Why is the Response of Multinationals' Capital-Structure Choice to Tax Incentives That Low? Some Possible Explanations

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This paper evaluates three possible explanations for why empirical studies have found a quite moderate response of multinationals' capital structure to tax incentives. Firstly, by concentrating on debt decisions by operating subsidiaries, previous studies may have overlooked the importance of holding companies. Secondly, international transfer-pricing guidelines may reduce the tax incentives for debt financing. And thirdly, debt as a tax planning tool may be especially used by large multinationals. Whereas I do not find empirical evidence in favor of the third hypothesis, I do find empirical evidence for the first and the second hypothesis.

Keywords: business taxation, tax planning, leverage, corporate finance

JEL classification: H 25, G 32, M 41, F 23

1. Introduction

Interest deductions are more valuable in countries with high tax rates. Therefore we should expect multinationals to shift debt to high-tax countries. In spite of this obvious tax incentive and contrary to anecdotal evidence provided by tax consultants, empirical studies so far have provided evidence for a rather low response of multinationals' capital-structure choice to tax incentives. For example, the results of Desai, Foley, and Hines (2004) imply that 10% higher tax rates are associated with 2.8% greater affiliate debt as a fraction of assets.

There are two possible explanations to close the gap between theoretical expectations and empirical estimates. One possibility is to show that empirical studies have overlooked important effects that led to an underestimation

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of the tax effects. Another possibility could be to refine the theory. Some previously overlooked features of the international tax system may reduce the incentives for debt financing in high-tax countries.

Turning to the first possibility, prior studies typically investigated the reaction of the leverage of operating subsidiaries to tax incentives only. However, there are several reasons for multinationals to implement tax-induced debt finance not (only) at the level of operating subsidiaries, but instead (additionally) at the level of their holdings. Firstly, while a direct ownership structure allows the parent to inject debt into the subsidiary up to the value of total assets, debt finance may reach the market value of such subsidiaries by using holding structures: the parent may endow a holding company with debt just to acquire the subsidiary from the parent, creating an indirect ownership structure. Recasting of the ownership structure that goes with an increase in debt financing is possible, independently of the actual capital requirement of the subsidiary. Secondly, implementing debt finance at the level of operating subsidiaries is limited to situations in which such subsidiaries need additional outside capital. And thirdly, in the case of mergers & acquisitions, implementing debt finance at the level of holdings is the only possibility for debt-financing the purchase-price tax efficiently in the country of residency of the target. Given the empirical importance of mergers & acquisitions for the foundation and enlargement of multinationals (see Desai and Hines, 2003, and Becker and Fuest, 2010), the latter aspect may be of high relevance.

I show, using logit regressions, that multinationals make use of holdings as a tax planning tool for implementing tax-induced debt finance when investing in Germany. The lower the corporate tax rate at the level of the foreign multinational's headquarter is, the greater the incentive for the multinational to shift debt to the high-tax country (Germany) and the more likely the use of such a tax planning tool is. I also provide empirical evidence for foreign multinationals' reorganizing their group structure in Germany in order to implement additional tax-induced debt finance at the level of holdings. In addition, descriptive statistics demonstrate the importance of holdings for the total amount of debt finance implemented in Germany: In the sample considered here, German subsidiaries of non-German multinationals had liabilities to affiliated enterprises outside Germany totaling up to 114 billion euros in 2005. Of these, 54 billion euros appear on the balance sheets of holdings, although holdings represent only 9% of the subsidiaries considered. Thus holdings are widely used in order to implement debt finance.

Whereas, according to the first explanation, empirical studies underestimate the impact of tax incentives on capital structure planning because they ignore the specific importance of holdings, the last two explanations are re-

lated to firm heterogeneity.[1] Even if the empirically identified response of multinationals' capital-structure choice to tax incentives is low on average, it is consistent with theoretical predictions and anecdotal evidence that a certain group of firms may exhibit a strong impact of tax incentives on their capital structure planning, whereas others – given the legal and economic limitations of tax planning – are not able to adjust their capital structure to tax incentives. As an important example of such limitations, international transfer-pricing guidelines may reduce the tax incentives for debt financing. Thus, under the second possible explanation offered here, the capital-structure choice of affected subsidiaries should not respond to tax incentives. I provide tentative empirical evidence that, consistent with this explanation, the capital-structure choice of subsidiaries active in wholesale or trade (typically subject to such transfer-pricing schemes) does not react to tax incentives, whereas it does react for the remaining group of subsidiaries. This argument is empirically important, since many subsidiaries may be subject to such transfer-pricing schemes. In the sample considered here, of around 60,000 subsidiary–year observations, subsidiaries active in wholesale and trade account for around 20,000 subsidiary–year observations.

The third possible explanation evaluated here, also related to firm heterogeneity, is the size sensitivity of debt as a tax planning tool. Tax planning is costly, because specific structures need to be implemented. Such costs typically depend on the structure to implement, but not on the size of the investment. Since the maximum possible tax savings increase with the size of the investment, a simple cost–benefit analysis implies that the incentive for large multinational groups to do tax planning should be higher. This argument should apply to the simple form of tax planning at the level of subsidiaries as well as to the more sophisticated form of tax planning using holdings. While I do not find empirical evidence in favor of this hypothesis at the level of operating subsidiaries, I do find empirical evidence for larger multinationals making more use of holdings as a tax planning tool.

I empirically evaluate these three explanations using the MiDi database provided by the Deutsche Bundesbank for the German inbound case. Given the high German corporate tax rate over the sample period 1996–2006, Germany is an ideal laboratory to investigate the three possible explanations offered above. Furthermore, the MiDi database offers excellent investigation possibilities in that it allows one to retrace the group structure of foreign multinationals in Germany. Still, the importance of the results presented here is not limited to Germany, since the explanations investigated here apply in principle also to other countries.

1 Buettner, Overesch, and Wamser (2011) discuss further explanations related to firm heterogeneity.

Several studies have already addressed the effect of host-country taxation on subsidiaries' leverage. Recently Desai, Foley, and Hines (2004) have shown that the leverage increases with the host-country tax rate for the case of U.S. multinationals, and Huizinga, Laeven, and Nicodeme (2008) have done so for the case of European multinationals. Mintz and Weichenrieder (2005), Buettner and Wamser (2009), and Buettner, Overesch, Schreiber, and Wamser (2008) find similar results for German multinationals. Ruf (2008b) argues that the increase, documented there, of the leverage with the corporate tax rate need not necessarily be due to tax planning, but could also be due to the lack of retained earnings in high-tax countries. Graham (2003) provides a survey of related literature. Studies addressing explicitly multinationals' tax planning for implementing tax-induced debt finance are scarce. Mackie-Mason (1990), studying incremental financing decisions, provides evidence for firms preferring debt over equity because of taxation. Weichenrieder and Mintz (2008) suspect that German multinationals make use of Swiss or Dutch holdings because of certain tax privileges for interest income. Investigating the German inbound case, Ramb and Weichenrieder (2005) can only provide limited evidence that the home tax rate of the foreign ultimate parent is important for the internal leverage of German subsidiaries. Overesch and Wamser (2010), on the contrary, find a significant effect of tax-rate differentials on the internal leverage of German subsidiaries. However, all of these studies focus on the leverage of operating firms and ignore the use of holdings as a tax planning tool. As an exception, Ruf (2008a) points to the fact that holdings react more strongly to tax incentives, and Weichenrieder and Windischbauer (2008) discuss the use of ownership chains for circumventing the German thin-capitalization rules.

Following this introduction, section 2 develops the main hypotheses. Section 3 describes the data, and section 4 presents the empirical results. Section 5 concludes.

2. Motivation and Hypotheses

In the case of internal debt financing, following the arguments of Ramb and Weichenrieder (2005), the tax incentive for a foreign ultimate parent to grant an interest-bearing loan to a profitable German subsidiary increases with the German tax rate at which the interest is deductible, on the one hand, and decreases with increase in the tax rate at which the interest is taxable in the home country of the ultimate parent, on the other hand. In the case of external debt financing, following the arguments of Desai, Foley, and Hines (2004), Huizinga, Laeven, and Nicodeme (2008), and Buettner, Overesch, Schreiber, and Wamser (2009), multinationals are in principle free

to choose where to locate their external liabilities within the multinational group. Given the tax deductibility of interest payments, the incentive to locate external liabilities in a German subsidiary and not at the ultimate parent increases with the German tax rate and decreases with increasing tax rate in the home country of the ultimate parent.[2]

As a result, the leverage (defined as the sum over external and internal liabilities divided by the balance-sheet total) of a German subsidiary should increase with the ultimate parent's corporate tax rate. However, according to the trade-off theory of corporate finance (see, e.g., Frank and Goyal, 2009), nontax costs such as the risk of bankruptcy (see, e.g., Kraus and Litzenberger, 1973) limit the use of tax-induced debt finance. As a result, the observed financing structure does not necessarily correspond one-to-one to the tax incentives.

One may argue that multinationals do not necessarily have to pay tax on interest in the home country of the ultimate parent, since they may alternatively establish a financing subsidiary in a low-tax country in order to grant loans. Then the interest is taxable in the low-tax country at a low or even zero tax rate. However, for most industrialized countries CFC rules prevent multinationals from using such structures (see Ruf and Weichenrieder, 2009).

Hypothesis 1 The higher the corporate tax rate at the level of the ultimate parent of a multinational group is, the lower the leverage (consisting of external and internal liabilities) of its German subsidiary.

As a result of the ideas presented above, the leverage of German subsidiaries should decrease with increasing tax rate of the home country of the ultimate parent. However, this increase of the leverage may not capture all tax planning activities of multinationals. Consider the simplified structure of a multinational group investing in Germany in figure 1. Under some easily fulfilled requirements (a profit transfer agreement between holding and subsidiary companies, and majority participation)[3], multinationals can establish a tax unity including all German subsidiaries. As a result, the taxable income of all subsidiaries is consolidated at the level of a holding company. Therefore it does not matter, in principle, in which subsidiary tax-induced debt finance is implemented. This argument applies to Germany, but also to all countries offering tax unities or any other form of group taxation, including the United States, Great Britain, and France.

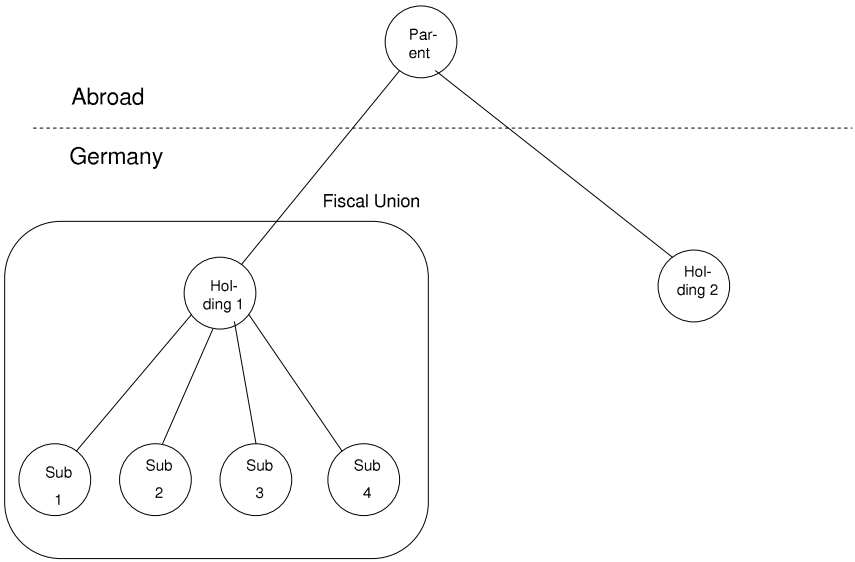
However, there are several cases where the implementation of tax-induced debt finance at the level of holdings is the preferred strategy.[4] Firstly, at the

2 For a detailed discussion of these tax incentives see Mintz and Weichenrieder (2010), chapter 3.

3 For a discussion see Oestreicher and Koch (2009).

4 For a discussion of nontax reasons to establish holdings see Jacobs (2007).

Figure 1
Holdings and Tax Unities



time subsidiaries are acquired, debt for financing the purchase price may only be found at the level of their holdings (see Schumacher and Bahns, 2005). Since the loan for financing the purchase price has to be granted before the subsidiary is acquired, the resulting liability cannot appear in the balance sheet of the acquired subsidiary, but only in the balance sheet of the holding acquiring the subsidiary. Given the empirical importance of mergers & acquisitions for the foundation and enlargement of multinationals (see Desai and Hines, 2003, and Becker and Fuest, 2010), this aspect is of high relevance.

Secondly, in the case of existing subsidiaries, implementing additional debt finance may be difficult. If subsidiaries are sufficiently profitable for financing additional investments, they only may replace retained earnings by debt via distributing dividends. This may, however, induce tax (withholding and dividend taxes) as well as nontax (due to the increased leverage) costs. Using holdings in combination with tax unities instead, it is possible to implement additional tax-deductible debt finance without affecting the corporate policy of the subsidiary. If holding 1 sells the shares in the subsidiary to holding 2 (see figure 1) and holding 2 uses debt to finance the purchase of the shares[5], debt

5 As a legal restriction, interest deductions on internal liabilities following internal share deals were no longer tax-deductible if the underlying deal took place after 31 December

finance up to the market value of the sold subsidiary can be implemented at the level of holding 2. Establishing a tax unity between holding 2 and the acquired subsidiary allows one to deduct the interest expenses at the level of holding 2 from the operating profits at the level of the subsidiary. As a further advantage of this strategy, it is possible to implement debt finance up to the market value of the subsidiary, whereas at the level of the subsidiary itself, implementing debt finance is limited to the book value. This is because holding 2 may debt-finance the whole purchase price paid for the shares, which should correspond to the market value of the subsidiary. On the contrary, any implementation of additional debt finance at the level of the subsidiary is restricted to the historical book values of the assets.[6] The maximum achievable level of debt finance then is the market value of the subsidiary at the level of the holding plus the book value of the subsidiary at the level of the subsidiary. Using the same arguments as before, the incentive for multinationals to use such more sophisticated tax planning tools decreases with increase of the corporate tax rate applicable in the country of residency of the multinational's ultimate parent.

Hypothesis 2 The higher the corporate tax rate at the level of the ultimate parent of a multinational group is, the less likely the use of holdings in ownership chains as a tax planning tool.

Whereas according to the previous hypothesis empirical studies underestimated the impact of tax incentives on multinationals' capital structure planning, other possible explanations for the discrepancy between theoretical predictions and anecdotal evidence on the one hand and empirical evidence on the other hand are based on firm heterogeneity. Empirical studies typically rely on data sets representing a huge number of firms. However, for some subgroups of firms in such large data sets, tax-motivated capital structure planning may be infeasible due to economic or legal limitations of tax planning.

Costs are an economic limitation on tax planning. Tax planning is costly, because it requires well-educated tax advisers as well as restructuring the multinational group. Whereas the resulting tax savings depend on the size of the economic activities of the multinational, the corresponding costs for tax planning are basically fixed. Thus, according to a simple cost–benefit analysis, the incentive for large multinational groups to do tax planning should be

2001. There were no limitations in place with respect to interest on external liabilities. See section 8a, para. VI, German Corporate Income Tax Act in the version of 22 December 2003.

6 Providing additional debt to the subsidiary is in principle always possible, but is not a reasonable tax planning strategy, since the financial means provided to the subsidiary will generate additional taxable earnings netting out the tax savings due to the tax deductibility of interest.

higher. This argument should apply to the simple form of tax planning at the level of subsidiaries as well as to the more sophisticated form of tax planning using holdings.

Hypothesis 3 The larger the economic activities of multinationals in Germany are, the more likely they are to do tax planning using debt.

International transfer-pricing guidelines may reduce the tax incentives for debt financing. The theoretical basis for most transfer-pricing analyses performed in the world's major economies is the arm's-length principle, which stipulates that related parties should transact with each other as if they were dealing with independent third parties. In practice, however, the application of the arm's-length principle is fraught with difficulties, particularly because of the enormous challenges associated with identifying arm's-length transactions between independent third parties that might be comparable to the transactions between two related parties within a multinational enterprise. As a result, in many transfer-pricing analyses, practitioners have resorted to the so-called profit-based methods to apply the arm's-length principle, due to the lack of adequate comparable transactional data. Then some type of ratio analysis is undertaken to prove, albeit indirectly, that the entity in question has transacted at arm's length with its related companies.

For example, for one empirically important group of subsidiaries, namely distributors, this is typically done using the Berry ratio, defined as the ratio of gross profit to operating expenses, to yield a markup on operating expenses. In essence, the use of the Berry ratio implicitly assumes that there is a relationship between the level of operating expenses and the level of gross profits earned by routine distributors (see Przysuski and Lalapet, 2005). As a result, the taxable profit of a distributor is determined by applying the Berry ratio to the operating expenses. Since interest expenses are not considered as operating expenses for distributors, their existence does not affect the resulting taxable income. This argumentation applies also specifically for Germany. As stated by the German Federal Tax Court (see Bundesfinanzhof, 2004) for distributors active in Germany, transfer prices should be based on the resale-price method. Practically this is done using the Berry ratio as described, e.g., by Jacobs (2007), Oestreicher and Duensing (2005), and Isensee (2002).

Alternatively the net profit margin relative to the sales revenue of distributors may be determined using the transactional net-margin method. That method operates in a manner similar to the cost-plus and resale-price methods. The net margin of the taxpayer from the controlled transaction should ideally be established by reference to the net margin that the same taxpayer earns in comparable uncontrolled transactions. Where this is not possible, the net margin that would have been earned in comparable transactions by an independent enterprise may serve as a guide (see OECD, 2001).

Given the spirit and the purpose of such transfer-pricing schemes, which intend to determine the relevant transfer prices indirectly through a comparable profit margin, interest expenses typically should not lower this profit margin, and there is at least a diminished incentive for such distributors to use debt as a tax planning tool.

The difficulty now is to identify the subsidiaries subject to such transfer-pricing schemes. Unfortunately, neither the MiDi database nor the other available databases contain information on this issue. However, as argued above, such transfer-pricing schemes are frequently applied to distributors and thus to subsidiaries engaged in wholesale or trade. Comparing subsidiaries active in wholesale or trade with subsidiaries active in other industries thus offers, in principle, a way to check empirically the validity of the above-presented arguments. However, being unable to identify distributors subject to such transfer-pricing schemes explicitly is a clear limitation of the empirical investigation.

Hypothesis 4 If the taxable income of subsidiaries is based on international transfer-pricing schemes, this may reduce the tax incentives for debt financing. This typically applies to subsidiaries engaged in wholesale and trade.

3. Descriptive Statistics

This paper uses the MiDi database of the Deutsche Bundesbank to investigate the effect of taxes on non-German multinationals' capital-structure choice with respect to their German subsidiaries. Foreign-owned German subsidiaries are legally required to report on their operations if they meet mild size and ownership requirements. For foreign-owned German subsidiaries compulsory reporting applies if total assets exceed the equivalent of 3 million euros. In addition, foreign-owned German subsidiaries are obliged to report also on their own German subsidiaries if ownership ties are sufficiently strong (see Lipponer, 2008, for a detailed description of the MiDi database). Most importantly for my purpose, foreign-owned German subsidiaries have to report on their liabilities, on their foreign-owned equity, and on whether they are held via ownership chains. For the purpose of the current study I exclude FDI in the financial sector, since such FDI serves special economic purposes, specifically with respect to leverage decisions. I also exclude investments made in branches or partnerships, since in such cases other statutory tax rates apply than in the standard case of corporations as subsidiaries. As a limitation of my analysis, MiDi does not contain information on the existence of tax unities necessary for the use of holdings as a tax planning tool as discussed in hypothesis 2.[7]

7 For a thorough discussion of tax unities see Oestreicher and Koch (2009).

Table 1

Descriptive Statistics for German Inbound FDI, 1996–2005: Stock of Fixed and Intangible Assets and Liabilities

Year	Holding	Assets	Liabilities
1996	no	38.07	27.75
	yes	0.30	18.58
1997	no	40.90	31.54
	yes	0.30	21.33
1998	no	45.95	35.75
	yes	0.24	29.57
1999	no	52.15	42.97
	yes	0.29	44.31
2000	no	55.67	53.88
	yes	0.43	118.61
2001	no	69.79	51.77
	yes	0.75	120.62
2002	no	70.95	55.52
	yes	0.33	112.50
2003	no	75.40	57.04
	yes	0.46	103.71
2004	no	91.96	56.60
	yes	0.66	49.60
2005	no	95.56	59.80
	yes	0.57	53.79

Note: Aggregated figures in billions of euros. yes (no): subsidiary is (is not) a holding. Assets are defined as fixed and intangible assets. Liabilities are defined as liabilities to affiliated enterprises outside Germany.

Table 1 gives the aggregated stocks of fixed and intangible assets as well as the aggregated stock of liabilities to affiliated enterprises outside Germany.[8] The subsidiaries were divided into groups according to whether they are holdings or not. For example, in 2005 holdings had liabilities to affiliated enterprises outside Germany amounting to around 54 billion euros, whereas the liabilities to affiliated enterprises outside Germany held by ordinary subsidiaries amounted to around 60 billion euros. Hence holdings are responsible for around half of the liabilities to affiliated enterprises outside Germany, although they only represent 9% of the subsidiaries considered. These figures suggest that holdings as a tax planning tool indeed may matter.

8 These figures are presented here because other figures – as, e.g., the aggregated stock of liabilities to external creditors – are unavailable for confidentiality reasons. They may, however, be available in some cases upon request.

Table 2
Descriptive Statistics of the Independent Variables

Variable	Mean	Std.Dev.	p5	p95
Leverage	0.600	0.413	0.023	1.056
Tax Rate	0.338	0.062	0.241	0.420
Tangibility	0.195	0.255	0	0.785
ln GDP-pc	10.412	0.249	10.172	10.671
ln Corruption	2.046	0.210	1.649	2.241
ln Lending Rate	1.624	0.409	0.842	2.133
ln Size	9.907	1.394	8.168	12.569
pcd	0.559	0.497	0	1
pcd75	0.296	0.456	0	1
use-hld	0.133	0.340	0	1
use-ophld	0.003	0.051	0	0
fumh	0.004	0.066	0	0
fumhff	0.004	0.066	0	0
fumhdiff	0.002	0.042	0	0
ln p11agg	7.537	2.400	3.367	11.273
ln p11sub	7.329	2.303	3.178	10.694

Note: Std.Dev.: standard deviation; p5: 5th percentile; p95: 95th percentile.

The considerable fall in reported liabilities of holdings from 2004 onwards in table 1 corresponds to a tax-law change in Germany, dated 22 December 2003, introducing section 8a, para. VI, German Corporate Income Tax Act. Following this tax-law change, interest deductions following internal share deals as described in section 2 were no longer tax-deductible if the underlying deal took place after 31 December 2001.

Table 1 provides evidence that although empirical studies in general find a low *variation* of multinationals' capital structure with respect to statutory tax rates, the *level* of debt financing used in Germany is huge. The amount of liabilities to affiliated enterprises outside Germany – not including liabilities to external creditors – already exceeds the amount of fixed and intangible assets held by foreign investors in Germany.

Table 2 shows descriptive statistics for the regression variables. I complemented the MiDi database with information on national characteristics from the World Bank Development Indicators, with the corruption index of Transparency International, and with tax rate information from Mintz and Weichenrieder (2010), KPMG, the Institute for Fiscal Studies, and the Bureau of Tax Policy Research at the University of Michigan.

4. Empirical Results

Table 3 presents the results of standard leverage regressions. The sample consists of all German subsidiaries of multinationals having a participation of more than 99%, not being active in the financial sector, and being a corporation (but not a branch or partnership). All regressions provide for firm fixed effects and for year dummies, which control for the German macroeconomic environment. This includes the effect of the German corporate tax rate on the leverage decision. Specifications (2)–(6) additionally provide for industry dummies.[9] The dependent variable Leverage is defined as total liabilities divided by balance-sheet total. Contrary to hypothesis 1, but consistent with the results of Ramb and Weichenrieder (2005), the corporate tax rate of the ultimate parent does not show a significant influence on the leverage at the 10% level (it does, however, show the expected negative influence at the 11% level). Also, the other variables controlling for the macroeconomic conditions in the country of residency of the ultimate parent – namely, the log of the gross domestic product per capita, the log of the corruption index provided by Transparency International, and the log of the lending rate – do not have a significant effect on the leverage. The log of the size of the subsidiary, defined as its balance-sheet total, exhibits a negative influence on the leverage. This reflects that large firms are typically mature firms having large amounts of retained earnings, lowering the leverage. Tangibility, defined as fixed and intangible assets divided by the balance-sheet total, enters positively. Following the financing literature, higher tangibility of assets should result in more favorable borrowing conditions and thus in a higher leverage, because agency costs may be reduced by collateral (Jensen and Meckling, 1976; Buettner, Overesch, Schreiber, and Wamser, 2008).

Specifications (3) and (4) in table 3 investigate hypothesis 4. In specification (3) the sample consists only of subsidiaries active in wholesale or trade. As expected by hypothesis 4, there is no significant negative effect of the ultimate parent's corporate tax rate on the leverage for this subsample. In specification (4) the sample consists of all subsidiaries other than subsidiaries active in wholesale or trade. Consistent with the prediction of hypothesis 4, the ultimate parent's corporate tax rate now shows a negative and significant effect on the leverage.[10] Since almost one-third (19,369 out of 72,558) of the subsidiaries are active in wholesale or trade, the use of international transfer-pricing schemes in order to determine the taxable income for many

9 I use industry dummies and firm fixed effects simultaneously, since some subsidiaries change their industry classification over time.

10 The 90% confidence interval of the tax-rate coefficient in specification (3) is −0.018 to 0.223, and it is −0.227 to −0.568 in specification (4). The 90% confidence intervals of the tax-rate coefficients hence do not overlap.

Table 3
The Effect of Taxes on the Leverage

	(1)	(2)	(3)	(4)	(5)	(6)
Tax Rate	−0.0354	−0.0500	0.103	−0.142***	−0.135**	−0.165***
	(0.046)	(0.047)	(0.073)	(0.051)	(0.067)	(0.058)
pcd					−0.00397	
					(0.024)	
pcd × Tax Rate					−0.0121	
					(0.070)	
pcd75						−0.00805
						(0.028)
pcd75 × Tax Rate						0.0760
						(0.078)
Tangibility		0.0739***	0.124***	0.0674***	0.0743***	0.0752***
		(0.016)	(0.036)	(0.019)	(0.018)	(0.018)
ln GDP-pc		0.00772	0.0415*	−0.000746	−0.000624	−0.000723
		(0.013)	(0.022)	(0.016)	(0.016)	(0.016)
ln Corruption		−0.00175	−0.0107	0.000587	0.00110	0.001000
		(0.0045)	(0.0087)	(0.0046)	(0.0045)	(0.0045)
ln Lending Rate		0.00373	0.00468	0.00851	0.00844	0.00794
		(0.0061)	(0.0092)	(0.0074)	(0.0072)	(0.0071)
ln Size		−0.00366	0.0296***	−0.0137**	−0.0105	−0.0169***
		(0.0047)	(0.0086)	(0.0057)	(0.0064)	(0.0063)
Year Dummies	✓	✓	✓	✓	✓	✓
Industry Dummies		✓	✓	✓	✓	✓
Subsidiary Fixed Effects	✓	✓	✓	✓	✓	✓
Observations	72558	72296	19369	52927	52927	52927
R^2	0.75	0.75	0.73	0.76	0.76	0.76

Note: The dependent variable Leverage is defined as total liabilities divided by the balance-sheet total. The tax rate is the statutory corporate tax rate of the country of residency of the ultimate parent of the considered German subsidiary. The dummy variable pcd is equal to zero for all subsidiaries that are smaller in size (size is defined according to the balance-sheet total) than the median, and equal to one otherwise. The dummy variable pcd75 is equal to zero for all subsidiaries that are smaller in size (size is defined according to the balance-sheet total) than the 75th percentile, and equal to one otherwise. Tangibility is defined as fixed and intangible assets divided by the balance-sheet total. ln GDP-pc is defined as the logarithm of the gross domestic product per capita of the country of residency of the ultimate parent. ln Corruption is defined as the logarithm of the Transparency International corruption index of the country of residency of the ultimate parent. ln Lending Rate is defined as the logarithm of the lending interest rate in the country of residency of the ultimate parent. ln Size is defined as the logarithm of the balance-sheet total of the German subsidiary. All regressions are estimated using OLS and include year dummies, industry dummies, and subsidiary fixed effects as indicated in the table. Standard errors in parentheses are corrected for clustering across year–country cells and for heteroscedasticity. Sample consists of German subsidiaries of non-German multinationals in MiDi for the period from 1996 to 2007 in specifications (1)–(2) and (5)–(6). Sample consists of German subsidiaries of non-German multinationals in MiDi for the period from 1996 to 2007 active in trade or wholesale in specification (3). Sample consists of German subsidiaries of non-German multinationals in MiDi for the period from 1996 to 2007 not active in trade or wholesale in specification (4). * denotes significance at the 10% level, ** at the 5% level, and *** at the 1% level.

subsidiaries may explain why it is so difficult to find the expected effects of corporate tax rates on the capital-structure choice of multinationals. Unfortunately, subsidiaries for which taxable income is determined according to international transfer-pricing schemes can be distinguished only very roughly, on the basis of the industry classification of subsidiaries, from subsidiaries for which it is determined using standard profit-and-loss statements. It may well be the case that also other subsidiaries are subject to such transfer-pricing schemes if their activity is determined largely by the needs of their parents. Since it is not possible to control explicitly for the use of the described international transfer-pricing schemes by subsidiaries active in wholesale or trade, it may happen, as a limitation of my analysis, that other specific characteristics of subsidiaries active in wholesale or trade for which I did not control in the regressions are responsible for this result.

Specifications (5) and (6) again use the sample consisting of all subsidiaries other than those active in wholesale or trade, but employ some additional controls in order to investigate whether, in line with hypothesis 3, large firms show a stronger reaction to tax incentives. The dummy variable pcd is equal to zero for all subsidiaries that are smaller (size is defined according to the balance-sheet total) than the median, and equal to one otherwise. However, contrary to the predictions of hypothesis 3, the interaction of pcd with the corporate tax rate has no significant effect on the leverage. This result remains unchanged when using the dummy variable pcd75 in specification (6). The dummy variable pcd75 is equal to zero for all subsidiaries that are smaller than the 75th percentile and equal to one otherwise. The sign as well as the interpretation of all other controls remains unchanged from that of specifications (1)–(4).

Table 4 presents results of logit regressions in order to test hypothesis 2. The dependent variable use-hld in specifications (1) and (2) is set equal to one if a multinational holds its German subsidiaries via one or several German holdings as described in section 2 and the liabilities of these holdings exceed 10% of their balance-sheet total, and equal to zero otherwise. use-hld is determined for each foreign immediate parent separately.[11] All regressions provide again for year dummies in order to control for the German macroeconomic environment.[12] The negative and significant coefficient

11 MiDi does allow one to identify the name (for confidentiality reasons, expressed as a unique number) of the immediate foreign parent of each German subsidiary, whereas with respect to the ultimate parent it only allows one to identify the country of residency. For defining use-hld I rely thus on the name of the immediate foreign parent. It may happen that an ultimate parent has two or even more immediate foreign parents for holding its German subsidiaries. In such cases I define two or more use-hld variables for only one ultimate parent.

12 Since subsidiaries are aggregated by the immediate foreign parent and year in specifications (1) and (2) and an immediate foreign parent may have subsidiaries active in differ-

on the corporate tax rate of the ultimate parent in specifications (1) and (2) shows, consistent with hypothesis 2, that the likelihood of using a debt-financed holding for entering Germany decreases with increasing corporate tax rate of the ultimate parent. These results do not change when additional controls are added in specification (2). The coefficient −2.046 on the tax rate in specification (2) translates into an elasticity of −0.631. Thus a 10% increase in the ultimate parent's tax rate decreases the likelihood of entering Germany using a holding structure by 6.31%. The log of the gross domestic product per capita in the country of residency of the ultimate parent does have a significant positive effect, reflecting that parents resident in more developed countries tend to use more holding structures. The log of the lending rate in the country of residency of the ultimate parent also has a positive and significant effect. If the lending rate in the country of residency of the ultimate parent is high, the ultimate parent prefers – given the comparatively low lending rates in Germany – to finance its investments in Germany using a holding structure.

The dependent variable use-hld is set equal to one whenever an immediate foreign parent organizes its activities using a financial holding in Germany in specifications (1) and (2). This, however, does not preclude the existence of an additional subsidiary of an immediate foreign parent, which is not held via such holdings. Thus, as an additional robustness check, specification (3) in table 4 reports results under a different definition of the dependent variable, use-hld-sub. Here I consider each subsidiary separately. Whenever a single subsidiary is held via a German financial holding, use-hld-sub is set equal to one, and zero otherwise.[13] Thus in specification (3) I consider each subsidiary independently from other subsidiaries of the same immediate foreign parent. The results, however, do not change materially. The significant coefficient on the tax rate translates into a similar elasticity of −0.655, as before.

As a further robustness check, in specification (4) I consider only holdings that do not have any liabilities on their balance sheet. The dependent variable use-ophld is set to one if the immediate foreign parent uses a holding without liabilities on its balance sheet in order to organize its activities in Germany. In contrast with specifications (1) and (2), in investigating the use of debt-finance holdings I do not find an effect of the corporate tax rate of the ultimate parent on using such holdings for entering Germany.

The control ln p11agg is defined as the aggregated sum of fixed and intangible assets over all German subsidiaries of an immediate foreign parent.

ent industries, no industry dummies can be included in specifications (1) and (2). They can, however, be included in specifications (3)–(8), because these specifications employ subsidiary data without aggregation.

13 Mintz and Weichenrieder (2010, Table 4.13) provide similar empirical evidence for the use of country holdings by German multinationals.

Table 4

Logit Regressions – The Use of Holdings

	Dependent Variable use-hld		Dependent Variable use-hld-sub	Dependent Variable use-ophld	Dependent Variable fumh		Dependent Variable fumhff		Dependent Variable fumhdiff	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Tax Rate	−1.501**	−2.046***	−2.320***	−0.257	−6.010***	−5.304***	−5.762***	−5.064***	−8.491***	−7.841***
	(0.67)	(0.47)	(0.57)	(1.59)	(1.61)	(1.63)	(1.68)	(1.71)	(2.40)	(2.47)
ln GDP-pc		0.734***	0.559***	0.315***	0.848	0.976	0.867	0.979	0.241	0.147
		(0.11)	(0.12)	(0.31)	(0.62)	(0.063)	(0.62)	(0.64)	(0.49)	(0.52)
ln p11agg		0.207***		0.127***						
		(0.0095)		(0.039)						
ln p11sub			0.171***		0.214***	0.140***	0.219***	0.140***	0.185***	0.125*
			(0.01)		(0.039)	(0.044)	(0.039)	(0.044)	(0.065)	(0.074)
ln Lending Rate		0.559***	0.531***	−0.119	−0.0996	−0.214	−0.0559	−0.166	0.715***	0.680*
		(0.080)	(0.10)	(0.22)	(0.28)	(0.28)	(0.28)	(0.29)	(0.33)	(0.35)
Year-Dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Industry-Dummies						✓		✓		✓
Observations	42340	38229	60203	38229	47213	44711	47213	44637	47213	39281

Note: The dependent variable use-hld in specifications (1) and (2) is set equal to one if a multinational having subsidiaries in Germany holds its subsidiaries via one or several holdings and the liabilities of this holding exceed 10% of its balance-sheet total; it is set equal to zero otherwise. The dependent variable use-hld-sub in specification (3) is set equal to one whenever a single subsidiary is held via a German financial holding; it is set equal to zero otherwise. The dependent variable use-ophld is set equal to one if a multinational having subsidiaries in Germany holds its subsidiaries via one or several holdings and the liabilities of this holding exceed 10% of its balance-sheet total; it is set equal to zero otherwise. The dependent variable use-ophld is set equal to one if a multinational having subsidiaries in Germany holds its subsidiaries via one or several holdings and this holding does not have any liabilities (purely operative holding); it is set equal to zero otherwise. The dependent variable fumh is set equal to one if a subsidiary is sold to a new holding within the same multinational group and set equal to zero otherwise. The dependent variable fumhff is set equal to one only if a subsidiary is sold to a new holding within the same multinational group and this new holding has some liabilities; it is set equal to zero otherwise. The dependent variable fumhdiff is set equal to one only if a subsidiary is sold to a new holding within the same multinational group and this new holding takes on some additional liabilities following the restructuring. Tax Rate is the statutory corporate tax rate of the country of residency of the ultimate parent of the considered German subsidiary. ln GDP-pc is defined as the logarithm of the gross domestic product per capita of the country of residency of the ultimate parent. ln p11agg is defined as the logarithm of the aggregated sum of fixed and intangible assets over all German subsidiaries of an immediate foreign parent. ln p11sub is defined as the logarithm of the amount of a German subsidiary's fixed and intangible assets. ln Lending Rate is defined as the logarithm of the lending interest rate in the country of residency of the ultimate parent. ln Size is defined as the logarithm of the balance-sheet total of the German subsidiary. All regressions are estimated using binary logit estimations and include year and industry dummies as indicated. Standard errors in parentheses are corrected for clustering across year–country cells and for heteroscedasticity. In specifications (1) and (2), sample consists of German subsidiaries of non-German multinationals in MiDi aggregated (therefore having reduced sample size compared to table 3) by the non-German immediate foreign parent and by year for the period from 1996 to 2007. In specifications (3)–(8), sample consists of German subsidiaries of non-German multinationals in MiDi (no aggregation) for the period from 1996 to 2007. In specifications (3)–(8) the sample is smaller than in table 3, since lagged data on each subsidiary included in the sample is necessary to compute the dependent variable. * denotes significance at the 10% level, ** at the 5% level, and *** at the 1% level.

The positive and significant coefficient 0.207 in specification (2) reflects that a 10% increase in an immediate foreign parent's aggregated fixed and intangible assets in Germany increases the likelihood of using a holding structure by 8.15%. Thus – consistent with hypothesis 3 – the use of holding as a tax planning tool is size-sensitive. Given the more or less fixed costs of implementing a holding structure, the likelihood of the use of this structure increases with the economic activity of an immediate foreign parent in Germany.

To inquire whether subsidiaries are sold within multinational groups in order to implement additional debt finance as argued in section 2, columns (5) and (6) show additional logit regression results based on subsidiary data without aggregation. The dependent variable fumh is set equal to one if a subsidiary – directly or indirectly owned before – is sold to a new holding within the same multinational group,[14] and set equal to zero otherwise (subsidiaries for which the ownership does not change). The significant and negative coefficient of −5.304 implies that a 10% increase in the ultimate parent's corporate tax rate decreases the likelihood for such a restructuring to occur by about 18.04%. The log of the gross domestic product per capita and the log of the lending rate in the country of residency of the ultimate parent do not have a significant effect. Confirming hypothesis 3, the decision to do such a restructuring is size-sensitive. The coefficient 0.19 on the control ln p11sub implies that an increase in a subsidiary's fixed and intangible assets in Germany increases the likelihood for such a restructuring to occur.

Specifications (7)–(10) in table 4 provide some additional robustness checks. Whereas the covariates are the same as in specifications (1)–(6), the dependent variables are different. In specifications (7) and (8) the dependent variable fumhff is set equal to one only if a subsidiary is sold to a new holding within the same multinational group and this new holding has some liabilities; it is set equal to zero otherwise. The results as well as the elasticities with respect to the tax rate remain nearly unchanged from those with specifications (5) and (6), since most acquiring holdings also have liabilities.

In specifications (9) and (10) the dependent variable fumhdiff is set equal to one only if a subsidiary is sold to a new holding within the same multinational group and this new holding takes on some additional liabilities following the restructuring; it is set equal to zero otherwise. In this case the

14 As a result, subsidiaries sold to other multinationals are not part of the investigation, although also in this case, following such a sale, additional debt finance may be implemented at the level of the acquiring corporation. Unfortunately, this may in some cases also include sales within multinational groups, since the MiDi database does not allow one to trace some group structures in the German inbound case. As a sensitivity analysis I redid all regressions including these cases; that did not affect the results significantly. See also Weichenrieder and Windischbauer (2008) for a discussion of the use of holdings for entering Germany.

coefficient −7.841 on the corporate tax rate in specification (10) translates into a 26.78% increase in the likelihood for such a restructuring to occur following a 10% increase in the ultimate parent's corporate tax rate.[15] The restructuring again is size-sensitive, as indicated by the coefficient 0.125 on ln p11sub.

5. Conclusion

Counterintuitively, empirical studies so far have documented a rather low response of multinationals' capital-structure choice to tax incentives. This paper investigates three possible explanations why – given the complexity of national and international tax law – empirical studies so far could have identified the effect of tax incentives on the capital-structure choice of multinationals only incompletely.

As a first explanation, I argue that holdings are an attractive and important tax planning tool in order to implement tax-induced debt finance. Indeed, in 2005 holdings had liabilities to affiliated enterprises outside Germany amounting to around 54 billion euros, whereas the liabilities to affiliated enterprises outside Germany held by ordinary subsidiaries amounted to around 60 billion euros. I show empirically, with respect to the German inbound case, that the use of debt-financed holdings for entering Germany decreases with increasing corporate tax rate at the level of the ultimate parent of a multinational group. I show further that subsidiaries are sold within multinational groups in order to implement additional debt finance.

As a second explanation, I show that subsidiaries active in wholesale or trade do not adjust their leverage in response to tax incentives. I argue that this could be due to special international transfer-pricing schemes applying to such subsidiaries, which reduce the tax incentives for debt financing.

I do not find empirical evidence for the third explanation. The response of the leverage of operating subsidiaries on tax incentives does not depend on the size of their activities.

The results of this study are especially important in order to evaluate the revenue consequences of tax reforms. According to the results presented here, it is not sufficient to compute changes in the capital-structure choice of operating firms. It is instead necessary to take changes at the level of holdings

15 The result in specifications (9) and (10) is based on only 93 of such restructurings taking place from 1996 to 2007. Still, these few restructurings result in 8.7 billion euros of additional debt finance implemented at the level of the acquiring holdings. I observe a drop from (on average) 10 such restructurings on a yearly basis down to less than 3 in 2004, which could be due to the newly introduced section 8a, para. 6, of the German Corporate Tax Act, as argued in section 3. However, given the few observations in 2004, I cannot provide evidence based on a regression analysis.

into account and to consider the determination of taxable income following international transfer-pricing schemes.

Empirical studies using regression analysis typically evaluate the *variation* of multinationals' capital-structure choice with respect to tax incentives. Even if, counterintuitively, this variation is low, the second aspect of the capital-structure puzzle – namely the *level* of debt finance implemented – should be kept in mind. Concerning the German inbound case, German subsidiaries of non-German multinationals had liabilities to affiliated enterprises outside Germany (not taking into account liabilities to external creditors) totaling up to 114 billion euros in 2005, compared to 97 billion euros invested in fixed and intangible assets. It is thus well understandable that the German government tries to limit the amount of tax-effective interest expenses, using thin-capitalization or interest-stripping rules.

6. Appendix: Definitions of Variables and Data Sources

Leverage is defined as liabilities divided by the balance-sheet total. Source: Deutsche Bundesbank.

Tax rate is the applicable statutory corporate tax rate in the country of residency of the ultimate parent, varying over time for the sample period from 1996 to 2007. Sources: Mintz and Weichenrieder (2010), KPMG, Institute for Fiscal Studies, and the Ross School of Business of the University of Michigan.

pcd is a dummy variable equal to zero for all subsidiaries smaller in size (size is defined according to the balance-sheet total) than the median, and equal to one otherwise. Source: Deutsche Bundesbank.

pcd75 is a dummy variable equal to zero for all subsidiaries smaller in size (size is defined according to the balance-sheet total) than the 75th percentile, and equal to one otherwise. Source: Deutsche Bundesbank.

Tangibility is defined as fixed and intangible assets divided by the balance-sheet total. Source: Deutsche Bundesbank.

ln Corruption is defined as the logarithm of the Transparency International corruption index of the country of residency of the ultimate parent. Source: Transparency International.

ln Lending Rate is defined as the logarithm of the lending interest rate in the country of residency of the ultimate parent. Source: World Bank and OECD.

ln Size is defined as the logarithm of the balance-sheet total of the German subsidiary. Source: Deutsche Bundesbank.

use-hld is set equal to one if a multinational having subsidiaries in Germany holds its subsidiaries via one or more holdings and the liabilities of these

holdings exceed 10% of their balance-sheet total; it is set equal to zero otherwise. Source: Deutsche Bundesbank.

use-hld-sub is set equal to one whenever a single subsidiary is held via a German financial holding; it is set equal to zero otherwise. Source: Deutsche Bundesbank.

use-ophld is set equal to one if a multinational having subsidiaries in Germany holds its subsidiaries via one or several holdings and this holding does not have any liabilities (purely operative holding); it is set equal to zero otherwise. Source: Deutsche Bundesbank.

fumh is set equal to one if the company is a subsidiary and set equal to zero otherwise. Source: Deutsche Bundesbank.

fumhff is set equal to one only if a subsidiary is sold to a new holding within the same multinational group and this new holding has some liabilities; it is set equal to zero otherwise. Source: Deutsche Bundesbank.

fumhdiff is set equal to one only if a subsidiary is sold to a new holding within the same multinational group and this new holding takes on some additional liabilities following the restructuring. Source: Deutsche Bundesbank.

ln p11agg is defined as the logarithm of the aggregated sum of fixed and intangible assets over all German subsidiaries of an immediate foreign parent. Source: Deutsche Bundesbank.

ln p11sub is defined as the logarithm of the amount of a German subsidiary's fixed and intangible assets. Source: Deutsche Bundesbank.

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