Anti Profi-Shifting Rules and Foreign Direct Investment

Thiess Buettner*, Michael Overesch† and Georg Wamser‡

December 2016

Abstract

This paper explores the effects of unilateral tax provisions aimed at restricting multinationals' tax planning on foreign direct investment (FDI). Using a unique dataset which allows us to observe the worldwide activities of a large panel of multinational firms, we test how limitations of interest tax deductibility, so-called thin-capitalization rules, and regulations of transfer pricing by the host country affect investment and employment of foreign subsidiaries. The results indicate that introducing a typical thin-capitalization rule or making it more tight exert significant adverse effects on FDI and employment in high-tax countries. Moreover, in countries that impose thin-capitalization rules, the tax-rate sensitivity of FDI is increased. Regulations of transfer pricing, however, are not found to exert significant effects on FDI or employment.

Key Words: FDI; Corporate taxation; Profit shifting; Thin-capitalization rules; Transfer-pricing regulations; Affiliate-level data; Foreign subsidiary; Employment; Base erosion and profit shifting (BEPS); OECD

Classification: H25; F23

*University of Erlangen-Nuremberg, Lange Gasse 20, 90403 Nuremberg, Germany, thiess.buettner@fau.de

†University of Cologne, Albertus-Magnus Platz, 50923 Cologne, Germany, overesch@wiso.uni-koeln.de

‡University of Tuebingen and CESifo. University of Tuebingen, Mohlstr. 36, 72074 Tuebingen, Germany, georg.wamser@uni-tuebingen.de.

1 Introduction

The international consensus on the taxation of multinational corporations (MNCs) subjects the profits of each foreign subsidiary to corporate income taxation in the host country. Taxable profits are determined by separate accounting for each subsidiary. In this setting, international tax-rate differences provide an incentive to alter the profit allocation between the parent company and all subsidiaries of an MNC. The key methods of so-called profit shifting involve manipulation of transfer-prices for intra company purchases of goods and services as well as internal debt financing. With regard to internal debt financing, subsidiaries of multinational firms located in high-tax countries tend to borrow from entities located in low-tax countries (Desai, Foley, and Hines, 2004; Huizinga, Laeven and Nicodème, 2008; Buettner and Wamser, 2013). This enables multinationals to save taxes since the taxes avoided through the interest deduction at the high-tax location exceed the taxes on interest income at the low-tax location. There is also evidence that firms adjust prices for intrafirm trade, so called transfer prices, to lower the tax base in high-tax countries (*e.g.*, Swenson, 2001; Bartelsman and Beetsma, 2003; Clausing, 2003). The extent to which this is possible, however, varies across industries, and intrafirm transactions related to R&D, intangible assets, or advertising are found to be particularly tax-sensitive (Harris, 1993; Grubert, 2003; Dischinger and Riedel, 2011). Saunders-Scott (2015) provides evidence that the two channels of profit shifting, transfer pricing and internal financing, are substitutes.

This tax planning has adverse consequences for tax revenues in high-tax countries, and enhanced opportunities to reduce taxes may give multinationals an advantage over companies operating only at a domestic level (Bucovetsky and Haufler, 2008). As a consequence, tax policy of developed

countries is under pressure to restrict multinational tax planning. Tax reforms addressing profit-shifting are accompanied by various initiatives to coordinate policies against what has recently been referred to as base erosion and profit shifting (BEPS) (*e.g.*, European Commission, 1997; OECD, 1998; OECD, 2013). Countries hosting foreign firms have responded unilaterally by introducing specific anti profit-shifting rules, *i.e.*, rules that restrict the foreign subsidiaries' ability to shift profits abroad. It is not clear, however, whether such restrictions are generally beneficial for the imposing countries. The theoretical literature on profit shifting has emphasized that opportunities for tax planning might help to establish a preferential tax regime that has positive implications for the economic cost of taxation in a context of tax competition (*e.g.*, Keen, 2001; Janeba and Smart, 2003; Peralta, Wauthy and van Ypersele, 2006; Bucovetsky and Haufler, 2008, Becker and Fuest, 2012). A similar argument has been discussed in the theoretical literature on the role of tax havens in tax competition (*e.g.*, Slemrod and Wilson, 2008, Hong and Smart, 2010; Haufler and Runkel, 2012; Gresik, Schindler, Schjelderup, 2015).

With regard to the two main methods of profit shifting, host countries have implemented unilateral measures that tend to limit options to manipulate transfer prices as well as possible deductions of interest payments.[1] The OECD acknowledges the need for more stringent transfer pricing documentation requirements (see OECD 2015a) and suggests to employ restrictions on interest deductibility (see OECD, 2015b). Previous empirical studies have demonstrated that thin-capitalization rules in OECD countries have significant effects on financial decisions of firms (*e.g.*, Buettner, Overesch, Schreiber and Wamser, 2012, 2015, Blouin, Huizinga, Laeven and Nicodeme, 2014). Evidence

[1]We do not consider withholding taxes as they are usually fixed in bilateral tax treaties. It should also be noted that tax-law provisions in the home country of the multinational may have important implications for the host countries' tax effects on FDI as well. The current paper, however, focuses on measures by the host-country.

for the German thin-capitalization rule is provided by Weichenrieder and Windischbauer (2008), Overesch and Wamser (2010), as well as Wamser (2014). Alberternst and Sureth-Sloane (2015) analyze the German interest barrier introduced in 2008 and also find effects on the capital structure. The literature also supports the effectiveness of transfer pricing regulations (*e.g.*, Beuselinck, Deloof and Vanstraelen, 2009; Blouin, Robinson and Seidman, 2010; Jost, Pfaffermayer and Winner, 2014; and Lohse and Riedel, 2013).

As a consequence of these limits and regulations, the tax burden and the cost of capital might increase with adverse effects on real investment (Ruf and Schindler, 2015). The adverse effects would be strengthened by the expectation of high future taxes, if investors regard such restrictions as a signal that future taxes will stay high or increase (Mintz and Weichenrieder, 2010, p.164). As noted by the OECD (2015b), however, the scarce empirical evidence on the effects on investment does not support adverse investment effects. Weichenrieder and Windischbauer (2008) analysing the German thin-capitalization rule do not find significant effects on inbound investment. In another study using German data Buslei and Simmler (2012) find no investment effect of the reform of the German thin-capitalization rule in 2008. As noted by Ruf and Schindler (2015), however, the evidence on the German rules might reflect the existence of other loopholes and substitution by other forms of debt. Studies for investment effects of thin-capitalization rules in other countries are lacking.

Against this background, this paper analyzes empirically the effects of anti profit-shifting provisions by OECD/EU countries on foreign direct investment. The analysis employs a unique micro-level database made available by the German central bank (Deutsche Bundesbank), which provides information on virtually all foreign subsidiaries of German multinational firms. We use this data in

combination with information on anti profit-shifting rules enacted by the host countries of foreign subsidiaries in 39 countries over 12 years and examine whether and to what extent these measures affect FDI of multinational firms. The empirical analysis focuses on anti profit-shifting measures directed against internal debt financing and transfer pricing, which have been identified as key mechanisms for profit shifting in the recent literature as noted above.

Our empirical results show that anti profit-shifting legislation intensifies the adverse tax effects on FDI. In particular, we find that thin-capitalization rules are associated with a stronger response of FDI to changes in the host-country tax-rate. Our results also indicate that imposing thin-capitalization restrictions is accompanied with adverse effects on employment and investment by multinational companies in host countries with rather high tax rates. Transfer-pricing regulations, however, are not found to exert significant effects.

The paper is organized as follows. Section 2 explains basic features of anti profit-shifting measures, discusses their likely consequences for FDI and considers some empirical indicators of these measures. Section 3 provides information on the data and the investigation approach. Section 4 presents and interprets our empirical results on the effects of anti profit-shifting measures on foreign subsidiaries' investment. Section 5 presents results of robustness checks that use other specifications and employment as alternative indicator of production activities by foreign subsidiaries. Section 6 concludes.

2 Anti Profit-Shifting Rules

Faced with MNCs' tax planning through debt financing as well as transfer pricing of intrafirm trade, many governments of countries hosting foreign firms have introduced specific anti profit-shifting rules, *i.e.*, tax provisions aimed at restricting the foreign subsidiaries' ability to shift profits by means of debt financing and transfer pricing. In the following, we consider each of these rules, separately.

2.1 Thin-Capitalization Rules

MNCs can use the financial structure of foreign operations in order to alter the international allocation of taxable profits. In particular, intercompany debt financing can be used to create interest payments that are deducted in high-tax countries and subject to tax in low-tax countries. Therefore, international tax-rate differentials give rise to thinly-capitalized subsidiaries of multinationals in high-tax countries. From a theoretical point of view, a multinational firm operating an internal capital market can minimize its overall tax payments by lending from the affiliate facing the lowest tax within the firm to all other subsidiaries (see Mintz and Smart, 2004).

As a consequence, some host countries of foreign subsidiaries, especially those that impose high taxes, have responded by introducing so-called thin-capitalization rules.[2] These rules usually restrict the interest deduction for loans from related parties such as the parent or some other foreign affiliate.[3] More specifically, if a firm's debt in proportion to its equity capital is above a certain

[2]While we focus on formal thin-capitalization rules, it should be noted that 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.

[3]See also the International Fiscal Association's report on thin capitalization, which provides an overview of thin-

threshold level, interest deduction for related party loans is limited.[4] The threshold level of debt is commonly referred to as the *safe haven debt-to-equity ratio* (OECD, 1987), indicating that only with a lower debt-to-equity ratio interest deduction is safely granted by the host-country's tax system.

While country-specific information is provided by Table A.2 in the Appendix, the solid line in Figure 1 indicates the share of OECD countries that have implemented such rules in the time period from 1996 until 2009. The dashed line reports the average safe haven debt-to-equity ratio implemented.[5] While the average tightness of the rules proves constant, more and more countries have implemented such rules.

For purposes of the empirical analysis below, note that the untransformed safe haven ratio is not a useful measure of thin-capitalization restrictions, as it is infinitely large if no restriction is imposed. Following Buettner *et al.* (2012), we make use of a simple non-linear transformation of the safe haven debt-to-equity ratio denoted by σ and employ the following indicator of the tightness of the thin-capitalization rule applied to subsidiary i in period t

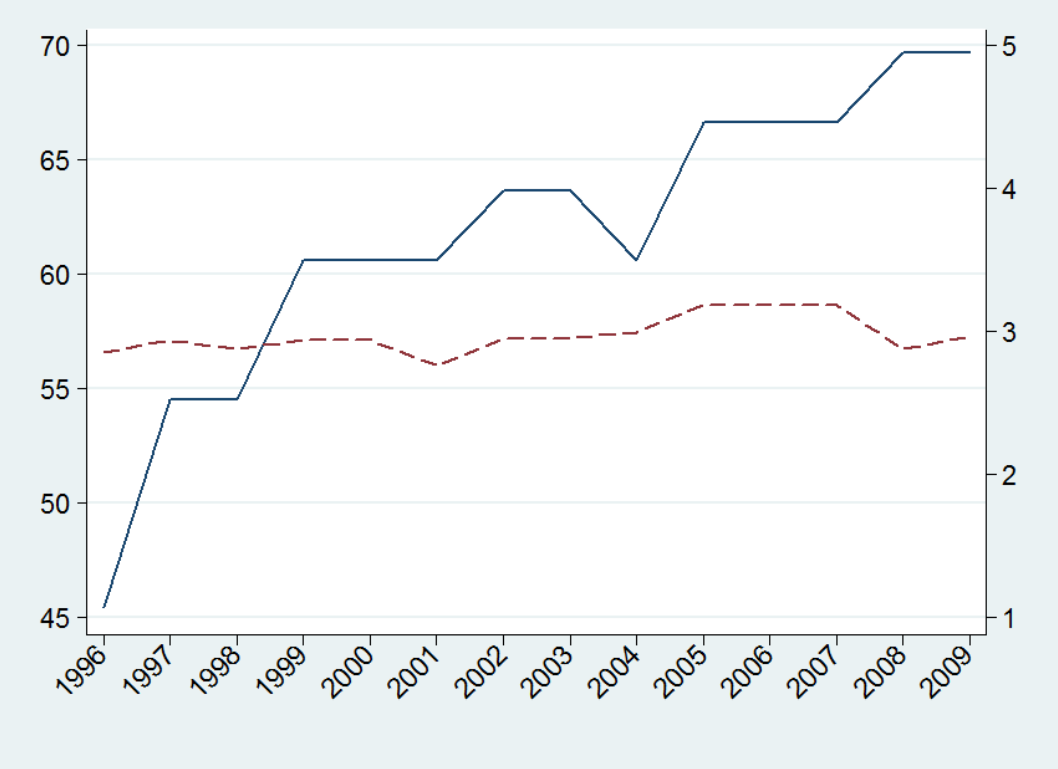
$$\text{TCR}_{it} \equiv \frac{1}{1+\sigma_{it}}. \tag{1}$$

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).

[4] While thin-capitalization rules tend to identify profit-shifting using the level of debt, firms might resort to setting high interest rates at low debt levels. However, this would tend to conflict with the arm's length principle and only offers limited leeway for profit shifting (Piltz, 1996: 103p).

[5] Although countries often establish special rules for financial institutions and holdings, we do not report these ratios here as the corresponding subsidiaries are excluded from our empirical analysis. 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.

Figure 1: Increasing Usage of Thin-Capitalization Rules among OECD Countries



Solid line: Share of countries imposing thin-capitalization rules in % measured on the left axis. Dotted line: mean value of the safe haven debt-to-equity ratio among OECD countries with existing hin-capitalization rules measured on the right axis. Source: see the Appendix.

The advantage of 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.[6] For a numerical example, consider the Canadian case, where the safe haven debt-to-equity ratio was 3:1 during the nineties. In this case, σ was 3, and the indicator was 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 ($= \frac{1}{1+2}$).

While we have been focusing here on the safe haven debt-to-equity ratio, further details of thin-capitalization rules differ between countries. Not only is the tax-penalty depending on the statutory tax rate, which is taken into account in the empirical analysis below by an interaction term. In some countries, interest payments for which deduction is denied are reclassified as dividend payments, which implies that additional withholding taxes may be due. Moreover, as discussed in Buettner *et.al.* (2012), in some countries the debt-to-equity ratio refers to total debt; in the others it refers only to loans provided by the parent company or to all loans from related parties. As a robustness check, therefore, in the empirical analysis, we also consider a binary variable *Thin-Capitalization Rule Exists (TCR - Exists)* which ignores the information about the safe haven debt-to-equity ratio and just focuses on whether a thin-capitalization rule is imposed or not.

[6]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 $\varepsilon \geq \frac{1}{1+\sigma}$.

2.2 Transfer-Pricing Regulations

The separate accounting principle requires MNCs to assign prices to all intrafirm deliveries of goods and services and to the licences for patents and trademarks that are used by a subsidiary. Tax planning by multinational firms enters since these prices determine the profit allocation among affiliates. Affiliates located in low-tax countries may charge high prices for intrafirm deliveries and affiliates located in high-tax countries may charge low prices. Firms might also increase intrafirm trade or even shift valuable assets into low-tax subsidiaries in order to charge additional licence fees.

In principle, shifting profits by means of transfer pricing is restricted by the so-called arm's length principle. Accordingly, intrafirm transfer prices must not be different from prices used for transactions between independent firms. The issue with applying the arm's length principle is, however, the lack of comparability of intra-group transfer prices with prices of transactions between unrelated parties. Since intra-group transactions tend to be often firm specific, identification of comparable transactions requires information that is hard to collect or unobservable (see, *e.g.*, Durst and Culbertson, 2003). In practice, different methods are applied to assess whether transfer prices comply with the arm's length principle. The 'comparable uncontrolled price method' and the 'resale price method' rely on publicly available price information. Obviously, when market prices are unobserved, these methods are not feasible and pricing behavior needs to be assessed using firm-specific information.[7] As a consequence, many countries have implemented transfer-pricing regulations which define documentation requirements, mostly following the OECD guidelines (OECD, 2011).

[7]Examples are the 'cost plus method', the 'transactional profit-split method', or the 'transactional net-margin method'.

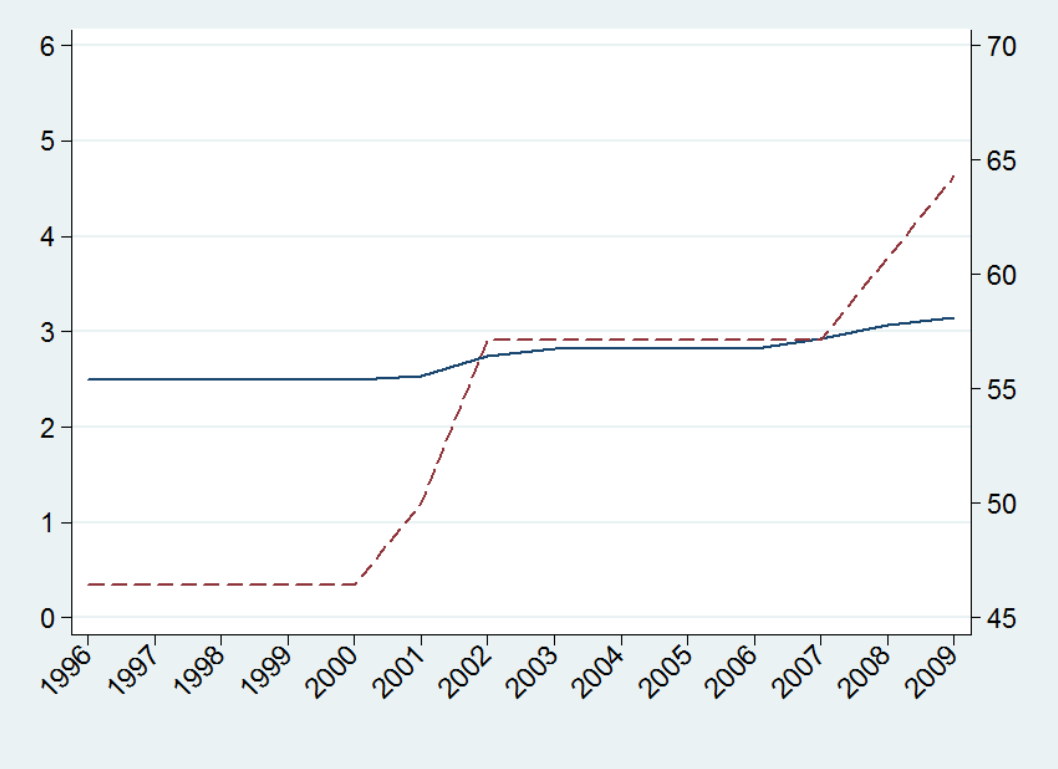
Lohse and Riedel (2013) provide a classification of the strictness of transfer-pricing regulations. Following this classification, a strict regulation is characterized by fewer exemptions, the requirement of an extensive documentation and high penalties. The classification by Lohse and Riedel (2013) particularly emphasizes the documentation requirements. It groups countries into six classes with similar transfer-pricing regulations. While class 0 comprises countries with no documentation requirements, countries assigned to class 5 demand full disclosure. Table A.3 provides the strictness of transfer-pricing regulations for each country. The average value of the indicator as provided by Lohse and Riedel (2013) is depicted by the solid line in Figure 2. Since the indicator only provides an ordinal scaling of the strictness of transfer-pricing regulations, the empirical analysis basically focuses on a binary variable *Strict Transfer-Pricing Regulation (TPR)*, which is unity if the transfer-pricing regulations are assigned to one of the two top classes (class 4 or 5). As also shown in Figure 2, in 2009 almost two thirds of all OECD countries are imposing such restrictions. As a robustness check, the empirical analysis below also uses the *Score of Transfer-Pricing Regulation (TPR - Score)*, which captures the original classification by Lohse and Riedel (2013).

2.3 Implications for Foreign Direct Investment

As is well established in the literature, in a setting with exemption of foreign earnings, or deferral, the host-country tax rate is an important determinant of FDI (*e.g.*, Janeba, 1995). Since tax planning of multinational firms tends to reduce the effective tax burden, at a given tax rate, restricting tax-planning opportunities will tend to reduce FDI. Hong and Smart (2010), for instance, discuss the effects of a general restriction of the interest deductibility.[8] In their model, each firm

[8] Also Haufler and Runkel (2012) provide a theoretical analysis of tax planning with restrictions of the interest deductibility.

Figure 2: Transfer-Pricing Regulations among OECD countries



Solid line: Mean level of strictness of transfer-pricing regulations imposed among OECD countries measured on the left axis. Dashed-line: Share of countries with strict regulations in % measured on the right axis. Source: own computations based on Lohse and Riedel (2013).

can deduct a fraction of interest expenses associated with loans from a tax haven subsidiary. The cost of capital is increased if the fraction of deductible interest expenses is reduced. Moreover, a tax-rate change has a stronger effect on the cost of capital if interest deductibility is restricted. These implications carry over to actual thin-capitalization restrictions.

To see this, consider a number of foreign subsidiaries, some of which finance their investments with internal debt from low-tax affiliates and, therefore, enjoy a relatively low effective tax burden. Now suppose a thin-capitalization rule is introduced. Firms that make heavy use of internal debt finance will find themselves in a situation with excess debt, *i.e.* with debt exceeding the threshold level defined by the *safe haven* debt-to-equity ratio. As a consequence, some part of the interest deduction will be denied, and the tax burden is increased at the given tax rate. *Ceteris paribus*, this will tend to depress FDI. If firms adjust and reduce internal debt finance, the tax burden would also increase, since the firms would then rely on less tax-efficient financing. A further implication arises with regard to changes in the statutory tax rate. In presence of a thin-capitalization rule, if the tax rate is increased, for firms with restricted interest deductibility, the tax shield from internal debt finance is less effective. Hence, the effective tax burden will increase more strongly. Thus, the tax-rate sensitivity of FDI should be higher in the presence of a thin-capitalization restriction.

Of course, firms that make little use of internal debt tend to be below the safe haven debt-to-equity ratio and do not face any denial of interest deductibility. These firms would not be affected by the introduction of thin-capitalization rules. But, the higher the tax rate is, the higher is the gain from profit shifting, and the more likely it is to find firms which are subject to the limitation of interest deduction.[9] Therefore, introducing thin-capitalization rules or making them more tight

[9] An empirical analysis of the characteristics of firms with debt exceeding the safe have debt-to-equity ratio is

should have adverse effects on FDI in high-tax countries. In fact, since only subsidiaries in high-tax countries have an incentive to use high levels of debt to shift profits abroad, an adverse effect of profit-shifting restrictions should mainly be present in these countries.

With regard to transfer-pricing regulations, the predictions are similar. If a country imposes strict transfer-pricing regulations, firms might find it more difficult to engage in profit shifting. As a consequence, the tax burden on FDI would increase. In presence of those regulations, we should expect that an increase in the tax rate has a stronger adverse effect on FDI since the tax shield from transfer pricing is less effective. Moreover, since the extent to which firms engage in profit-shifting activities will be increasing with the host country's tax rate, the imposition of strict transfer pricing regulations should have stronger adverse effects in countries with high tax rates. As for the empirical analysis, it is important to account for both thin-capitalization- as well as transfer-pricing rules in order to account of possible substitution between the two channels of profit shifting (debt financing and transfer pricing) (Saunders-Scott, 2015).[10]

3 Data and Investigation Approach

Our empirical analysis is based on annual subsidiary-level data for German multinational firms in the period from 1996 to 2007 taken from the Microdatabase Direct Investment (MIDI) made available by the German central bank (Deutsche Bundesbank). This dataset includes a number of balance-sheet variables at the subsidiary level and some additional information on location,

provided by Buettner, Overesch, Wamser (2015).

[10]Schindler and Schjelderup (2013) argue that regulation of transfer-prices also affects the cost of profit-shifting via debt financing. This adds support to the joint analysis of the effects of transfer-pricing and thin-capitalization rules on FDI.

industry classification, and on the parent firm (see Lipponer, 2011). We focus on wholly-owned foreign subsidiaries and exclude subsidiaries belonging to the financial sector, holding companies, and subsidiaries active in agriculture, forestry, mining, or quarrying, where specific tax conditions apply.

The resulting dataset captures 21,278 foreign subsidiaries of 5,267 multinationals operations in 39 countries over 12 years. The host countries included in our analysis cover about 90 percent of German outbound FDI in 2007.[11] The largest single host country is the US, where roughly a quarter of the total German outbound FDI (23%) is located. The second most important location is the UK, where about 13% of German FDI is located.

The key indicator of FDI used in the analysis below is the value of property, plant, and equipment (PPE) reported for subsidiary i at time t. Tax effects on PPE will comprise both mobility and substitution effects. Mobility effects arise if multinationals respond to changes in the effective tax burden with a reallocation of production among different locations. Substitution effects occur if individual subsidiaries adjust their production process and substitute capital with other factors such as labor.[12] Descriptive statistics for all variables are presented in Table 1.

As an alternative indicator of production activities by foreign subsidiaries we also consider the level of employment by the foreign subsidiary. As with PPE, tax effects on employment will also reflect mobility and substitution effects. Of course, with taxes imposed on capital income, the substitution

[11] See Deutsche Bundesbank (2012), Statistische Sonderveroeffentlichung 10, Table 1.2a, Frankfurt.

[12] Becker, Fuest and Riedel (2012) emphasize that taxes also exert quality effects on FDI in the sense that taxation affects the profitability and labor intensity of FDI projects. Since our data mainly provides information on the volume of FDI and the number of employees, the exploration of the effects of profit-shifting rules on this dimension of FDI is left for future research.

effect for employment would be different. If higher taxes induce individual subsidiaries to substitute capital with labor, a positive effect on employment emerges. But the mobility effect of a higher tax burden would result in adverse employment effects. Even without making assumptions about the actual magnitude of the substitution elasticity, the comparison between employment and PPE effects enables us to make a qualitative statement regarding the importance of mobility effects.

To test for the effects of taxation of firm profits, we include the host country's statutory corporation tax rate. To capture the effects of anti-profit-shifting rules, we use indicators for the respective legislation in the host country as discussed in the previous section. Note that due to numerous reforms in particular among the EU countries, the key indicators of the tax systems are subject to various changes in the observation period (see table A.1 in the appendix). Not only are there substantial changes in statutory corporation tax rates (*e.g.*, Loretz, 2008; Overesch and Rincke, 2011), as indicated by tables A.2 and A.3 in the appendix there are also changes in thin-capitalization rules and transfer-pricing legislation. In 2007, thin-capitalization rules have been implemented in 24 countries out of 39 host countries included in the sample. In this year, these countries comprise a share of 88% of the FDI represented by the dataset. Changes in thin-capitalization rules are observed in 19 countries; however, these countries are less important as a location for FDI – the corresponding share of FDI represented by the dataset is only 19%. At the end of the observation period, some transfer-pricing restrictions are imposed by every host country in the sample. Over the observation period, changes in transfer-pricing restrictions are observed in 16 countries. In 2007, these countries comprise a share of 35% of all FDI represented by the dataset.

Let us denote the indicator applicable to subsidiary i with $I_{it} \in \{TCR_{it}; TPR_{it}\}$, capturing thin-capitalization rules or transfer pricing regulations. In order to test whether the anti profit-shifting

rules affect investment we include the statutory tax rate applicable to subsidiary i, STR_{it}, and specify the following equation:

$$\ln FDI_{it} = \alpha_1 \cdot STR_{it} + \alpha_2 \cdot (STR_{it} \cdot I_{it}) + \alpha_3 \cdot I_{it} + \beta \cdot X_{it} + \phi_i + \psi_t + \epsilon_{it}, \tag{2}$$

where ϕ_i refers to subsidiary-specific fixed effects, ψ_t are aggregate time effects, ϵ_{it} is an error term, and X_{it} is a vector of additional controls. Note that the specification provides estimates of the long-term effect on the level of the capital stock invested in the home-country.

With this specification, we can test for the effects of both the statutory tax rate STR_{it} and of anti profit-shifting provisions I_{it} on the FDI position. Formally, the marginal effects are

$$\frac{\partial lnFDI_{it}}{\partial STR_{it}} = \alpha_1 + \alpha_2 I_{it}, \qquad \frac{\partial lnFDI_{it}}{\partial I_{it}} = \alpha_3 + \alpha_2 STR_{it}.$$

With $\alpha_1, \alpha_2 < 0$ we would confirm the above hypothesis that the tax-sensitivity increases in the presence of anti profit-shifting rules. Moreover, with $\alpha_2 < -\frac{\alpha_3}{STR_{it}} < 0$, imposing an anti-profit-shifting restriction or making it more tight would depress FDI. This is in accordance with the theoretical reasoning, since anti-profit shifting restrictions matter more if there are stronger tax incentives to shift profits abroad. For low tax countries no such incentive exists and, hence, anti-profit-shifting rules might have no effect. However, the latter is difficult to test empirically, since anti-profit shifting restrictions tend to be implemented by countries with higher tax rates.[13]

[13]The average tax rate of countries that have implemented thin-capitalization restrictions is about 35%, compared to a sample average of 33%. Also the variation in thin-capitalization rules is mainly observed in countries with higher tax rates. The two most important countries in our data with newly introduced TCRs are Italy and Poland with 5,493 and 3,922 observations and tax rates in the year before TCR implementation of 38.25% and 36%. Similarly, the most relevant case where a TCR has been made more strict is Canada (1,784 observations) with a tax rate of

X_{it} includes variables capturing specific characteristics of the subsidiary and the host country. This includes the (log) sales of the subsidiary and a binary variable which captures the presence of loss carryforwards. We also include host-country variables taken from the World Bank's World Development Indicators to control for market size effects ($log\ GDP$), the dynamics of the host market ($GDP\ growth$), and for labor productivity at the location of the subsidiary ($log\ GDP\ per\ capita$). To capture financial market conditions, we include the inflation rate and $Financial\ Freedom$, an indicator of the institutional conditions for financial markets taken from the Heritage indicators database. From the latter source we also include an indicator of corruption, *i.e.* the $Freedom\ from\ Corruption$.

4 Basic Results

Basic regression results are displayed in Table 2. The dependent variable is the foreign subsidiary's stock of property, plant, and equipment (PPE). The empirical analysis follows the approach described in Section 3. All specifications include time - and subsidiary fixed effects. To take account of possible correlation between observations across time, we employ robust standard errors that are clustered at the level of subsidiaries. Since the tax indicators vary by country-year cells, correlation within country-year cells may also constitute a problem. We, therefore, employ a two-dimensional cluster which also takes account of correlation within country-year cells.

Specification (1) in Table 2 only considers the statutory tax rate and a basic set of control variables. In accordance with theoretical predictions, a higher statutory tax rate is associated with a lower

44.6% before the reform.

Table 1: Descriptive Statistics

	Mean	Std. Dev.
Firm Variables:		
Property, Plant, and Equipment (PPE)	17,024	194,169
Total Assets	56,999	1,260,207
Number of Employees	228	1,007
Sales	80,167	716,943
Loss Carryforward	.324	.468
Tax Variables:		
STR	.328	.068
Thin-Capitalization Rule Tightness (TCR)	.229	.170
Thin-Capitalization Rule Exists ($TCR - Exists$)	.717	.451
Strict Transfer-Pricing Regul. (TPR)	.403	.490
Score of Transfer-Pricing Regul. ($TPR - Score$)	2.92	1.07
High Tax	.104	.306
Additional Controls:		
GDP	2,050	3,350
GDP Growth	.032	.220
GDP per Capita	26,095	13,877
Inflation Rate	.029	.091
Financial Freedom	70.0	17.6
Freedom from Corruption	68.2	19.7

Statistics refer to 94,187 observations of foreign subsidiaries of German MNCs. Firm-level variables are taken from the MiDi database made available by Deutsche Bundesbank. *Property, Plant and Equipment*, *Total Assets* and *Sales* are in €1,000. *Loss Carryforward* is a binary variable which is one if subsidiary has a loss carryforward. *STR* is the statutory corporate income tax rate. Information on thin-capitalization rules is taken from Buettner *et al.* (2012), see appendix, while data on transfer-pricing regulations are taken from Lohse and Riedel (2013). *TCR* is the minimum share of equity stipulated by the thin-capitalization rule of the borrowing entity's host country. *TCR Exists* is a dummy variable which is one if a host country applies a thin-capitalization rule. *TPR Score* is the classification of transfer-pricing regulation by Lohse *et al.* (2012). The scores range from 0 (no transfer-regulations) to 5 (very strict transfer-pricing regulation). *TPR* is a dummy variable which is one if transfer-pricing regulation have been classified as very strict (score values 4 or 5). *GDP* (billion US dollars, current prices), *GDP per Capita* (US dollars, current prices), *GDP Growth*, and *Inflation Rate* (consumer prices) are taken from the IMF World Development Indicators. *Financial Freedom* and *Freedom from Corruption* are taken from the Heritage Database. Scores range from 0 to 100.

Table 2: Anti Profit-Shifting Rules and Foreign Direct Investment

	(1)	(2)	(3)	(4)
Tax rate (STR)	-.829***	-.586**	-.930***	-.712**
	(.264)	(.287)	(.310)	(.322)
Thin-cap.rule (TCR)		.765*		.885**
		(.398)		(.410)
Tax rate × Thin-cap.rule (STR × TCR)		-2.17*		-2.42**
		(1.14)		(1.17)
Transf.-pr.regul. (TPR)			-.101	-.142
			(.123)	(.120)
Tax rate × Transf.pr.regul. (STR × TPR)			.161	.261
			(.369)	(.355)
ln(Sales)	.400***	.400***	.400***	.400***
	(.013)	(.013)	(.013)	(.013)
Loss Carryforward	-.040***	-.040***	-.040***	-.039***
	(.012)	(.012)	(.012)	(.012)
ln(GDP)	-.150	-.058	-.125	.011
	(.461)	(.477)	(.460)	(.477)
GDP Growth	-.052	-.005	-.153	-.116
	(.348)	(.347)	(.348)	(.348)
ln(GDP per Capita)	.845*	.745	.823*	.680
	(.454)	(.459)	(.454)	(.470)
Inflation Rate	.036	.041	.034	.042
	(.028)	(.026)	(.028)	(.027)
Financial Freedom	.000	.000	.000	.001
	(.001)	(.001)	(.001)	(.001)
Freedom from Corruption	-.001	-.001	-.001	.000
	(.001)	(.001)	(.001)	(.001)
Observations	94,187	94,187	94,187	94,187
Adj. R^2	.1069	.1071	.1070	.1072

Dependent variable is property, plant, and equipment (PPE) in logs. *TCR* is measured by the transformation of the safe haven debt-to-equity ratio. *TPR* is a dummy variable indicating if transfer-pricing regulations have been classified by Lohse *et al.* (2013) as strict. Estimations include time-specific and subsidiary-specific fixed effects. Robust standard errors, clustered at subsidiary and country-year cells, are in parentheses. *,**,*** denote significance at the 10%, 5%, and 1% level.

level of FDI. The point estimate suggests that a one percentage point higher tax rate is associated with 0.83 percent less investment in fixed assets. This basic estimate is broadly in line with the existing literature on how FDI responds to higher host-country corporation tax rates.[14]

With regard to other firm-level variables, we find significant effects for both sales and the existence of a loss carry-forward. Sales show a positive coefficient possibly pointing at firm-size effects. The negative effect of a loss carry-forward might point at investments made in the past, but could also reflect unfavorable profit prospects. We do not find significant effects of the size of the host country's local market as indicated by the GDP. At first sight, this may seem surprising, but it should be taken into account that estimations include subsidiary-specific fixed effects which nest country-level fixed effects. Therefore, all cross-sectional differences between host countries are removed entirely. The lack of cross-sectional variation might also explain why the inflation rate, financial freedom and freedom from corruption prove insignificant. GDP per capita, which is included as a proxy for labor productivity, shows a positive and statistically significant effect.

In Columns (2) - (4) of Table 2 we take into account indicators of anti profit-shifting legislation. As explained above, since the incentive to engage in profit shifting increases with the tax rate, it is important to include interaction terms between the tax rate and the respective indicators for anti profit-shifting legislation. The interaction term between the tax rate and the tightness of the thin-capitalization rule shows a significant negative effect on investment. This supports the view that a tax increase is associated with a stronger response of FDI under restrictions of interest deduction.

[14]For surveys, see DeMooij and Ederveen (2003) or Feld and Heckemeyer (2011). In a meta-analysis, Feld and Heckemeyer (2011) find a higher tax effect but also note that studies using micro-level data (like our study) typically find significantly smaller tax effects in absolute values. For example, Wamser (2011) uses the same firm-level data and finds a tax semi-elasticity of about -0.5. Thus, the tax effect of about -0.83 found in column (1) of Table 2 is in accordance with previous findings.

By conditioning on both TCR and TPR, the specification in column (4) takes account of possible substitution between the two channels of profit shifting (debt financing and transfer pricing). The interaction with the transfer-pricing regulation indicator is not significant, however.

Due to the significant interaction term for thin-capitalization restrictions, the marginal effects of statutory tax rate and thin-capitalization restriction cannot be directly inferred from the slope parameters. Consider the results of specification (2). Evaluating the point estimates at mean level of tightness of the thin-capitalization rule among the countries that have implemented this restriction, the marginal effect of the statutory tax rate is

$$\frac{\partial \ln \widehat{FDI}_{it}}{\partial STR_{it}} = -0.586 - 2.17 \cdot \overline{TCR} = -0.586 - 2.17 \cdot 0.25 = -1.13.$$

Accordingly, with $\overline{TCR} = 0.25$ or with safe haven debt-to-equity ratio of 3:1, the tax-rate sensitivity of FDI is about twice as large (-1.13) as in the unrestricted case (-0.586).

The coefficients obtained from specification (2) can also be used to compute marginal effects of the strictness of thin-capitalization restrictions. If evaluated at the sample average of the tax rate among the host countries that have implemented a thin-capitalization rule (35%), increasing the tightness of the thin-capitalization rule exerts a negligible effect on FDI. However, if the statutory tax rate is higher, a negative effect is obtained. To see this, consider a host country, where the tax rate exceeds the mean tax rate by one standard deviation and, thus, has a value of 40%. Evaluating the marginal effect at this tax rate yields

$$\frac{\partial \ln \widehat{FDI}_{it}}{\partial I_{it}} = 0.765 - 2.17 \cdot 0.40 = -0.103.$$

This point estimate suggests that, if a high-tax country implements a thin-capitalization rule with mean level of tightness among the countries that have implemented this restriction (0.25), the FDI stock declines by about 2.5 percent.

5 Robustness and Employment Effects

To check for robustness, we carry out several additional regressions. A first set of results is shown in Table 3. Specifications (1) and (2) deal with potential spurious correlation associated with the interaction term between the tax rate and anti profit-shifting rules, that might arise since high-tax countries have a higher propensity to implement such measures. In column (1) we test whether the results are robust against inclusion of a non-linear tax effect by adding the tax rate squared. In specification (2) we include a dummy identifying countries with above average tax rates – also as an interaction term – to test whether interaction effects between the tax rate and anti profit-shifting measures are driven specifically by high-tax countries in the sample. Yet the results in columns (1) and (2) show that the interaction with anti-profit shifting rules does not pick up those non-linear tax effects.

In columns (3) and (4) we consider alternative proxies for the anti profit-shifting rules. In column (3), we employ a simple binary variable for the existence of a thin-capitalization rule. The estimation results confirm our findings from the basic specifications in Table 2. More specifically, regardless of the level of the safe haven debt-to-equity ratio, the existence of a thin-capitalization rule is associated with a greater tax effect on FDI. But it should be noted that with a limited number of reforms in the dataset, it is difficult to distinguish effects of newly introduced TCRs

Table 3: Robustness Analysis

	(1)	(2)	(3)	(4)
Tax rate (STR)	-1.88**	-.736**	-.682**	-.703*
	(.962)	(.329)	(.312)	(.421)
Thin-cap.rule (TCR)	.765*	.893**	.263**	.889**
	(.412)	(.411)	(.105)	(.413)
Tax rate × Thin-cap.rule (STR × TCR)	-2.06*	-2.49**	-.763**	-2.48**
	(1.19)	(1.17)	(.304)	(1.18)
Transf.-pr.regul. (TPR)	-.100	-.135	-.154	-.036
	(.120)	(.120)	(.119)	(.042)
Tax rate × Transf.pr.regul. (STR × TPR)	.126	.261	.285	.051
	(.354)	(.354)	(.350)	(.127)
Tax rate, squared (STR^2)	1.75			
	(1.28)			
High tax		-.011		
		(.032)		
High tax × Thin-cap.rule (TCR)		.153		
		(.122)		
High tax × Transf.pr.regul. (TPR)		.001		
		(.040)		
ln(Sales)	.400***	.400***	.400***	.400***
	(.013)	(.013)	(.013)	(.013)
Loss Carryforward	-.039***	-.039***	-.039***	-.039***
	(.012)	(.012)	(.012)	(.012)
ln(GDP)	.119	-.073	-.007	-.040
	(.492)	(.476)	(.475)	(.477)
GDP Growth	-.172	-.072	-.218	-.134
	(.345)	(.350)	(.344)	(.349)
ln(GDP per Capita)	.598	.770	.692	.740
	(.486)	(.469)	(.469)	(.471)
Inflation Rate	.042	.043	.040	.042
	(.027)	(.027)	(.027)	(.025)
Financial Freedom	.001	.001	.001	.001
	(.001)	(.001)	(.001)	(.001)
Freedom from Corruption	.000	.000	.000	.000
	(.001)	(.001)	(.001)	(.001)
Observations	94,187	94,187	94,187	94,187
Adj. R^2	.1073	.1073	.1073	.1072

Dependent variable is property, plant, and equipment (PPE) in logs. In columns (1), (2) and (4), *TCR* is measured by the transformation of the safe haven debt-to-equity ratio, see above. In column (3) the *TCR* is a dummy variable indicating if a thin-capitalization rule exists. In columns (1) - (3), the *TPR* is a dummy variable indicating if transfer-pricing regulations have been classified by Lohse *et al.* (2013) as strict, while column (4) considers the complete transfer-pricing score as proposed by Lohse *et al.* (2013). Estimations include time-specific and subsidiary-specific fixed effects. Robust standard errors, clustered at subsidiary and country-year cells, are in parentheses. *,**,*** denote significance at the 10%, 5%, and 1% level.

and of adjustments of existing restrictions. In column (4) we substitute the binary indicator for transfer-pricing regulations with the original indicator by Lohse and Riedel (2013). Nevertheless, we are still unable to detect any statistically significant FDI effect of host country transfer-pricing regulations.[15]

A second set of additional regressions is presented in Table 4. While the specifications are similar to Table 2, Table 4 considers the effects obtained with the log number of employees as dependent variable. Again, we do not find effects of transfer-pricing regulations. However, as above, the tightness of the thin-capitalization rule exerts adverse effects. Following the above procedure, we can compute the marginal effect of the statutory corporation tax rate at the mean level of tightness among the countries that have implemented thin-capitalization restrictions (0.25) and obtain

$$\frac{\partial \ln \widehat{FDI}_{it}^{emp}}{\partial STR_{it}} = -0.085 - 1.31 \cdot \overline{TCR}, = -0.085 - 1.31 \cdot 0.25 = -0.41.$$

Accordingly, in presence of a typical thin-capitalization rule, raising the statutory corporation tax rate by a percentage point is associated with a decline of employment of foreign subsidiaries by -0.4 percent. However, if there are no thin-capitalization restrictions, the tax rate has only insignificant effects on employment. While the result is qualitatively similar to the effect on PPE, the lower tax-sensitivity points at some capital-labor substitution effects in the sense that subsidiaries in high-

[15]Since Lohse and Riedel (2013) have shown that the transfer-pricing regulations have significant effects on profit-shifting, it is an interesting question why the empirical results do not detect significant FDI effects of these regulations. A possible reason could be that the study by Lohse and Riedel (2013) is based on the Orbis dataset provided by Bureau van Dijk. This dataset includes multinational parent firms, whose headquarters can be anywhere around the world, and their foreign subsidiaries. In the MiDi data used in our study, only German parent firms are reporting their (worldwide) foreign transactions. If German firms find it easier to engage in profit shifting via internal debt or more difficult to engage in transfer pricing than MNCs from other countries, transfer pricing could be less of an option for their subsidiaries.

Table 4: Employment Effects

	(1)	(2)	(3)	(4)
Tax rate (STR)	-.067	-.085	-.093	.216
	(.144)	(.157)	(.174)	(.179)
Thin-cap.rule (TCR)		.494**		.499**
		(.239)		(.239)
Tax rate × Thin-cap.rule (STR × TCR)		-1.31**		-1.36**
		(.664)		(.657)
Transf.-pr.regul. (TPR)			.066	.043
			(.072)	(.074)
Tax rate × Transf.pr.regul. (STR × TPR)			-.291	-.236
			(.212)	(.215)
ln(Sales)	.447***	.447***	.447***	.447***
	(.009)	(.009)	(.009)	(.009)
Loss Carryforward	-.036***	-.036***	-.036***	-.036***
	(.006)	(.006)	(.006)	(.006)
ln(GDP)	-.279	-.195	-.279	-.201
	(.249)	(.253)	(.248)	(.250)
GDP Growth	.786***	.824***	.756***	.778***
	(.240)	(.240)	(.243)	(.242)
ln(GDP per Capita)	.338	.252	.345	.264
	(.250)	(.253)	(.248)	(.250)
Inflation Rate	-.014	-.009	-.017	-.012
	(.015)	(.013)	(.015)	(.014)
Financial Freedom	.000	.000	.000	.000
	(.000)	(.000)	(.000)	(.000)
Freedom from Corruption	-.000	-.000	-.000	-.000
	(.000)	(.000)	(.000)	(.000)
Observations	92,582	92,582	92,582	92,582
R^2	.2799	.2799	.2800	.2802

Dependent variable is $ln(Number\ of\ Employees)$ in columns (1) - (4). *TCR* is measured by the transformation of the safe haven debt-to-equity ratio, see above. *TPR* is a dummy variable indicating if transfer-pricing regulations have been classified by Lohse *et al.* (2013) as strict. Estimations include time-specific and subsidiary-specific fixed effects. Robust standard errors, clustered at subsidiary and country-year cells, are in parentheses. *,**,*** denote significance at the 10%, 5%, and 1% level.

tax countries tend to substitute capital with labor. However, in the presence of thin-capitalization restrictions, the adverse mobility effect dominates.

Evaluated at the mean tax rate among the countries with a thin-capitalization rule (35%), the marginal employment effect of the tightness of the thin-capitalization rule points at a small positive effect. The marginal effect is different if the tax rate of the imposing country is higher. Evaluating the marginal effect at a tax rate of 40%, *i.e.* about a standard deviation above the sample average, yields

$$\frac{\partial \ln \widehat{FDI}_{it}^{emp}}{\partial I_{it}} = 0.494 - 1.31 \cdot \overline{STR} = 0.494 - 1.31 \cdot 0.40 = -0.030.$$

This is in accordance with the above finding for FDI. Imposing or tightening thin-capitalization restrictions in countries with relative high tax rates would exert some adverse employment effects.

Note that we have conducted additional robustness tests (available upon request). The findings of these tests can be summarized as follows. First, since 8 of 19 countries with changes in anti-profit shifting rules are transition countries in Eastern Europe, we tested whether the results might be affected by confounding effects in the transition process of these countries. To this end, we introduced interaction terms of a transition country dummy and our measures for the strictness of anti-avoidance regulations (TCR, TPR). While the results confirm that the tax rate elasticity increases if a TCR applies, we did not find a statistically different effect for Eastern European countries compared to the other countries. Second, dropping the US observations from the estimation sample as the single most important location of FDI with no change in tax parameters during the observation period leaves the coefficients (and significance levels) almost unaffected. Also including only countries whose TCRs do not vary over time as well as those that do not have a TCR still

leads to a negative and significant effect of the interaction term between STR and TCR. Since the level of the TCR is obviously not identified in this subsample (as no changes occur over time), this suggests that the effect of STR is identified at different levels of strictness in safe-haven ratios. Fourth, the results are robust against dropping observations for the year 2007 (when the financial crisis of 2007/2008 started) with no significant change in the size of the estimates.

Finally, we have checked whether and to what extent the empirical results obtained from the micro-level analysis are consistent with the observed trends in FDI. To this end, we have calculated the growth in PPE for all countries that have newly implemented a TCR or made their existing TCRs more tight. Distinguishing between periods before the TCR has changed and periods after a change has taken place, we find that average growth in PPE has been equal to 7.4% before stricter or new TCRs have been implemented. This compares to average growth of 2.9% afterwards (the difference in means is significant at 1%). Focusing on subsidiaries located in countries with higher tax rates ($STR \geq 32\%$) we find a mean value of 7.2% before TCR's are implemented or made more strict, and a value of 0.9% after. In comparison, for the few subsidiaries facing TCRs in countries with lower tax rates ($STR < 32\%$), average growth has been 7.8% during the years before the TCR reforms, and 7.9% afterwards. These findings indicate that the aggregate developments are consistent with the above results.

6 Conclusion

This paper has studied the effects of host countries' anti profit-shifting measures on FDI. More specifically, the empirical analysis has considered whether limitations on the two main profit-shifting

channels – debt financing and transfer pricing – exert adverse effects on FDI. The empirical results show that restrictions of the interest deductibility, so-called thin-capitalization rules, are associated with a decline of FDI – if imposed by host countries with relatively high tax rates. More specifically, we find that if a country with a corporation tax rate exceeding the average tax-rate by one standard deviation implements a typical thin-capitalization rule, FDI declines by about 2.5 percent. Moreover, we find that the sensitivity of FDI with regard to the host-country tax rate increases if such restrictions are imposed or tightened. On average, we find that the tax-rate elasticity of FDI almost doubles if, for example, a typical thin-capitalization rule with a debt-to-equity ratio of 3:1 is implemented compared with a case where no such restriction is present. A consideration of employment by foreign subsidiaries suggests that the empirical effects of thin-capitalization rules on capital do not only reflect capital-labor substitution but also adverse mobility effects.

We have also explored whether regulations of transfer pricing have similar adverse effects on FDI, but our results do not point at any significant effects. Of course, those restrictions might be ineffective or substituted with other forms of tax planning more easily. While the empirical literature has provided evidence that these regulations have significant effects on profit shifting, it should be noted that the data used in our study focuses exclusively on German multinationals. And it could be that these firms find it easier to engage in profit shifting via internal debt or more difficult to engage in transfer pricing than MNCs from other countries. Then, transfer-pricing would be less of an option for their subsidiaries and its restriction of little relevance. At any rate, further research is needed to determine the reasons behind the lack of investment and employment effects of the transfer-pricing regulations for German FDI.

While the adverse effect on FDI contributes to lower employment and to a tax revenue loss, a host

country government might still prefer to impose anti profit-shifting rules in order to limit tax discrimination against domestic firms. Alternative unilateral measures to eliminate tax-discrimination, such as to lower the corporate tax rate also for domestic firms or to impose withholding taxes, might involve much larger revenue losses or would constitute a violation of bilateral tax treaties. However, we also find that the tax-rate effect on FDI increases in the presence of restrictions of the interest deductibility for related party debt. This finding supports the theoretical literature, which suggests that anti profit-shifting measures might lead to more intense tax-competition for FDI. From a general equilibrium perspective, therefore, attempts to shield corporation tax revenues by combatting MNEs tax planning might be futile.

Our results raise concerns about recent initiatives to limit profit shifting by multinational firms such as the action plan by the OECD against 'profit shifting and base erosion' (BEPS). Action 4 of the OECD proposal explicitly suggests to limit base erosion via interest deductions (OECD, 2015b). Similarly, in 2016 the European Union has issued a directive against tax avoidance practices (Council Directive (EU) 2016/1164 from 16 July 2016), which includes an interest limitation rule. Our findings suggest that policymakers considering those restrictions should not only take account of adverse effects on FDI but should also be aware of a higher tax-rate sensitivity of FDI under such provisions. Intensified tax competition is the likely consequence. In other words, tax policy is facing a trade-off since limiting base erosion exerts adverse tax effects on foreign direct investment.

A.1 Datasources

Micro-Level Data are taken from the micro-level dataset (MiDi) of the Deutsche Bundesbank (see Lipponer, 2011, for an overview) using a version that covers the period from 1996 to 2007.

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. For details on the tax rates used, see Table A.1.

Thin-Capitalization Rules: Basic information about thin-capitalization rules has been obtained from the same sources as the tax data. As in Buettner *et al.* (2012) this information was augmented and cross-checked with questionnaires sent out to country experts of PricewaterhouseCoopers. Table A.2 provides the safe haven debt-to-equity ratios.

Transfer-Pricing Regulations are taken from the study by Lohse and Riedel (2013) who provide a classification of the strictness of national transfer-pricing regulations, see Table A.3 for details. The empirical analysis basically focuses on a binary variable, which is unity if the transfer-pricing regulations are categorized in the two top classes (class 4 or 5).

Macroeconomic Indicators such as GDP and GDP per Capita in US dollars, current prices, as well as GDP Growth and Inflation are taken from the IMF World Development Indicators.

Heritage Indicators: 'Financial Freedom' and 'Freedom from Corruption' are taken from the Heritage Database. Scores range from 0 to 100.

Table A.1: Corporate Tax Rates

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Australia	0.360	0.340	0.340	0.360	0.360	0.340	0.340	0.300	0.300	0.300	0.300	0.300
Austria	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.340	0.250	0.250	0.250
Belgium	0.402	0.402	0.402	0.402	0.402	0.402	0.402	0.340	0.340	0.340	0.340	0.340
Brasil	0.250	0.250	0.330	0.330	0.370	0.340	0.340	0.340	0.340	0.340	0.340	0.340
Bulgaria	0.400	0.400	0.370	0.343	0.325	0.280	0.235	0.235	0.195	0.150	0.150	0.100
Canada	0.446	0.446	0.446	0.446	0.446	0.420	0.386	0.366	0.360	0.360	0.360	0.360
China	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330
Columbia	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.340
Croatia	0.250	0.350	0.350	0.350	0.350	0.200	0.200	0.200	0.200	0.200	0.200	0.200
Czech Republic	0.390	0.390	0.350	0.350	0.310	0.310	0.310	0.310	0.280	0.260	0.240	0.240
Denmark	0.340	0.340	0.320	0.320	0.320	0.300	0.300	0.300	0.300	0.280	0.280	0.280
Finland	0.280	0.280	0.280	0.280	0.280	0.290	0.290	0.290	0.290	0.260	0.260	0.260
France	0.367	0.367	0.417	0.400	0.367	0.364	0.354	0.354	0.354	0.354	0.333	0.333
Greece	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.320	0.290	0.250
Hungary	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.196	0.177	0.177	0.160	0.160
India	0.400	0.350	0.350	0.350	0.385	0.396	0.357	0.368	0.366	0.366	0.337	0.340
Indonesia	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Ireland	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.125	0.125	0.125	0.125	0.125
Italy	0.532	0.532	0.413	0.413	0.413	0.403	0.403	0.383	0.373	0.373	0.373	0.373
Japan	0.510	0.510	0.510	0.480	0.420	0.420	0.420	0.420	0.420	0.407	0.407	0.407
Lithuania	0.290	0.290	0.290	0.290	0.240	0.240	0.150	0.150	0.150	0.150	0.150	0.150
Luxembourg	0.403	0.393	0.375	0.375	0.375	0.375	0.304	0.304	0.304	0.304	0.296	0.296
Malaysia	0.300	0.300	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.270
Mexico	0.340	0.340	0.340	0.350	0.350	0.350	0.350	0.340	0.330	0.300	0.290	0.280
Netherlands	0.350	0.350	0.350	0.350	0.350	0.350	0.345	0.345	0.345	0.315	0.296	0.255
Norway	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280
Peru	0.300	0.300	0.300	0.300	0.300	0.300	0.270	0.270	0.300	0.300	0.300	0.300
Poland	0.400	0.380	0.360	0.340	0.300	0.280	0.280	0.270	0.190	0.190	0.190	0.190
Portugal	0.360	0.360	0.340	0.340	0.320	0.320	0.300	0.300	0.275	0.275	0.275	0.250
Romania	0.380	0.380	0.380	0.380	0.250	0.250	0.250	0.250	0.250	0.160	0.160	0.160
Russia	0.350	0.350	0.350	0.350	0.300	0.350	0.240	0.240	0.240	0.240	0.240	0.240
Slovak Republic	0.400	0.400	0.400	0.400	0.290	0.290	0.250	0.250	0.190	0.190	0.190	0.190
Slovenia	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.230
Spain	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.325
Sweden	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280
Switzerland	0.258	0.258	0.251	0.251	0.249	0.247	0.244	0.241	0.241	0.213	0.213	0.213
Thailand	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
United Kingdom	0.330	0.330	0.310	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
United States	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410	0.410

Source: Tax data are taken from the International Bureau of Fiscal Documentation (IBFD) and from tax surveys provided by Ernst&Young, PricewaterhouseCoopers (PwC), and KPMG.

Table A.2: Thin-Capitalization Debt-to-Equity Ratios

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Australia	3	3	2	2	2	2	3	3	3	3	3	3
Belgium	7	7	7	7	7	7	7	7	7	7	7	7
Bulgaria	-	-	2	2	2	2	2	2	2	2	2	3
Canada	3	3	3	3	3	2	2	2	2	2	2	2
Croatia	-	-	-	-	-	-	-	-	-	4	4	4
Czech Republic	4	4	4	4	4	4	4	4	4	4	4	4
Denmark	-	-	-	4	4	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	1.5	1.5
Hungary	-	4	4	4	4	3	3	3	3	3	3	3
Italy	-	-	-	-	-	-	-	-	5	4	4	4
Japan	3	3	3	3	3	3	3	3	3	3	3	3
Lithuania	-	-	-	-	-	-	-	-	4	4	4	4
Luxembourg	-	-	-	-	-	-	5.7	5.7	5.7	5.7	5.7	5.7
Mexico	-	-	-	-	-	-	-	-	-	3	3	3
Netherlands	3	3	3	3	3	3	3	3	3	3	3	3
Poland	-	-	-	3	3	3	3	3	3	3	3	3
Portugal	2	2	2	2	2	2	2	2	2	2	2[a]	2[a]
Romania	-	-	-	-	-	-	3	3	3	3	3	3
Russia	3	3	3	3	3	3	3	3	3	3	3	3
Slovakia	4	4	4	4	4	4	4	4	-	-	-	-
Slovenia	-	-	-	-	-	-	-	-	-	8	8	8
Spain	3	3	3	3	3	3	3	3	3[a]	3[a]	3[a]	3[a]
Switzerland	6	6	6	6	6	6	6	6	6	6	6	6
United Kingdom[b]	1	1	1	1	1	1	1	1	1	1	1	1
United States	1.5	1.5	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 which are accepted by the thin-capitalization rules for unrestricted interest deduction from taxable profits. Special rules for financial institutions and holdings are not reported.
[a] Rule does not apply to related party debt provided by a company located in a member state of the European Union.
[b] 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.

Table A.3: Strictness of Transfer-Pricing Regulation

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Australia	4	4	4	4	4	4	4	4	4	4	4	4
Austria	2	2	2	2	2	2	2	2	2	2	2	2
Belgium	3	3	3	3	3	2	2	2	2	2	2	2
Brasil	5	5	5	5	5	5	5	5	5	5	5	5
Bulgaria	0	0	0	0	0	0	0	0	0	0	0	2
Canada	4	4	4	4	4	4	4	4	4	4	4	4
China	4	4	4	4	4	4	4	4	4	4	4	4
Columbia	2	2	2	2	2	2	2	2	4	4	4	4
Croatia	0	0	0	0	0	0	0	0	0	4	4	4
Czech Republic	2	2	2	2	2	2	2	2	2	2	2	2
Denmark	4	4	4	4	4	4	4	4	4	4	4	4
Finland	2	2	2	2	2	2	2	2	2	2	2	3
France	2	2	2	2	2	2	2	2	2	2	2	2
Greece	1	1	1	1	1	1	1	1	1	1	1	1
Hungary	2	2	2	2	2	2	2	3	3	3	3	3
India	5	5	5	5	5	5	5	5	5	5	5	5
Indonesia	1	1	1	1	1	1	4	4	4	4	4	4
Ireland	1	1	1	1	1	1	1	1	1	1	1	1
Italy	4	4	4	4	4	4	4	4	4	4	4	4
Japan	4	4	4	4	4	4	4	4	4	4	4	4
Lithuania	0	0	0	0	0	0	0	0	5	5	5	5
Luxembourg	2	2	2	2	2	2	2	2	2	2	2	2
Malaysia	4	4	4	4	4	4	4	4	4	4	4	4
Mexico	3	3	3	3	3	5	5	5	5	5	5	5
Netherlands	1	1	1	1	1	1	4	4	4	4	4	4
Norway	2	2	2	2	2	2	2	2	2	2	2	2
Peru	0	0	0	0	0	4	4	4	4	4	5	5
Poland	4	4	4	4	4	4	4	4	4	4	4	4
Portugal	1	1	1	1	1	1	4	4	4	4	4	4
Romania	2	2	2	2	2	2	2	2	2	2	2	3
Russia	2	2	2	2	2	2	2	2	2	2	2	2
Slovak Republic	2	2	2	2	2	2	2	2	2	2	2	2
Slovenia	4	4	4	4	4	4	4	4	4	4	4	4
Spain	2	2	2	2	2	2	2	2	2	2	2	3
Sweden	2	2	2	2	2	2	2	2	2	2	2	3
Switzerland	2	2	2	2	2	2	2	2	2	2	2	2
Thailand	2	2	2	2	2	2	2	2	2	2	2	2
United Kingdom	3	3	3	3	3	3	3	3	3	3	3	3
United States	4	4	4	4	4	4	4	4	4	4	4	4

Source: Lohse and Riedel (2013). Classification of transfer-pricing regulation from 0 (no transfer-pricing regulations) to 5 (very strict transfer-pricing regulation).

References

Alberternst, S., C. Sureth-Sloane (2015), The Effect of Taxes on Corporate Financing Decision-sEvidence from the German Interest Barrier. WU International Taxation Research Paper Series, (2015-09).

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.

Bartelsman, E.J., and R.M.W.J. Beetsma (2003), Why pay more? Corporate tax avoidance through transfer pricing in OECD countries, *Journal of Public Economics* 87(9-10), 2225-2252.

Becker, J., and C. Fuest (2012), Transfer pricing policy and the intensity of tax rate competition, *Economics Letters* 117 (1), 146-148.

Becker, J, C. Fuest and N. Riedel (2012), Corporate Tax Effects on the Quality and Quantity of FDI, *European Economic Review* 56(8), pp. 1495-1511

Beuselinck, C., M. Deloof and A. Vanstraelen (2009), Multinational income shifting, tax enforcement and firm value, Working Paper, Tilburg University.

Blouin J., Huizinga H., Laeven L. and Nicodeme G. (2014), Thin Capi- talization Rules and Multinational Firm Capital Structure, *CentER Discussion Paper* 2014-00, Tilburg.

Blouin, J.L., L.A. Robinson and J. Seidman (2010), Transfer pricing behaviour in a world of multiple taxes, *Tuck School of Business Working Paper* 2010-74, Dartmouth.

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.

Buettner, T., M. Overesch, U. Schreiber, and G. Wamser (2012), The impact of thin-capitalization rules on the capital structure of multinational firms, *Journal of Public Economics* 96, 930-938.

Buettner, T., M. Overesch, and G. Wamser (2015), Restricted interest deductibility and multinationals use of internal debt finance, *International Tax and Public Finance* available online.

Buettner, T., and G. Wamser (2013), Internal debt and multinationals' profit shifting – empirical evidence from firm-level panel data, *National Tax Journal* 66, 63-95.

Buslei, H., and M. Simmler (2012), The impact of introducing an interest barrier - evidence from the German corporation tax reform 2008, *DIW Discussion Paper* 1215, Berlin

Clausing, K.A. (2003), Tax-motivated transfer pricing and US intrafirm trade, *Journal of Public Economics* 87, 2207-2223.

De Mooij, R.A. and S. Ederveen (2003), Taxation and foreign direct investment: a synthesis of empirical research, *International Tax and Public Finance* 10, 673-693.

De Mooij, R.A. and S. Ederveen (2008), Corporate tax elasticities: a reader's guide to empirical findings, *Oxford Review of Economic Policy* 24 (4), 680-697.

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.

Deutsche Bundesbank (2012), Special Statistical Publication 10 - Foreign direct investment stock statistics, Frankfurt.

Dischinger, M. and N. Riedel (2011), Corporate taxes, profit shifting and the location of intangibles within multinational firms, *Journal of Public Economics* 95, 691-707.

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.

Durst, M.C. and R.E. Culbertson (2003), Clearing away the sand: retrospective methods and prospective documentation in transfer pricing today, *Tax Law Review* 57, 37-134.

European Commission (1997), A package to tackle harmful tax competition in the European Union, COM(97) 564 final.

Feld, L. and J.H. Heckemeyer (2011), FDI and taxation: a meta-study. *Journal of Economic Surveys* 25, 233-272.

Gresik, T. A., Schindler, D., and G. Schjelderup (2015), The effect of tax havens on host country welfare, *CESifo Working Paper* 5314, Munich.

Grubert, H. (2003), Intangible income intercompany transactions, income shifting, and the choice of location, *National Tax Journal* 56, 221-242.

Harris, D.G. (1993), The impact of U.S. tax law revision on multinational corporations' capital location and income shifting decisions, *Journal of Accounting Research* (Supplement) 31, 111-140.

Haufler, A. and M. Runkel (2012), Firms' financial choices and thin capitalization rules under corporate tax competition, *European Economic Review* 56, 1087-1103.

Hong, Q. and M. Smart (2010), In praise of tax havens: international tax planning and foreign direct investment, *European Economic Review*, 54, 82-95.

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

Janeba, E. (1995), Corporate income tax competition, double taxation treaties, and foreign direct investment , *Journal of Public Economics* 56, 311-325.

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

Jost, S.P., M. Pfaffermayer and H. Winner (2014), Transfer pricing as a tax compliance risk, *Accounting and Business Research* 44, 260-279.

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

Lohse, T. and N. Riedel (2013), Do Transfer Pricing Laws Limit International Income Shifting? Evidence from European Multinationals, CESifo Working Paper 4404, Munich.

Loretz, S. (2008), Corporate taxation in the OECD in a wider context, *Oxford Review of Economic Policy*, 24(4), 639-660.

Lipponer, A. (2011), *Microdatabase direct investment - MiDi. A brief guide*, Technical Documentation, Frankfurt.

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.

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

OECD (1998), Harmful tax competition: an emerging global issue, Paris.

OECD (2011), Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations, Paris.

OECD (2013), Action plan on base erosion and profit shifting, Paris.

OECD (2015a), Transfer Pricing Documentation and Country-by-Country Reporting, Action 13 - 2015 Final Report, Paris.

OECD (2015b), Limiting Base Erosion Involving Interest Deductions and Other Financial Payments, Action 4 - 2015 Final Report, Paris.

Overesch, M. and Rincke, J. (2011), What Drives Corporate Tax Rates Down? A Reassessment of Globalization, Tax Competition, and Dynamic Adjustment to Shocks, *Scandinavian Journal of Economics* 113, 579602.

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.

Schindler, D., G Schjelderup (2013), Transfer Pricing and Debt Shifting in Multinationals, *CESifo Working Paper* 4381, Munich.

Ruf, M., and D. Schindler (2015), Debt shifting and thin-capitalization rules - German experience and alternative approaches, *Nordic Tax Journal* 2015 (1), 17-33.

Saunders-Scott, M.J. (2015), Substitution across methods of profit shifting, *National Tax Journal*, 68, 10991120.

Slemrod, J., and J. D. Wilson (2009), Tax competition with parasitic tax havens, *Journal of Public Economics*, 93 (11-12), 1261-1270.

Swenson, D.L. (2001), Tax reforms and evidence of transfer pricing, *National Tax Journal* 54, 7-25.

Wamser, G. (2011), Foreign (in)direct investment and corporate taxation, *Canadian Journal of Economics*, 44, 1497-1524.

Wamser, G. (2014), The impact of thin-capitalization rules on external debt usage – a propensity score matching approach, *Oxford Bulletin of Economics & Statistics*, 76 (5), 764-781.

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