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Working Paper

Taxation and the financial structure of German outbound FDI

CESifo Working Paper, No. 1612

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Mintz, Jack; Weichenrieder, Alfons J. (2005) : Taxation and the financial structure of German outbound FDI, CESifo Working Paper, No. 1612, Center for Economic Studies and ifo Institute (CESifo), Munich

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TAXATION AND THE FINANCIAL STRUCTURE OF GERMAN OUTBOUND FDI

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CESIFO WORKING PAPER NO. 1612
CATEGORY 1: PUBLIC FINANCE
DECEMBER 2005

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Abstract

The paper analyzes the financial structure of outbound FDI during the period 1996-2002 by drawing on up to 54,022 firm-year observations of 13,758 German-owned subsidiaries. We find that the tax rate in the host country has a sizeable and significantly positive effect on leverage for wholly-owned foreign unlike partially-owned foreign companies. Most of the effect comes from increased intra-company borrowing, while third-party debt is not significantly affected by tax differences. While wholly-owned subsidiaries react more sensitively to tax rate differentials, they are less sensitive to macroeconomic influences like interest rates.

JEL Code: F23, H25.

Keywords: foreign direct investment, financial structure, capital structure, taxation.

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November 2005.

We are grateful to Thiess Buettner and Fred Ramb for valuable discussions and helpful comments by Peter Egger, Torberg Falch, Michael Pfaffermayer, and Hannes Winner. The second author gratefully acknowledges financial support from the Deutsche Forschungsgemeinschaft (DFG).

1 Introduction

The extent to which taxes influence the financial structure of firms has been subject to debate. In theory, high corporate tax rates invite firms to finance their investment with debt since interest expenses, often unadjusted for inflation, are deductible from corporate taxable income, thereby providing a tax shield. Until recent years, empirical evidence showing the dependency of financing structures was often lacking, prompting Myers (1984) to raise doubt if there would ever be such evidence.¹

However, in the past decade and a half several studies of corporations in a domestic context have been successful in identifying tax effects. MacKie–Mason (1990) found that the marginal source of finance was influenced by the effective corporate tax rate by exploiting differences in the loss carry-forward position of firms.² For firms with high loss carry-forwards the tax deductibility of interest has a lower value than for profitable firms. MacKie–Mason also showed for a sample of U.S. corporations that firms with high loss carry-forwards indeed used less debt at the margin. Givoly et al. (1992) used a similar method and show a tax influence by looking at the natural experiment of the U.S. 1986 tax reform act. Gentry (1994) compared U.S. firms that operate in special industries and can avoid the double taxation under the U.S. corporate tax system with other firms that are subject to double taxation of corporate profits. Indeed the first group of corporations shows a significantly different financing behavior. Graham (1999) argued that empirically the tax rate of the personal investor plays a role in corporate financing decisions. Gordon and Lee (1999) exploited the fact that in the

¹ In his presidential address to the American Finance Association Myers said, “I know of no study clearly demonstrating that a firm’s tax status has predictable, material effects on its debt policy. I think the wait for such a study will be protracted.”

² A similar result on tax loss companies is found in Bartholdy, Fisher and Mintz (1987) who also provided evidence that an increase in the federal-provincial statutory corporate tax rates resulted in the debt-to-asset to rise by 0.4 percentage points.

U.S. smaller corporations are granted a lower corporate tax rate and find a significant effect of this lower rate. Finally, Gropp (2002) showed a sizeable tax effect on the financing of marginal corporate investment by exploiting local tax differentials for German firms.

When it comes to international investments only a few studies have dealt with the relationship between corporate taxes and debt and most have used data on U.S.-owned affiliates (Altshuler and Grubert (2003) and Desai, Foley, and Hines (2003)). One exception is Jog and Tang (2001). Using Finance Canada data, they found that Canadian-controlled and US-controlled multinationals debt was significantly influenced by corporate tax rate differentials with the United States. Another exception is Ramb and Weichenrieder (2004) who consider tax differentials of parent companies for explaining intra-company loans of foreign-owned affiliates in Germany (German inbound FDI), including a majority of non U.S.-owned firms.

The following study uses a large panel set on German outbound FDI to reconsider the flexibility of financial structure with respect to taxation. Consistent with other studies we find that the fraction of debt in total assets is positively related to the host country's corporate tax rate and the estimated marginal effects are of approximately the same magnitude. More precisely we find that a 10 per cent increase in the host country's corporate tax rate leads to a 5.6 percentage point increase in the debt ratio of wholly-owned manufacturing³ firms.

We also find two other results of interest. The first is that partly-owned foreign subsidiaries react little to corporate income tax rate variation. We speculate that this might arise from a conflict between the majority and minority shareholders that would need to be resolved through governance procedures. The second result is that German-owned subsidiaries will adjust their internal financing from affiliates rather than their third-party debt when the corporate tax rate varies.

³ Manufacturing is broadly defined in the data to include mining and utility companies.

2 Descriptive Statistics

To study the tax effects on financial structure we selected from the micro data base of the Deutsche Bundesbank those firms that were operating in one of 68 countries for which we could collect reliable tax rate information and were operating in manufacturing. We also dropped branches, which are a minor form of conducting foreign operations in manufacturing. The firms in the Bundesbank database are owned either directly or via a holding company abroad (indirectly). All firm observations come from the years 1996 to 2002. Data on years before 1996 are in principle available but the panel structure has been lost due to data protection measures. This leaves us with 13,758 firms that on average are observed over 3.9 years.

German investors owning foreign affiliates are legally required to report on their foreign operations if it meets mild size and ownership requirements.⁴ These reports are the basis for a recent data base by the Deutsche Bundesbank (see Lipponer 2003). Most of the information in the data refers to a reduced set of balance sheet information. On the liability side, which is on the forefront of this study, there is information on paid-up plus non-paid-up equity, capital reserves, loss carry-forwards, current profits net of taxes, debt, liabilities to German affiliated companies, liabilities to foreign affiliated firms, and other liabilities. Figure 1 gives an overview of several financial ratios and their development during the period 1996 – 2002. The left hand side graphs refer to German-owned affiliates that are directly held by a German parent firm. The graphs on the right-hand side refer to the sample of firms that are held indirectly via a foreign holding company. The financial ratios have been constructed by dividing the respective balance sheet items by balance sheet total. Each of the panels includes

⁴ There is a yearly reporting requirement for wholly-owned foreign subsidiaries if total assets of the foreign subsidiary exceed the equivalent of €3 million (DM 1 million in years before 2002).

five lines that represent the respective financial ratio at the 5th, the 25th, the 75th, the 95th centile and the median.

All panels show that, at least for the respective median firm, financial ratios have been pretty stable over the period 1996-2002. For some firms, equity or debt can reach more than 100 per cent of balance sheet total as is indicated by the 5th centiles in Figures 1b, 1g, and 1h. Technically, this is feasible if a firm has loss carry-forwards or current losses that enter negatively on the liability side of the balance sheet. A somewhat unusual feature of the balance sheets collected by the Deutsche Bundesbank is that they contain the yearly after-tax profit prior to dividend distributions as a separate part of the equity of the firm. Therefore, the balance sheets provide information on current profits even though the data base does not contain formal profit and loss statements. For the median firm, current profits net of taxes are around two per cent of balance sheet total in all years, but at least five per cent of the firms have profits of nineteen per cent or more. This is mirrored by a similar fraction of firms that have a current loss of more than 20 per cent of total assets. The median debt-to-asset ratio is between 53 % and 58%. For more than five percent of the directly and indirectly-held firms, debt exceeds total assets. Since losses may dramatically reduce total assets, which serve as the denominator of the debt ratio, debt ratios can become extremely high and the data set even contains eight observations with debt ratios exceeding ten.

While directly and indirectly-held manufacturing firms show quite similar financing patterns for equity and total debt, they differ strongly when it comes to intra-company loans. As panel 1i shows, the median firm in the directly held sample has no liabilities against affiliated firms outside Germany and 75 per cent of the firms have less than three per cent of their assets financed by those liabilities. This is different when we turn to those firms that are held via an intermediate foreign holding. For at least 25 per cent of these firms, liabilities against affiliated companies outside Germany account for 28 per cent of total assets or more. When we look at the liabilities against German affiliated companies (including the parent),

then we see the opposite: the median indirectly owned firm does not owe money to a German firm, while this is the case in the sample of directly-held firms.

Figure 1: The Financial Structure of German-owned Subsidiaries
(fractions of balance sheet total)

Figure 1a: Paid-up capital and capital reserves, directly-held subsidiaries

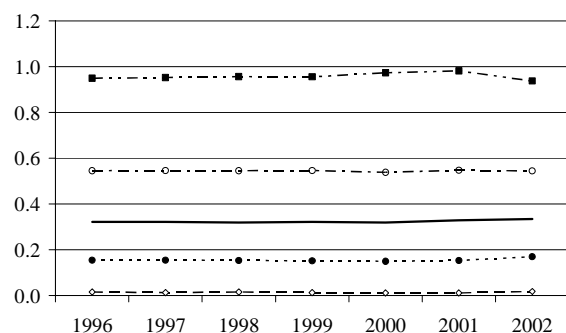


Figure 1b: Paid-up capital and capital reserves, indirectly-held subsidiaries

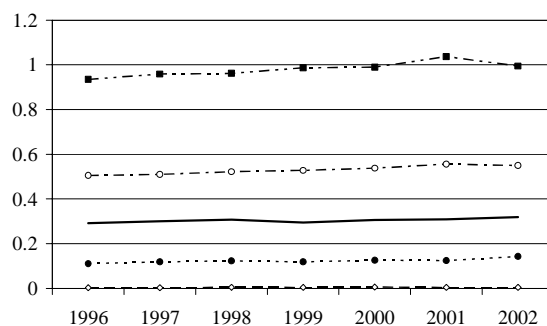


Figure 1c: Profit and loss carry-forwards, directly-held subsidiaries

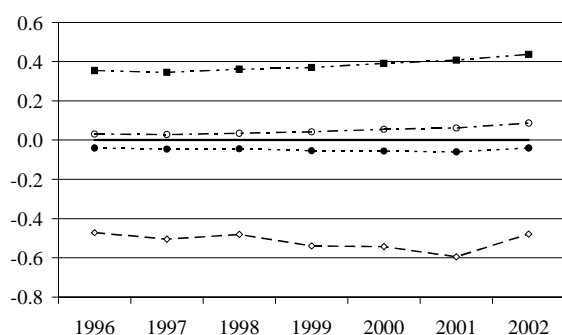


Figure 1d: Profit and loss carry-forwards, indirectly-held subsidiaries

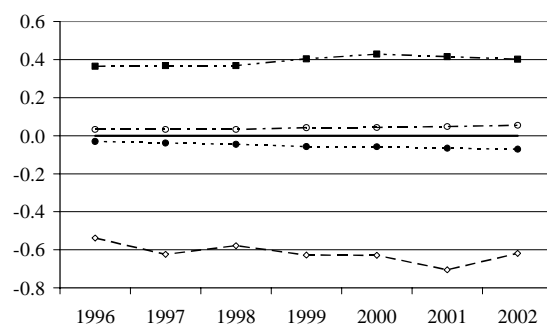


Figure 1e: Current profits after taxes, before dividends, directly-held subsidiaries

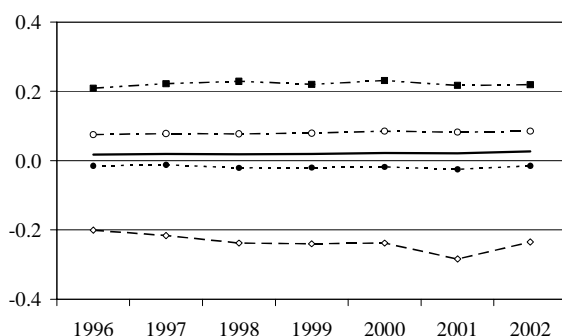


Figure 1f: Current profits after taxes, before dividends, indirectly-held subsidiaries

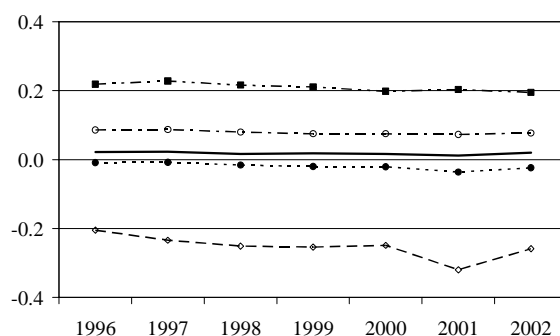


Figure 1g: Total debt, directly-held subsidiaries



Figure 1h: Total debt, indirectly-held subsidiaries



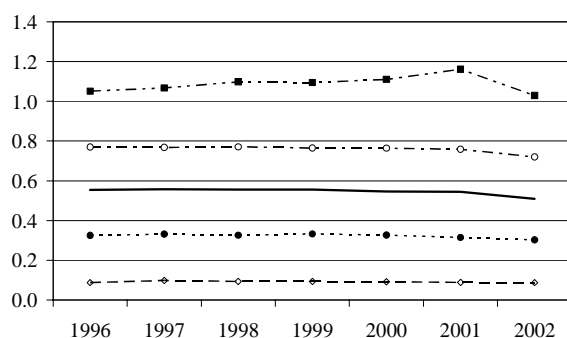


Figure 1i: Liabilities against foreign affiliates, directly-held subsidiaries

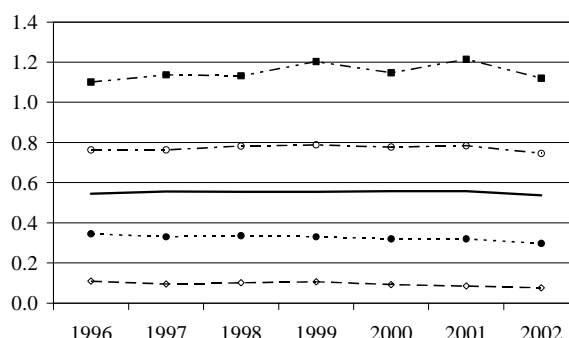


Figure 1j: Liabilities against foreign affiliates, indirectly-held subsidiaries

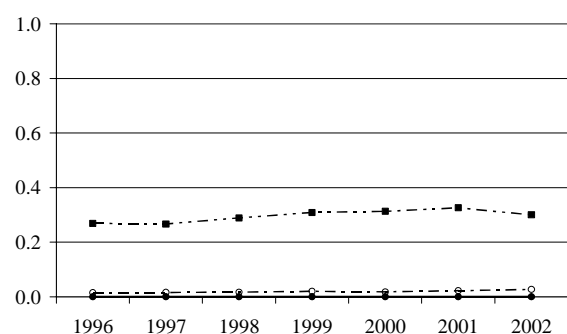


Figure 1k: Liabilities against German affiliated companies, directly-held subsidiaries

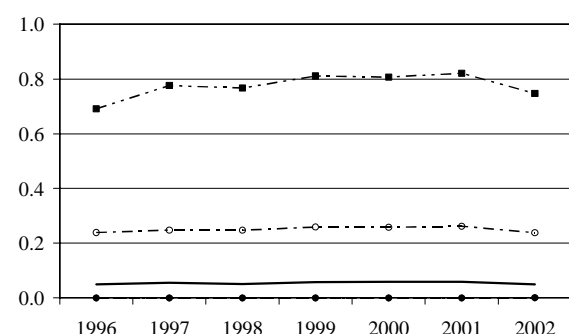


Figure 1l: Liabilities against German affiliated companies, indirectly-held subsidiaries

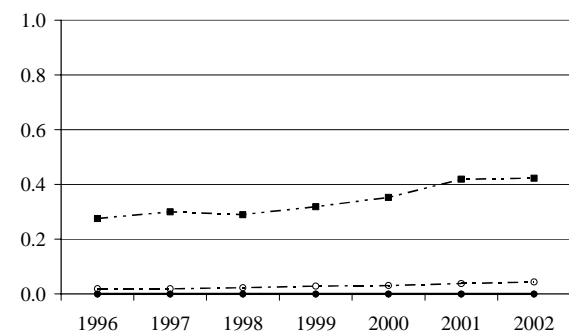
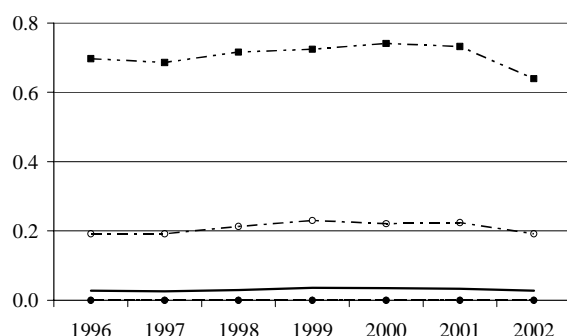
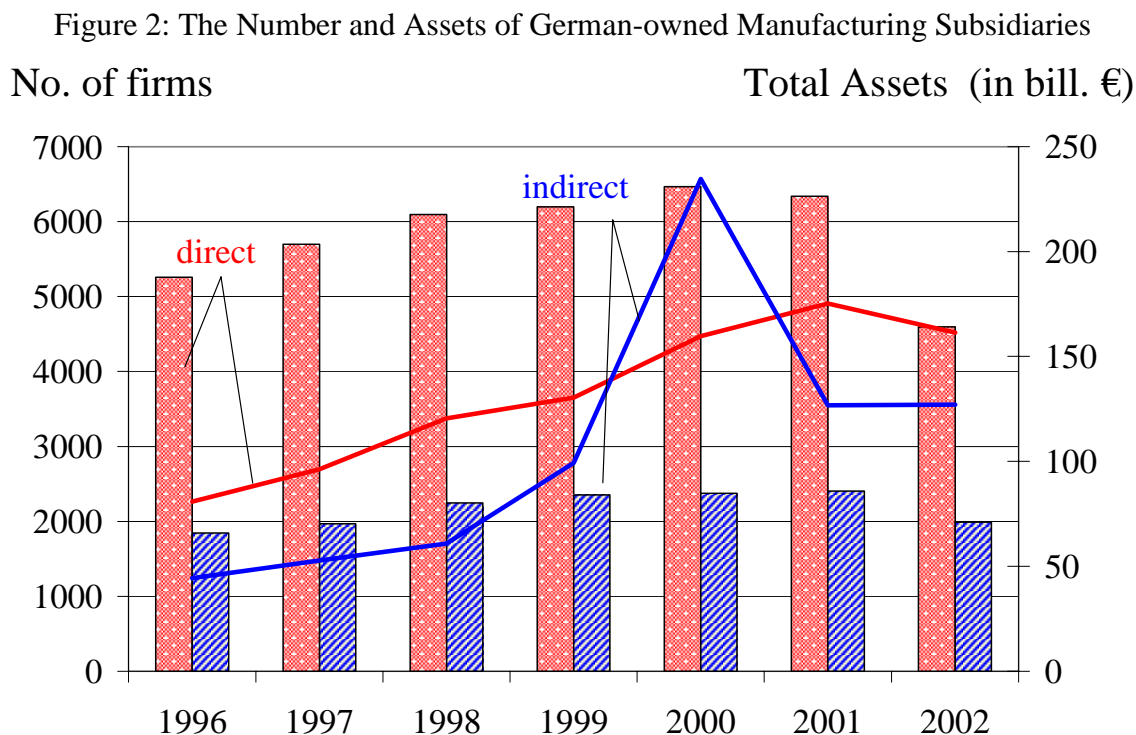


Figure 2 gives an impression of the amount of assets represented in our sample firms. In the last year of our sample, total assets (measured by balance sheet total) of indirectly and directly-held firms amounted to € 288 billion. Total assets peaked in the year 2000 and declined after the burst of the New Economy bubble. Some part of the further decline in reported investment from 2001 to 2002 is due to an increase in the size threshold for the reporting requirement. Also, values can shift as exchange rates relative to the Euro (or Mark in early years) change overtime. Figures for directly-held firms have been affected more strongly, as directly-held firms tend to be smaller than those held indirectly via a foreign

holding company. When FDI is measured by size, Figure 2 shows a growing importance of indirectly-held firms compared to directly-held manufacturing subsidiaries.



Annotation: The lines refer to total assets (balance sheet total) measured on the right scale. The columns indicate the total number of firms measured on the left scale.

We also constructed a panel of corporate tax rates, which resulted in a cross-section of 68 countries for the combined data set. For all countries the rates reflect the general corporate tax rates, including average local taxes, and have been collected at the University of Toronto's International Tax program, using information from Finance Canada, International Bureau of Fiscal Documentation, PricewaterhouseCoopers, the Bureau of Tax Policy Research at the University of Michigan, KPMG, and other sources.

Figure 3 provides some analysis of the tax rate information in our data set. The left panel of Figure 3 shows the distribution of tax rates according to our sample. For the period 1996 to 2002 the bold line in the middle indicates the tax rate faced by the median firm in each year. The two lines above show the rates for the 95 and 75 centiles firms. The two lines

below indicate the rates for the 5th and the 25th centiles. The right panel of Figure 3 reflects the same centiles but ignores the number of German firms operating in a given country. It only reflects the distribution of the unweighted national tax rates.

Figure 3: The distribution of Host Country Tax Rates for German-owned Firms

Figure 3a: Tax Rates faced by German-owned Subsidiaries
(Country Tax Rates weighted by No. of German Firms)

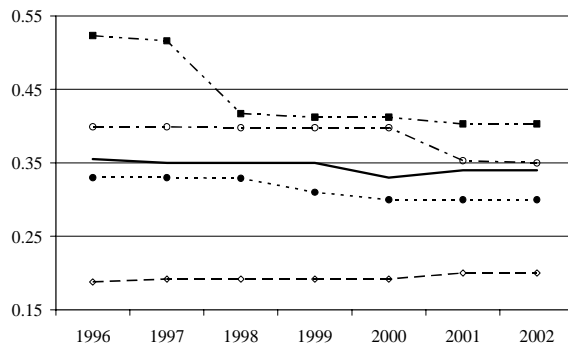
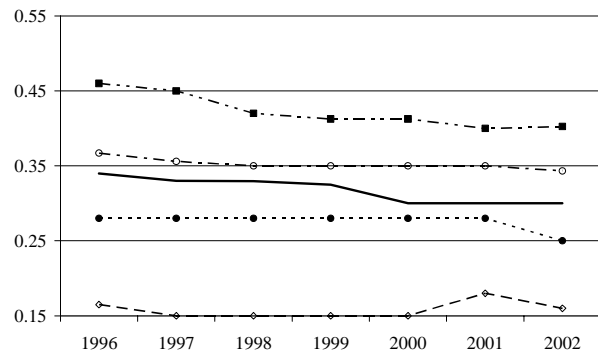


Figure 3b: Tax Rate Dispersion among Host Countries
(unweighted)



As Figure 3b illustrates, the median tax rate in our set of 68 countries has come down from 34 per cent to 30 per cent and only five per cent of the included countries tax corporations at a rate of 40 per cent or higher. While a downward trend is also visible in Figure 3a, this left panel suggests that German-owned manufacturing firms are relatively often located in countries that have experienced a less pronounced downward trend in taxation. Of the 68 countries in our sample, 25 experienced no tax rate change during the period 1996-2002, while the remaining 41 countries did. The average standard deviation of the sample countries' tax rates equals 1.63 percentage points.

3 Empirical Results

The fundamental hypothesis is that for firms in high-tax countries the benefit of the tax shield provided by debt finance is higher than in low-tax countries and therefore leverage

should increase with the local tax rate. To allow for the possibility that directly held firms react differently to a tax change than indirectly-held firms, which are held via an intermediate holding company, we started with two tax variables. CTXDIR is zero if the firm under consideration is indirectly held but equals the foreign corporate tax if the firm is held directly. Conversely, CTXINDIR takes on the value zero if the firm is directly held by the German parent, but equals the host country's corporate tax rate otherwise. In cases in which the restriction $CTXDIR = CTXINDIR$ was accepted by a Wald test we introduced the new variable CT, which equals the corporate tax rate. To allow for tax effects that are nonlinear in taxes we also introduced squares of the tax variables ($CT2 = CT^2$, $CT2XDIR = CTXDIR^2$, $CT2XINDIR = CTXINDIR^2$). To account for non-tax reasons for the amount of leverage we use four macroeconomic variables for the host countries: real GDP growth (GDPGROWTH), the bank lending rate from the IMF International Financial statistics (IBANK), the host country's nominal inflation rate (INFLATION) and the amount of bank lending to the private sector scaled by GDP (DOMPRIVCRED). We expect that growth in the host country should make it easier to self finance investment and may have a negative effect on the demand for debt. The interest rate should negatively affect the demand for debt, while a higher inflation rate (at a given interest rate) reduces the real interest rate and should favour debt. The variable DOMPRIVCRED captures the efficiency of the banking sector in the host country and may positively affect the amount of debt.

Table 1 begins with the determinants of subsidiaries' overall debt to asset ratio. Three different samples are considered. The full sample of all subsidiaries [column (1)-(3)] consists of up to 13,758 firms and 54,022 firm-year observations, but is slightly reduced by the limited availability of macroeconomic variables for some host countries. Columns (4)-(6) present results for up to 9,156 subsidiaries that are wholly-owned by the German investor, while columns (7)-(9) include up to 6,023 less than fully owned-subsidaries. Since the Hausman test generally rejected the validity of a GLS model, all regressions use a fixed effects model

with robust p-values, which have been corrected for errors correlated across country observations and firm observations (clustering).

Model (1) uses the full sample to regress the overall debt ratio on the host country's tax rate and fixed time effects (not reported), while model (2) additionally introduces the macro variables discussed above. These simple linear models suggest that a one percentage point increase in the host country's tax rate leads to a .19 to .3 percentage point increase in the debt ratio of German subsidiaries. None of the macroeconomic variables in model (2) is significant in the full sample of firms and the hypothesis that all four variables are insignificantly different from zero is accepted by a Wald test. The increased significance of the tax variable CT in model (2) is largely owed to the loss of 1,210 firms in less-developed countries for which not all of the four macroeconomic variables are available. Dropping the lost observations without including the macro-variables would yield a very similar increase in the estimated coefficient. Firms in countries for which the macroeconomic variables are not available seem to react with much less flexibility in determining their leverage decision. Despite their insignificance, the macro-variables show the expected signs. Growth and lending rates reduce reliance on debt while inflation and the liquidity of the banking sector increase leverage.

As shown by the significantly negative coefficient of CT2 in model (3) there is evidence that the tax effect is concave in the tax rate. The estimates imply that a one percentage point tax rate increase in the host country causes leverage to rise by .41 percentage points (evaluated at sample means).

The models (4)-(6) repeat the regressions (1)-(3) but rely only on wholly-owned subsidiaries. Throughout, the magnitudes of tax effects are larger than in the full sample. The results from model (6) for wholly-owned subsidiaries imply that a one percentage point tax rate increase pushes up leverage by .56 percentage points (evaluated at sample means).

Columns (7)-(9) report results for partly-owned subsidiaries. Here the tax rate loses significance, and the marginal effect of the tax rate is largely reduced. At the same time three out of four macro variables are now significantly different from zero. Wholly-owned firms, that are under the control of a single German investor seem largely independent of credit market conditions, while firms with more than one owner have to revert to the external funding and are more sensitive to conditions on the debt market. The comparison between wholly-owned and partly-owned subsidiaries points to the potential importance of governance issues. Since the multinational parent is a related party to an affiliate, conflicts arise in determining the appropriate financial policy when unrelated (minority) shareholders are involved. Coordinating several owners' may be difficult if these owners face different financing and tax conditions – after all, minority shareholders of a subsidiary do not benefit in the same manner from world-wide tax minimization strategies desired by the parent.

We now look deeper into the leverage decision by decomposing debt into loans received from third parties and loans received from foreign and German affiliated companies (including the German parent). Table 2 shows tax and macroeconomic effects on third party debt. Since the null hypothesis that the tax rate affects indirectly held and directly held firms in the same way was not generally accepted, the variables CTXDIR and CTXINDIR were kept and all results separately report the effects on both types of firms. Irrespective of the subsample considered, we find that the tax rate is insignificant in explaining third-party debt. For partly owned subsidiaries the estimated coefficients even show consistently the wrong sign. Unlike the findings for the overall debt ratio, this result is in stark contradiction to findings for U.S.-owned multinationals (Altshuler and Grubert 2003, Desai, Foley, and Hines 2003) that suggest that the local tax rate is both influencing intra-company loans and third-party debt.

Table 1: Taxes and the Debt-Asset Ratio of Foreign Subsidiaries

	All subsidiaries			Wholly-owned subsidiaries			Partly-owned subsidiaries		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CT	0.192 [0.10]	0.300 [0.02]**	1.274 [0.03]**	0.383 [0.06]*	0.444 [0.05]*	1.681 [0.04]**	0.024 [0.86]	0.174 [0.17]	0.514 [0.48]
CT2			-1.275 [0.07]*			-1.652 [0.07]*			-0.437 [0.64]
GDPGROWTH		-1.52E-03 [0.25]	-1.63E-03 [0.18]		-1.47E-04 [0.94]	-2.15E-04 [0.90]		-2.68E-03 [0.07]*	-2.73E-03 [0.07]*
IBANK		-8.99E-04 [0.24]	-9.54E-04 [0.20]		3.03E-04 [0.81]	2.71E-04 [0.83]		-1.53E-03 [0.01]**	-1.56E-03 [0.01]**
INFLATION		8.10E-05 [0.57]	6.02E-05 [0.67]		1.45E-04 [0.53]	1.06E-04 [0.61]		2.84E-05 [0.84]	2.22E-05 [0.87]
DOMPRIVCREd		4.38E-04 [0.19]	4.17E-04 [0.18]		3.66E-04 [0.36]	3.39E-04 [0.36]		6.97E-04 [0.10]	6.91E-04 [0.10]
Observations	54022	47037	47037	33525	29184	29184	20447	17807	17807
Firms	13758	12527	12527	9156	8377	8377	6023	5399	5399
R-squared (adj.)	0.69	0.69	0.69	0.70	0.70	0.70	0.71	0.71	0.71

Annotations: ***significant at 1%-level, **significant at 5%-level, *significant at 10%-level. P-values in brackets are based on robust t-statistics (corrected for correlations within country cells and within firm cells). All regressions contained a set of time and firm dummies plus a constant; coefficients are not reported. We excluded firms that on average over year observations had a debt-asset ratio of unity or larger.

Table 2: Taxes and Third-party Debt

	All subsidiaries			Wholly-owned subsidiaries			Partly-owned subsidiaries		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CTXINDIR	-0.053 [0.54]	-0.003 [0.97]	-0.108 [0.80]	0.039 [0.65]	0.059 [0.53]	0.289 [0.54]	-0.132 [0.36]	-0.032 [0.83]	-0.464 [0.46]
CTXDIR	0.005 [0.95]	0.056 [0.50]	0.120 [0.76]	0.070 [0.38]	0.099 [0.26]	0.488 [0.28]	-0.043 [0.73]	0.047 [0.72]	-0.187 [0.75]
CT2XINDIR			0.316 [0.57]			-0.151 [0.81]			0.777 [0.37]
CT2XDIR			-0.128 [0.79]			-0.563 [0.32]			0.259 [0.72]
GDPGROWTH		-4.39E-04 [0.68]	-4.18E-04 [0.69]		-3.01E-04 [0.81]	-2.88E-04 [0.81]		-3.32E-04 [0.84]	-2.77E-04 [0.87]
IBANK		-1.24E-03 [0.00]***	-1.23E-03 [0.00]***		-1.04E-03 [0.05]*	-1.02E-03 [0.06]*		-1.27E-03 [0.00]***	-1.24E-03 [0.01]***
INFLATION		9.55E-05 [0.32]	9.34E-05 [0.33]		1.06E-04 [0.26]	9.74E-05 [0.29]		3.80E-05 [0.71]	4.05E-05 [0.69]
DOMPRIVCRED		9.54E-05 [0.63]	9.85E-05 [0.61]		-3.50E-05 [0.86]	-3.97E-05 [0.84]		3.83E-04 [0.25]	3.90E-04 [0.24]
Observations	54022	47037	47037	33525	29184	29184	20447	17807	17807
Firms	13758	12527	12527	9156	8377	8377	6023	5399	5399
R-squared (adj.)	0.67	0.67	0.67	0.66	0.66	0.66	0.70	0.70	0.70

Annotations: ***significant at 1%-level, **significant at 5%-level, *significant at 10%-level. P-values in brackets are based on robust t-statistics (corrected for clusters within country cells and within firm cells). All regressions contained a set of time and firm dummies plus a constant; coefficients are not reported. We excluded firms that on average over all year observations had a debt-asset ratio of unity or larger.

Table 3: Loans from German Affiliated Firms

	All subsidiaries			Wholly-owned subsidiaries			Partly-owned subsidiaries		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CTXINDIR	0.092 [0.46]	0.128 [0.40]	1.149 [0.05]**	0.132 [0.48]	0.155 [0.45]	1.342 [0.04]**	0.072 [0.43]	0.112 [0.35]	0.864 [0.17]
CTXDIR	0.171 [0.18]	0.211 [0.17]	1.183 [0.03]**	0.251 [0.19]	0.285 [0.18]	1.445 [0.01]**	0.095 [0.23]	0.136 [0.19]	0.805 [0.18]
CT2XINDIR			-1.396 [0.04]**			-1.617 [0.04]**			-1.058 [0.16]
CT2XDIR			-1.265 [0.03]**			-1.540 [0.00]***			-0.842 [0.23]
GDPGROWTH		-6.21E-04 [0.65]	-7.32E-04 [0.56]		5.27E-04 [0.77]	4.57E-04 [0.76]		-2.03E-03 [0.14]	-2.13E-03 [0.11]
IBANK		2.40E-04 [0.56]	1.83E-04 [0.64]		8.91E-04 [0.30]	8.58E-04 [0.26]		-1.58E-04 [0.62]	-2.13E-04 [0.47]
INFLATION		1.47E-05 [0.84]	-5.75E-06 [0.93]		9.64E-05 [0.62]	5.96E-05 [0.69]		-1.99E-06 [0.97]	-1.34E-05 [0.81]
DOMPRIVCRED		2.99E-04 [0.16]	2.77E-04 [0.15]		3.59E-04 [0.15]	3.33E-04 [0.09]*		1.81E-04 [0.42]	1.68E-04 [0.43]
Observations	54022	47037	47037	33525	29184	29184	20447	17807	17807
Firms	13758	12527	12527	9156	8377	8377	6023	5399	5399
R-squared (adj.)	0.63	0.62	0.62	0.64	0.63	0.63	0.65	0.64	0.64

Annotations: ***significant at 1%-level, **significant at 5%-level, *significant at 10%-level. P-values in brackets are based on robust t-statistics (corrected for clusters within country cells and within firm cells). All regressions contained a set of time and firm dummies plus a constant; coefficients are not reported. We excluded firms that on average over all year observations had a debt-asset ratio of unity or larger.

Table 4: Loans from Affiliated Companies outside Germany

	All subsidiaries			Wholly-owned subsidiaries			Partly-owned subsidiaries		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CTXINDIR	0.137 [0.00]***	0.147 [0.00]***	-0.001 [1.00]	0.229 [0.00]***	0.229 [0.01]***	-0.057 [0.82]	0.024 [0.69]	0.026 [0.70]	0.012 [0.96]
CTXDIR	0.007 [0.88]	0.018 [0.66]	-0.187 [0.36]	0.070 [0.22]	0.071 [0.33]	-0.288 [0.30]	-0.031 [0.56]	-0.021 [0.73]	-0.074 [0.73]
CT2XINDIR			0.136 [0.67]			0.311 [0.40]			-0.027 [0.94]
CT2XDIR			0.283 [0.27]			0.500 [0.15]			0.077 [0.78]
GDPGROWTH		-4.66E-04 [0.35]	-4.54E-04 [0.38]		-3.64E-04 [0.67]	-3.60E-04 [0.64]		-3.74E-04 [0.61]	-3.71E-04 [0.56]
IBANK		1.03E-04 [0.58]	1.09E-04 [0.55]		4.04E-04 [0.25]	4.03E-04 [0.20]		-7.25E-05 [0.62]	-7.05E-05 [0.65]
INFLATION		-3.38E-05 [0.61]	-2.92E-05 [0.50]		-6.98E-05 [0.31]	-6.01E-05 [0.65]		-1.30E-05 [0.84]	-1.17E-05 [0.84]
DOMPRIVCRED		7.20E-05 [0.72]	7.49E-05 [0.59]		6.73E-05 [0.84]	7.33E-05 [0.82]		1.55E-04 [0.28]	1.55E-04 [0.20]
Observations	54022	47037	47037	33525	29184	29184	20447	17807	17807
Firms	13758	12527	12527	9156	8377	8377	6023	5399	5399
R-squared (adj.)	0.61	0.61	0.61	0.62	0.62	0.62	0.59	0.58	0.58

Annotations: ***significant at 1%-level, **significant at 5%-level, *significant at 10%-level. P-values in brackets are based on robust t-statistics (corrected for clusters within country cells and within firm cells). All regressions contained a set of time and firm dummies plus a constant; coefficients are not reported. We excluded firms that on average over all year observations had a debt-asset ratio of unity or larger.

Unlike for overall debt, the bank lending rate (IBANK) is now significant in all samples, but as in the case of overall debt, it is more significant for partly-owned subsidiaries than for wholly-owned firms. The estimated magnitudes are small, though. A one percentage point increase of the interest rate tends to decrease the debt to asset ratio by roughly a tenth of a percentage point for wholly-owned firms and some 13 per cent of a percentage point for partly-owned firms. The other three macro-variables have the expected signs but are not significant.

Table 3 shows results for the ratio of German loans to balance sheet. Again the models that include a quadratic term perform significantly better than simple linear models. While, evaluated at the sample means, we always find a positive effect of the tax rate on German intra-company loans, the results are not significant for partly-held firms (model 6 – 8). For wholly-owned subsidiaries, the coefficients of model (6) imply a marginal effect of the tax rate on leverage of .252 for indirectly-held firms and .408 for directly-held firms. For example, we can expect that a one percentage point increase in the tax rate leads to a sizeable increase in German loans that amounts to 0.25% to 0.41% of balance sheet total.

Finally, Table 4 reports on the determinants of loans received from affiliated companies outside Germany. Here we find a strong difference between wholly-owned firms that are held directly and those that are held via a holding. Only those firms that are held via an intermediate holding company show a reaction of their respective debt ratio with respect to taxation. Unlike in the previous regressions the tax effect is linear and the inclusion of quadratic terms shows insignificant results. A likely reason for this is that even the bulk of the indirectly held firms has only a modest ratio of this type of loans to balance sheet total (cf. Figure 11). We also find insignificant results for the sub-sample of partly-owned firms. Macro-variables seem to play an insignificant role for the magnitude of loans received from affiliated companies outside Germany in all samples.

4 Summary and Conclusions

This paper is one of the first studies that empirically analyze the effect of company taxes on complex multinational financial decisions and it is especially unique in using non-American data. Unlike most previous studies we have relied on statutory corporate tax rates rather than implicit tax rates derived by dividing tax payments by pre-tax profits. Despite these differences our estimates are largely in line with results derived from U.S.-owned subsidiaries. We find that a one percentage point increase in the host country's tax rate increases the debt to asset ratio by some .3 to .57 percentage points. This result is broadly comparable to results of U.S. studies (Altshuler and Grubert (2003); Desai, Foley, and Hines (2003)) and a Canadian study using statutory tax rates (Jog and Tang (2001)). However, when it comes to the specific instrument of financial flexibility, German-owned subsidiaries rely almost exclusively on intra-company loans, while in U.S. studies the marginal effect of a tax change has turned out to be larger for third-party debt.

Our study is the first that separately analyzes wholly-owned subsidiaries and partly-owned subsidiaries. While wholly-owned firms experience a significant tax effect on their financial leverage, this is not the case for German subsidiaries that are less than 100% owned affiliates. This squares with the observation that the major instrument of flexibility is the use of intra-company loans. Coordination of (tax-) efficient intra-company (related-party) loan strategies seems more difficult to achieve when there minority shareholder interests are to be protected.

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