The Impact of Thin-Capitalization Rules on the Capital Structure of Multinational Firms

Thiess Buettner
(FAU and CESifo)[†‡]

Michael Overesch
(Goethe-University Frankfurt)

Ulrich Schreiber
(University of Mannheim)

Georg Wamser
(ETH Zurich and CESifo)

Final Version, June 2012

forthcoming in the Journal of Public Economics

Abstract:

This paper analyzes the effectiveness of limitations of the tax deductibility of interest expenses for multinational corporations, so-called thin-capitalization rules. The empirical investigation exploits a large micro-level panel dataset of multinational firms to analyze the effects of thin-capitalization rules on the capital structure of foreign subsidiaries located in OECD countries in the time period between 1996 and 2004. The findings indicate that thin-capitalization rules effectively reduce the incentive to use internal loans for tax planning but result in higher external debt.

Keywords: Corporate Income Tax, Multinational Firms, Capital Structure, Thin-Capitalization Rules, Firm-Level Data

JEL Classification: H25, H26, G32

[†]Address: Friedrich Alexander University
Lange Gasse 20
D-90403 Nuremberg
Germany

Phone: +49 911 5302 200
Fax: +49 911 5302 396

E-mail: buettner@ifo.de

[‡]We thank Joel Slemrod, three anonymous referees, Paul Kremmel, seminar participants at the University of Kentucky, at the Bundesbank, at the Oxford University Centre for Business Taxation, at Johannes Kepler University Linz, and conference participants in Chicago, Graz, and Garmisch for helpful comments. Support by the German Science Foundation (DFG) is gratefully acknowledged. We would also like to thank the Deutsche Bundesbank for granting access to the MiDi database.

1 Introduction

Faced with an increased ability of multinational corporations to use debt finance, many governments have imposed restrictions on the interest deductibility of debt, so-called thin-capitalization rules (*e.g.*, Weichenrieder, 1995, 1996; Piltz, 1996). While these rules differ from country to country, a general characteristic is that interest deduction is denied for loans provided by foreign affiliates if the debt-to-equity ratio is above a certain threshold. The first OECD country to implement a thin-capitalization rule was Canada in 1971, followed by Australia (1987), the U.S. (1989), and many more countries over the nineties. In the mid-nineties, less than a third of European countries and less than half of the OECD countries had thin-capitalization rules in place. By 2005, three fifths of European and two thirds of OECD countries had imposed such rules.

A comparative empirical analysis of the effectiveness and consequences of thin-capitalization rules has not been conducted, so far.[1] The lack of studies is surprising, considering how commonly these rules are used today. While several studies have analyzed how statutory tax rates affect the capital structure choice of multinational firms (*e.g.*, Desai, Foley and Hines, 2004; Huizinga, Laeven and Nicodème, 2008), this paper extends this literature and explores the effects of thin-capitalization rules. The empirical analysis employs a comprehensive micro-level panel database of virtually all foreign subsidiaries of German multinationals made available for research by the German central bank (*Deutsche Bundesbank*). Combined with the information on corporate taxation and thin-capitalization rules in all OECD countries and all European Union countries over a period of 9 years, this dataset allows us to study the consequences of thin-capitalization rules across countries and time.

[1] For recent papers on capital structure effects of reforms of the German thin-capitalization rule see Weichenrieder and Windischbauer (2008), and Overesch and Wamser (2010).

Our empirical analysis shows that thin-capitalization rules exert substantial effects on the tax-sensitivity of the capital structure. If a country imposes a relatively strict thin-capitalization rule, our estimates show that the tax-sensitivity of internal debt is reduced by about half. While the tax-incentive to use internal debt is effectively reduced, we find that the tax-sensitivity of external debt increases. However, substitution of external debt for internal debt is not perfect and the total leverage of subsidiaries facing thin-capitalization rules is reduced. Further results suggest that the way how thinly-capitalized firms are defined by the tax law is important for the effectiveness of thin-capitalization rules.

The paper is structured as follows. Section 2 explains the main characteristics of thin-capitalization rules and provides information about details relevant for the empirical analysis. In Section 3 we discuss possible implications of these rules for financing decisions of multinationals. Section 4 provides an outline of the investigation approach. The subsequent sections are then concerned with the empirical analysis. Section 5 gives a short description of the dataset, before Section 6 presents the results. Section 7 provides our conclusions.

2 Institutional Details of Thin-Capitalization Rules

A general problem with the taxation of corporations is that capital invested by a shareholder as equity is treated differently from capital that is invested by a bondholder in the form of a loan. With regard to equity capital, the return on capital is part of corporate profits, and is taxed at the level of the corporation. In the case of a loan, the bondholder receives interest payments which, in the absence of restrictions, are considered deductible expenses in computing the taxable profits of the corporation, and are not taxed at the level of the corporation. Corporate taxation, therefore, tends

to contribute to the emergence of thinly-capitalized corporations with capital mainly provided in the form of debt. In an international context this problem is aggravated, because loans from foreign bondholders might result in a situation in which the return on capital is effectively exempted from taxation in the host country. While host countries could impose withholding taxes on interest payments to foreign creditors, bilateral tax treaties usually assign the right to tax interest earnings to the home country of a foreign creditor and reduce or abolish withholding taxes.[2]

The tax policy of individual countries has responded to the problem of thinly-capitalized corporations in cases where controlling shareholders also act as bondholders. In particular, multinational corporations are subjected to general anti-abuse provisions of the tax law and to specific thin-capitalization rules. These rules restrict the interest deductibility for loans provided to a domestic corporation by a foreign parent or by other foreign affiliates of the controlling shareholder.

During the period from 1996 until 2005, all OECD countries with thin-capitalization rules or similar restrictions employ what the OECD report on thin capitalization (1987) refers to as the "Fixed Ratio Approach".[3] Under this approach, the deduction of interest for loans provided by a foreign parent or by other foreign affiliates of the controlling shareholder is restricted or penalized for tax purposes if the firm's debt in proportion to its equity capital is above a fixed ratio. As noted in the OECD report, this fixed ratio is used as *safe haven* or *safe harbor* rule, indicating that only with a lower debt-to-equity ratio interest deduction is safely granted by the host-country's tax system.

Table 1 provides an overview of these ratios among OECD and European countries. The table lists

[2]Within the European Union the Interest and Royalties Directive adopted in 2003 fully abolishes withholding taxes on companies' cross-border interest payments.

[3]See also the International Fiscal Association's report on thin capitalization, which provides an overview of thin-capitalization rules in 29 countries (Piltz, 1996). More recent overviews about thin-capitalization rules in Europe are provided by Ambrosanio and Caroppo (2005) and Dourado and de la Feria (2008).

Table 1: Thin-Capitalization Rules in 2005

Country	Safe Haven Debt-to-Equity Ratio	Debt in Column (1) refers to
	(1)	(2)
Australia	3:1	total debt
Belgium	7:1[a)]	related party debt
Bulgaria	3:1	total debt [b)]
Canada	2:1	related party debt
Croatia	4:1	related party debt
Czech Republic	4:1	related party debt
Denmark	4:1	total debt
France	1.5:1	related party debt
Germany	1.5:1	related party debt
Hungary	3:1	total debt [b)]
Italy	4:1	related party debt
Japan	3:1	total debt
Latvia	4:1	total debt [b)]
Lithuania	4:1	total debt
Luxembourg	5.7:1	related party debt
Mexico	3:1	total debt
Netherlands	3:1	total debt
New Zealand	3:1	total debt
Poland	3:1	total debt
Portugal	2:1	related party debt
Romania	3:1	total debt [b)]
Slovakia (2003) [c)]	4:1	related party debt
Slovenia	8:1	related party debt
Spain	3:1[d)]	related party debt
South Korea	3:1	related party debt
Switzerland	6:1	total debt
Turkey	2:1	related party debt
UK	1:1[e)]	total debt
USA	1.5:1	total debt

Special rules for financial institutions and holdings are not reported. Sources: International Bureau of Fiscal Documentation (IBFD), Ernst&Young, PricewaterhouseCoopers, KPMG.

[a)] Related party debt is only taken into consideration if the creditor is located in a country with a tax system considered as significantly more advantageous than the Belgian income tax system.

[b)] Debt in Column (1) refers to total debt, but loans from financial institutions are not considered.

[c)] Thin-capitalization rule was abolished in 2004.

[d)] Since 2004 the thin-capitalization rule applies only to related party debt from outside the European Union.

[e)] Since 2004 the UK applies anti-abuse rules employing an arm's length principle, but the safe haven debt-to-equity ratio is still used as a guideline.

all those countries where thin-capitalization rules or similar restrictions existed in 2005.[4] Note that special rules for financial institutions and holdings are not reported.[5]

While all countries listed in the table define a safe haven debt-to-equity ratio (see Column (1)), in some countries the ratio refers to total debt; in the others it refers only to loans provided by the shareholder (parent) and, in order to prevent circumvention of thin-capitalization rules, to all loans from related parties (see Column (2)). Additionally, bank loans that are backed by shareholder funds are also taken into account by the thin-capitalization rules.[6]

With regard to the tax treatment of firms with debt exceeding the safe haven debt-to-equity ratio, the main restriction in all countries is to disallow some part of the tax deduction of interest payments to related parties. Since tax revenue losses are most significant with regard to non-resident bondholders, most countries apply such restrictions exclusively to interest payments associated with loans provided by a foreign parent or by other foreign affiliates of the controlling shareholder (Piltz, 1996: 119). Some countries such as the U.S. or Switzerland extend thin-capitalization rules to all persons and corporations that are exempted from the host-country's tax on interest income (Engle and Raineri, 1996: 795p; Schmid, 1996: 739).[7]

[4]The empirical analysis below focuses on the period from 1996 to 2004. Table A.1 in the Appendix reports the development of the safe haven debt-to-equity ratios from 1996 to 2005.

[5]For instance, financial institutions in Australia enjoy a more generous debt-to-equity rule similar to banks and insurance companies in South Korea, or holding companies in Germany up to 2003. Similar exceptions hold in the Czech Republic and in Mexico.

[6]As Piltz (1996) notes, almost all of the 29 countries discussed in the International Fiscal Association's (IFA) report on thin capitalization also consider bank loans if these loans are backed by funds that the non-resident shareholder has deposited in the bank and on which the shareholder receives interest income (back-to-back financing).

[7]The extensions in the U.S. and Switzerland may reflect the classical corporation tax system of these countries (Piltz, 1996: 117). Within the European Union, after a European Court of Justice ruling in 2002 (ECJ, 12.12.2002, C-324/00) which regarded thin-capitalization rules targeting foreign creditors as an infringement of the fundamental freedoms granted by the EC treaty, a new generation of thin-capitalization rules is emerging that applies to both residents and non-residents (Thoemmes, Stricof and Nakhai, 2004).

In order to calculate the amount of non-deductible interest expenses, the majority of countries apply the following simple accounting relationship (*cf.* Piltz, 1996). In a first step, the *excess debt* is calculated, *i.e.* the amount of debt that exceeds the admissible debt, with the latter being defined by the amount of equity times the safe haven debt-to-equity ratio. In a second step, this excess debt is expressed as a fraction of debt. In a third step, this fraction is multiplied by the total amount of interest payments to related parties. In this amount, the tax deduction for interest payments to related parties is then disallowed.[8]

To put it more formally, in a typical case in which the safe haven debt-to-equity ratio refers to related party debt, the admissible amount of related party debt is σE, with E denoting equity and σ is the fixed debt-to-equity ratio in the host country. With D denoting related party debt, we arrive at excess debt in the amount of $max\{D - \sigma E\ ,\ 0\}$. For a firm with excess debt, the fraction $\frac{D-\sigma E}{D}$ determines the share of interest payments to related parties that is non-deductible. With this design, the thin-capitalization rule implies that the marginal tax deduction, *i.e.* the tax deduction for the additional interest payments associated with an increase in debt, is zero. To see this, note that $\frac{\sigma E}{D}$ is the fraction of interest payments that is deductible. If debt to related parties is charged with an interest rate of i, the total deduction is limited to $\left(\frac{\sigma E}{D}\right) iD = \sigma E i$. Since the total amount of deductible interest payments is limited to this amount, for a firm with excess debt, interest payments associated with an increase of related party debt are not deductible.

In countries that define the fixed debt-to-equity ratio in terms of total debt rather than related party debt, the fraction of denied interest expenses is determined using total debt. However, note that also in this case, only interest payments to related parties are usually restricted; interest deduction

[8]Conceivably, firms could avoid the tax penalty by issuing only a small amount of related party debt and instead setting a rather high rate of interest. However, high interest rates would conflict with the arm's length principle. Since interest rates are roughly comparable across different firms, the literature does not consider interest pricing as a viable strategy to circumvent thin-capitalization rules (Piltz, 1996: 103p).

for external debt is generally not restricted. In some countries, excess debt as determined by the safe haven debt-to-equity ratio may only be a precondition for possible restrictions on interest deduction. A prominent example is the U.S. interest stripping rule. If total debt exceeds the safe haven debt-to-equity ratio, deduction for interest payments is only denied for (net) interest payments to non-U.S. affiliates and other tax exempt persons exceeding 50% of adjusted taxable income (see Sec. 163 (j) IRC). Moreover, several countries refer to different definitions of related parties or add requirements with regard to the ownership share of the creditor.[9] Country-specific regulations are also encountered with regard to tax penalties. For instance, in some countries, interest payments for which deduction is denied are reclassified as dividend payments, which implies that additional withholding taxes may be due.

3 Theoretical Implications

A large literature on taxes and corporate finance suggests that corporate taxation favors debt finance because interest payments are tax deductible (see Auerbach, 2002, for an overview). Though the tax advantage of debt finance carries over to foreign subsidiaries, with regard to multinational corporations we can distinguish between *external debt*, where the lender is unrelated to the owner, and *internal debt*, which refers to loans from the parent firm or some other affiliated entity. In the latter case, the multinational might also exploit profit-shifting opportunities if the tax rate of the country where the lending affiliate is located is below the host-country tax rate (Mintz and Smart, 2004).

[9] In some countries, such as Canada, Croatia, Germany, Italy, and Poland, the thin-capitalization rule requires an ownership share of a related party creditor of about 25%; in other countries, such as Australia, France, Japan, and the U.S., the thin-capitalization rules only apply to majority-owned companies.

It is important to note that also non-tax factors influence a firm's financial decisions. The corporate finance literature has emphasized a variety of incentive issues that ultimately result from information asymmetries and the difficulties to specify managerial decisions contractually (see Tirole, 2006: 78pp). As a consequence, debt finance can play an important role in mitigating managerial incentive problems (Aghion and Bolton, 1989). The extent to which those incentive problems arise will depend on firm characteristics. Jensen (1986), for instance, argues that debt might be helpful to reduce incentive problems associated with free cash flows. Debt finance also gives rise to agency costs that arise from the inability to solve potential conflicts between equity and debt claimants by means of contracts (*e.g.*, Jensen and Meckling, 1976; Myers, 1977). In the context of multinationals, these considerations have implications also for internal debt finance. As Desai, Foley and Hines (2004) point out, multinationals use internal debt in order to substitute external debt financing of foreign subsidiaries. Thus, a foreign subsidiary with characteristics that result in unfavorable external borrowing conditions might resort to the lending capacity of the parent which issues debt and transfers funds in the form of internal loans to the foreign subsidiary. Similarly, adverse conditions in the local credit market, resulting from country-specific risks or creditor rights, for instance, might be overcome by means of internal debt (see also Gopalan, Nanda and Seru, 2007).

Following the corporate finance literature, an optimal capital structure is obtained if the marginal benefit of increasing the share of debt finance is just equal to the associated marginal cost (Graham, 2003). Incorporating the non-tax factors of debt finance, Huizinga, Laeven and Nicodème (2008) provide a simple model of a multinational's choice of the capital structure. In this model, each subsidiary has a certain target level for the debt-asset ratio on the basis of incentive considerations alone. To determine the optimal debt-to-capital ratio, firms trade off the marginal tax-incentive of debt finance against the (increasing) marginal cost of deviating from the target value of the

debt-to-capital ratio. Applying this reasoning to internal debt finance, we can derive empirical predictions with regard to effects of thin-capitalization rules. If non-tax benefits of debt finance are important, a foreign subsidiary might eventually choose to use a large amount of internal debt – even if a thin-capitalization rule exists that restricts interest deductibility associated with internal debt financing. Because interest deduction is denied at the margin, *i.e.* for an additional unit of internal debt, the tax-incentive to prefer internal debt relative to equity should be absent for such a firm.

To make this point more precise, let us briefly review the tax-incentive for using internal debt of a foreign subsidiary in host country j. The interest rate charged by the lending entity is denoted by i. If interest expenses are tax deductible, the tax savings per unit of debt amount to the tax deduction $\tau_j\, i$, where τ_j is the statutory tax rate on corporate profits in the host country. Of course, the interest income of the affiliated company that provides the loan – the parent or some other affiliate – could result in additional tax payments. If the internal loan is refinanced with external debt and charged with the same interest rate, the interest income of the lending affiliate is offset by its interest payments to an external creditor. In this case, the final tax savings amount to $\tau_j\, i$ and, obviously, increase with the host-country tax rate. If the internal loan is refinanced with equity, interest income will raise taxable profits of the affiliated company. Taking the corresponding tax payments into account, the effective tax deduction for an additional unit of internal debt is $(\tau_j - \tau)\, i$, where τ is the tax rate on the interest income received by the affiliated company. At any rate, the tax-incentive to use internal debt increases with the host-country tax rate – regardless of whether internal debt is refinanced with equity or debt. If a thin-capitalization rule is imposed, subsidiaries with debt below the safe haven debt-to-equity ratio would still face the same tax-incentive. But, if debt exceeds the threshold determined by the safe haven debt-to-equity

ratio, the interest deduction for the marginal unit of internal debt is disallowed.

Based on the view that firms trade off marginal benefits and costs of internal debt finance, the differences in the tax deductibility of interest associated with an additional unit of internal debt can be used to derive empirical predictions with regard to thin-capitalization rules. A foreign subsidiary with levels of debt below the threshold (*i.e.* a subsidiary without excess debt) still enjoys a tax-incentive for using internal debt. As a consequence, the amount of internal debt should increase with the host-country tax rate. For subsidiaries with levels of debt above the threshold (*i.e.* subsidiaries with excess debt), the tax-incentive is removed, and a change of the host-country tax rate τ_j should have no effect on internal debt. Note that the role of the safe haven debt-to-equity ratio is to assign subsidiaries to different tax treatments. Conditional on this assignment, the safe haven threshold has no effect on the tax-incentive to use internal debt.

While thin-capitalization rules tend to remove the tax-incentive to use internal debt, interest deduction for external debt is generally not restricted. Therefore, the tax-incentive for external debt finance is not affected directly by thin-capitalization rules. If internal and external debt are substitutes, however, foreign subsidiaries may respond to thin-capitalization rules by relying more heavily on external debt finance. Therefore, thin-capitalization rules may not only reduce the tax-incentive to use internal debt but may also encourage the use of external debt.

4 Investigation Approach

To test the theoretical implications, we use a micro-level panel dataset of the affiliates of German multinationals in 36 countries – including all OECD and European Union countries – over the time period from 1996 to 2004. This data, which will be described in greater detail below, provides

information on the capital structure of each affiliate including information on internal and external debt. To study the effects of thin-capitalization rules, we can basically use two sources of empirical variation.

- A first source is the variation in the existence of thin-capitalization rules across countries (see Table 1). Note that this variation is not constant over time. In the time period from 1996 to 2004, eleven countries introduced and two countries abolished thin-capitalization restrictions (see Table A.1 in the Appendix).
- A second source is the variation in the safe haven debt-to-equity ratio. Besides differences across countries, there is also variation over time, as three countries have tightened and two countries have loosened restrictions in the period from 1996 to 2004 (see Table A.1).

To capture the presence and tightness of thin-capitalization rules, we employ two alternative indicators. $RULE_{j,t}$ is a binary variable which is unity if a thin-capitalization rule is imposed in country j in period t.[10] In order to capture the tightness, based on the above description of the institutional details, it seems natural to use the safe haven debt-to-equity ratio, which is specified by all countries with thin-capitalization rules. It is not useful, however, to employ this ratio directly, since it approaches infinity in the case where no restrictions are imposed. We, therefore, make use of a simple, non-linear transformation of the safe haven debt-to-equity ratio σ and employ the following indicator of the tightness in host country j in period t :

$$TIGHT_{j,t} \equiv \frac{1}{1+\sigma_{j,t}}. \tag{1}$$

[10]Our analysis focuses on formal thin-capitalization rules. However, a country may also restrict excessive interest deduction by means of a general substance over form rule, although it has no explicit thin-capitalization rule. Therefore, we may underestimate the effect of thin-capitalization rules if general anti-abuse rules are likely to restrict debt financing of subsidiaries in countries without a thin-capitalization rule.

The advantage of using this indicator is that it maps the complete possible range of σ in the 0-1 interval. If no restriction is imposed ($\sigma \to \infty$), the indicator is zero. In the hypothetically most restrictive case ($\sigma \to 0$), the indicator has unit value.[11] For a numerical example, consider the Canadian case with a safe haven debt-to-equity ratio of 3:1 during the nineties. The corresponding figure for the tightness is 0.25 ($= \frac{1}{1+3}$). In 2001, when the Canadian safe haven debt-to-equity ratio was tightened to 2:1, the indicator increased to 0.33 ($= \frac{1}{1+2}$).

Equipped with indicators of the presence and tightness of thin-capitalization rules, the empirical analysis is concerned with the implications of these rules for the tax-sensitivity of the capital structure of multinationals. In particular, the analysis explores whether imposing thin-capitalization rules has noticeable effects on the tax-incentive to use internal debt – which is the ultimate objective of these rules. One way to approach the estimation problem is to think of unrestricted and restricted affiliates as operating under two different *regimes*. The first regime refers to affiliates in countries without thin-capitalization rules or to affiliates that have a debt-to-equity ratio below the host country's safe haven debt-to-equity ratio. As a consequence, these affiliates do not have excess debt ($d_{i,t} = 0$) and interest payments associated with an additional unit of internal debt should be deductible from gross profits. The second regime refers to affiliates in countries with thin-capitalization restrictions that are tight enough to be binding. As these affiliates have excess debt ($d_{i,t} = 1$), the marginal tax advantage from using internal loans should be zero. Assuming that only the tax-rate effect differs between regimes, the internal debt ratio, *i.e.* the ratio of debt from internal sources relative to total capital, of affiliate i in period t can be characterized by:

$$y^0_{i,t} \quad = \quad (1 - d_{i,t}) \cdot \widetilde{y}^0_{i,t} = (1 - d_{i,t}) \cdot \left(\tau_{i,t}\beta^0 + x_{i,t}\delta + \alpha_i + \epsilon_{i,t}\right) \tag{2}$$

[11] The tightness indicator can be interpreted as the minimum share of capital that needs to be financed with equity capital in order to avoid tax penalties. To see this, note from above that interest deduction is not restricted if debt obeys $D \leq \sigma E$. Denote the share of equity capital with ε. Then $1 - \varepsilon \leq \sigma\varepsilon$ and $\varepsilon \geq \frac{1}{1+\sigma}$.

$$y^1_{i,t} \quad = \quad d_{i,t} \cdot \widetilde{y}^1_{i,t} = d_{i,t} \cdot \left(\tau_{i,t}\beta^1 + x_{i,t}\delta + \alpha_i + \epsilon_{i,t}\right). \tag{3}$$

While the tax rate $\tau_{i,t}$ and the controls $x_{i,t}$ are always observed, $\widetilde{y}^0_{i,t}, \widetilde{y}^1_{i,t}$ are latent variables whose observability depends on the outcome of the indicator variable $d_{i,t}$. α_i is an unobservable time-invariant affiliate-specific effect and $\epsilon_{i,t}$ is a disturbance term. Because each affiliate is associated with a separate fixed effect, the specifications nest company-specific effects. Note that α_i also nests country-specific fixed effects, and thus, removes time-invariant differences across countries. The controls $x_{i,t}$ include dummy variables for the year, capturing changes in the lending rate and in the taxing conditions in the parent country, since all parent firms share the same location in our data. Following the above considerations, we would expect to find that, for unrestricted firms, internal debt increases with the tax rate. For firms that display debt in excess of the admissible range marked by the safe haven debt-to-equity ratio, we would expect to find that the tax rate is insignificant if the tax-incentive to use internal debt is removed effectively. More specifically, the theoretical considerations suggest that $\beta^1 = 0$, $\beta^0 > 0$, and, thus, $\beta^0 > \beta^1$.

It is difficult, however, to observe with precision whether or not a firm has excess debt and, hence, is facing a binding restriction. As discussed above, the details of thin-capitalization rules differ across countries and information about specific firm characteristics is sometimes required to predict precisely the tax status of a firm. Moreover, some firm characteristics will reflect firm decisions and, hence, are not suited to identify thin-capitalization restrictions in a regression analysis. Our estimation strategy, therefore, exploits the relationship between the likelihood that a firm is facing a binding restriction $d_{i,t} = 1$ and the measure of the tightness of the thin-capitalization rule. Let us formalize this relationship using a linear probability function

$$d_{i,t} \quad = \quad TIGHT_{i,t}\gamma + u_{i,t}, \tag{4}$$

where γ is a positive parameter and $u_{i,t}$ is a random disturbance. Pooling equations (2) and (3) and inserting for $d_{i,t}$ from equation (4), we obtain the regression equation

$$y_{i,t} = \tau_{i,t} a_1 + (\tau_{i,t} \cdot TIGHT_{i,t})\, a_2 + x_{i,t} a_3 + \alpha_i + e_{i,t}, \tag{5}$$

where $y_{i,t} = \max\left(y^0_{i,t}, y^1_{i,t}\right)$ is the observed internal debt ratio used by subsidiary i and $e_{i,t}$ denotes the error term. The standard tax effect on internal debt is captured by a_1, which is expected to be positive. The slope parameter a_2 associated with the interaction of tax rate and tightness corresponds to $\left(\beta^1 - \beta^0\right)\gamma$. Hence, provided γ is positive, a_2 will be negative if and only if $\beta^0 > \beta^1$, and zero if $\beta^0 = \beta^1$. To test for robustness, we also run regressions that replace the tightness measure $TIGHT_{i,t}$ by the binary indicator $RULE_{i,t}$ which only exploits information about the existence of a thin-capitalization rule in a country.

The investigation approach outlined so far aims at testing the implications for internal debt in general. But, depending on the details of the tax law, the scope of restrictions of interest deductibility may be more narrow in practice. As we have seen above, most countries focus on related party debt, which usually includes loans from the parent and other affiliated foreign entities. However, for tax purposes, it may be difficult to trace ownership patterns within a multinational corporation and to assess whether loans come from affiliated foreign entities or are indirectly backed by funds which are owned by such entities. Since the case of parent debt is more obvious, effects of thin-capitalization rules might be more pronounced if we replace the dependent variable with the parent debt ratio, *i.e.* the ratio of debt borrowed from the parent relative to total capital.

While thin-capitalization rules aim at removing the tax-incentive to use internal debt, external debt serves as an alternative way to exploit differences in the tax treatment between debt and equity.

If external debt serves as a substitute for internal debt, the tax-sensitivity of external debt may be affected by the presence and tightness of thin-capitalization rules. More specifically, if a tight thin-capitalization rule is imposed which limits the tax-incentive to use internal debt, a higher tax rate may exert a stronger effect on external debt. To test this prediction, we replace the dependent variable with the external debt ratio, *i.e.* the ratio of debt from external sources relative to total capital, and follow the same investigation approach.

5 Data and Descriptive Statistics

The empirical analysis employs micro-level data for multinationals provided by the *Deutsche Bundesbank*. This data contains balance-sheet information for foreign affiliates of German enterprises and is available as an annual panel starting in 1996. Data collection is required by German law, which determines reporting mandates for international transactions.[12] Since several countries define ownership requirements for the application of thin-capitalization rules, we focus on majority-owned subsidiaries. Furthermore, financial service providers as well as holdings and subsidiaries with zero sales are excluded because they face special tax treatments including special provisions of thin-capitalization rules (see above).

Table 2 provides information on the size and geographic distribution of the foreign subsidiaries in the sample. The list of host countries comprises 36 destinations, 28 of which are European

[12]Sec. 26 Aussenwirtschaftsgesetz (Foreign Trade and Payments Act) in connection with Aussenwirtschaftsverordnung (Foreign Trade and Payment Regulations). Each German multinational has to report its foreign assets, including both direct FDI and indirect FDI, conditional on some lower threshold level for mandatory reporting. Since 2002, FDI has to be reported if the participation is 10% or more and if the balance-sheet total of the foreign object exceeds 3 million euros (for details see Lipponer, 2006). Though previous years showed lower threshold levels, we apply this threshold level uniformly in all years in order to avoid discrete changes in the sample selection.

Table 2: Foreign Subsidiaries by Country

Host Country	Observations		Internal Debt Ratio	Parent Debt Ratio	External Debt Ratio
	Number	Share (in %)		(Mean)	
Australia	902	2.10	.338	.168	.284
Austria	3,379	7.87	.246	.099	.364
Belgium	1,655	3.85	.281	.107	.352
Bulgaria	91	0.21	.287	.146	.352
Canada	690	1.61	.256	.128	.293
Croatia	134	0.31	.320	.172	.234
Cyprus [a)]	-	-	-	-	-
Czech Republic	2,107	4.91	.311	.167	.316
Denmark	794	1.85	.277	.122	.376
Estonia [a)]	-	-	-	-	-
Finland	288	0.67	.286	.094	.283
France	4,772	11.11	.276	.137	.372
Greece	403	0.94	.322	.163	.341
Hungary	1,370	3.19	.264	.146	.304
Ireland	310	0.72	.264	.110	.269
Italy	3,425	7.97	.305	.138	.410
Japan	972	2.26	.246	.108	.424
Latvia	46	0.11	.214	.088	.294
Lithuania	62	0.14	.452	.233	.183
Luxembourg	196	0.46	.293	.128	.387
Malta	29	0.07	.333	.251	.263
Mexico	605	1.41	.297	.134	.235
Netherlands	2,050	4.77	.273	.112	.320
New Zealand	115	0.27	.301	.082	.245
Norway	338	0.79	.285	.122	.327
Poland	2,446	5.69	.314	.169	.297
Portugal	690	1.61	.253	.110	.313
Slovakia	468	1.09	.285	.152	.292
Slovenia	179	0.42	.284	.143	.265
South Korea	438	1.02	.236	.092	.325
Spain	2,846	6.63	.252	.109	.360
Sweden	968	2.25	.297	.105	.330
Switzerland	2,570	5.98	.205	.077	.358
Turkey	389	0.91	.246	.127	.336
UK	3,306	7.70	.274	.138	.324
USA	3,893	9.06	.322	.180	.273
Total	42,950	100.00	.279	.132	.337

Bundesbank (MiDi) data for the basic estimation sample in the time period 1996 to 2004. [a)] confidential data.

countries.[13] The table reports country-specific means for the internal debt ratio, the parent debt ratio, and the external debt ratio. All debt ratios are defined as a ratio of debt relative to total capital consisting of nominal capital, capital reserves, profit reserves, and total debt. Internal debt comprises all debt owed to the parent firm, to affiliated entities or to entities linked with the reporting subsidiary through participating interests. Parent debt refers to the subgroup of debt owed directly to the controlling shareholder. External debt is defined as total debt minus internal debt.

Table 2 indicates that the internal debt ratio in most countries is about a quarter. While some countries report much higher figures, the average internal debt ratio is never below 20%. In most countries the external debt ratio is higher than the internal debt ratio – across countries, the average external debt ratio is about a third. Usually, about half of all internal debt is provided by the parent – the rest is provided by other affiliates including holding companies.

In order to capture the tax-incentive for using internal debt, the analysis employs the statutory tax rate on corporate income modified by applicable general restrictions on interest deductions. Thus, the employed statutory tax rate captures the tax savings from deducting one unit of interest. Since the effective tax reduction from using debt might be zero if a subsidiary carries forward any losses for tax purposes (MacKie-Mason, 1990), we also use a dummy variable indicating whether some loss carry-forward is reported. Of course, losses in previous periods may capture other determinants of current decisions of the company, such as the expected performance of a subsidiary. Hence, the overall effect on the capital structure is ambiguous. Two variables ($RULE$, $TIGHT$) capture the presence and tightness of thin-capitalization rules, where the latter is simply a transformation of

[13] All EU and OECD member states are included, except Romania, because no lending rates were available for this country, and except Iceland, because there are no subsidiaries of German multinationals with capital above the reporting threshold in our dataset. Finally, Germany is not included as the country of the parent companies.

Table 3: Descriptive Statistics

Variable	Mean	Std.Dev.	Min.	Max.
Subsidiary-level variables				
Internal debt (rel. to total capital)	.279	.246	0	1
Parent debt (rel. to total capital)	.132	.208	0	1
External debt (rel. to total capital)	.337	.233	0	1
Loss carry-forward (binary)	.302	.459	0	1
Sales (in € mill.)	52.7	354.3	[a)]	[a)]
Asset tangibility	.249	.228	0	1
Country-level variables				
STR (Statutory tax rate)	.340	.069	0	.532
RULE (thin-capitalization rule exists) (binary)	.702	.458	0	1
TIGHT (tightness of the safe haven debt-to-equity ratio)	.217	.168	0	.5
TIGHT (referring to related party debt)	.096	.147	0	.4
TIGHT (referring to total debt)	.122	.173	0	.5
Lending rate	.074	.064	.018	1.23

Based on 42,950 observations representing 36 countries in the time period from 1996 to 2004. Subsidiary-level variables are taken from the Bundesbank (MiDi) data. Corporate taxation data are taken from the International Bureau of Fiscal Documentation (IBFD) and from tax surveys provided by Ernst&Young, PwC and KPMG. The lending rate refers to private sector debt taken from the IMF International Financial Statistics Yearbook (2006) augmented with corresponding OECD figures. [a)] confidential data.

the safe haven debt-to-equity ratio (see page 12).

Since the firm-level data does not provide us with information about subsidiary-specific interest expenses, we employ the host-country's lending rate for the private sector taken from the IMF, augmented with OECD data. In order to control for company-specific variation in corporate debt policies and in borrowing conditions, we employ sales as an indicator of the cash flow of the subsidiary. Another variable that might capture differences in borrowing conditions is asset tangibility measured as the ratio of fixed assets to total capital. Because tangible assets may serve as collateral, a higher tangibility should result in more favorable (external) borrowing conditions. Descriptive statistics for all variables used are provided in Table 3.

6 Results

Table 4 provides regression results for the determinants of the internal debt ratio of foreign subsidiaries. All estimations allow for time- and affiliate-level fixed effects and include a set of standard controls. Column (1) provides results for a basic specification, which includes the statutory tax rate. We find that an increase in the tax rate by 10 percentage points results in an increase in the internal debt ratio by approximately 2.1 percentage points. The marginal effect corresponds to a semi-elasticity of about 8% evaluated at the sample mean. Though the estimate of the tax-rate effect seems low compared to the existing literature,[14] it should be noted that the estimation refers to internal debt.

[14]Desai, Foley and Hines (2004) report an effect of 3.3 percentage points on total debt for U.S. multinationals. Mintz and Weichenrieder (2010) report results for foreign subsidiaries of German corporations of between 3.0 and 5.7, depending on the specification. For German affiliates of foreign investors, Ramb and Weichenrieder (2005) find a coefficient of 1.4. Huizinga, Laeven and Nicodème (2008) find an estimate of 2.7 for a sample of European corporations.

For internal debt from U.S. parent firms, Desai, Foley and Hines (2004) obtain a semi-elasticity of about 10% if the tax rate increases by 10 percentage points.[15] With regard to the other controls, the results are in accordance with theoretical expectations, given the substitutability between external and internal debt.[16] Asset tangibility shows a negative effect, suggesting that less internal debt is used if borrowing costs for external debt are reduced. Similarly, the positive effect of the lending rate indicates that more internal debt is used if external borrowing costs increase.

To test whether thin-capitalization rules effectively reduce the tax-incentive for using internal debt, Column (2) employs an interaction term of the host-country tax rate with the dummy variable indicating whether a thin-capitalization rule is imposed. The negative coefficient for the interaction term is in accordance with the view that the tax-incentive to use internal debt is reduced. Column (3) takes account of differences between the thin-capitalization rules and uses an interaction of the tax rate with the indicator of the tightness of the thin-capitalization rule. Recall that the latter indicator shows a value of zero if no thin-capitalization rule is imposed and has a potential maximum value of unity if no interest for internal debt can be deducted from the tax base. Again, a negative effect is found, which is highly significant.

Since the effect of the tightness of the thin-capitalization rule may depend on whether the safe haven debt-to-equity ratio refers to related party debt or total debt, it is interesting to allow for differences in the slope parameter of the interaction term.[17] As documented in Column (4), the interaction term exerts stronger effects if the safe haven debt-to-equity ratio refers to total debt – the interaction term referring to related party debt proves insignificant.

[15]Column (10) of Table III in Desai, Foley and Hines (2004) reports a coefficient of 0.082. From Table I, the mean parent debt ratio is about 0.08.

[16]Substitutability is also confirmed by results for external debt shown in Columns (5) - (8) of Table 5.

[17]We also conducted robustness tests excluding the U.S., where the thin-capitalization rule differs from that of other countries (see above), but obtained very similar results.

Table 4: Thin-capitalization Rules and Internal Debt

	(1)	(2)	(3)	(4)
Statutory tax rate (STR)	.214 **	.209 **	.213 **	.211 **
	(.095)	(.094)	(.093)	(.091)
STR x RULE		-.049 *		
		(.028)		
STR x TIGHT			-.287 **	
			(.120)	
STR x TIGHT (related party debt)				-.116
				(.092)
STR x TIGHT (total debt)				-.588 **
				(.209)
Loss carry-forward	.036 **	.036 **	.036 **	.036 **
	(.003)	(.003)	(.003)	(.003)
ln(Lendingrate)	.021 **	.021 **	.020 **	.018 **
	(.008)	(.008)	(.008)	(.008)
ln(Sales)	-.005 *	-.005 *	-.005 *	-.004 *
	(.003)	(.002)	(.002)	(.002)
Asset tangibility	-.068 **	-.068 **	-.068 **	-.068 **
	(.012)	(.013)	(.012)	(.012)
R^2	.7643	.7644	.7645	.7646
Observations	42,950	42,950	42,950	42,950
Affiliate Fixed Effects	yes	yes	yes	yes

Dependent variable: internal debt ratio. Time-specific fixed effects included. Heteroskedasticity robust standard errors clustered at the level of country-year cells in parentheses. A star denotes significance at the 10% level and two stars at the 5% level.

To obtain an impression of the empirical magnitudes involved, consider the case of a safe haven debt-to-equity ratio of 2:1 (as, for example, in Canada) – reflected by a tightness indicator of 0.33 ($= \frac{1}{2+1}$). The estimates in Column (3) indicate that, given the imposition of such a tight thin-capitalization rule, an increase of the tax rate by 10 percentage points is associated with an increase in the internal debt ratio by only 1.2 percentage points ($\approx .10 \times (.213 - .287 \times .33)$). Compared with the unrestricted case, the tax-sensitivity is reduced by about half.

An alternative way to interpret the empirical findings is to consider the implications of imposing a thin-capitalization rule at a given tax rate. Suppose a host country with tax rate equal to the sample average of 34% implements a thin-capitalization rule with a safe haven debt-to-equity ratio of 2:1. According to the results reported in Column (3), the internal debt ratio declines by 3.2 percentage points ($\approx .34 \times .287 \times .33$), or by almost 12% of its mean value. If the host country defines the safe haven in terms of total debt (see Column (4)), the predicted decline in the internal debt ratio even amounts to 6.6 percentage points or 24%, which is a sizeable effect.

Given the practical difficulties in defining related party debt for tax purposes, the effect of thin-capitalization rules may be more pronounced when focusing on debt provided by the parent firm. Columns (1) to (4) of Table 5 report results where, apart from the different dependent variable, the same regression approach is used as above. Qualitatively, the above findings are confirmed. Quantitatively, we find that, in the absence of a thin-capitalization rule, an increase in the tax rate by 10 percentage points is associated with an increase of the parent debt ratio by about 9,5% evaluated at the sample mean. This estimate matches closely the findings for the U.S. (Desai et al., 2004, see above). According to Column (3), if a thin-capitalization rule with a safe haven debt-to-equity ratio of 2:1 is introduced, the same increase in the tax rate is associated with an increase in parent debt evaluated at the sample mean only by about 2.5% ($\approx .10 \times (.126 - .282 \times .33) / .132$).

Table 5: Thin-capitalization Rules and Different Types of Debt

	Dependent Variable: Parent Debt Ratio				*Dependent Variable: External Debt Ratio*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
STR	.127 *	.122 *	.126 *	.125 *	-.031	-.028	-.030	-.030
	(.073)	(.073)	(.072)	(.071)	(.043)	(.043)	(.042)	(.042)
STR × RULE		-.049 **				.032		
		(.024)				(.021)		
STR × TIGHT			-.282 **				.176 **	
			(.095)				(.080)	
STR × TIGHT				-.159 *				.127
(related party debt)				(.097)				(.106)
STR × TIGHT				-.489 **				.246 **
(total debt)				(.138)				(.112)
Loss carry-forward	.022 **	.022 **	.022 **	.021 **	-.006 **	-.006 **	-.006 **	-.006 **
	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)
ln(Lendingrate)	.018 **	.018 **	.017 **	.016 **	-.004	-.004	-.003	-.003
	(.007)	(.006)	(.006)	(.006)	(.007)	(.006)	(.006)	(.006)
ln(Sales)	-.007 **	-.007 **	-.007 **	-.007 **	.032 **	.032 **	.032 **	.032 **
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Asset tangibility	-.011	-.011	-.011	-.011	.057 **	.057 **	.057 **	.057 **
	(.012)	(.012)	(.012)	(.012)	(.012)	(.012)	(.012)	(.012)
R^2	.7334	.7335	.7337	.7338	.7735	.7736	.7736	.7736
Affiliate Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes

42,950 Observations. Dependent variables: (1)-(4) internal debt provided by parent relative to total capital, (5)-(8) external debt relative to total capital. Time-specific fixed effects included. Heteroskedasticity robust standard errors clustered at the level of country-year cells in parentheses. A star denotes significance at the 10% level and two stars at the 5% level.

This indicates that in particular parent debt becomes less tax sensitive in the presence of thin-capitalization rules. Column (4) reports results from a specification where the coefficient of the interaction terms differs, depending on whether the safe haven is defined using total or related party debt. While both restrictions exert significant negative effects on the tax-sensitivity of parent debt, the effect turns out to be stronger if the safe haven debt-to-equity ratio refers to total debt.

Column (3) of Table 5 indicates that if a host country with a tax rate equal to the sample average implements a thin-capitalization rule with a safe haven debt-to-equity ratio of 2:1, the parent debt ratio declines by 3.2 percentage points ($\approx .34 \times .282 \times .33$). If the host country defines the safe haven in terms of total debt (see Column (4)), the decline in the parent debt ratio amounts to 5.5 percentage points. In comparison with the above results, these findings indicate that the sensitivity of internal debt to thin-capitalization rules is mainly driven by parent debt.

While thin-capitalization rules aim at removing the tax-incentive to use internal debt, external debt finance offers an alternative way to exploit differences in the tax treatment between debt and equity. As documented in Columns (5) to (8), in the absence of thin-capitalization rules, the corporate tax rate does not show significant effects on the external debt ratio.[18] The external debt ratio is also not significantly related to the interaction between the tax rate and the indicator for the presence of a thin-capitalization rule (see Column 6). Column (7) reports results of an estimation which takes account of differences in the tightness of thin-capitalization rules. This specification confirms a tax-sensitivity of external debt in countries with tight thin-capitalization rules. According to the estimation results, a foreign subsidiary in a country that imposes a thin-capitalization rule with a safe haven debt-to-equity ratio of 2:1 increases the external debt ratio by 0.6 percentage points if the statutory tax rate increases by 10 percentage points ($\approx .10 \times .176 \times .33$). Expressed as a

[18]Note that in contrast to the existing literature, *e.g.* Desai *et al.*(2004), the estimations take account of affiliate-specific fixed effects which remove the cross-country variation in tax rates.

semi-elasticity, an increase of the tax rate by 10 percentage points results in an increase of the external debt ratio by less than 2%. Thus, we note that even with a tight thin-capitalization rule, the tax-sensitivity of external debt is not higher than the sensitivity of internal or parent debt. Column (8) reports results of a specification distinguishing between cases where the safe haven is defined using total debt and related party debt. As in the case of internal debt, the tax-sensitivity is higher if the safe haven refers to total debt.

It is interesting to consider the implications of an imposition of a thin-capitalization rule at a given tax rate. Suppose a host country with a tax rate equal to the sample average implements a thin-capitalization rule with a safe haven debt-to-equity ratio of 2:1. According to the results reported in Column (7), the external debt ratio increases by 2 percentage points ($\approx .34 \times .176 \times .33$). If the host country defines the safe haven in terms of total debt, the external debt ratio is expanded by about 2.8 percentage points ($\approx .34 \times .246 \times .333$). Since the expansion of external debt is smaller than the reduction in internal debt (see above), these findings indicate that the total leverage declines if a thin-capitalization rule is implemented.

7 Conclusions

In the last decades, governments have increasingly used thin-capitalization rules to restrict debt financing of multinational firms. With the motivation to curb tax planning of multinationals by means of internal loans, these rules typically limit interest deduction for loans provided by foreign affiliates if the borrowing entity's debt-to-equity ratio is above the so-called safe haven debt-to-equity ratio. While thin-capitalization rules are quite common today, a comparative analysis of their effects has not been conducted, so far. Using a micro-level panel dataset of multinationals,

this paper studies the effectiveness of thin-capitalization rules as well as their consequences for the capital structure. The empirical investigation is concerned with the capital structure of the subsidiaries of all German multinationals in 36 countries, including all OECD and some additional European countries, in the time period between 1996 and 2004.

In accordance with the previous literature, the results support the view that more internal debt is used in host countries with high tax rates and where the borrowing costs for external debt are high. The analysis also shows that thin-capitalization rules tend to reduce the tax-incentive to use internal debt. Quantitatively, the empirical findings point at sizeable effects of thin-capitalization rules on the capital structure. According to the results, if a host country with a tax rate equal to the sample average of 34% implements a tight thin-capitalization rule, denying interest deduction for debt exceeding a debt-to-equity ratio of 2:1, the ratio of internal debt declines by almost 12% or 24%, depending on how the thin-capitalization rule is defined. Further inspection reveals that the sensitivity of internal debt to thin-capitalization rules is mainly driven by parent debt.

While the estimation results also show that thin-capitalization rules encourage the use of external debt, substitution of external for internal debt is limited and the total debt-to-equity ratio declines if a thin-capitalization rule is implemented. With regard to the different types of debt used in defining the safe haven debt-to-equity ratio, we find some evidence that restrictions triggered by total debt exert stronger effects. This finding suggests that thin-capitalization rules using a broad definition of the safe haven debt-to-equity ratio are more effective in reducing the tax-incentive for using internal debt.

Even though our results indicate that thin-capitalization rules can effectively reduce the tax-incentive for internal debt and, thus, curb tax planning by multinational firms, it is not clear whether the imposition of such rules is generally beneficial for the imposing countries. As has

been discussed in the theoretical literature, restricting opportunities for tax planning might result in adverse consequences for multinationals' investment and reinforce tax competition (Keen, 2001; Janeba and Smart, 2003; Peralta, Wauthy and van Ypersele, 2006; Bucovetsky and Haufler, 2008; Haufler and Runkel, 2008). However, it is left for future research to explore whether imposing thin-capitalization rules exerts negative effects on real investment in host countries.

Appendix: Datasources and Definitions

Micro-Level Data are taken from the micro-level dataset (MiDi) of the Deutsche Bundesbank (see Lipponer, 2006, for an overview). Internal debt is defined as liabilities to shareholders, affiliated enterprises, and enterprises linked with the reporting subsidiary through participating interests. Parent debt refers to liabilities owed directly to the parent firm. External liabilities are defined as all liabilities except internal debt. All debt ratios are defined as a ratio of corresponding liabilities relative to total capital consisting of nominal capital, capital reserves, profit reserves, and total liabilities. Asset tangibility is defined as the ratio of fixed assets to total capital.

Corporate Taxation Data are taken from the International Bureau of Fiscal Documentation (IBFD) and from tax surveys provided by Ernst&Young, PricewaterhouseCoopers (PwC), and KPMG. The statutory tax rate variable contains statutory profit tax rates modified by restrictions on interest deduction – as in the case of the Italian IRAP.

Thin-Capitalization Rules: Basic information about thin-capitalization rules is obtained from the same sources as the tax data. This information was augmented and cross-checked with questionnaires sent out to country experts of PricewaterhouseCoopers.

Lending Rates refer to private sector debt taken from the IMF International Financial Statistics Yearbook (2006) augmented with corresponding OECD figures.

References

Aghion, P. and P. Bolton (1989), The financial structure of the firm and the problem of control, *European Economic Review* 33, 286-293.

Ambrosanio, M.F. and M.S. Caroppo (2005), Eliminating harmful tax practices in tax havens: defensive measures by major EU countries and tax haven reforms, *Canadian Tax Journal* 53, 685-719.

Table A.1: Safe Haven Debt-to-Equity Ratios

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	3	3	2	2	2	2	3	3	3	3
Bulgaria	-	-	2	2	2	2	2	2	2	3
Canada	3	3	3	3	3	2	2	2	2	2
Croatia	-	-	-	-	-	-	-	-	-	4
Czech Republic	4	4	4	4	4	4	4	4	4	4
Denmark	-	-	-	4	4	4	4	4	4	4
France	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Great Britain	1	1	1	1	1	1	1	1	1	1
Hungary	-	4	4	4	4	3	3	3	3	3
Italy	-	-	-	-	-	-	-	-	5	4
Japan	3	3	3	3	3	3	3	3	3	3
Latvia	-	-	-	-	-	-	-	4	4	4
Lithuania	-	-	-	-	-	-	-	-	4	4
Luxembourg	-	-	-	-	-	-	5.7	5.7	5.7	5.7
Mexico	-	-	-	-	-	-	-	-	-	3
Netherlands	3	3	3	3	3	3	3	3	3	3
New Zealand	-	3	3	3	3	3	3	3	3	3
Poland	-	-	-	3	3	3	3	3	3	3
Portugal	2	2	2	2	2	2	2	2	2	2
Romania	-	-	-	-	-	-	3	3	3	3
Slovakia	4	4	4	4	4	4	4	4	-	-
Slovenia	-	-	-	-	-	-	-	-	-	8
South Korea	-	3	3	3	3	3	3	3	3	3
Spain	3	3	3	3	3	3	3	3	-[a]	-[a])
Switzerland	6	6	6	6	6	6	6	6	6	6
Turkey	2	2	2	2	2	2	2	2	2	2
USA	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Number of debt units in relation to equity capital that are accepted by the thin-capitalization rules for unrestricted interest deduction from taxable profits. Special rules for financial institutions and holdings are not reported. Belgium is excluded as the rules do not apply for the German multinationals (see Table 1). [a]) Since 2004 the Spanish rule does not apply to related party debt provided by a German parent company.

Auerbach, A.J. (2002), Taxation and corporate financial policy, in: Auerbach, A.J. and M. Feldstein (eds.), *Handbook of Public Economics*, Vol. 3, Amsterdam, 1251-1292.

Bucovetsky, S. and A. Haufler (2008), Tax competition when firms choose their organizational form: should tax loopholes for multinationals be closed? *Journal of International Economics* 74, 188-201.

Desai, M.A., C.F. Foley and J.R. Hines (2004), A multinational perspective on capital structure choice and internal capital markets, *Journal of Finance* 59, 2451-2487.

Dourado, A.P. and R. de la Feria (2008), *Thin capitalization rules in the context of the CCCTB*, Oxford University Centre for Business Taxation Working Paper Series, WP 08/04.

Engle, H.S. and W.T. Raineri (1996), United States, *Cahiers de Droit Fiscal* LXXXIb, 773-800.

Graham, J.R. (2003), Taxes and corporate finance: a review, *Review of Financial Studies* 16, 1075-1129.

Gopalan, R., V. Nanda, and A. Seru (2007), Affiliated firms and financial support: evidence from Indian business groups, *Journal of Financial Economics* 86, 759-795.

Haufler, A. and M. Runkel (2008), *Firms' financial choices and thin capitalization rules under corporate tax competition*, CESifo Working Paper 2429, Munich.

Huizinga, H., L. Laeven and G. Nicodème (2008), Capital structure and international debt shifting, *Journal of Financial Economics* 88, 80-118.

Janeba, E. and M. Smart (2003), Is targeted tax competition less harmful than its remedies? *International Tax and Public Finance* 10, 259-280.

Jensen, M. (1986), Agency costs of free cash flow, corporate finance and takeovers, *American Economic Review* 76, 323-329.

Jensen, M. and W.H. Meckling (1976), Theory of the firm: managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 42, 159-185.

Keen, M. (2001), Preferential regimes can make tax competition less harmful, *National Tax Journal* 54, 757-762.

Lipponer, A. (2006), *Microdatabase direct investment - MiDi. A brief guide*, Bundesbank Working Paper, Frankfurt.

MacKie-Mason, J. (1990), Do taxes affect corporate financing decisions? *Journal of Finance* 45, 1471-1493.

Mintz, J. and M. Smart (2004), Income Shifting, investment, and tax competition: theory and evidence from provincial taxation in Canada, *Journal of Public Economics* 88, 1149-1168.

Mintz, J. and A.J. Weichenrieder (2010), The indirect side of direct investment - multinational company finance and taxation, MIT Press, 128 -140.

Myers, S. (1977), Determinants of corporate borrowing, *Journal of Financial Economics* 5, 147-175.

OECD (1987), Thin-capitalization and taxation of entertainers, artistes and sportsmen, Comittee on Fiscal Affairs, *Issues in International Taxation* No. 2, Paris.

Overesch, M. and G. Wamser (2010), Corporate tax planning and thin-capitalization rules: evidence from a quasi-experiment, *Applied Economics* 42, 563-573.

Peralta, S., X. Wauthy and T. van Ypersele (2006), Should countries control international profit shifting? *Journal of International Economics* 68, 24-37.

Piltz, D. (1996), General report, *Cahiers de Droit Fiscal* LXXXIb, 83-140.

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

Schmid, W. (1996), Switzerland, *Cahiers de Droit Fiscal* LXXXIb, 719-744.

Thoemmes, O., R. Stricof and K. Nakhai (2004), Thin capitalization rules and the non-discrimination principles, *Intertax* 32 (3), 127-137.

Tirole, J. (2006), The theory of corporate finance. Princeton.

Weichenrieder, A.J. (1995), *Besteuerung und Direktinvestition*, Tuebingen.

Weichenrieder, A.J. (1996), Fighting international tax avoidance: the case of Germany, *Fiscal Studies* 17, 37-58.

Weichenrieder, A.J., and H. Windischbauer (2008), *Thin-capitalization rules and company responses - experience from German legislation*, CESifo Working Paper 2456, Munich.