

Taxation and the Financial Structure of German Outbound FDI*

by

Jack Mintz

(Rotman School of Management, University of Toronto, C. D. Howe Institute & CESifo)

and

Alfons J. Weichenrieder

(Goethe-University Frankfurt & CESifo)

This version: 15 November 2004

Abstract

The paper analyzes the financial structure of outbound FDI during the period 1996-2002 by drawing on up to 52,053 firm-year observations of 13,297 German-owned subsidiaries. We find that the tax rate in the host country has a sizeable and significantly positive effect on leverage. Most of the effect comes from increased intra-company borrowing, while third-party debt is not significantly affected by tax differences.

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

JEL classification: F23, H25

Addresses of authors

Jack Mintz
J.L. Rotman School of Management
University of Toronto
105 St. George Street
Toronto, Ontario, M5S 3E6, Canada
Fax 1-416-782-7915
E-mail : jmintz@cdhowe.org

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

* We are grateful to Thiess Buettner and Fred Ramb for valuable discussions. 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 often been a subject of 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 differences in federal-provincial corporate tax rates significantly influenced firm debt ratios in Canada.

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, 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. Like 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 5.7 percentage point increase in the debt ratio of wholly-owned manufacturing firms.

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 13,297 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.³ 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 not 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 five lines that represent the respective financial ratio at the 5th, the 25th, the 75th, the 95th centil 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 profit after taxes but before dividend distributions as a separate part of the equity of the firm. Therefore, the balance sheets provide information on current profits despite the fact that data

³ 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).

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 or more per cent. 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 10.

While directly and indirectly-held 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 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

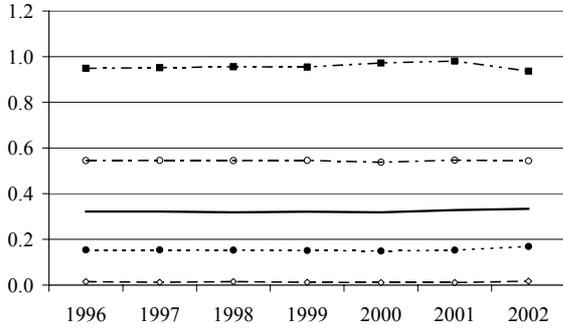


Figure 1b: Paid-up capital and capital reserves, indirectly-held subsidiaries

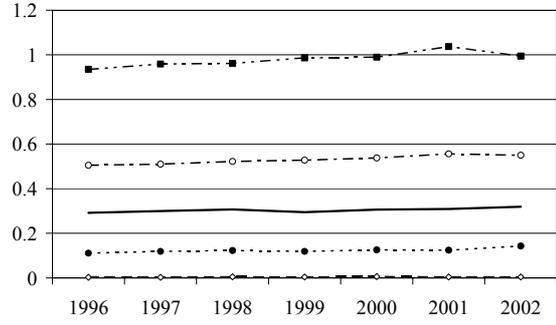


Figure 1c: Profit and loss carry-forwards, directly-held subsidiaries

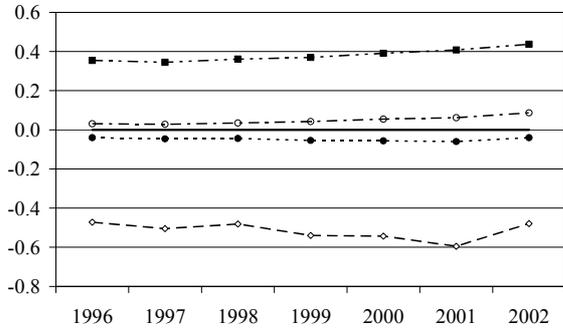


Figure 1d: Profit and loss carry-forwards, indirectly-held subsidiaries

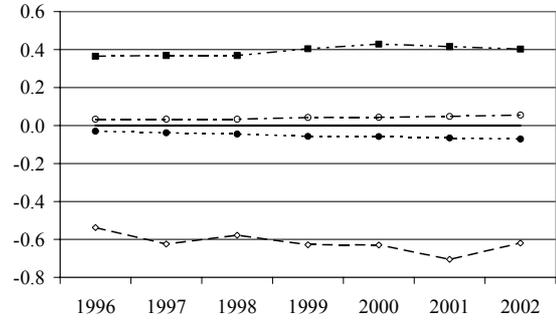


Figure 1e: Current profits after taxes, before dividends, directly-held subsidiaries

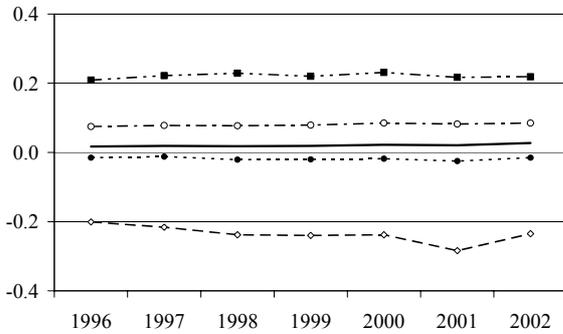


Figure 1f: Current profits after taxes, before dividends, indirectly-held subsidiaries

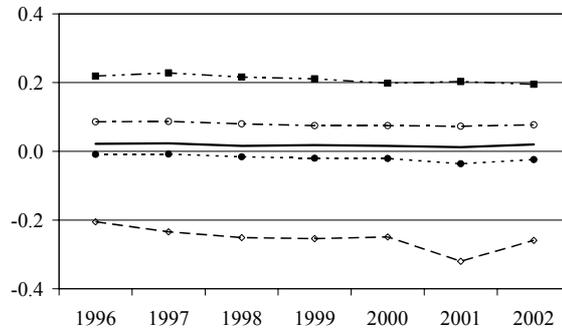


Figure 1g: Total debt, directly-held subsidiaries

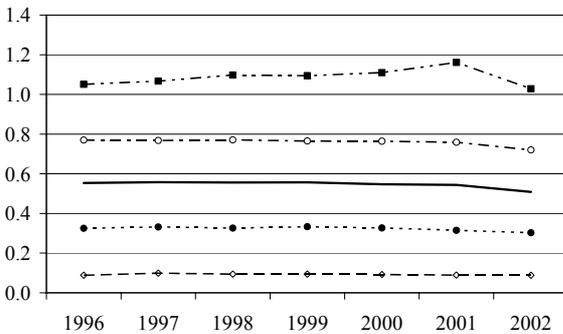


Figure 1h: Total debt, indirectly-held subsidiaries

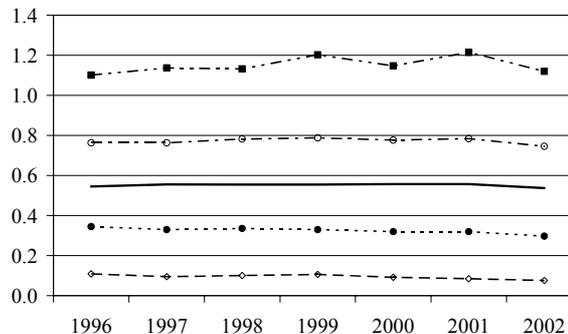


Figure 1i: Liabilities against foreign affiliates, directly-held subsidiaries



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



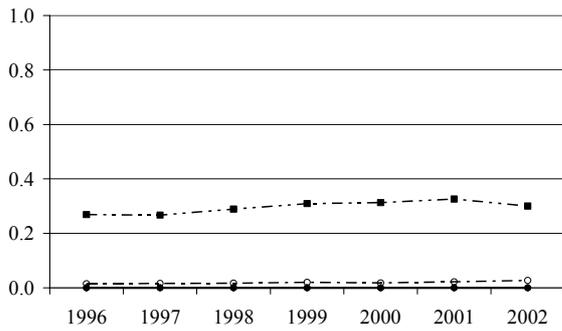


Figure 1k: Liabilities against German affiliated companies, directly-held subsidiaries

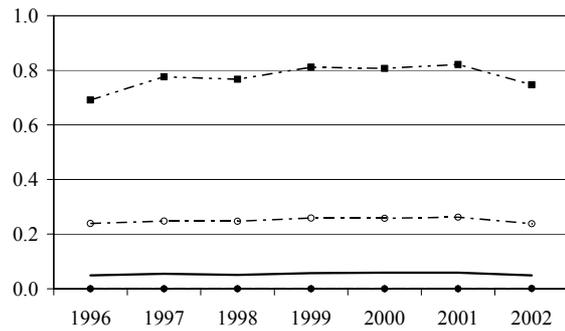


Figure 1l: Liabilities against German affiliated companies, indirectly-held subsidiaries

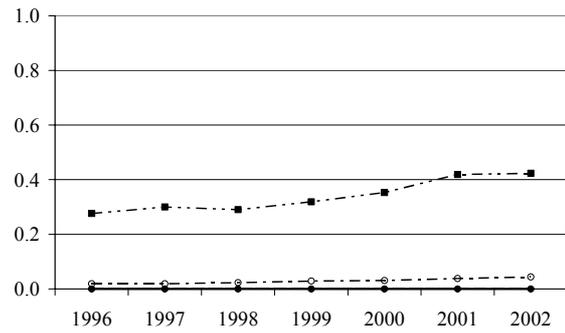
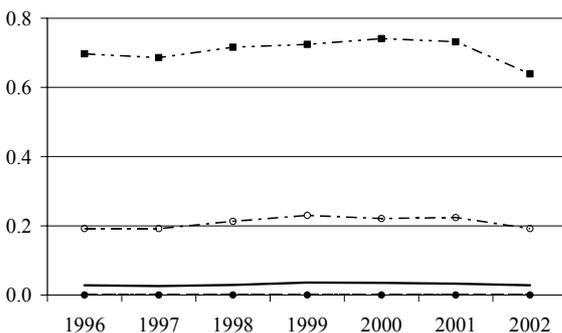
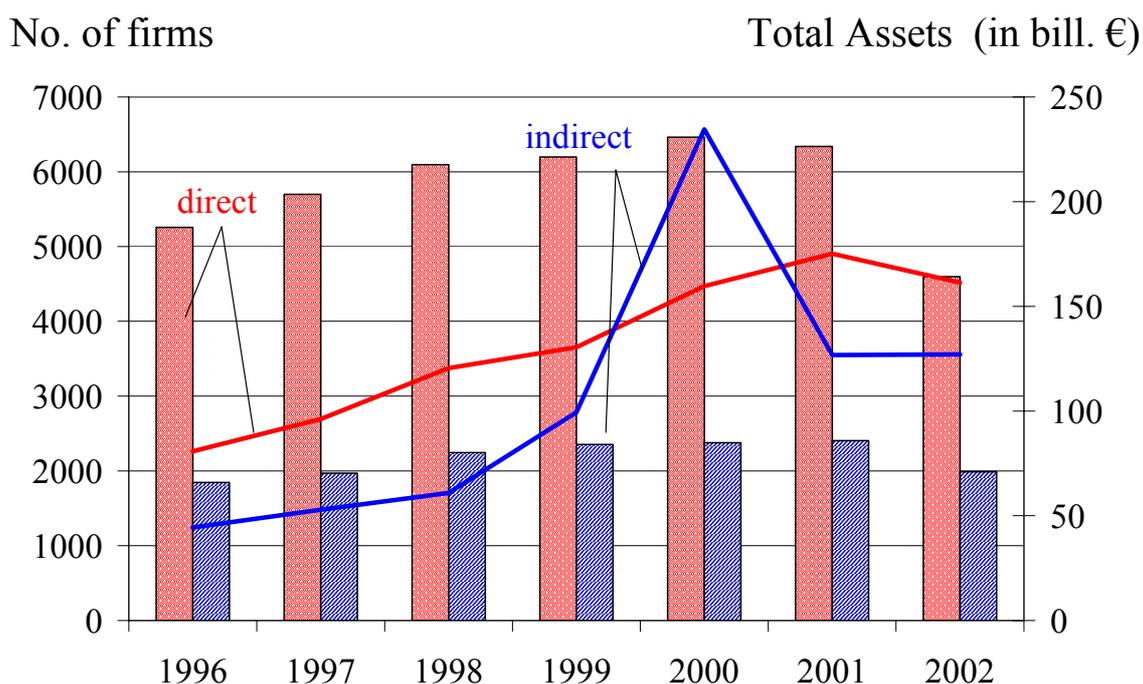


Figure 2 gives an impression of the amount of assets represented in our sample firms. In the last year of our sample, total assets (measured by balance sheet total) of indirectly and directly-held firms amounted to € 288 billion. Total assets peaked in the year 2000 and declined after the burst of the 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. 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.

Figure 2: The Number and Assets of German-owned 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. Manufacturing firms only.

Complimentary to the FDI data we 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 headline corporate taxes, including average local taxes, and have been collected by reference to information from PricewaterhouseCoopers, the Bureau of Tax Policy Research at the University of Michigan, KPMG, and other sources.

Figure 3 gives a picture of the tax rate information in our data set. The left panel of Figure 3 shows the distribution of tax rates as they have been faced by the firms in 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)

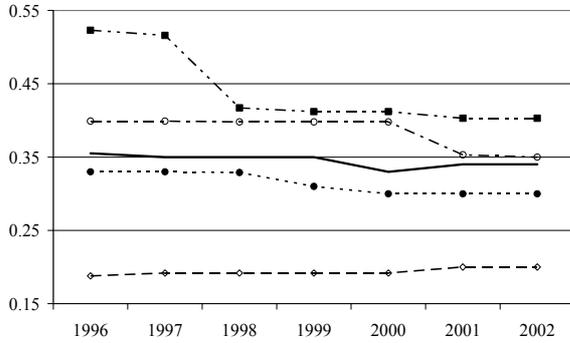
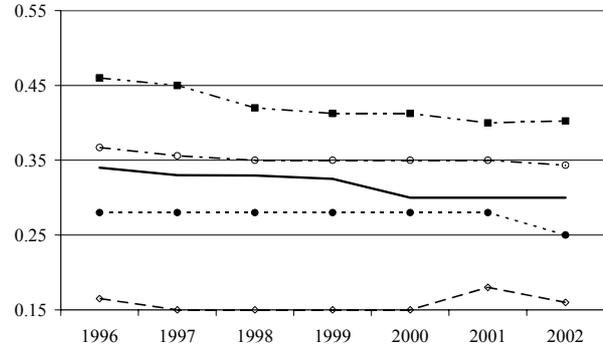


Figure 3b: Tax Rate Dispersion among Host Countries
(unweighted)



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 be higher the higher 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 under consideration 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 starts by asking about 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 13,297 firms and 52,053 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 8,831 subsidiaries that are wholly-owned by the German investor, while columns (7)-(9) include up to 5,848 less than fully owned-subsidaries. Since a 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 across firm observations.

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. Firms in those countries react much less flexible with their leverage decision. Despite their insignificance, the macrovariables show the expected signs. Growth and lending rates reduce reliance on debt, 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 increase in the host country pushes up leverage 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) imply that for wholly-owned subsidiaries a one percentage point tax increase pushes up leverage by .57 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

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 | 0.195 [0.10] | 0.301 [0.02]** | 1.295 [0.03]** | 0.378 [0.07]* | 0.439 [0.05]* | 1.665 [0.04]** | 0.036 [0.78] | 0.178 [0.18] | 0.585 [0.43] |
| CT2 | | | -1.301 [0.06]* | | | -1.636 [0.07]* | | | -0.523 [0.58] |
| GDPGROWTH | | -1.62E-03 [0.22] | -1.73E-03 [0.15] | | -7.67E-05 [0.97] | -1.62E-04 [0.93] | | -2.77E-03 [0.07]* | -2.83E-03 [0.06]* |
| IBANK | | -9.53E-04 [0.21] | -1.01E-03 [0.18] | | -2.77E-04 [0.84] | 2.40E-04 [0.86] | | -1.56E-03 [0.01]** | -1.59E-03 [0.01]*** |
| INFLATION | | 1.20E-04 [0.40] | 1.02E-04 [0.46] | | 1.78E-04 [0.55] | 1.42E-04 [0.60] | | 8.94E-05 [0.51] | 8.40E-05 [0.55] |
| DOMPRIVCRED | | 4.28E-04 [0.21] | 4.06E-04 [0.20] | | 3.27E-04 [0.43] | 3.00E-04 [0.44] | | 7.43E-04 [0.08]* | 7.37E-04 [0.08]* |
| Observations | 52053 | 45408 | 45408 | 32320 | 28160 | 28160 | 19733 | 17248 | 17248 |
| Firms | 13297 | 12087 | 12087 | 8831 | 8063 | 8063 | 5848 | 5236 | 5236 |
| R-squared (within) | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.00 | 0.01 | 0.01 |

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 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.

issues. Coordinating several owners' debt lending may be difficult if these owners face different financing and tax conditions, while additional loans from a single owner may bring up discussions among investors about the appropriate interest rate for such a loan.

Let us 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.

Unlike for overall debt, the bank lending rate (IBANK) is now significant in all samples, but like 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. This yields moderate elasticities of .037 and .046, respectively. The other three macro variables have the expected signs but are not significant.

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 | -0.05 [0.57] | 0.013 [0.89] | -0.002 [1.00] | 0.021 [0.81] | 0.048 [0.61] | 0.332 [0.48] | -0.121 [0.41] | -0.015 [0.92] | -0.466 [0.46] |
| CTXDIR | 0.011 [0.89] | 0.072 [0.39] | 0.202 [0.62] | 0.052 [0.52] | 0.083 [0.35] | 0.49 [0.28] | -0.031 [0.81] | 0.069 [0.62] | -0.203 [0.74] |
| CT2XINDIR | | | 0.174 [0.76] | | | -0.256 [0.69] | | | 0.780 [0.37] |
| CT2XDIR | | | -0.208 [0.67] | | | -0.577 [0.32] | | | 0.309 [0.67] |
| GDPGROWTH | | -4.23E-04 [0.70] | -4.14E-04 [0.70] | | -1.73E-04 [0.89] | -1.73E-04 [0.89] | | -3.70E-04 [0.84] | -3.05E-04 [0.86] |
| IBANK | | -1.29E-03 [0.00]*** | -1.29E-03 [0.00]*** | | -1.04E-03 [0.09]* | -1.03E-03 [0.09]* | | -1.30E-03 [0.00]*** | -1.27E-03 [0.00]*** |
| INFLATION | | 1.21E-04 [0.15] | 1.18E-04 [0.15] | | 1.70E-04 [0.19] | 1.60E-04 [0.21] | | 6.89E-05 [0.46] | 7.15E-05 [0.44] |
| DOMPRIVCRED | | 6.19E-05 [0.75] | 6.29E-05 [0.75] | | 7.89E-05 [0.69] | -8.55E-05 [0.67] | | 3.83E-04 [0.24] | 3.91E-04 [0.23] |
| Observations | 52053 | 45408 | 45408 | 32320 | 28160 | 28160 | 19733 | 17248 | 17248 |
| Firms | 13297 | 12087 | 12087 | 8831 | 8063 | 8063 | 5848 | 5236 | 5236 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 |

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 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 | 0.098 | 0.128 | 1.213 | 0.136 | 0.153 | 1.33 | 0.073 | 0.107 | 0.861 |
| | [0.45] | [0.40] | [0.04]** | [0.47] | [0.46] | [0.07]* | [0.44] | [0.37] | [0.17] |
| CTXDIR | 1.74E-01 | 2.11E-01 | 1.247 | 2.50E-01 | 0.284 | 1.432 | 0.097 | 0.131 | 0.801 |
| | [0.18] | [0.17] | [0.02]** | [0.19] | [0.18] | [0.03]** | [0.23] | [0.21] | [0.19] |
| CT2XINDIR | | | -1.474 | | | -1.604 | | | -1.061 |
| | | | [0.03]** | | | [0.07]* | | | [0.16] |
| CT2XDIR | | | -1.342 | | | -1.524 | | | -0.841 |
| | | | [0.02]** | | | [0.03]** | | | [0.23] |
| GDPGROWTH | -7.15E-04 | -8.36E-04 | | 4.59E-04 | 3.88E-04 | | -2.01E-03 | -2.12E-03 | |
| | [0.61] | [0.50] | | [0.80] | [0.82] | | [0.15] | [0.12] | |
| IBANK | 2.46E-04 | 1.83E-04 | | 9.05E-04 | 8.70E-04 | | -1.74E-04 | -2.29E-04 | |
| | [0.57] | [0.65] | | [0.33] | [0.34] | | [0.58] | [0.44] | |
| INFLATION | 1.96E-05 | 1.71E-06 | | 7.72E-05 | 4.36E-05 | | 1.49E-05 | 6.07E-06 | |
| | [0.83] | [0.98] | | [0.77] | [0.85] | | [0.82] | [0.92] | |
| DOMPRIVCRED | 2.83E-04 | 2.59E-04 | | 3.31E-04 | 3.05E-04 | | 1.99E-04 | 1.86E-04 | |
| | [0.19] | [0.18] | | [0.19] | [0.19] | | [0.38] | [0.38] | |
| Observations | 52053 | 45408 | 45408 | 32320 | 28160 | 28160 | 19733 | 17248 | 17248 |
| Firms | 13297 | 12087 | 12087 | 8831 | 8063 | 8063 | 5848 | 5236 | 5236 |
| R-squared | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 |

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 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 | 0.147 [0.00]*** | 0.154 [0.00]*** | 0.039 [0.85] | 0.238 [0.00]*** | 0.238 [0.01]*** | -0.022 [0.94] | 0.038 [0.53] | 0.04 [0.55] | 0.078 [0.78] |
| CTXDIR | 0.011 [0.79] | 0.019 [0.67] | -0.134 [0.53] | 0.073 [0.26] | 0.073 [0.31] | -0.244 [0.45] | -0.022 [0.68] | -0.014 [0.81] | 0.006 [0.98] |
| CT2XINDIR | | | 0.110 [0.72] | | | 0.291 [0.55] | | | -0.068 [0.87] |
| CT2XDIR | | | 0.211 [0.44] | | | 0.439 [0.28] | | | -0.022 [0.95] |
| GDPGROWTH | | -4.85E-04 [0.34] | -4.75E-04 [0.35] | | -3.72E-04 [0.67] | -3.68E-04 [0.68] | | -3.87E-04 [0.59] | -3.92E-04 [0.58] |
| IBANK | | 9.57E-05 [0.59] | 1.01E-04 [0.57] | | 4.07E-04 [0.24] | 4.07E-04 [0.24] | | -8.30E-05 [0.57] | -8.54E-05 [0.56] |
| INFLATION | | -2.07E-05 [0.59] | -1.79E-05 [0.64] | | -6.86E-05 [0.37] | -6.07E-05 [0.40] | | 3.62E-06 [0.94] | 3.46E-06 [0.95] |
| DOMPRIVCRED | | 8.26E-05 [0.70] | 8.49E-05 [0.70] | | 7.50E-05 [0.82] | 8.05E-05 [0.81] | | 1.61E-04 [0.25] | 1.60E-04 [0.25] |
| Observations | 52053 | 45408 | 45408 | 32320 | 28160 | 28160 | 19733 | 17248 | 17248 |
| Firms | 13297 | 12087 | 12087 | 8831 | 8063 | 8063 | 5848 | 5236 | 5236 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |

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 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 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 8). For wholly-owned subsidiaries, the coefficients 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 w.r.t. 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 firm has only a modest ratio of this type of loans to balance sheet total (cf. Figure 11). We also find insignificant results for the subsample of partly-owned firms. Macrovariables 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 tax effects on financial decisions of multinational firms and it is unique in using non-American data. Unlike previous studies we have not relied on implicit tax rates that are derived from dividing tax payments by pre-tax profits but have used statutory tax rates. 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)). 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 show a significant tax effect of their financial leverage this is not the case for German subsidiaries that are less than 100% affiliates. This squares with the observation that the major instrument of flexibility is the use of intra-company loans. Coordination on a (tax-) efficient use of intra-company loans seems to be more difficult when there is more than one owner. This brings up the question of whether the tax effects can be expected to be of the same magnitude for purely national firms for which more of one owner is the standard.

Bibliography

- Altshuler, R. and H. Grubert 2003. Taxes, Repatriation Strategies and Multinational Financial Policy. *Journal of Public Economics*, Vol. 87, 73-107.
- Bartholdy, J., G. Fisher and J. Mintz 1987. "Taxation and Financial Policy of Firms: Theory and Empirical Application to Canada", Economic Council of Canada, Discussion Paper No. 324.
- Desai, M.A., C. Fritz Foley, and J.R. Hines 2003. A Multinational Perspective on Capital Structure Choice and Internal Capital Markets. Harvard NOM Research Paper No. 03-27.
- Gentry, W. M. 1994. Taxes, Financial Decisions and Organizational Form: Evidence from Publicly Traded Partnerships, *Journal of Public Economics*, Vol. 53, 223–244.
- Givoly, D. C., A. Hain, R. Ofer, and O. Sarig 1992. Taxes and Capital Structure: Evidence from Firms' Response to the Tax Reform Act of 1986. *Review of Financial Studies*, Vol 5, 331–355.
- Gordon, R.H. and Y. Lee 1999. Do Taxes Affect Corporate Debt Policy? Evidence from U.S. Corporate Tax Return Data, NBER Working Paper 7433.
- Graham, J.R. 1999. Do Personal Taxes Affect Corporate Financing Decisions?, *Journal of Public Economics*, Vol. 73, 147-185.
- Gropp, R.E. 2002. Local Taxes and Capital Structure Choice. *International Tax and Public Finance*, Vol. 9, 51-71.
- Jog, V. and J. Tang (2001), "Tax Reforms, Debt Shifting and Tax Revenues: Multinational Corporations in Canada", *International Tax and Public Finance*, 8(1), 5-26.
- Lipponer, A. 2003. Deutsche Bundesbank's FDI Micro Database. *Schmollers Jahrbuch – Zeitschrift für Wirtschafts- und Sozialwissenschaften*, 123 (4), 593–600.
- MacKie-Mason, J.K. 1990. Do Taxes Affect Corporate Financial Decisions? *Journal of Finance*, Vol. 45, 1471–1493.
- Myers, S. 1984, The Capital Structure Puzzle, *Journal of Finance* Vol. 39, 575-92.
- Ramb, F. and A.J. Weichenrieder 2004. Taxes and the Financial Structure of German Inward FDI. Goethe-University Frankfurt, mimeo.