The Effects of Multinationals' Profit Shifting Activities on Real Investments

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Non-Technical Summary

Investment decisions of multinational companies are affected by international tax rate differentials. Furthermore, multinationals have enhanced tax planning opportunities by means of cross-country profit shifting. Until now only very few studies have combined profit shifting activities and related investment effects. Therefore, this paper aims to provide an empirical insight into the interaction between profit shifting activities and real investment decisions. In particular, the question whether the size of multinationals' real investments at high-tax locations is affected by taxation of shifted profits is analyzed.

It can be expected that profit shifting activities lead to smaller tax payments and thus, competitive advantages arise. A simple theoretical model which examines profit shifting and investment decisions of a multinational company is used to obtain empirical implications. The theoretical analysis shows that tax rates abroad impact the cost of capital in the presence of profit shifting activities. The respective size of investment should theoretically increase with a decreasing tax rate at a foreign affiliate, towards which profits are shifted.

An empirical analysis is based on the *MiDi* database, a comprehensive micro-level panel database of virtually all FDI projects in Germany, made available for research by the German central bank (*Deutsche Bundesbank*). A specific advantage for the empirical analysis lies in the fact that, due to the high German tax level, profit distribution of foreign subsidiaries is always tax exempt at the owner's home country. Therefore, without profit shifting a negative impact of higher taxation abroad on investment levels in Germany is not expected. The empirical analysis, based on a panel of German inbound investments, confirms a positive tax response of real investments with a decreasing tax rate at the foreign direct investor's location. Hence, the results suggest that the size of foreign investments in a high-tax country is positively affected by lower taxation of shifted profits.

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Abstract: This paper investigates whether the size of multinationals' real investments in a high-tax country is affected by profit shifting activities. A simple theoretical analysis shows that tax rates abroad impact the cost of capital in the presence of profit shifting activities of multinational companies. As profit shifting opportunities constitute a competitive advantage, the respective size of investments should theoretically increase if profits can be shifted to a lower taxing country. An empirical analysis, based on a panel of German inbound investments, confirms a positive tax response of real investments with a decreasing tax rate at the foreign direct investor's home country. Hence, the results suggest that the size of foreign investments in a high-tax country is positively affected by lower foreign taxation of shifted profits.

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1 Introduction

International tax planning of multinational companies seems to be of great significance, given the fact that international differences in business taxation are very distinct. Real investment decisions in particular seem to be affected by international differences in business taxation. Moreover, cross-country profit shifting activities of multinationals can be expected. The latter are known for inducing consequences for tax revenues. Hence, governments attempt to restrict profit shifting opportunities. From a theoretical point of view, however, adverse consequences for the level of investment in high-taxing countries can be expected, which may also intensify tax-competition (see *e.g.* Keen, 2001; Peralta, Wauthy and van Ypserle, 2006). Therefore, this paper aims to provide an empirical insight into the interaction between profit shifting activities and real investment decisions. In particular, the question whether the size of multinationals' real investments in high-tax locations is affected by taxation of shifted profits is analyzed.

Previous empirical literature confirms significant effects of company taxation on business decisions. In particular, the effects of corporate taxation on multinationals' foreign direct investment decisions have been analyzed extensively. This literature confirms significant negative effects of the host country's tax level on the size and the frequency of FDI.[1] Furthermore, there is strong evidence that, apart from real investment decisions, multinationals' behavior is affected by international taxation.[2] This applies to cross-border shifting of paper profits in particular, which is confirmed by previous empirical work. Several studies such as Altshuler and Grubert (2003) or Desai, Foley and Hines (2004) show that financial structures are used as a profit shifting tool. Furthermore, there is evidence that multinationals' transfer pricing is also tax driven (Clausing 2003, 2006; Grubert, 2003).

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[1]A comprehensive survey and meta analysis based on 25 previous studies is provided by De Mooij and Ederveen (2003). This work has recently been updated by De Mooij and Ederveen (2005).

[2]Detailed surveys concerning empirical evidence on several aspects of companies' international tax planning behavior are provided by Hines (1999) and Devereux (2006).

The success of such shifting strategies is confirmed by studies, which ascertain that the reported profitability of multinationals' affiliates is negatively affected by the level of the local tax rate (See *e.g.* Hines and Rice, 1994; Huizinga and Laeven, 2007).

Until now only very few studies have combined profit shifting activities and related investment effects. Several studies focus on profit shifting activities and the related effects on the size and probability of multinationals' investments at typical tax havens. Hines and Rice (1994), Grubert and Slemrod (1998) as well as Desai, Foley and Hines (2006) analyze the effects of profit shifting activities on US investments in tax havens. Thus, previous empirical analysis provides evidence for significant profit shifting and also for significant investment effects on affiliates, which are used as targets of shifted profits. However, empirical studies dealing with the expected corresponding investment effects in high-tax countries are still rare. Grubert (2003) finds that US multinationals with higher-than-average profit shifting activities choose locations with extreme tax levels. These companies prefer locations in countries, which exhibit either extremely low or extremely high tax levels. The preference for tax-havens stems from the need for locations as tax shelter subsidiaries. By contrast, the higher attractiveness of high-tax locations for multinationals can be explained by competitive advantages as a result of profit shifting opportunities. With regard to investment levels at existing locations of multinational groups, Buettner et al. (2006) confirm for German multinationals negative effects of thin-capitalization rules, which constitute a restriction on profit shifting by means of inter-company finance, on investment levels.

This paper aims to provide additional insight into the effects of profit shifting opportunities on investment behavior of multinationals in a high-tax country. The analysis is focussed on the effects of profit shifting on investment levels rather than on location decisions. A simple theoretical analysis shows that tax rates abroad impact the cost of capital in the presence of profit shifting activities of multinational companies. The respective size of investment should theoretically increase with a decreasing tax rate at a foreign affiliate,

towards which profits are shifted. The empirical analysis is based on the *MiDi* database, a comprehensive micro-level panel database of virtually all FDI projects in Germany, made available for research by the German central bank (*Deutsche Bundesbank*). Germany as a host country for FDI is of interest for several reasons. First of all, the German statutory company tax rate is almost the highest in the world. Hence, there are high incentives to shift profits out of Germany.[3] Secondly, Germany is the biggest economy in Europe and an important location for FDI, *e.g.* from the US. Finally, due to European directives, profit shifting towards other European countries is not restricted by adverse withholding taxes.

A specific advantage for the empirical analysis lies in the fact that, due to the high German tax level, profit distribution of foreign subsidiaries is always tax exempt at the owner's home country. Therefore, without profit shifting we would by no means expect a negative impact of higher taxation at home on investment levels in Germany. However, in the presence of profit shifting activities between a foreign owner and a German affiliate, a negative effect of an increasing tax rate at the parent company's location on the investment level of the German affiliate can be expected. By using firm-level data, we can confirm that a company's investment level increases significantly with a decreasing tax rate of the direct foreign owner. Hence, the results suggest that investments in a high-tax country are significantly affected by a competitive advantage due to profit shifting activities.

The paper is structured as follows. In section 2, a theoretical model examines profit shifting and investment decisions of a multinational corporation, from which empirical implications are derived. Section 3 empirically tests the implication that investment levels are responsive to tax rates in the owner's country. Lastly, section 4 concludes.

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[3]Germany's tax revenues from company taxation are comparatively low (European Communities, 2005), which can be taken as a hint that multinationals shift profits in practice.

2 Theoretical Background

2.1 A Model of Profit Shifting and Investment

The impact of profit shifting activities and real investment decisions of a multinational company can be described via a simple company model with only two locations. The parent company is denoted by 1 and the controlled affiliate by 2. The affiliate's profit, π_2, is determined by output $f_2(k_2)$, whereas k_2 is the amount of capital invested at the foreign location. Typical characteristics of the production function are assumed as $f_{2,k}(k_2) > 0$; $f_{2,kk}(k_2) < 0$. We assume opportunity costs of capital, denoted by r. Furthermore, the company can shift a share of the affiliate's profit to the parent company's location. In practice, a multinational has several options for effecting this shift, for example, by means of interest payments for internal loans or tax-optimal transfer prices for intra-firm sales. It is reasonable to assume that the amount of profits shifted is related to the size of the affiliate's business activity, i.e. to the amount of invested capital.[4] The shifting amount per capital unit is denoted by λ_2. The statutory tax rate of the affiliate's location, t_2, is avoided by profit shifting activities. Correspondingly, the shifted amount is taxed by the statutory tax rate at another location, for example, at the parent company location's statutory tax rate, t_1.[5] Hence, the profit after taxes deviates by $(t_2 - t_1)\lambda_2 k_2$.

Additionally, it is reasonable to consider some costs which depend on the level of intra-firm profit shifting. The costs for inter-company loans, for instance, might arise from tax as well as non-tax constraints, such as costs arising from asymmetric information and agency

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[4]A commonly applied tool is, for example, internal debt shifting. In this case, λ represents the share of intra-company-debt-to-assets multiplied with the interest rate paid for the internal credit.

[5]Withholding taxes on profit shifting are not considered. For example, the withholding taxes on interest payments are typically low and can be credited against the lender's corporate tax. However, in the case of German data, which is used in the empirical analysis, no withholding taxes are imposed on interest payments.

costs (see Jensen and Meckling, 1976; Myers, 1977). Furthermore, the risk increases that interest deduction will no longer be approved for tax purposes. With regard to tax-optimal transfer pricing of intra-firm deliveries, it is reasonable to assume that the probability of punishment, tax advisory costs and economic inefficiencies rises with an increasing deviation from the optimal transfer price before-taxes. The economic inefficiencies seem to be of particular importance, since transfer prices and intra-firm markets are typically used as instruments of a non-central coordination and incentive system for the local management (see *e.g.* Baldenius et al., 2004). Hence, we assume a convex cost function, $c_2(\lambda_2)$.[6]

There are several non-tax reasons to use transactions, which effect profit shifting between affiliates. For example, inter-company debt is used for short-term cash management between parent and affiliate, or as an instrument to control the local management by fixed annual interest payments (Jensen, 1986). Therefore, a concave utility function, $g_2(\lambda_2)$, is assumed.[7]

Thus, the following profit function for investments in the foreign affiliate can be obtained

$$\pi_2 \;=\; f_2(k_2)(1-t_2) - k_2 r + [(t_2 - t_1)\lambda_2 - c_2(\lambda_2) + g_2(\lambda_2)]k_2. \tag{1}$$

This profit function is relevant in the case of an exemption system for the repatriation of foreign dividends. In this case, the tax level of the affiliate is final. This holds true for investors from most European countries and Canada. By contrast, in the case of a tax system based on a worldwide tax base like the US system, the foreign profits are taxed by t_1 at the parent's location, when they are repatriated. Foreign taxes can be credited against these tax payments. However, a credit system effectively becomes an exemption system if the foreign tax level is higher than the tax level at home.[8] With regard to

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[6] $\frac{dc_2}{d\lambda_2} > 0, \quad \frac{d^2 c_2}{d\lambda_2^2} > 0.$

[7] $\frac{dg_2}{d\lambda_2} > 0, \quad \frac{d^2 g_2}{d\lambda_2^2} < 0.$

[8] It should be emphasized that an excess credit does not affect the tax-sensitivity of investments in

our empirical analysis, based on foreign affiliates in Germany from 1996 until 2005, the combined tax level consisting of the German company taxation and additional withholding taxes on profit distribution is always higher than taxation at home.[9]

When considering equation (1), it becomes obvious that intra-firm profit shifting between the foreign affiliate and the parent company affects after-tax profits. Hence, one would expect the share of foreign profits that are shifted internally, λ_2, and the amount of capital invested at the foreign location, k_2, to be responsive to tax rate differences. Thus, in order to choose the optimum share of internally shifted profits, the following first-order condition is obtained,

$$t_2 - t_1 + g_{2,\lambda}(\lambda_2) = c_{2,\lambda}(\lambda_2). \tag{2}$$

When one takes the convex character of the cost function into account, the share of taxable profit, which is shifted internally, increases with a rising tax rate differential, $(t_2 - t_1)$. Comparative static, which is shown in the appendix, points out that the optimal shifting amount increases with a rising tax rate at the investment location, t_2, and decreases with an increasing tax rate at the owner's location, t_1, towards which the profit is shifted.

Additionally, for the optimum amount of capital invested by the affiliate 2, we obtain

$$f_{2,k}(k_2) \quad = \quad \frac{r - [(t_2 - t_1)\lambda_2 - c_2(\lambda_2) + g_2(\lambda_2)]}{(1 - t_2)}. \tag{3}$$

The expression on the right hand side of equation (3) can be interpreted as the cost of capital, i.e. as a required rate of return. A company's management should invest as much as the marginal capital productivity, $f_{2,k}(k_2)$, matches this required rate of return.

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countries, that procure an excess credit, but may affect the tax sensitivity of investment in other low-tax countries.

[9]During the considered period from 1996 until 2005 the German tax rate ranges from 43.9% to 39.4 %. These rates are significantly higher than the US tax level, for instance, irrespective of any additional withholding taxes on profit distribution between Germany and the US.

Subsequently, taxes have the following consequences: First of all, a higher local tax rate, t_2, in the denominator induces a higher cost of capital. Thus, the size of invested capital is reduced by a higher local tax rate at the investment location. Furthermore, the expression in squared brackets of equation (3) shows the effect of profit shifting activities on the cost of capital. Taking into account equation (2), the expression in squared brackets never becomes negative since the management is able to optimize the cross-country profit allocation. Hence, the cost of capital decreases if a company shifts taxable profits. For multinationals, the advantage of a lower cost of capital due to profit shifting opportunities depends on both the share of profits shifted and, in particular, on the level of the tax rates. Comparative static in the appendix highlights that the shifted amount of profit increases and the cost of capital decreases with a falling tax rate abroad. Thus, the optimal investment level should increase with a decreasing tax rate at the foreign owner's location, t_1, if profits are shifted there. Correspondingly, in the presence of profit shifting the negative effect of an increasing tax rate at the investment location, t_2, is smaller compared to cases without any profit shift. This means that, unlike cases without profit shifting, another tax rate, *e.g.* the tax rate of the corresponding parent company, becomes significant for the investment level in a high-tax host country.

2.2 Losses

The incentive to shift profits changes if the actual profit is negative or if former losses are carried forward. In this case, the immediate advantage of shifting any profit amount to another affiliate does not exist. In the context of the model presented above, the value of avoided taxes decreases significantly and tends to become zero if a loss set-off cannot be expected in the future. However, empirical identification is limited since we cannot measure profitability before profit shifting is effected in practice. Nevertheless, the presence of a loss carryforward seems to be a suitable indicator for affiliates, which have a significantly

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smaller incentive to shift profits.[10] In this case the actual profit for tax purposes becomes zero irrespective of any profit shifting activities. Thus, as a result sensitivity of investment levels concerning foreign tax rates decreases if an affiliate exhibit a loss carryforward.[11] Therefore, affiliates in a high-tax country exhibiting a loss carryforward may constitute a suitable control group for an empirical test on the effects of foreign tax rates due to profit shifting on investment.

2.3   Interposed Entities

So far, we have considered a simple two-tier company structure. In practice, company group structures are more complex. This also holds true for data used by the following empirical analysis. Table 1, for example, shows the distribution among countries of direct owners of German inbound investments, which are ultimately held by US parent companies in 2005. Additionally, Table 1 denotes that, in 2005 for example, only 62.5 per cent of US controlled affiliates in Germany are directly held by US companies. Approximately 14 per cent are indirectly held via interposed companies, which are located in the Netherlands. Moreover, Luxembourg and Switzerland are important locations for interposed entities although they are comparably small countries, whereas the United Kingdom and France are big European economies which also have significant numbers of conduit entities. If fractions are considered, which are weighted by investment stocks in fixed assets, only 44 per cent of US controlled FDI in Germany are held directly by US companies.

A number of possible management reasons might render it necessary to organize business activities in functional divisions or regional structures. Furthermore, tax reasons are im-

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[10]Considerably reduced tax sensitivities of companies exhibiting a loss carryforward with regard to financial decisions and with regard to transfer pricing are empirically confirmed by *e.g.* MacKie-Mason (1990) and Overesch (2006), respectively.

[11]See *e.g.* Edgerton (2007), who find a significantly reduced tax response of US companies' investment if companies exhibit a loss carryforward.

Table 1: US controlled FDI in Germany in 2005

Location of Direct Owner	Affiliates		Fixed Assets	
	Number of Observations	Percent	Mean per Observation (€ 1,000)	Percent
USA	513	62.48	5,649	44.14
Belgium	10	1.22	2,550	0.39
France	22	2.68	20,698	6.94
Denmark	15	1.83	5,888	1.35
Ireland	6	0.73	1,908	0.17
Luxembourg	45	5.48	5,598	3.84
Netherlands	117	14.25	19,738	35.16
Spain	11	1.34	9,305	1.56
Sweden	7	0.85	1,322	0.14
Switzerland	17	2.07	19,687	5.10
United Kingdom	44	5.36	1,730	1.16
Other Countries	10	1.22	375	0.05
Total	821	100.00	7,998	100.00

Singly incorporated affiliates in Germany in 2005 are considered whose majority is owned by a US parent company either directly or via a conduit entity. The data is taken from the *MiDi* database for multinationals provided by the German central bank (*Deutsche Bundesbank*). This is a comprehensive annual micro database of all foreign direct investment positions in Germany. See Lipponer (2006) for a detailed description of the data set. Other countries are Austria, Canada, Czech Republic, Hongkong, Italy, Japan, Netherlands Antilles, and Slovakia.

portant determinants of group structures and chains of ownership. Firstly, withholding taxes on repatriated profits can be reduced if an entity, which is located in a country offering favorable tax treaties, is interposed between parent company and affiliate. This so-called treaty-shopping strategy might explain the existence of some of the conduit companies in the Netherlands or the United Kingdom.[12] Secondly, interposed entities can be used to defer taxation of repatriated foreign income if the parent company's country taxes corporations on a worldwide tax base.[13]

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[12]No withholding tax is imposed on profit distribution from the Netherlands or the United Kingdom into the United States. Withholding taxes on dividend distribution between companies within the European Union have also been abolished. By contrast, the withholding tax rate on a direct dividend distribution from a German affiliate to a US parent company amounts to 5%.

[13]The relevance of this strategy to avoid or defer repatriation taxes is empirically confirmed by Altshuler

However, irrespective of any other reasons for setting up interposed entities, they can always be used as a shelter of profit shifting activities. Subsequently, shifted profits are taxed at the tax rate of the interposed entity.[14] For example, financial structures using an conduit entity can be used to achieve a double dip of interest deductions at the parent company and the investment affiliate (Mintz, 2004). An equity financed entity, which is lending an inter-company loan to the high-taxed investment affiliate, is interposed in a low-tax country. The proposition that conduit entities are set up as profit-shifting shelters is indirectly confirmed by previous empirical work, which has found an increasing business activity in tax havens (Grubert and Slemrod, 1998; Desai, Foley and Hines, 2006). Given that the advantage of profit shifting is not restricted to affiliates in typical tax havens, the following analysis considers interposed entities in 40 countries, mostly located in OECD and EU countries.

Finally, opportunities to take advantage of a lower foreign tax level by shifting profits may not be restricted to the parent company or conduit entities. Nevertheless, they seem to be of special relevance when considering the number of financial and business transactions between directly affiliated companies. We will restrict our empirical analysis on the tax rates of the foreign direct owners of German inbound investments, i.e. on parent companies or, respectively, interposed entities, because information about the group structure in our data set is limited.

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and Grubert (2003) as well as by Desai, Foley and Hines (2003).

[14]This argument resembles to that of Altshuler and Grubert (2003), who discovered that US multinationals use foreign companies at low-tax locations in order to retain foreign profits, which are taxed at a level below the US tax rate. By means of this strategy, the higher US taxation can be deferred. Whereas a strategy to avoid repatriation taxes might be of little importance considering the comparably high tax level in Germany, conduit entities can be used to shift profits from a high-tax country such as Germany into a lower taxed conduit entity. Consequently the high German tax level is avoided and the US tax level is at least deferred.

3 Empirical Analysis

The theoretical discussion shows that in the presence of profit shifting activities, foreign tax rates have increasing importance for investment decisions. Considering the vast amount of empirical evidence on profit shifting activities of multinationals, our empirical analysis focusses on the investment effects related to these profit shifting activities. The following empirical analysis aims at identifying the expected negative effect of an increasing foreign tax rate at the direct owner's location on the investment level in a high-taxing host country, namely Germany.

3.1 Data and Descriptive Statistics

The empirical analysis uses the *MiDi* database for multinationals, provided by the German central bank (*Deutsche Bundesbank*). This is a comprehensive annual micro database of direct investment positions of German enterprizes held abroad as well as of direct investment positions held in Germany by foreign companies. However, this analysis is only based on the data of German inbound FDI positions. The data provides annual information on the investment object's balance sheet, including further information on the type of investment and on the foreign investor.[15] The collection of the data is enforced by the German law, which set out reporting obligations for certain international transactions and positions.[16] Access to the data is only permitted if no confidential single data is published. A favorable characteristic of the data set is the possibility to trace direct investment positions of

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[15] See Lipponer (2006) for a detailed description of the data set.

[16] Sec. 26 Law on Foreign Trade and Payments (*Aussenwirtschaftsgesetz*) in connection with Foreign Trade and Payment Regulations (*Aussenwirtschaftsverordnung*). Every German affiliate held by a foreign multinational has to report its assets, including both direct FDI and indirect FDI conditional on certain threshold levels. Since 2002, inbound FDI has to be reported, if the balance sheet total of the investment object surpasses 3 million euros. For details see Lipponer (2006). Despite lower threshold levels in previous years, we apply this higher threshold level uniformly for all years in the panel.

individual firms over time. Due to the panel data structure it is possible to control for heterogeneity across companies. The version used provides firm-level panel data for the period of 1996 to 2005.

Table 2 shows the home country apportionment of the German inbound FDI data. Only incorporated inbound investments are taken into account if the ultimate parent company is located in a member state of the OECD or the European Union. Important home countries of ultimate owners are Germany's neighboring countries such as France, the Netherlands, Austria or Switzerland. Furthermore, a high number of investments is held by companies from big economies such as Japan, Canada and, of course, the US. During the period of 1996 until 2005, more than 20 per cent of the considered foreign affiliates in Germany were affiliates of US companies. Due to interposed companies, the apportionment of the direct owners' locations is different. Table 2 reveals that the Netherlands and Switzerland become more important as a location for direct owners. Correspondingly, the shares of direct owners, for example, from Japan or the United States decrease in comparison to the respective shares of ultimate owners from these countries.

Since the model deals with an enterprize optimizing the real investment of its affiliate, only observations displaying a participation level above 50 per cent are taken into account for the empirical analysis. We employ fixed assets of each affiliate as the dependent variable. The empirical analysis is based on a sample, to which only firm observations are included which display positive real investment levels in fixed assets for each year. The sample is limited to first-tier incorporated affiliates in Germany, because we will focus on effects caused by profit shifting between affiliates in Germany and their foreign direct owners.

The direct owner's foreign statutory tax rate is denoted by the variable STR. The foreign statutory tax rate represents the incentive to shift profits if an affiliate does not exhibit any loss carryforward or any current losses for tax purposes. This means that if affiliates

Table 2: FDI in Germany 1996 - 2005

	Ultimate Home Country		Direct Owner's Country	
	Number	Percent	Number	Percent
Australia	129	0.31	58	0.14
Austria	2,037	4.96	2,165	5.27
Belgium	897	2.18	1,081	2.63
Bulgaria	23	0.06	23	0.06
Canada	466	1.13	315	0.77
Cyprus	18	0.04	32	0.08
Czech Republic	71	0.17	80	0.19
Denmark	1,247	3.03	1,399	3.40
Finland	484	1.18	398	0.97
France	3,482	8.47	3,555	8.65
Germany	359	0.87	0	0.00
Greece	50	0.12	50	0.12
Hungary	37	0.09	41	0.10
Iceland	25	0.06	22	0.05
Ireland	154	0.37	174	0.42
Italy	1,579	3.84	1,321	3.21
Japan	3,733	9.08	2,939	7.15
Luxembourg	947	2.30	1,358	3.30
Mexico	4	0.01	0	0.00
Netherlands	5,074	12.35	7,945	19.33
New Zealand	11	0.03	0	0.00
Norway	373	0.91	342	0.83
Poland	37	0.09	41	0.10
Portugal	57	0.14	34	0.08
Romania	8	0.02	8	0.02
Slovakia	14	0.03	18	0.04
Slovenia	91	0.22	85	0.21
South Korea	314	0.76	305	0.74
Spain	407	0.99	485	1.18
Sweden	1,256	3.06	1,242	3.02
Switzerland	5,092	12.39	5,266	12.81
Turkey	186	0.45	174	0.42
United Kingdom	3,674	8.94	3,333	8.11
USA	8,763	21.32	6,762	16.45
Other Countries[a]	7	0.02	55	0.13
Total	41,106	100.00	41,106	100.00

[a]Brasilia, Hongkong, Indonesia, Lithuania, Malaysia, Malta, Netherlands Antilles, Panama, Singapore.

Table 3: Descriptive Statistics

Variable	Definition	Mean	Std.Dev.
	Firm level variables		
Fixed Assets	stocks in € thousand	10,878	80,095
LCF	indicator of loss carryforward in the previous year	.418	.493
NLCF	indicator of no loss carryforward in the previous year	.582	.493
	Tax variable		
STR	foreign direct owner's statutory tax rate	.346	.068
	Further characteristics		
Exchange Rate	foreign currency of the ultimate owner's location per €	30.6	135
GDP	of ultimate owner's home country in billion US dollars	2,392	3,459

24,487 observations of foreign controlled FDI in Germany from 1997 until 2005. The first period is always not considered due to the lagged indicator of a loss carryforward. Firm level variables are taken from the MiDi database, a comprehensive data set of all foreign direct investment in Germany. See Lipponer (2006) for a more detailed description. The statutory tax rate is collected from various sources such as surveys provided by the International Bureau of Fiscal Documentation (IBFD) and KPMG, PwC and Ernst&Young. Exchange rates are taken from Reuters Financial and the GDP is from World Bank's World Development Indicators.

exhibit a loss carryforward, the sensitivity to foreign tax rates should be reduced. For this reason, a dummy variable LCF is used as an indicator for the possibility of offsetting former losses with actual profits taking on the value one, while otherwise zero.

Investment levels of foreign affiliates in Germany may also be affected by the track of the bilateral exchange rate between the parent company's local currency and the local currency at the investment location (see *e.g.* Froot and Stein, 1991). Therefore, we use annual averages of the daily exchange rate between the parent company's local currency and the Euro. In additional robustness checks the GDP of the parent companies' home country is employed. Table 3 presents descriptive statistics of the data used by the regressions, including 24,487 German inbound observations during the period of 1997 until 2005.

3.2 Investigation Approach

Basically, the theoretical discussion presented above provides a testable relationship between the investment levels of multinationals in a high tax country and the foreign tax rate of a company, which is used as a shelter for profit shifting. Considering the typically high number of transactions it seems to be fairly appropriate to focus on the relationship between a subsidiary and its direct owner.[17] For the empirical analysis, firm-level data of foreign inbound investments in Germany are used, which are taken from the *MiDi* database. This means that the considered investments take place in the same country, i.e. in Germany. A resulting advantage for the empirical analysis lies in the fact that all location specific characteristics are equal for all considered objects. Since we have information about the location of the direct foreign owner, we focus on the tax effects of profit shifting between the foreign direct owner and the German affiliate. Then, the following estimation equation can be set up to estimate the effect of a higher foreign statutory tax rate, STR_j, of the direct owner j on the investment level of affiliate i in Germany in year t.

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\begin{aligned}
ln(Fixed\,Assets_{i,j,k,l,t}) &= \alpha_0 + \alpha_1 STR_{j,t} + \alpha_2 ln(Exchange\,Rate)_{i,k,t} + \alpha_3 LCF_{i,t} \\
&+ \alpha_i + \alpha_k + \alpha_l + \alpha_t + \epsilon_{i,j,k,l,t}.
\end{aligned}
\tag{4}
$$

As dependent variable we use the natural log of fixed assets as a measure of real investment level. Here α_i denotes an affiliate specific fixed effect used to control for firm specific unobserved effects. A country fixed effect of the ultimate parent company's location, α_k, is introduced to control for effects such as distance between the parent company's location and Germany. Furthermore, if an interposed entity is used, an additional country fixed effect, α_l, of that additional location is considered.

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[17]It is possible that other affiliates exist within a multinational group, which can be used to shift profits. Due to data limitation, we focus on the effect of a higher direct owner's tax rate on investment levels of foreign affiliates in Germany. Hence, we may underestimate the total tax effects of profit shifting on multinational investments in Germany.

Since all investments are located in Germany, unobserved characteristics such as the local market size, labor costs, and regulations are equal for all considered investment objects. The German tax law, in particular, is equal for all considered investment objects. Furthermore, different conditions in different years are controlled for by using time fixed effects, α_t. Since the German tax level was very high during the considered period from 1997 until 2005, all repatriated profits were effectively exempt from taxation at the parent company. Theoretical analysis shows that in this case a negative impact of the home country tax level on investment can be expected only if shifted profits are taxed there. Hence, in accordance with our theoretical analysis, a negative sign can be expected for α_1.

As in previous studies focussing on tax effects on inbound investments (*e.g.* Slemrod, 1990; Swenson, 1994; Cassou, 1997), the natural log of the exchange rate between the ultimate parent company's local currency and the Euro is considered. Firm specific characteristics may impact investment decisions. In particular profitability seems to be important. For this reason, we introduce a dummy variable LCF indicating affiliates exhibiting a loss carryforward. This dummy variable is used as an indicator for bad performance in previous years. It can be expected that this leads to smaller investment levels. Correspondingly, a dummy variable NLCF which indicates subsidiaries exhibiting no loss carryforward is introduced.

As discussed before, it can be expected that the incentive to shift profits, and thus, the tax sensitivity of investments is reduced if an affiliate can immediately set off actual earnings with losses carried forward. Hence, affiliates exhibiting a loss carryforward may constitute a suitable control group. For this reason, in a second set of estimations an interaction term between the foreign tax rate and the dummy variable LCF is used to identify the expected difference in tax sensitivity of that group. Since we expect a negative sign for α_1, a positive sign for the interaction between LCF and STR indicates a smaller tax sensitivity of investment levels with respect to the foreign tax rate in the presence of a loss carryforward.

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3.3 Regression Results

The empirical analysis is based on the estimation equation (4). As dependent variable the natural log of fixed assets is used. Table 4 shows the respective regression results. According to the theoretical model, a negative impact of the direct owner's statutory tax rate at home on the investment level in Germany can be confirmed. The results suggest a negative investment effect due to increasing tax rates on shifted profits. That means a higher taxation of shifted profits abroad has a negative impact on investment decisions at the high-tax location Germany. With regard to control variables, a negative impact of a more expensive Euro on investment levels in Germany is confirmed. Subsidiaries exhibiting a loss carryforward show significantly smaller investment levels. The lower investment levels of loss carrying affiliates should not be as surprising, since the dummy variable LCF also reflects past business performance of an affiliate. This might be a suitable indicator for expectations of future profitability.

In column (2) an interaction between the LCF dummy variable and the direct owner's statutory tax rate is introduced. This interaction term is likely to control for a different tax sensitivity if affiliates exhibit a loss carryforward. The empirical results confirm a significantly lower tax sensitivity for loss carrying affiliates. Moreover, in column (3) a corresponding dummy variable $NLCF$ indicating affiliates without a loss carryforward is interacted with the statutory tax rate. This specification shows that loss carrying subsidiaries are also, to some extent, sensitive to tax rates abroad. A lower tax sensitivity of about -.869 is estimated for loss carrying subsidiaries, while a significantly negative semi-elasticity of affiliate's fixed assets with regard to the foreign tax rate of about -1.33 is estimated for affiliates without a loss carryforward.

Additional robustness checks are carried out in accordance with gravity models explaining

Table 4: Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
STR	-1.13**	-1.33**		-1.21**		-1.01**	-.854**
	(.428)	(.427)		(.379)		(.342)	(.401)
STR x NLCF			-1.33**		-1.21**		
			(.427)		(.379)		
STR x LCF		.463*	-.869*	.502**	-.712*	.525**	.413*
		(.246)	(.469)	(.244)	(.404)	(.211)	(.242)
ln(Exchange Rate)	-.127**	-.130**	-.130**	-.308**	-.308**	-.509**	-.265**
	(.060)	(.060)	(.060)	(.075)	(.075)	(.097)	(.067)
LCF	-.078**	-.239**	-.239**	-.251**	-.251**	-.259**	-.246**
	(.017)	(.086)	(.086)	(.086)	(.086)	(.072)	(.087)
ln(GDP)				-.471**	-.471**	-.543**	-.473**
				(.125)	(.125)	(.123)	(.126)
Adj. R^2	.899	.900	.900	.900	.900	.918	.905
Observations	24,487	24,487	24,487	24,487	24,487	22,126	20,698

Dependent variable is ln(Fixed Assets). Columns (6) and (7) are based on subsamples, where all observations from the financial sector or all affiliates held via a conduit entity, respectively, are excluded. Standard errors are in parentheses, which are clustered within year-country cells and robust against random firm-specific and country effects using the Huber-White sandwich formula. A star denotes significance at the 10% level and two stars at the 5% level. All estimates include a full set of firm, time and country fixed effects.

FDI.[18] In columns (4) and (5) the GDP of the parent company's country is introduced. The negative effect of the size of the home country's GDP suggests that the more the home market grows, the less incentives arise to invest abroad. However, the estimated tax effects seem to be fairly unaffected.

Furthermore, additional results are presented which are based on subsamples. Firstly, the regression shown in column (6) is based on a subsample where all affiliates from the financial sector are excluded. In column (7) only affiliates are considered which are not held

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[18]In the context of tax effects on FDI, gravity model specifications are employed, for example, by Mutti and Grubert (2004). Note that the size of the host country's GDP, however, is controlled for by the time fixed effects, because all considered subsidiaries are located in the same country, namely Germany.

via an interposed entity located in a country other than the parent company's location. That means we focus exclusively on the tax effect of the parent company. However, the estimated tax sensitivities are robust.

Until now only very few studies consider the level of the investor's home country tax rate in addition to the host country's tax rate (Slemrod, 1990; Cassou, 1997; Egger et al., 2006; Wijeweera et al., 2007). These studies find positive or insignificant effects of the investor's home country tax rate on investments in foreign host countries. By contrast, our empirical analysis identifies a negative tax sensitivity with regard to the home country's tax rate. At first glance, our results oppose to the above-mentioned studies. However, this is not necessary a real contradiction. Previous results are based on data of investors stemming from countries with smaller but also higher tax rates than the host country tax level. Furthermore, these results are based on aggregated data. Hence, different tax effects stemming from host country taxation and adverse tax effects of profit shifting opportunities are measured together. By contrast, our analysis is exclusively based on data of investment levels of foreign affiliates in one specific extremely high-tax country, Germany. In the case of a very high tax level in a host country, profit shifting becomes more important. Moreover, our data consists of investment levels of foreign affiliates, for which location decisions in favor of Germany have already been made. Thus, our empirical analysis is more exclusively focused on the investment-size effects due to profit shifting activities, while previous studies based on aggregated data are likely to estimate total tax effects due to several underlying mechanisms.

4 Conclusion

The theoretical analysis shows that the foreign tax level of a foreign entity used as a shelter of shifted profits becomes important for investment decisions in a high-tax host country. Then, it can be expected that the investment level in the high-tax host country decreases with an increasing tax rate at a shelter location abroad. This proposition is confirmed by our empirical analysis. By using firm-level data of German inbound investments, we find a significantly negative effect of the direct foreign owner's tax rate on the investment level in Germany. Since repatriated profits from Germany are always effectively tax exempt, considering the very high German tax level, our results suggest that investment decisions are significantly affected by the level of taxation of shifted profit.

We can conclude that multinationals generate significant competitive advantages by means of shifting profits if the parent company is located in a lower taxing home country. Furthermore, our analysis shows that advantages are also evident if an interposed company in a lower taxing country is used. It can be assumed that similar advantages can be generated by using other affiliated companies as profit shifting shelters. Hence, we may underestimate the total effect of profit shifting activities on real investment decisions. However, the estimated magnitudes suggest that effects due to taxation of shifted profits on investments in a high-tax host country are important. The competitive advantage due to enhanced tax planning opportunities of multinational companies may affect, in particular, the competition with purely national companies. Since our data set is restricted to affiliates of multinational companies, this must remain a topic for further research.

The results lead to interesting implications for tax policy and its effects on multinationals' investment decisions. Tax rate cuts in a country need not necessarily induce negative effects on multinationals' investment activities in other countries. In particular, a positive effect on FDI in high-tax countries can be expected, to a certain extent, if significant

profit shifting activities exist between the tax cutting country and the other high-tax countries such as Germany or the US. Furthermore, from a high-tax country's point of view the negative effect of the own tax rate is mitigated by actual profit shifting activities of multinational companies. Against this background, anti-avoidance legislation set up to restrict profit shifting opportunities and to protect tax revenues may constitute significant negative investment effects.

Datasources and Definitions

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

GDP in US dollars, nominal, taken from World Bank World Development Indicators (2006).

Exchange rates are annual average spot rates, which are taken from Reuters Financial.

Statutory tax rates are taken from databases provided by the International Bureau of Fiscal Documentation (IBFD) and from tax surveys provided by Ernst&Young, PwC and KPMG.

Appendix

Comparative Static

The following comparative static properties are derived by differentiating the first-order conditions (2) and (3). Thus, we obtain

$$dt_2 - dt_1 = [c_{2,\lambda\lambda}(\lambda_2) - g_{2,\lambda\lambda}(\lambda_2)]d\lambda_2, \tag{A-1}$$

$$(1-t_2)f_{2,kk}(k_2)dk_2 - f_{2,k}(k_2)dt_2 = \lambda_2 dt_1 - \lambda_2 dt_2 - [t_2 - t_1 - c_{2,\lambda}(\lambda_2) + g_{2,\lambda}(\lambda_2)]d\lambda_2. \tag{A-2}$$

We assume that a country does not immediately react on tax reforms in another country, e.g. $\frac{dt_2}{dt_1} = 0$ With regard to the share of profits shifted, we obtain for the effects of increasing tax rates

$$\frac{d\lambda_2}{dt_1} = -\frac{1}{c_{2,\lambda\lambda}(\lambda_2) - g_{2,\lambda\lambda}(\lambda_2)} < 0, \tag{A-3}$$

$$\frac{d\lambda_2}{dt_2} = \frac{1}{c_{2,\lambda\lambda}(\lambda_2) - g_{2,\lambda\lambda}(\lambda_2)} > 0. \tag{A-4}$$

With regard to the optimal investment size, we obtain

$$\frac{dk_2}{dt_1} = \frac{\lambda_2 - [t_2 - t_1 - c_{2,\lambda}(\lambda_2) + g_{2,\lambda}(\lambda_2)]\frac{d\lambda_2}{dt_1}}{(1-t_2)f_{2,kk}(k_2)} < 0, \tag{A-5}$$

$$\frac{dk_2}{dt_2} = \frac{f_{2,k}(k_2) - \lambda_2 - [t_2 - t_1 - c_{2,\lambda}(\lambda_2) + g_{2,\lambda}(\lambda_2)]\frac{d\lambda_2}{dt_2}}{(1-t_2)f_{2,kk}(k_2)} \gtrless 0. \tag{A-6}$$

However, without profit shifting activities the effect of the foreign tax rate on investment, $\frac{dk_2}{dt_1}$, would equal zero. With regard to the effect of the host taxation, we would obtain

$$\frac{dk_2}{dt_2} = \frac{f_{2,k}(k_2)}{(1-t_2)f_{2,kk}(k_2)} < 0. \tag{A-7}$$

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