_D < t_H$ this incentive may occur.[8] Since the cost of shifting profits is assumed to depend on the direction of the profit manipulations, two cases have to be distinguished.

Case A: $(1-t_H) - (1-\lambda)(1-t_D) > 0$. *Shifting profits home.*

In this case the first order condition for optimal profit shifting is given by

$$
\partial c_D(T,\lambda) / \partial T = (1-t_H)/[(1-\lambda)(1-t_D)] - 1 > 0\,. \tag{3}
$$

[8] Outside ownership has also been considered in the theoretical work by Kant (1988). The conflict of interest arising from transfer pricing and co-ownership has recently been emphasized by Desai, Foley and Hines (2004).

Using assumptions (1) and implicitly differentiating equation (3) yields the marginal effect of a change in t_H on the amount of profit shifting:

$$\frac{\mathrm{d}T}{\mathrm{d}t_H} = -\frac{1}{(1-\lambda)(1-t_D)\cdot \partial^2 c_D(T,\lambda)/\partial T^2} < 0\,. \tag{4}$$

The effect of t_H on T is as expected: the higher the foreign tax rate the smaller the optimal profit shifting T. The role of λ on the slope $\mathrm{d}T/\mathrm{d}t_H$ is less straightforward. A direct effect of a larger λ is a positive one: a higher share of co-owners increases the gain from any Euro that is shifted. But since $\partial^2 c_D(T,\lambda)/\partial T^2$ increases in λ, there is also a higher cost of shifting profits home and the net effect is unclear.

The empirical parts of this paper will exploit information on the net of tax profits. Net-of-tax profits π_D and π_H of our model firm are defined in equation (2). The reaction of the reported net of tax profit in D is:[9]

$$\mathrm{d}\pi_D = (1-t_D)\cdot \partial T/\partial t_H \cdot [-1-\partial c_D/\partial T\cdot]\cdot \mathrm{d}t_H\,. \tag{5}$$

Given the slope in equation (4) this may be rewritten as

$$\frac{\mathrm{d}\pi_D}{\mathrm{d}t_H} = \frac{1}{(1-\lambda)\cdot \partial^2 c_D(T,\lambda)/\partial T^2}\cdot\left[\frac{1-t_H}{(1-\lambda)(1-t_D)}\right] > 0\,, \tag{6}$$

From equation (6), the predicted impact of an increase in t_H is positive: ceteris paribus, a tax increase abroad should increase the profitability of a German subsidiary. For the later empirical investigation it would be helpful to also have a clear testable prediction about the role of outside shareholders on the size of this tax effect. Unfortunately, like in equation (4), the role of minority shareholders is ambiguous.

Now consider the impact of a change in the tax rate t_D on the reported profits π_D. Again I start from the first order condition (3) to derive the tax rate effect. Differentiation w.r.t. t_D yields:

[9] The main attention here is on net-of-tax profits since the empirical data used in this paper fails to contain information on pre-tax profits.

(7) $$\frac{\mathrm{d}T}{\mathrm{d}t_D} = \frac{(1+\partial c_D / \partial T)}{(1-t_D)\cdot \partial^2 c_D(T,\lambda)/\partial T^2} > 0 .$$

Since $\partial c_D / \partial T > 0$ the slope is positive: A higher host country tax rate leads to additional profit shifting to the parent. Whether this slope should be expected to differ for subsidiaries with different λ is unclear. In equation (8), the first term of the numerator on the r.h.s. is positive, while the second part of the numerator is negative.

(8) $$\frac{\mathrm{d}\left(\frac{\mathrm{d}T}{\mathrm{d}t_D}\right)}{\mathrm{d}\lambda} = \frac{\left(\partial^2 c_D / \partial T^2\right)\cdot\left(\partial^2 c_D / \partial T \partial\lambda\right) - \left(\partial^3 c_D / \partial T^2 \partial\lambda\right)\cdot(\partial c_D / \partial T + 1)}{(1-t_D)\cdot\left[\partial^2 c_D(T,\lambda)/\partial T^2\right]^2} .$$

The effect of t_D on net-of-tax profits can be derived as:

(9) $$\frac{\mathrm{d}\pi_D}{\mathrm{d}t_D} = -(1-t_D)\left\{\frac{\partial T}{\partial t_D}\left(\frac{1-t_H}{(1-\lambda)(1-t_D)}\right)\right\} - \left(f_D - T - c_D\right) < 0 .$$

Clearly, the reported profits of the subsidiary are expected to be a negative function of t_D. The impact of λ on this slope is unclear for two reasons. First, the expression in equation (8), which re-enters in (9), cannot be signed. Second, it may be that the pre-tax profit $\left(f_D - T - c_D\right)$ depends on λ.

It is useful to summarize the results for Case A (T > 0) in a non-technical proposition.

> PROPOSITION 1: If the profit shifting incentives lead to an upward manipulation of home country profits and a downward manipulation of profits in the host country, then an increase in the host (home) country tax rate should reduce (increase) reported profits of the foreign subsidiary. It is theoretically unclear how co-ownership influences the magnitudes of these effects.

Case B: $(1-t_H) - (1-\lambda)(1-t_D) < 0$. *Shifting profits abroad.*

If the home country is a high tax country, then the incentives are to shift profits abroad (T < 0) as long as co-ownership is limited. The first order condition in this case is

(10) $$\partial c_H(T)/\partial T = 1 - \frac{(1-\lambda)(1-t_D)}{(1-t_H)} < 0 .$$

Implicit differentiation yields:

(11) $$\frac{\mathrm{d}T}{\mathrm{d}t_H} = -\frac{(1-\partial c_H(T)/\partial T)}{(1-t_H)\cdot \partial^2 c_H(T)/\partial T^2} < 0 .$$

As long as case B applies, an increase in the home country tax rate will make T more negative, i.e. it will increase profit shifting. Since c_H is independent of λ, so is the slope $\mathrm{d}T/\mathrm{d}t_H$. It is easy to verify, that if profits ($f_D - T$) are independent of the co-ownership variable λ, then the marginal effect of t_H on net-of-tax profits will also be independent of λ.

From the first order condition, we also have

(12) $$\frac{\mathrm{d}T}{\mathrm{d}t_D} = \frac{(1-\lambda)}{(1-t_H)\cdot \partial^2 c_H(T)/\partial T^2} > 0 .$$

Clearly, if the profit shifting incentives are such that profits are shifted into the subsidiary, then an increased taxation of the subsidiary will reduce this incentive and make T less negative. Unlike in Case A, the impact of λ can now be signed:

(13) $$\frac{\mathrm{d}\left(\frac{\mathrm{d}T}{\mathrm{d}t_D}\right)}{\mathrm{d}\lambda} = \frac{-1}{(1-t_H)\cdot \partial^2 c_H(T)/\partial T^2} < 0 .$$

An increase in the co-ownership abroad lowers the (absolute) marginal effect of a change in the host country tax. An intuition behind this is that a fraction of a tax decrease abroad is benefiting other shareholders of the subsidiary, which makes this increase less effective for the decisions of the multinational. What are the implications for reported net of tax profitability? From the definition of the subsidiary's net of tax profit and $c_D = 0$ it follows:

(14) $$\frac{\mathrm{d}\pi_D}{\mathrm{d}t_D} = -(f_D - T) - (1-t_D)\frac{\partial T}{\partial t_D} < 0 .$$

When t_D increases net-of-tax profits fall for two reasons. First, an increase in the tax rate reduces net profitability for a given amount of profit shifting. Second, profit shifting into the

subsidiary is reduced. Since net of tax profits, which will be the focus of the econometric analysis, are reduced even in the absence of profit shifting it is important to have a testable hypothesis on how the slope in equation (14) depends on λ. If the profit ($f_D - T$) of the subsidiary is independent of co-ownership, then from equation (13) we have $\partial^2 \pi_D / \partial t_D \partial \lambda > 0$. Increased co-ownership in this case would reduce the impact of tax rate changes on profitability. The above results may be summarized in a non-technical way as follows.

> PROPOSITION 2: If the profit shifting incentives lead to a downward manipulation of home country profits and an upward manipulation of profits in the host country, then an increase in the host (home) country tax rate should reduce (increase) reported net-of-tax profits of the foreign subsidiary. Under the assumption that pre-tax profits are not dependent on co-ownership, co-ownership should reduce the effect of the host country tax rate on reported net of tax profitability.

5. Profit shifting and the profitability of German inbound FDI

The following analysis considers empirical evidence related to theoretical predictions above. Since Germany is a high tax country by international comparison, the results derived for the case A ($T > 0$) should be the more relevant ones for the profitability of inflowing FDI. According to Proposition 1 the foreign corporate tax rate in the country of the parent is then expected to positively affect the profitability of a German subsidiary. Whether this effect should be expected to be larger for wholly-owned versus partly-owned subsidiaries is unclear from Proposition 1.

To test these implications I use a subsample of incorporated non-financial firms in Germany that on average across all firm observations show a positive profitability. The endogenous variable is return on assets (ROA), where the return is measured by the net-of-tax profits after interest payments (but before dividends). Because of the data problems discussed in Section 3, I concentrate on firms that are directly held by a foreign investor.

Table 4 gives a summary statistics of this sample that contains 3776 firms that on average are observed over 4.7 years. Despite the fact that the sample is built by excluding firms that on average show non-positive profitability, the profitability measure shows a huge spread between -407 percent and 321 percent. To limit the impact of outliers I use a winsorized variable W_ROA that has been derived by setting the top and the lowest 5% of the observations to the 5th and 95th percentile of ROA, respectively. The average tax rate in the home country of the German subsidiary is 34.7%. The variable CT_SPREAD has been formed by identifying the maximum and the minimum values of the effective statutory corporate tax rate CT across all observations of a given subsidiary and taking the difference for this subsidiary.[10] The average (weighted by firm observations) of CT_SPREAD is 4.4 percentage points and gives a measure for the variation in the tax rates of the parent companies.[11] WHOLLY is an indicator variable with value one if the foreign investor holds 100 percent of the German firm and zero otherwise. This variable is also used to create interactive variables. CT_WHOLLY takes on the value of the home country tax rate if the subsidiary is wholly owned, and zero otherwise. Analogously, CTGER_WHOLLY results from multiplying the German corporate tax rate with the variable WHOLLY. DEBT_RATIO is defined as the ratio of debt to total assets that in some cases exceeds 100 percent. This can occur if the firm under consideration has loss carry forwards. To limit the impact of those outliers, the regressions use a winsorized variable, W_DEBT_RATIO.

[10] In cases in which investors from different countries own a German corporation I used the rate for the largest investor. The tax rate employed includes also average or representative local income taxes. It abstracts from tax base effects since optimal profit shifting decisions of profitable firms are independent of tax base effects.

[11] There are two possible reasons for a change in CT in the empirical framework used. A first one applies if a given parent faces a changed corporate tax. A second one is given if the German subsidiary is sold to another parent that faces a different tax rate. Restricting the sample to subsidiaries that had no change in the identity of the parent leaves the regressions results below virtually unchanged.

Table 4: Descriptive statistics of German inbound sample (1996-2003)

Variable	Observations	Firms	Average	Std.deviation	Min	Max
ROA	17636	3776	5.6%	12.8%	-407.2%	321.1%
W_ROA	17636	3776	5.3%	7.1%	-5.1%	23.0%
CT	17636	3776	34.7%	7.2%	0.0%	58.6%
CT_SPREAD	17636	3776	4.4	5.1	0.0	33.6
WHOLLY	17636	3776	0.71	0.45	0	1
CT_WHOLLY	17636	3776	24.7%	16.9%	0.0%	58.6%
CTGER_WHOLLY	17636	3776	33.2%	22.4%	0.0%	56.8%
DEBT_RATIO	17636	3776	59.1%	30.6%	0.0%	512.4%
W_DEBT_RATIO	17636	3776	58.2%	26.8%	8.6%	98.2%

Since random effects models did not pass a Hausman test, the tax effects were estimated using a fixed effects model. Table 5 reports the regression results. The German tax rate could not be entered in the model as all firms are subject to the same rate in a given year and year fixed effects are also included. Model (1) starts with a parsimonious specification using the foreign tax rate, fixed firm and time effects, plus the logarithms of employment, sales, and fixed assets.[12] Our variable of prime interest, CT, turns out significant at the six percent level. The coefficient of 0.05 implies that an increase in the tax rate of the parent by ten percentage points increases the return on assets of a German subsidiary by half a percentage point, which amounts to roughly ten percent of the average profitability in the sample. This evidence is compatible with profit shifting behavior and Proposition 1. Employment does not enter significantly, while sales enter significantly positive. The size of fixed assets enters negatively, which may result from large depreciation allowances of investing firms.

Model (2) uses the same specification but adds the variable W_DEBT_RATIO. Since additional debt increases the interest cost of a subsidiary, the significant negative coefficient is in line with expectations. Inclusion of the debt ratio leads only to a small change in the coefficient of CT. Changes in the profit shifting activities that are induced by a change in CT seem to not result from the use of debt. This is in line with the previous observation that the

[12] To be precise, the value for fixed assets also includes intangible assets as these are compounded in the Bundesbank questionnaires.

parent tax rate does not influence the leverage decision of foreign owned subsidiaries in Germany (Ramb and Weichenrieder 2005).

According to Proposition 1, the effect of co-owners on the impact of a change in tax rates is unclear. Models (3) and (4) include variables that are constructed by interacting the German and the foreign tax rates with the dummy WHOLLY. The objective is to empirically investigate whether co-ownership matters for the size of the tax effects. The effect of ownership on the size of the tax effects turns out to be not only theoretically undetermined but also empirically insignificant. Finally, the insignificance of WHOLLY does not suggest that the net of tax profitability changes if firms have a change from partial to full ownership by a foreign investor.

Table 5: Foreign tax rate and domestic profitability

	(1)	(2)	(3)	(4)
CT	0.05	0.044	0.065	0.051
	[0.05]*	[0.08]*	[0.05]**	[0.10]
CT_WHOLLY			-0.023	-0.013
			[0.55]	[0.73]
CTGER_WHOLLY			6.67E-03	0.016
			[0.78]	[0.45]
WHOLLY			9.24E-03	1.01E-03
			[0.53]	[0.94]
LN_EMPLOYMENT	-1.14E-04	-7.20E-05	-1.11E-04	-7.08E-05
	[0.81]	[0.89]	[0.81]	[0.89]
LN_SALES	1.21E-03	1.30E-03	1.22E-03	1.31E-03
	[0.00]***	[0.00]***	[0.00]***	[0.00]***
LN_FIXEDASSETS	-2.02E-03	-9.30E-04	-2.02E-03	-9.33E-04
	[0.00]***	[0.06]*	[0.00]***	[0.05]*
W_DEBT_RATIO		-0.156		-0.156
		[0.00]***		[0.00]***
Observations	17636	17636	17636	17636
Firms	3776	3776	3776	3776
adj. R-squared	0.39	0.58	0.52	0.58
Country clusters	51	51	51	51

Annotations: ***significant at 1%-level, **significant at 5%-level, *significant at 10%-level. P-values in brackets are based on robust t-statistics (corrected for correlations within country cells and within firm cells). Dependent variable: W_ROA. All regressions contained a full set of time and firm fixed effects; coefficients are not reported. W_DEBT_RATIO and W_ROA have been winsorized. To avoid losing firms with zero employment, sales, or fixed assets in some year, I added a small constant before taking logs.

6. The profitability of German outbound FDI

I now turn to the outbound side of German FDI. Given the high German tax rates a major concern is that German multinationals have an incentive to shift profits abroad to repatriate these profits as a tax free dividend. This is a concern that corresponds to the Case B in Section 3.

Of course a straightforward approach would be to test whether foreign taxes influence the pre-tax profitability of German owned foreign subsidiaries. The problem in doing so is that the Bundesbank database only contains net-of-tax profits. Therefore, it is impossible to identify whether a reduction in a foreign affiliate's observed return is due to a change in profit shifting activities or is simply caused by higher taxation at constant pre-tax

earnings. However, there is another prediction of the model in Section 3 that indeed can be tested. If the incentives are to shift profits abroad, then, according to Proposition 2, co-ownership should lead to a reduced impact of the foreign tax rate if co-ownership by itself has no impact on profitability. This contrasts with the case in which co-investors have an incentive to resist to profit shifting and the cost of profit shifting was assumed to increase in the amount of profit shifting.

Table 6: Descriptive statistics of German outbound sample (1996-2003)

Variable	Observations	Firms	Average	Std.deviation	Min	Max
ROA	75436	17555	7.0%	17. 8%	-210%	3699%
W_ROA	75436	17555	6.6%	7.5%	-3.5%	25.1%
CT_WHOLLY	75436	17555	23.4%	16.3%	0	58.6%
CT_PARTLY	75436	17555	10.2%	16.1%	0	58.6%
CT_SPREAD	75436	17555	3.6	4.3	0	33.6
CTGER_WHOLLY	75436	17555	32.0%	22.0%	0	56.8%
WHOLLY	75436	17555	0.70	0.46	0	1
W_DEBT_RATIO	75436	17555	51.2%	29. 8	0	1267%

Table 7: Differential effects of the host country tax rate

	(1)	(2)
CT_WHOLLY	-0.075	-0.058
	[0.07]*	[0.14]
CT_PARTLY	-0.031	-0.029
	[0.42]	[0.44]
CTGER_WHOLLY	0.027	0.027
	[0.17]	[0.14]
WHOLLY	-0.002	-3.57E-03
	[0.87]	[0.70]
LN_EMPLOYMENT	5.74E-04	8.59E-04
	[0.06]*	[0.01]***
LN_SALES	2.16E-03	2.43E-03
	[0.00]***	[0.00]***
W_DEBT_RATIO		-0.109
		[0.00]***
LN_FIXEDASSETS	-2.55E-03	-2.00E-03
	[0.00]***	[0.00]***
GDPGROWTH	1.81E-03	1.85E-03
	[0.00]***	[0.00]***
DOMPRIVCRED	-6.16E-05	-3.40E-05
	[0.33]	[0.54]
Observations	75436	75436
Firms	17555	17555
Country clusters	68	68
Adj. R-squared	0.57	0.61
Test CT_WHOLLY – CT_PARTLY = 0	-0.041	-0.029
	[0.08]*	[0.25]

Annotations: ***significant at 1%-level, **significant at 5%-level, *significant at 10%-level. P-values in brackets are based on robust t-statistics (corrected for correlations within country cells and within firm cells). Dependent variable: W_ROA. All regressions contained a full set of time and firm fixed effects; coefficients are not reported. W_ROA and W_DEBT-RATIO are winsorized versions of ROW and DEBT-RATIO. To avoid losing firms with zero employment, sales, or fixed assets in some years, I added a small constant before taking logs.

Like in Section 5, I concentrate on subsidiaries that on average show a positive profitability. Table 6 gives the summary statistics for important variables. Like on the inbound side, the return on total assets shows a huge variation that is obviously unrelated to taxation and the regressions below will therefore use the winsorized variable W_ROA. CT is now characterizing the corporate tax rate applicable to profits of the German-owned subsidiary abroad. Using the dummy WHOLLY that takes on the value one if the German

investor holds a 100% participation, I created the variable CT_WHOLLY = CT * WHOLLY and CT_PARTLY = CT * (1 – WHOLLY). Of course, the impact of both these variables is expected to be negative: an increased tax rate should reduce the net of tax profitability as long as tax broadening does not overcompensate.[13] However, Proposition 2 suggests that the coefficient of CT_WHOLLY should be more negative than CT_PARTLY if the profitability of firms does not depend on the existence of co-investors.

Table 7 contains two regression results using fixed effects models. While model (2) contains a variable for the leverage of the subsidiary, column (1) omits such a variable. Apart from this, there are no differences in the specifications.

The variable for ownership structure, WHOLLY, is far from being significant. At the same time, the coefficient of CT_WHOLLY is twice as large as the coefficient for CT_PARTLY in model (1), which is then compatible with Proposition 2. Unfortunately, the coefficient CT_PARTLY has a large standard error and the hypothesis that the coefficients of CT_PARTLY and CT_WHOLLY are identical can only be rejected at the 8 percent level.

Like in Section 5, the German tax rate cannot be tested when time fixed effects are included as it is identical for all firms in a given year. The variable CTGER_WHOLLY measures the differential effect of the German tax rate for wholly owned subsidiaries as compared to non-wholly owned subsidiaries. It shows a positive sign but is not significant at the ten percent level.

Unlike in the inbound sample, LN_EMPLOYMENT has a positive effect on profitability, while the control variables LN_SALES and LN_FIXEDASSETS have a corresponding sign: positive for sales and negative for the amount of fixed assets.[14] Finally, two variables are added that represent the macroeconomic situation in the host country. GDPGROWTH enters positively: subsidiaries in high growth countries are enjoying a significantly higher return on assets. DOMPRIVCRED, which measures the domestic

[13] I do not observe information on the tax base of foreign subsidiaries.
[14] Like on the inbound side, LN_FIXEDASSETS include intangible assets as these are compounded in the Bundesbank questionnaires.

private credit to GDP and captures the liquidity of local loan markets, does not show up to be significant.

If the difference in the coefficients of CT_WHOLLY and CT_PARTLY is interpreted as evidence in favor of profit shifting activity the question arises as to how much this profit shifting may be due to a different financial structure. Since the dependent variable is a measure of the return on total assets, interest on additional debt, which an increased local tax rate may induce, will reduce profits and decrease this measure. Inclusion of a variable for the debt to asset ratio in model (2) should control for this latter effect. Indeed the inclusion of DEBT_RATIO decreases the estimated coefficient of CT_WHOLLY and reduces its significance. While the coefficient of CT_PARTLY stays unaffected, the test of a difference of the two variables changes from borderline significance to complete insignificance. These changes suggest that a sizable part of the profit reaction that is induced by a lower foreign tax rate CT results from a reduced leverage. These results are fully compatible with the finding of Mintz and Weichenrieder (2005) that the foreign tax rates significantly influences the intra-company loans granted by a German parent, but much less so if the foreign subsidiary is co-owned by other investors.

7. German-owned U.S. subsidiaries and subsidiaries in third countries

One potential shortcoming of the above analysis is the assumption that the multinational consists of only two units: a parent and a subsidiary. On the inbound side the assumption is owed to data limitations. The database MiDi contains only subsidiaries that are located in Germany. On the outbound side, the data availability is somewhat better. While the database does not contain firm level information on the German parent, it collects data on all affiliates owned by a German parent firm and information on one subsidiary can be linked with

information on another subsidiary that is held by the same parent.[15] In the present section I will use this opportunity of linking information on affiliated companies to look at the influence of tax rates in third countries. More precisely, I will look at the question whether the profitability of German-owned U.S. subsidiaries depends on the tax treatment of affiliated firms in countries other than Germany or the U.S. Such a finding would suggest that subsidiaries in third countries are used as profit shifting devices by German parents. Putting the attention to German investment in the U.S. is tempting for several reasons. First, the U.S. is by far the most important host country for German multinationals accounting for roughly a third of total assets of German-owned non-financial subsidiaries. Second, the profitability of foreign-owned subsidiaries in the U.S. has been a major concern, but the empirical analysis so far has relied only on U.S. data. Table 8 shows the number of observations of U.S. non-financial corporations that are available for the analysis in the period 1996-2003.

Table 8: German non-financial subsidiaries in the U.S.

Year	No. of directly held subsidiaries	No. of indirectly held subsidiaries
2003	993	884
2002	1053	901
2001	1105	927
2000	1056	892
1999	920	788
1998	821	615
1997	806	587
1996	734	521

Information on the profitability of these firms is presented in Figure 4. It looks very similar to the general picture on the profitability of German outbound FDI as presented in Figure 2.

[15] Information on affiliated corporations cannot be linked, however, if there are two separate German parents that are jointly owned by another German corporation as the database would not allow tracing the ownership chain within Germany.

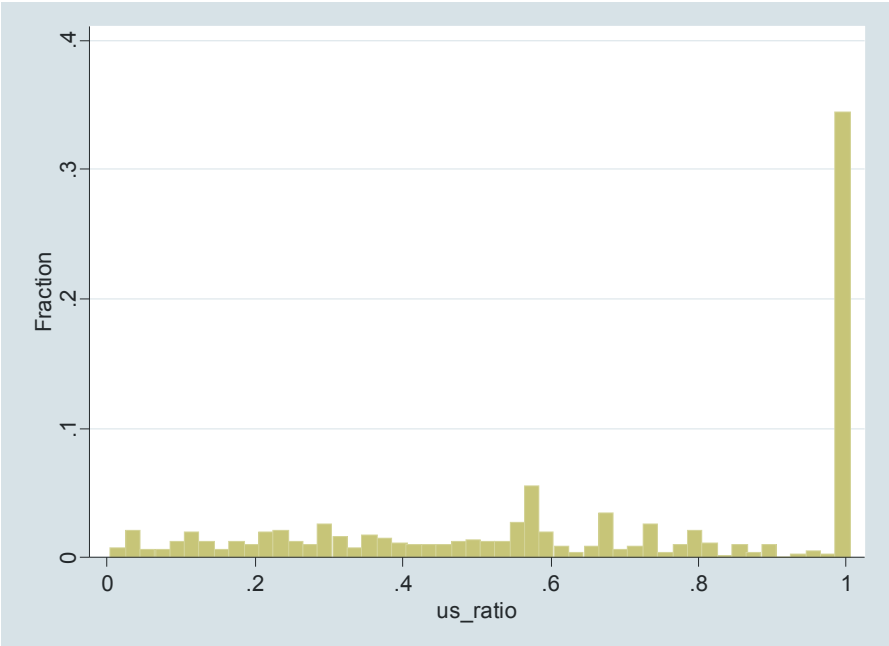
Figure 4. The profitability of German subsidiaries in the U.S. (ROA)

Annotation: The bold line indicates the return on assets of the median non-financial firm. The two lines below the median line characterize the profitability of the 5th and 25th centile firms; the two lines above the median ratio indicate the 75th and 95th centiles.

Figure 5 gives an impression of the relative importance of non-U.S. assets held by German parent firms of non-financial U.S. subsidiaries. The x-axis plots the fraction of U.S. assets of a German parent firm to total foreign assets of this parent (us_ratio), where assets are measured by balance sheet total.[16] The y-axis shows the fractions of firms that fall into 2-percentage-point intervals. In 2003, roughly a third of the German parents held a U.S. subsidiary but no subsidiary from another country. For the remaining part of the German parent firms, the relative value of U.S. assets to third country assets was pretty uniformly distributed in the range between 0 and 1.

[16] For the purpose of this section, U.S. assets include the assets of non-financial firms (our objects of interest), while in third countries I also count in the assets of financial corporations as these may play a role in profit shifting activities.

Figure 5. The share of U.S. assets in total assets (2003)



I constructed four different tax measures to capture a possible influence of affiliates in third countries. First, CT_MIN_AFF is defined as the lowest tax rate among subsidiaries of the same German parent (but outside Germany and the U.S.). For example, if U.S. based firm A1 has a German parent, say A, which owns other subsidiaries in Greece and Brazil, then CT_MIN_AFF takes on the lower of the Greek and Brazilian tax rates. In cases, in which the parent owns only U.S. subsidiaries, the value of CT_MIN_AFF is missing. This has the effect that using CT_MIN_AFF drops all observations where the U.S. subsidiary faces no affiliated company outside Germany and the U.S. To circumvent this property I alternatively tested a variable CT_MIN_AFF2, which takes on the value of the German corporate tax rate in these cases. There are pros and cons about using CT_MIN_AFF2 rather than CT_MIN_AFF. A failure to observe affiliated firms outside the U.S. may result from more involved ownership chains within Germany. For example, there may be a German firm B owning a German firm A, which in turn holds the U.S. based firm A1. From the database one can only say whether A owns foreign subsidiaries outside Germany. It is not possible to detect firm B, and therefore we have no knowledge about B's foreign subsidiaries that may

act as A1's partners in profit shifting. By using CT_MIN_AFF instead of CT_MIN_AFF2 one excludes those multinationals that establish a separate German holding company for each foreign affiliate.[17] This should decrease the number of cases in which we erroneously conclude that there is no affiliated corporation outside the U.S. but indeed there is. On the other hand, by using CT_MIN_AFF rather than CT_MIN_AFF2 we may drop observations for which the assumption that there are no affiliated firms outside the U.S. is correct.

I also tested a variable CT_AVG_AFF, which was formed similarly to CT_MIN_AFF, but instead of using the *lowest* corporate tax rate faced by an affiliated firm outside Germany and the U.S. I calculated the *average* tax rate among the non-U.S. affiliates with balance sheet total acting as the relevant weight. Like CT_MIN_AFF2, CT_AVG_AFF2 uses the German rate in cases where no affiliated firm outside the U.S. is in the database.[18]

Some countries have quite sizeable corporate tax rates but nevertheless may act as hosts to tax saving vehicles. Belgium, Luxemburg, and the Netherlands are examples for well-known locations for financial services corporations that offer special tax benefits targeted at multinationals.[19] I therefore constructed a tax haven dummy TAX_HOL, which takes on the value one if a U.S. subsidiary is affiliated with a corporation in such a country. The set of countries that qualify for TAX_HOL = 1 was collected by a heuristic rule. It contains all top ten countries for German FDI in 2002 when investment is measured by total assets, but drops all countries that are among the top ten countries when FDI instead is measured by jobs in German-owned corporations. This leaves us with Belgium, Ireland, Luxembourg, the Netherlands, and Switzerland, for which TAX_HOL = 1, and TAX_HOL = 0 for all other countries.

[17] As mentioned above, I am not able to identify affiliated German parents.
[18] Missing any information on the characteristics of the German parent firm, I cannot use size information on the parent for calculating an average tax rate.
[19] For a discussion, see Mintz (2004).

Since a Hausman test always rejected the use of random effects, Table 9 reports results from a fixed effects model. Like in the previous sections I selected those subsidiaries that on average across year observations had a positive profitability. The endogenous variable again is return on total assets, which has been winsorized to limit the role of outliers. The tax variables used in this model where CT_MIN_AFF and TAX_HOL. Both variables are insignificant and even show the wrong sign, which, if taken seriously, would suggest that a lower tax rate of an affiliated outside the U.S. is increasing reported U.S. profits. To cut short, also different specifications provided no evidence that low taxes on affiliated corporations in third countries are negatively affecting reported profitability in the U.S. Using CT_MIN_AFF2, CT_AVG_AFF, or CT_AVG_AFF2 produced similarly insignificant results.

Table 9: U.S. profitability and affiliated subsidiaries

CT_MIN_AFF	0.002
	[0.91]
TAX_HOL	4.01E-03
	[0.32]
LN_EMPLOYMENT	1.45E-03
	[0.02]**
LN_SALES	1.33E-03
	[0.00]***
LN_FIXEDASSETS	-1.66E-03
	[0.00]***
Observations	5780
Subsidiaries	1464
Adj. R-squared	0.41

Annotations: ***significant at 1%-level, **significant at 5%-level, *significant at 10%-level. P-values are in brackets. Dependent variable: W_ROA of U.S. subsidiaries. All regressions contained a full set of time and firm fixed effects; coefficients are not reported. W_ROA has been winsorized at the five percent tails. To avoid losing firms with zero employment, sales, or fixed assets in some years, I added a small constant before taking logs.

While tax variables prove insignificant, the additional control variables LN_EMPLOYMENT, LN_SALES, and LN_FIXEDASSETS have rather similar

coefficients to those found in Section 6: an increase in fixed assets again reduces profitability, while increases in sales and employment are positively associated with profitability.

8. Summary

The paper has taken several approaches to identify profit shifting behavior. In a first step, it has looked at the correlation between the home country tax rate of a parent and the net of tax profitability of its German subsidiary. The finding is compatible with profit shifting behavior. For profitable subsidiaries the evidence suggests that a 10 percentage point increase in the parent's home country tax rate leads to half a percentage point increase in the profitability of the German subsidiary.

In a second step the paper has analyzed German outbound FDI. Given the high tax rates of German parents by international standards, the profitability of German-owned subsidiaries abroad may benefit from profit shifting. Since pre-tax profits are not observed in the German FDI data, the empirical test looks at whether the local tax rates of German-owned subsidiaries have a stronger impact on wholly-owned subsidiaries. While such a differential effect seems to be the case if leverage is excluded as an explanatory variable, the distinction between wholly-owned and partly-owned subsidiaries is blurred if leverage enters the regression. This suggests that changes in loans are relatively important instruments when subsidiaries have to react to local tax rate changes.

Finally, the paper has looked at the linkage between the profitability of German-owned subsidiaries in the U.S. and the existence of affiliated corporations in low tax countries. The exercise has provided no evidence that third-country subsidiaries of a German parent are used as profit shifting vehicles at the expense of a lower profitability in the U.S.

Bibliography

Bartelsmann, E.J. and R.M. Beetsma (2003), "Why pay more? Corporate tax avoidance through transfer pricing", Journal of Public Economics 87, 2225-2252.

Buettner, T. and M. Ruf (2004), Tax incentives and the location of FDI: Evidence from a panel of German multinationals, ZEW Discussion Paper No. 76-04.

Caves, R.E. (1982), "Multinational enterprise and economic analysis. Cambridge: Cambridge University Press.

Collins, J.H., D. Kemsley, and D.A. Shackelford (1997), "Transfer pricing and the persistent zero taxable income of foreign-controlled U.S. corporations", Journal of the American Taxation Association 19 (Suppl.), 68-83.

Collins, J.H. and D.A. Shackelford (1998), " Global organizations and taxes: An analysis of the dividend, interest, royalty, and management fee payments between US multinationals' foreign affiliates", Journal of Accounting and Economics 24, 151-173.

de Mooij, R. (2005), "Will corporate income taxation survive?", DE Economist 153, 277-301.

Desai, M.A., C.F. Foley, and J.R. Hines (2004), "The cost of shared ownership: Evidence from international joint ventures", Journal of Financial Economics 73, 323-374.

Dworin, L. (1990), "Transfer pricing issues", National Tax Journal 43, 285-291.

Elitzur, R. and J. Mintz (1996), "Transfer pricing rules and corporate tax competition", Journal of Public Economics 60, 401-422.

Gruber, H. and J.H. Mutti (1991), "Taxes, tariffs and transfer pricing in multinational corporate decision making", Review of Economics and Statistics, 73, S. 285-293.

Grubert, H., T. Goodspeed, and D. Swenson (1993), "Explaining the low taxable income of foreign-controlled companies in the United States", in A. Giovannini, R.G. Hubbard, and J. Slemrod (eds.), Studies in international taxation. Chicago: University of Chicago Press, 237- 275.

Harris, D. (1993), "The impact of U.S. tax law revision on multinational corporations' capital location and income-shifting decisions", Journal of Accounting Research 31 (Supplement), 111-140.

Harris, D., Morck, R., Slemrod, J., and B. Yeung (1993) "Income shifting in U.S. multinational corporations", in: A. Giovannini, R.G. Hubbard and J. Slemrod (eds.) Studies in international taxation. Chicago: University of Chicago Press, 277-307.

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.

Huizinga, H. and L. Laeven (2005), International profit shifting within European multinationals. Working Paper, Tilburg University.

Jacob, J. (1996), "Taxes and transfer pricing: Income shifting and the volume of intra firm transfers", Journal of Accounting Research 34, 301-312.

Kant, C. (1988), "Foreign subsidiary, transfer pricing and tariffs", Southern Economic Journal 55, 162-170.

Klassen, K., M. Lang, and M. Wolfson (1993), "Geographic income shifting by multinational corporations in response to tax rate changes", Journal of Accounting Research 31, 141-173.

Lipponer, A. (2003), "Deutsche Bundesbank's FDI Micro Database", Schmollers Jahrbuch – Zeitschrift für Wirtschafts- und Sozialwissenschaften 123, 593–600.

Mansori, K. and A.J. Weichenrieder (2001), "Tax competition and transfer pricing disputes", Finanzarchiv 58, 1-11.

Mintz, J. (2004), "Conduit entities: Implications of indirect tax-efficient financing structures for real investment", International Tax and Public Finance 11, 419-431.

Mintz, J. and A.J. Weichenrieder (2005), Taxes and the financial structure of German outbound FDI, CESifo Working Paper.

PricewaterhouseCoopers (2002), Corporate Taxes 2002-2003. Worldwide Summaries.

Ramb, F. and A.J. Weichenrieder (2005), "Taxes and the financial structure of German inbound FDI", Review of World Economics (Weltwirtschaftliches Archiv) 141, 670-692.

Rousslang, D.J. (1997), "International income shifting by US multinational corporations", Applied Economics 29, 925-934.

Schjelderup, G. and A.J. Weichenrieder (1999), "Trade, multinationals, and transfer pricing regulations", Canadian Journal of Economics 32, 817-834.

Wheeler, J.E. (1988), "An academic look at transfer pricing in a global economy", Tax Notes, (July 1988), 87-96.