ECONSTOR
Make Your Publications Visible.

A Service of

ZBW Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Harendt, Christoph

Working Paper

Tax influence on financial structures of M&As

ZEW Discussion Papers, No. 18-004

Provided in Cooperation with:
ZEW - Leibniz Centre for European Economic Research

Suggested Citation: Harendt, Christoph (2018) : Tax influence on financial structures of M&As, ZEW Discussion Papers, No. 18-004, Zentrum für Europäische Wirtschaftsforschung (ZEW), Mannheim

This Version is available at:
https://hdl.handle.net/10419/173384

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

Discussion Paper No. 18-004

Tax Influence on Financial Structures of M&As

Christoph Harendt

ZEW
Zentrum für Europäische Wirtschaftsforschung GmbH
Centre for European Economic Research

Discussion Paper No. 18-004

Tax Influence on Financial Structures of M&As

Christoph Harendt

Download this ZEW Discussion Paper from our ftp server:

http://ftp.zew.de/pub/zew-docs/dp/dp18004.pdf

Die Discussion Papers dienen einer möglichst schnellen Verbreitung von neueren Forschungsarbeiten des ZEW. Die Beiträge liegen in alleiniger Verantwortung der Autoren und stellen nicht notwendigerweise die Meinung des ZEW dar.

Discussion Papers are intended to make results of ZEW research promptly available to other economists in order to encourage discussion and suggestions for revisions. The authors are solely responsible for the contents which do not necessarily represent the opinion of the ZEW.

Tax Influence on Financial Structures of M&As*

Christoph Harendt**
Centre for European Economic Research (ZEW), Mannheim

January 2018

Abstract: In this paper, I investigate the influence of tax incentives on the financial structures of mergers and acquisitions (M&A) conducted by multinational entities (MNE). Previous research has already found evidence for tax avoidance by debt shifting. I analyze the importance of locating debt at holdings which own the operating firm. Placing debt at the level of the holding is more advantageous since it allows inter alia for debt financing up to the purchase price. Accordingly, by using firm-level data provided by the German Central Bank I show empirically that the probability that a firm is held by a holding in the same country increases with the tax rate in that country (though the effect is rather small). As a limitation, I find this effect only for a sample of all firms and no additional effect in case of M&As (denoted as M&A firms). Since this way of debt financing requires that interest payments of holdings are used to offset profits of the operating firms, I consolidate financial structures of holdings and the operating firms. I discuss theoretically and show with descriptive statistics that this consolidation – the major contribution of my paper – leads to a higher total debt ratio compared to the unconsolidated case. However, this effect can only be observed in particular for the subsample of those M&A firms which actually belong to such structures of holdings and operating firms and does not lead to an increase of the debt ratio in the sample of all M&A firms. Finally, I show that the tax sensitivity of external debt financing increases with the consolidation (though again with no additional effect in case of M&A firms). I conclude that those findings may be one explanation why previous studies have found relatively low effects of taxes on debt financing.

Keywords: Corporate Taxation, Multinational Firms, Foreign Direct Investment, Capital structure, Mergers and acquisitions, Empirical Analysis, Firm-level data

JEL Classification: F23, G32, G34, H25, H26, H32

* I gratefully acknowledge the constructive comments of Michael Overesch and Ulrich Schreiber. I would like to thank the Research Data and Service Centre (RDSC) of the German Central Bank (*Deutsche Bundesbank*) for granting access to the Microdatabase Direct investment (MiDi). Financial support by the German Science Foundation (DFG) and the Leibniz ScienceCampus "MannheimTaxation" (a joint initiative of the ZEW and the University of Mannheim) is gratefully acknowledged. The usual disclaimer applies.

** Centre for European Economic Research (ZEW), L7,1, D-68161 Mannheim, Germany, harendt@zew.de, +49 621 1235 367.

1. Introduction

My paper focuses on tax avoidance in the context of mergers and acquisitions (M&A). M&As account for an increasing part of foreign direct investment (FDI) (48 percent in 2015, (UNCTAD, 2016)) and are therefore potentially relevant for tax planning in multinational entities (MNE). Indeed, it is, e.g., shown that effective tax rates of formerly domestic targets decline by around 3 percent after M&As (Belz, Robinson, Ruf & Steffens, 2013). Furthermore, Huizinga and Voget (2009) show that potential double taxation has an effect on the location of headquarters in MNEs after M&As.

Targets are often not acquired directly but via holding structures. It is a question, whether this happens for tax reasons. Several papers have investigated, why operating firms are held via holdings. Mintz and Weichenrieder (2010) show that so-called treaty shopping, i.e., the avoidance of withholding taxes, is a relevant determinant of holdings. In addition, Lewellen and Robinson (2013) find that transaction costs and the reduction of tax payments through intercompany loans are drivers of the use of holdings.

Holding structures are also used to implement certain financial structures. From a tax perspective the interest tax shield should be allocated in a high tax location. Mintz (2004) shows that in this context so-called “double-dipping” can explain the use of holdings: Parent firms invest in operating firms via holdings. While the parent finances this investment by taking a loan, the operating firm receives its funds also as a loan from the holding. Whereas the holdings are located in countries where the interests from the operating firm are not considered as income, the interests may be twice deducted from the taxable profit.

Another strategy is known as debt push down financing, i.e., loading debt on subsidiaries in countries with a high tax rate. In case of M&As, the debt may particularly be loaded at the level of a holding. This is advantageous since it allows for debt financing up to the purchase price (and not just the amount of total assets) (Ruf, 2011). Indeed, for German inbound investment, Ruf (2010) shows that debt is particularly shifted to holding companies. In line with that, he shows that a higher tax rate of the parent firm (i.e. a relatively lower tax rate of the firm) decreases the probability of the usage of a holding (Ruf, 2011). Another explanation could be, that debt-push-down strategies including the usage of holdings can particularly be used to circumvent thin-capitalization rules (Jacobs, 2011). Thin-capitalization rules are targeted against excessive debt financing, since they limit the deduction of interests from the tax base in case of excessive debt ratios.

I focus on financial structures set up through M&As. I consider German outbound FDI and thereby exploit more variation in the explanatory and control variables than previous studies that considered German inbound FDI. Considering outbound investment, my dataset – the Microdatabase Direct investment (MiDi) provided by the German Central Bank (*Deutsche Bundesbank*) – allows us to observe the complete chain of ownership including holding companies, since it is based on mandatory reporting from German MNEs. I will consider all FDI (i.e. also greenfield investment) and measure additional effects of firms which became FDI through M&As (in the following referred to as "M&A firms"; firms which follow from greenfield investment are denoted as "non-M&A firms").

Loading debt at the level of holdings may also explain why previous studies, which do not account for this kind of debt financing, have found relatively small tax effects on debt financing. Several papers have investigated how taxes affect debt financing in MNEs. Büttner, Overesch, Schreiber and Wamser (2011) find a positive effect of taxes both on internal and external debt. In addition, they find that, in case of adverse lending conditions, the tax sensitivity of the former is larger than the one of the latter. In a meta-study based on 46 primary studies, Feld, Heckemeyer and Overesch (2013) predict, as a consensus estimate, that the debt ratio (relative to total capital) increases by 0.3 percentage points if the tax rate increases by one percentage point, which seems to be a rather small effect.

Several papers have made theoretical contributions or found empirical results which may explain the relatively small effects of the tax rate on the debt ratio. Excessive external debt financing may lead to debt overhang (too much debt may hinder attractive investment projects) or bankruptcy risks (Myers (1977), Kraus and Litzenberger (1973)). Furthermore, controlled foreign corporation rules (a common regulation of countries against tax avoidance), by immediately taxing income in low tax subsidiaries at the tax rate of the parent company, reduce the accumulation of internal debt financing in low tax affiliates (see, e.g., Altshuler and Hubbard (2003), Ruf and Weichenrieder (2012)). Büttner, Overesch and Wamser (2011) find that the effect of taxes on the debt ratio is rather strong for firms with less capabilities to reduce their tax base through non-debt tax shields and for firms with a smaller probability to experience losses. Büttner, Overesch, Schreiber and Wamser (2012) show that thin-capitalization rules reduce internal debt shifting. Ruf (2011) finds that transfer pricing regulations, by restricting interest rates, may also have a negative effect on debt financing. Egger, Keuschnigg, Merlo and Wamser (2014) find several reasons, which may explain the relatively small tax sensitivity: First, previous studies have not considered small firms which may increase the tax sensitivity

of the internal debt ratio to some extent. Second, they show that the tax sensitivity also increases if an empirical model is chosen which accounts for the boundedness of the dependent variable between zero and one. Third, they find that relative advantages to locating debt at alternative affiliates, reduces debt financing of a firm. Another explanation could be, that in case of thin-capitalization rules and no strict transfer pricing regulations, the height of interests rather than the debt ratios are adapted (Schindler & Schjelderup, 2016). I however expect, that previous studies have also probably underestimated the effect of taxes on debt financing because they neglect the significant debt financing of holding companies and that it is necessary to consolidate financial structures of operating firms and holdings in order to measure the debt ratio more precisely.[1]

My paper is organized as follows: in the following section, I start by developing relevant hypotheses for my research. In Sections 3 and 4, I then describe the identification strategy and the used data. Afterwards, I present my results. The paper ends with some concluding remarks.

2. Development of Hypotheses

I analyze how taxes affect the financial structures of M&As. I separate my analysis in two steps. First, I investigate, whether financial considerations and associated tax benefits determine group and in particular holding structures which emerge from M&As. As a second step, I investigate the effect of taxes on debt ratios and particularly account for debt-push-down strategies including holdings. To be precise, I consolidate financial structures of operating firms and holdings located in the same host country before evaluating the tax influence on the debt ratio. Note, that in my empirical analysis I will always consider all firms and measure additional effects for M&A firms. The hypotheses will however be formulated for M&As in particular.

2.1. Determinants of Holding Structures in the Case of M&As

I start by investigating the effect of several determinants of group and holding structures implemented in the course of M&As. Debt financing, which reduces the tax base, is especially relevant in case of a high corporate tax rate in the host country. In case of M&As, this debt should particularly be placed at the level of the holding, which leads to my first hypothesis:

[1] Note, that whenever I refer to consolidation, I do not refer to the well-known meaning of consolidating financial statements of MNEs as a whole, but of consolidating those balance sheet positions of all subsidiaries of an MNE in each country which enter the calculation of the debt ratios.

H-1: *The tax rate of the host country has a positive effect on the probability that a firm is held indirectly by a holding in the same country.*

In order to offset the profits of the subsidiaries with the interest payments of the holding firms in the same country a group tax regime is necessary. Therefore I formulate the following hypothesis:

H-2: *The existence of a group tax regime in the host country has a positive effect on the probability that a firm is held indirectly by a holding in the same country.*

As mentioned above, an alternative explanation of the usage of holdings is treaty shopping, i.e., the avoidance of withholding taxes. In that case they would be located in intermediary countries. In accordance to that, I also test the following hypothesis:

H-3: *The withholding tax rate of the host country has a positive effect on the probability that a firm is held indirectly by a holding in an intermediary country.*

Another driver of using a holding may be that there is a credit system in the headquarters home country (e.g., like in the USA). If the home country taxes exceed the tax credit, setting up a holding in an exemption country would be beneficial (Weichenrieder and Mintz (2008)). However, this is not relevant in my case, where I only consider subsidiaries of German MNEs and observations after 2004. Starting from 2001, Germany generally exempted foreign dividends.

2.2. Considering Debt-Push-Down Strategies When Analyzing Capital Structure Choices

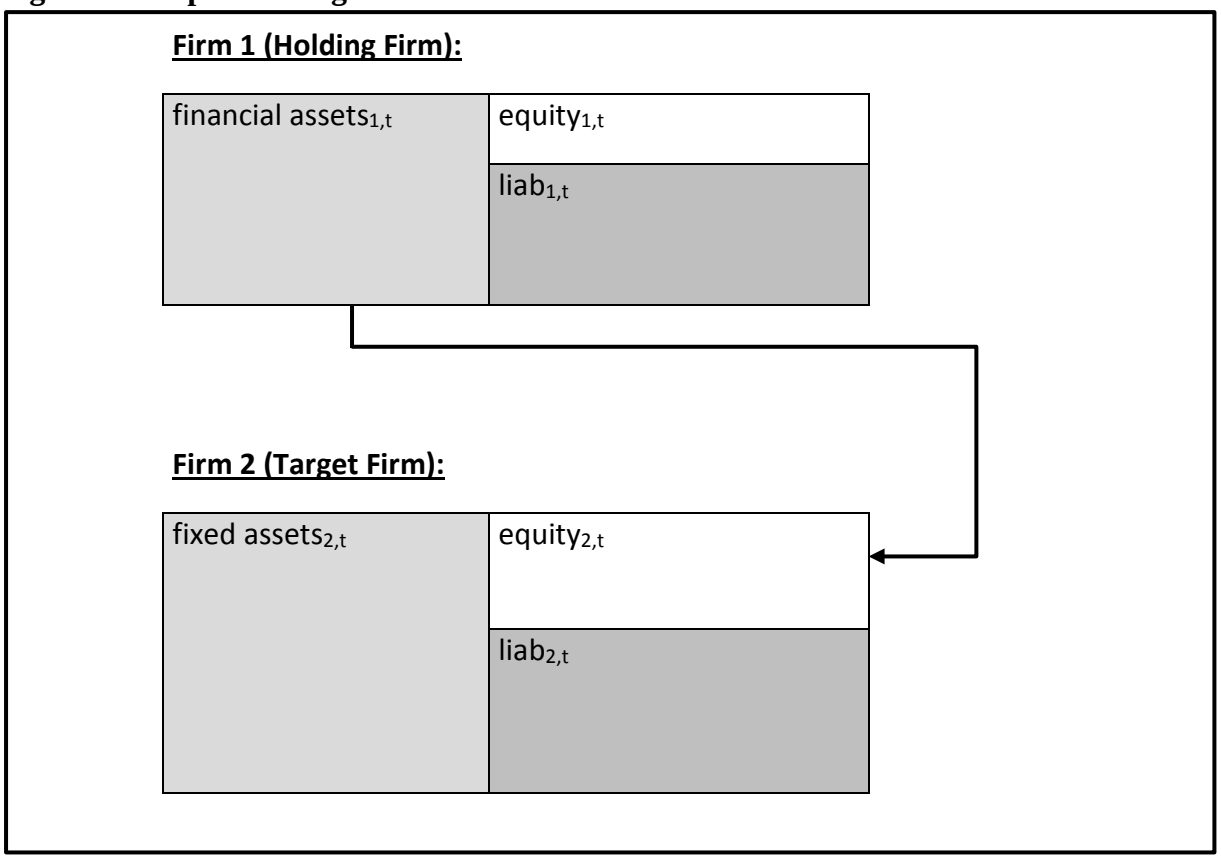
In the second part of my analysis, I focus on the financial structures and in particular on debt financing of holding and target firms. First, I refer to previous literature that has already analyzed the tax effect in capital structure choices. Therefore, I attempt to confirm previous findings about a positive relationship between the host country tax rate and leverage:

H-4: *The tax rate of the host country is assumed to have a positive effect on the debt ratio.*

Unlike previous literature, my focus is on debt-push-down strategies by means of holding firms. I expect that previous literature has underestimated the effect of host country taxes on debt financing if the different entities of a holding structure are analyzed separately.

The following simple example may help to clarify this argument. Figure 1 illustrates an example of a simple holding structure, where I have a target firm (Firm 2) which is owned by a holding in the same country (Firm 1). Let us suppose that the holding firm reports exclusively financial assets, i.e., the shares of the target firm, and that no intercompany loans are used here. The target firm however invests the capital in fixed assets.

Figure 1: Simple Holding Structure



Notes: The index of all balance sheet positions (i,t) includes the number of the firm before the comma (i) and the period after the comma (t). $Liab_{i,t}$ denotes the liabilities of the respective firm.

Traditionally the total debt ratio was calculated as the average of the ratios of debt to total capital ($cap_{i,t}$, i.e., $financial\ assets_{1,t}$ respectively $fixed\ assets_{2,t}$):

$$TDR_t = \frac{\frac{liab_{1,t}}{cap_{1,t}} + \frac{liab_{2,t}}{cap_{2,t}}}{2} \tag{1}$$

I can compute the consolidated total debt ratio (CTDR) of the two entities as follows:

$$CTDR_t = \frac{(liab_{1,t} + liab_{2,t})}{(cap_{1,t} + cap_{2,t} - equity_{2,t})} \tag{2}$$

Note that I subtract $equity_{2,t}$ in the denominator because it is already included in $cap_{1,t}$ and hence it would be counted twice. Because of goodwill the value of $cap_{1,t}$ (the market value of Firm 2) may exceed $equity_{2,t}$ (the book value of Firm 2).

This CTDR of both firms might differ from the average TDR_t for the holding and the operating firm. The simple intuition is as follows. Since I subtract $equity_{2,t}$, the ratio increases.

If there are multiple holding structures in one country, simple examples can show that the CTDR may be lower than the TDR if one holding structure is relatively large and has a low debt ratio. Hence, in the overall sample (not just M&A firms in countries with a high tax rate), the effect of a higher CTDR must not necessarily be observed. However, in case of debt-push-down strategies the debt ratios should be similar across different aggregates (i.e., have the same height relative to the profits). If debt is used to reduce profits (and there are no financing constraints), there is no reason why this should only be conducted for some subsidiaries of an MNE. Still, for earlier investments debt-push-down strategies may not have already been conducted (if the MNE rather recently started to do tax avoidance). As mentioned above, in my empirical analysis I will consider also the overall sample of all firms and measure additional effects for M&A firms. As discussed above, in case of the latter, using holding structures is more likely. Hence, all of the following hypotheses should at least hold for M&A firms.

I conclude that I expect a higher level of the CTDR compared to debt ratios measured for each single entity (at least in countries with a high tax rate where debt financing at the level of holdings is attractive).

H-5: *Measures for the debt ratio show higher levels of debt-financing if I consolidate all liabilities assigned to subsidiaries of an MNE located in the same country (at least in countries with a high tax rate).*

The consolidation, which allows us to observe the debt ratio more precisely, will presumably lead to a higher measured effect of the tax rate on the debt ratio. I therefore expect that previous literature has underestimated the tax effect on capital structure choices.

H-6: *The effect of the tax rate on the debt ratio is larger compared to previous results if I consolidate subsidiaries with their holdings in the same country.*

If I consolidate financial information of all entities controlled by the same MNE in a certain host country, I can compute the ratio for total debt as well as similar measures for total inter-company debt and total bank loans. I therefore further look at internal and external debt financing in particular. As for total debt financing, I also expect a stronger effect of the tax rate on those two ratios once I consider the consolidated financial items.

H-7: *The effect of the tax rate on the internal debt ratio and the external debt ratio is larger if I consider consolidated financial items.*

3. Identification Strategy

3.1. Determinants of Holding Structures in the Case of M&As

In the following empirical part, I inter alia determine the probability that a firm is held by a holding. I estimate this probability with a logit model. For my first regression, I consider a dummy variable as my dependent variable that is equal to one if the firm is held indirectly by a holding in the same country ($Holding\ (same\ country)$) in the first year where it appears in the database. I only consider firms which are not holdings for firms in the same country themselves (though they may have subsidiaries in other countries). Expression (3) shows my empirical approach, where i denotes the respective firm:

$$Holding\ (same\ country)_i = \beta_1 STR_i + \beta_2 MA_i + \beta_3 GT\ Regime_i + \beta_4 WhT_i + \beta_5 STR_i * MA_i + \beta_6 GT\ Regime_i * MA_i + \beta_7 WhT_i * MA_i + X\gamma + \varepsilon \quad (3)$$

My variables of interests are the statutory profit tax rate in the host country of the firm (STR) as well as the existence of a group tax regime ($GT\ Regime$) in the host country. Since I am

particularly interested in the usage of holdings in case of M&A firms I interact both variables with the variable MA, which is equal to one, if the firm has entered the database in such a way (and equal to zero if it has entered the database through greenfield investment). Furthermore, I also include the withholding tax rate WhT in the host country as an explanatory variable but I only expect an effect in the second regression which I will describe below and where I change the dependent variable. X denotes a vector of country specific control variables. According to my hypotheses, I expect a positive effect for β_6 and β_7 (see hypotheses H-1 and H-2).

For the second regression I now exchange the dependent variable by the variable $Holding\ (interm.country)$ which is equal to one if there is a holding in an intermediary country.

$$Holding\ (interm.country) = \beta_1 STR_i + \beta_2 MA_i + \beta_3 GT\ Regime_i + \beta_4 WhT_i + \beta_5 STR_i * MA_i + \beta_6 GT\ Regime_i * MA_i + \beta_7 WhT_i * MA_i + X\gamma + \varepsilon \quad (4)$$

I now focus on the withholding taxes (WhT). I expect a positive effect for β_7 (see hypothesis H-3).

3.2. Considering Debt-Push-Down Strategies When Analyzing Capital Structure Choices

In this second step, I investigate the effect of taxes on financial structures. I refer to well-known strategies to identify a tax effect on the capital structure choice but I also consider consolidated debt ratios as a dependent variable. If I observe a positive effect of taxes on the probability that a firm is held via a holding (which – as explained in Section 2.2 – leads to higher debt ratios) in the regression as denoted in expression (3), then, on average, the consolidated debt ratios should be higher in countries with a high tax rate and hence the effect of the tax rate on the debt ratio should be higher in the consolidated case.

For my basic set of regressions, I consider the total as well as the external and internal debt ratio as dependent variables. The total debt ratio TDR is defined as $TDR_{it} = \frac{liab_{i,t}}{cap_{i,t}}$ (see Section 2.2 for the definition of the variables in the ratio). This differs only in so far from the debt ratio in expression (1) as a) there I consider the average of those debt ratios for the special case of two firms and b) now I also subtract current profits from total capital, since they may also be considered as equity. Different from that, the internal debt ratio IDR considers only liabilities to affiliates and the parent of the firm. For the external debt ratio EDR, the difference between the total liabilities and those internal liabilities (i.e., the external liabilities) is divided by total

capital. Again I use STR and MA as explanatory variables. However, different than in Section 3.1, MA is now assigned the value one for all subsidiaries of an MNE in a country, if one is a M&A firm. In addition, the variable MA is defined equal to zero if no firm in the same MNE and country has entered the database through an M&A, but at least one through greenfield investment. Because of this sample design I consider only holding structures where at least one firm has entered the database in either of the two ways. However, the mode of entry is only given for firms which became FDI after 2004, so my sample is restricted to the time period 2005 to 2014.[2] Expression (5) shows the regression equation for the case of the TDR, where i denotes the respective firm and t the year:

$$TDR_{it} = \beta_1 STR_{it} + \beta_2 STR_{it} * MA_i + X\gamma + \theta_i + \theta_t + \varepsilon_{it} \quad (5)$$

X is a vector of firm and country level characteristics. According to my hypothesis H-4 I expect a positive sign for β_1. In this unconsolidated case, I do not assume an additional effect for M&A firms and hence I have no expectation about the sign or significance of β_2.

Furthermore, I consider the consolidated debt ratios as dependent variables, i.e., the consolidated total debt ratio ($CTDR$), the consolidated internal debt ratio ($CIDR$) and the consolidated external debt ratio ($CEDR$). As can be seen from expression (2), they are basically constructed as in the unconsolidated case, but now generally as a sum of all the firms in each holding structure (including chains of subsidiaries) with the equity of the operating firms being subtracted in the denominator. However, different from the stylized case in expression (2), now also internal liabilities between the firms in the holding structure are subtracted in order to avoid double counts (they are generally subtracted from the numerator and the denominator of all three debt ratios, except from the numerator of the $CEDR$). Furthermore – as for the unconsolidated debt ratios – the debt ratios differ in so far from the debt ratio in Section 2.2 as now I also subtract current profits from total capital, since they may also be considered as equity. Finally, for simplifying the aggregation, this consolidation is conducted for all affiliates in the same MNE and country, i.e., a common debt ratio is for example also constructed if there are multiple such structures (arranged in a parallel way) of one MNE in a country.

[2] I need firms with a known mode of entry in order to identify differences between M&A firms and non-M&A firms. However, as mentioned above, we can observe the mode of entry only for new firms after 2004. It may be questioned whether new non-M&A firms may not enter holding structures with affiliates that are M&A firms. Hence the expected difference between M&A firms and non-M&A firms would be biased. However, this would be a downward bias and the actual results may even be stronger.

Expression (6) shows the example of the consolidated total debt ratio (which I again analogously consider for the internal and external debt ratio):

$$CTDR_{it} = \beta_1 STR_{it} + \beta_2 STR_{it} * MA_i + X\gamma + \theta_i + \theta_t + \varepsilon_{it} \quad (6)$$

The variables MA and STR are defined as for expression (5). I also expect a positive effect of the tax rate on this debt ratio, i.e., β_1 should be positive in expression (6). For H-6 and H-7, I assume a positive and significant effect of the interaction term (those are the cases, were holding structures are likely and hence the consolidation should lead to higher debt ratios in countries with a high tax rate). According to this reasoning, it should only be the firms belonging to a holding structure for which I observe this effect. Therefore, in additional regressions, I will only consider firms belonging to an MNE which has such a holding structure in the respective host country.

Moreover, I will consider the potential influence of group tax regimes and thin-capitalization rules and further reduce the sample to firms which are located in countries with such rules. Regarding group tax regimes, the effect of the tax rate is supposed to be larger for firms located in countries with such regimes. Accounting for thin-capitalization rules is relevant since, as mentioned above, one purpose of using holdings may also be to circumvent those rules (Jacobs, 2011). Accordingly, I also expect a stronger effect in case there are thin-capitalization rules in the host country (but rather on the internal debt ratio, which – different then the external debt ratio – has been found to depend on those rules (Büttner et al., 2012)). My dataset on thin-capitalization rules does not distinguish between those rules and earnings stripping rules. Like thin-capitalization rules, earnings stripping rules are targeted against excessive debt financing. Whereas thin-capitalization rules limit the deduction of interests in case of excessive debt ratios, earnings stripping rules apply if the interest to earnings ratio exceeds a certain threshold. Accordingly I expect similar effects.

4. Data

I use firm data for multinationals from the MiDi database, which is collected by the German Central Bank (*Deutsche Bundesbank*). This database includes information on both FDI of German MNEs (outbound) as well as FDI of foreign MNEs in Germany (inbound). I consider German outbound FDI, which – as mentioned in Section 1 – allows us to exploit more variation.[3]

[3] I exclude observations from mining, agriculture, non-profit and membership organizations because special tax regimes may be available there. Furthermore, I exclude firms from the financial services sector, for which special

Due to mandatory reporting, this database provides balance-sheet information on all FDI positions (subsidiaries) of German MNEs abroad.[4] Furthermore I can observe chains of ownership including the holdings. MiDi provides panel data with information on the mode of entry (M&A project vs. Greenfield project), so I can observe the group structures over time, including the emergence of new subsidiaries through M&As. As mentioned above, my sample is restricted to the time period 2005 to 2014. I consider only fully owned subsidiaries so that the MNE has sufficient influence to conduct the described debt-push-down strategies.

I consider investment in EU-countries and countries belonging to the OECD, excluding Germany which is the country of the MNEs' headquarters.[5] My sample includes 1,842 observations for the regressions explaining the holding structures (this number is here also equal to the number of firms since I consider always only the first year per firm), 8,211 observations (2,335 firms) for the regressions explaining the unconsolidated debt ratios and 6,442 observations (1,716 firms/holding structures) for the regressions explaining the consolidated debt ratios.

The descriptions, means and standard deviations of the variables used in the empirical analysis are listed in Tables 1 to 3. I generally use the dependent variables and variables of interests as described in Section 3. The selection of control variables is oriented on recent papers dealing with related research questions (see, e.g., Ruf (2011)). The variables of my first set of regressions (i.e. for explaining holding structures) are listed in Table 1.

Here I consider the dependent variables and variables of interest as defined in section 3.1, namely *Holding (same country)*, *Holding (interm. country)*, *STR*, *GT Regime* and *WhT*. Those explanatory variables are further interacted with the variable indicating M&A firms (*MA*), which is also considered separately. Regarding control variables, certain country specific factors may also have an impact on whether subsidiaries are held directly or via holdings (Dreßler,

regulations for the balance sheet structure apply, that may lead to biased results. Finally, I also exclude observations whose German parent is not an incorporated and legally independent entity, as well as subsidiaries which are not legally independent. In all those cases, I drop all observations of an MNE (in all years) in one country, since otherwise I might drop some firms from a holding structure whereas others remain which may bias the debt ratios.

[4] The mandatory collection is determined in the German Foreign Trade and Payments Regulation (Aussenwirtschaftsverordnung). The criteria, when an investment has to be reported varied over time. From 1999 until 2001, FDI had to be reported if the participation was 10% or more and the balance-sheet total of the respective foreign investment exceeded 5 million Euros or if the participation was 50% or more and the balance-sheet total exceeded 500.000 Euros. From 2002 until 2006, FDI had to be reported if the participation was 10% or more and the balance-sheet total exceeded 3 million Euros. Since 2007 the threshold of 10% applies only for direct shares, whereas for indirect shares or a mixture of direct and indirect shares the threshold has been raised to 50% (for details see Schild and Walter (2016)).

[5] I exclude firms located in Iceland. The used database is confidential concerning information on individual firms and since there are only few German subsidiaries in Ireland, this has initially caused conflicts with this requirement. For further revision, it may be possible to include firms located in Iceland again.

2012). Therefore I include *GDP*, *GDP per capita*, *Inflation* and *Corruption* (measured by the Worldbank's Control of Corruption index where higher values denote less corruption).

Table 1: Descriptive Statistics for Regressions on Determinants of Holding Structures

Variable	Description	Mean	Standard Deviation
Holding (same country)	Dummy variable that is equal to one if the firm is held indirectly by a holding in the same country in the first year where it appears in the database.	0.163	0.370
Holding (interm. country)	Dummy variable that is equal to one if the firm is held indirectly by a holding in an intermediary country in the first year where it appears in the database.	0.047	0.212
Statutory profit tax rate (STR)	Statutory profit tax rate in the firm's host country.	0.280	0.070
MA	Dummy variable, that is equal to one if the firm has entered the database through an M&A by the reporting MNE (and equal to zero if it has entered the database through greenfield investment).	0.713	0.453
Group Tax Regime (GT Regime)	The firm is located in a country with a group tax regime.	0.742	0.438
Withholding Tax (WhT)	Withholding tax rate in the firm's host country.	0.014	0.043
GDP	Gross Domestic Product in the firm's host country; measured in billion USD.	2,387.753	4,162.962
GDP per Capita	Gross Domestic Product per home country national in the firm's host country; measured in USD.	39,307.708	19,805.559
Inflation	Inflation rate in the firm's host country.	2.228	2.145
Corruption	Value of World Bank's Control of Corruption Index in the firm's host country.	1.189	0.811

Notes: The number of observations is 1,842. Firm specific variables are obtained from the Microdatabase Direct investment (MiDi) 1999-2014 of the Deutsche Bundesbank's research Data and Service Centre (RDSC). Tax variables are derived from IBFD Tax Handbooks and the Worldwide Corporate Tax Guides by Ernst & Young. *GDP*, *GDP per Capita*, *Inflation* and *Corruption* stem from the World Bank.

Whereas *GDP* and *GDP per capita* may increase the probability of holdings in the same country since they indicate the market size and purchasing power (and hence maybe profits which could be offset by interest payments) they may reduce the probability of holdings in an intermediary country, since high values of those variables may indicate well-established markets where firms are presumably rather directly held by the headquarters. Both, *Inflation* and *Corruption* may however be indicators of investment risks in the respective countries and are hence assumed to have opposite signs to the GDP measures in regressions explaining the usage of holdings in intermediary countries (for domestic holdings, I have no clear expectations).

Table 2 shows the variables for my second set of regressions (i.e. with the unconsolidated debt ratios as dependent variables). Here, I keep the tax rate as an explanatory variable and adapt the definition of the variable *MA* as stated in Section 3.2. In addition I include several variables at firm level which should affect the ability respectively willingness of firms to take loans, namely *Loss Carryforward*, *Sales* and *Tangibility*. I expect a negative sign for *Loss Carryforward* because if a firm carries forward losses, it has relatively low current profits and hence should have a lower incentive to reduce its tax base via a high debt ratio (see, e.g., MacKie-Mason (1990)). For the variable *Sales* different effects can be thought of. On the one hand, for large firms (i.e. firms with large sales) it is assumed to be easier to receive external debt financing (see, e.g., Graham and Harvey (2001)). On the other hand, large firms may typically be more mature and hence might rather finance themselves with retained earnings (Ruf, 2011). Whereas the first effect is only expected for external debt financing, the second effect may be relevant for both, internal and external debt financing. Hence I have no clear expectation concerning external and overall debt financing but assume that the internal debt ratio declines with *Sales*. Like *Sales*, also a high value of *Tangibility* (measured by fixed and intangible assets of the firm, divided by total capital (balance sheet total)) should increase the willingness of external lenders to give a loan. Hence, for this variable I expect a positive effect on the external debt ratio but no specific effect on the internal and total debt ratio. Furthermore, I consider *GDP growth*, which is a measure for potential profits (see, e.g., Huizinga, Laeven and Nicodeme (2008)) and should also increase the chance to receive a loan. *Inflation* serves as a measure for lending conditions because high inflation is usually associated with low interest rates, which should increase borrowing. Finally, I again include *Corruption*, which – as stated above – takes a high value in case of low corruption and presumably has a positive effect on the debt ratios, since lenders may be eager to give loans rather to firms in more secure countries.

Table 2: Descriptive Statistics for Regressions on Capital Structures

Variable	Description	Mean	Standard Deviation
TDR	Liabilities of a firm, divided by total capital (balance sheet total).	0.510	0.264
IDR	Internal liabilities of a firm, divided by total capital (balance sheet total).	0.219	0.242
EDR	External liabilities of a firm, divided by total capital (balance sheet total).	0.291	0.239
Statutory profit tax rate (STR)	Statutory profit tax rate in the firm's host country.	0.274	0.070
High STR	The firm is located in a country with a tax rate above the 75%-percentile of all countries.	0.239	0.427
MA	Dummy variable, that is equal to one if any firm in the same MNE and country (though I consider disaggregated debt ratios here) has entered the database through an M&A by the reporting MNE (and equal to zero if no firm in the same MNE and country has entered the database through an M&A, but at least one through greenfield investment).	0.729	0.445
Group Tax Regime (GT Regime)	The firm is located in a country with a group tax regime.	0.730	0.444
Thin-capitalization or earnings stripping rule	The firm is located in a country with a thin-capitalization or earnings stripping rule.	0.836	0.371
Holding structure	The firm is located in a country, where it's MNE has at least one holding structure.	0.252	0.434
Loss Carryforward (LCF)	The firm has a loss carryforward.	0.256	0.437
Sales	Sales of the firm (in million Euro).	64.427	253.493
Tangibility	Fixed and intangible assets of the firm, divided by total capital (balance sheet total).	0.278	0.276
GDP Growth	Current years GDP in the firm's host country minus last years GDP, divided by last years GDP.	0.034	0.086
Inflation	Inflation rate in the firm's host country.	1.887	1.876
Corruption	Value of World Bank's Control of Corruption Index in the firm's host country.	1.140	0.825

Notes: The number of observations is 8,211. Firm specific variables are obtained from the Microdatabase Direct investment (MiDi) 1999-2014 of the Deutsche Bundesbank's research Data and Service Centre (RDSC). Tax variables are obtained from IBFD Tax Handbooks and the annual Worldwide Corporate Tax Guides by Ernst & Young. *GDP growth*, *Inflation* and *Corruption* stem from the World Bank.

For the consolidated case, the country specific explanatory variables and the variable indicating M&As are the same as in the unconsolidated case (see Table 3), besides that in case of firms belonging to the same MNE and country, they are now not considered for single firms, but for the group of those firms (considered as one single firm). However, the value of those variables for the group is the same as for each firm of the group in the unconsolidated case (since the

firms of those groups are in the same country). Besides the debt ratios, also some explanatory variables (*Loss Carryforward*, *Sales* and *Tangibility*) differ, since they are now not calculated for a single firm but as a minimum outcome (*Loss Carryforward*) respectively sum (*Sales* and *Tangibility*) for all firms in the same MNE and country.

Table 2 and Table 3 also include further variables which are relevant for defining the subsamples in Table 4 and the regressions, since they indicate firms which are located in a country with a Group Tax Regime *(Group Tax Regime)*, a thin-capitalization or earnings stripping rule (*Thin-capitalization or earnings stripping rule*) or which belong to a holding structure (*Holding structure*).

Table 4 shows the means of the total debt ratio for the consolidated and unconsolidated case, which I consider in order to test my hypothesis H-5. I consider all firms (rows (1) and (2)) and M&A firms in particular (rows (3) to (12)).

In the case of all firms, the debt ratio is surprisingly slightly smaller for the consolidated case compared to the unconsolidated case (0.499 in row (2) compared to 0.510 in row (1)). However – as mentioned in Section 2.2 – this may well be the case, if multiple holding structures of an MNE in one country are consolidated. But in case of debt-push-down strategies – as stated above – I expect an increase in the debt ratio through the consolidation. In the following rows, I consider subsamples where holding structures and therefore higher debt ratios should become more likely given my discussion in Section 2. Foremost, holding structures should be more likely in case of M&As. Starting from row (3) I will only consider such firms. Here, the debt ratio in the consolidated case (row (4)) is at first still smaller than in the unconsolidated case (row (3)). So I find no stronger effect for M&A firms in general. In a next step, I further restrict my sample to firms in countries with a high tax rate (above the 75%-percentile of all countries). Here, the effect of higher consolidated debt ratios is even more likely, also in case of multiple holding structures (in countries with a high tax rate the debt ratios should be similar across different holding structures). Indeed the consolidated debt ratio (0.518 in row (6)) is slightly higher than the unconsolidated debt ratio (0.511 in row (5)). Not surprisingly, this effect becomes stronger if I consider only firms belonging to holding structures (0.574 in row (8)), i.e., those firms from which the increase stems. I expect this increase to be even larger, if there is a group tax regime in the host country of the aggregate (row (10)), since such regimes are necessary for offsetting profits in the holding structures. However, here the consolidated debt ratio slightly declines to 0.554. Hence, there may be other factors affecting the debt ratios for which

the chosen descriptive statistic do not control for. Finally, the effect should also be stronger if there are thin-capitalization rules, which may be circumvented by holding structures. Since in my sample, all host countries which have group tax regimes, also have such rules, the effect is the same as in the previous sample. I can conclude, that the results support my hypothesis H-5, according to which the consolidated debt ratios should be higher than the unconsolidated ones, though only for especially relevant samples (i.e., in particular in such subsamples, where only those firms, which belong to holding structures, are included).

Table 3: Descriptive Statistics for Regressions on Capital Structures (consolidated case)

Variable	Description	Mean	Standard Deviation
CTDR	Liabilities of the firm/consolidated liabilities of all firms belonging to the same MNE and country, divided by consolidated total capital (balance sheet total).	0.499	0.256
CIDR	Internal liabilities of the firm/consolidated internal liabilities of all firms belonging to the same MNE and country, divided by consolidated total capital (balance sheet total).	0.215	0.232
CEDR	External liabilities of the firm/consolidated external liabilities of all firms belonging to the same MNE and country, divided by consolidated total capital (balance sheet total).	0.284	0.229
Statutory profit tax rate (STR)	Statutory profit tax rate in the firm's/group of firms' (in same MNE and country) host country.	0.270	0.070
High STR	The firm/group of firms (in same MNE and country) is located in a country with a tax rate above the 75%-percentile of all countries.	0.218	0.413
MA	Dummy variable, that is equal to one if any firm in the same MNE and country has entered the database through an M&A by the reporting MNE (and equal to zero if no firm in the same MNE and country has entered the database through an M&A, but at least one through greenfield investment).	0.719	0.450
Group Tax Regime (GT Regime)	The firm/group of firms (in same MNE and country) is located in a country with a group tax regime.	0.714	0.452
Thin-capitalization or earnings stripping rule	The firm/group of firms (in same MNE and country) is located in a country with a thin-capitalization or earnings stripping rule.	0.826	0.379
Holding structure	The firm/group of firms (in same MNE and country) is located in a country, where it's MNE has at least one holding structure.	0.162	0.368
Loss Carryforward (LCF; consolidated)	The firm/at least one firm in the group of firms (in same MNE and country) has a loss carryforward.	0.324	0.468
Sales (consolidated)	Total sales of the firm/group of firms (in same MNE and country).	82.120	307.191
Tangibility (consolidated)	Total fixed and intangible assets of the firm/group of firms (in same MNE and country), divided by total capital (balance sheet total).	0.265	0.256
GDP Growth	Current years GDP in the firm's/group of firms' (in same MNE and country) host country minus last year's GDP, divided by last year's GDP.	0.034	0.087
Inflation	Inflation rate in the firm's/group of firms (in same MNE and country) host country.	1.913	1.959
Corruption	Value of World Bank's Control of Corruption Index in the firm's/group of firms (in same MNE and country) host country.	1.154	0.830

Notes: The number of observations is 6,442. Firm specific variables are obtained from the Microdatabase Direct investment (MiDi) 1999-2014 of the Deutsche Bundesbank's research Data and Service Centre (RDSC). Tax variables are obtained from IBFD Tax Handbooks and the annual Worldwide Corporate Tax Guides by Ernst & Young. *GDP growth*, *Inflation* and *Corruption* stem from the World Bank.

Table 4: Means of the total debt ratio

	Only M&A firms	Country with a high tax rate	Belonging to holding structure	Group tax regime	Thin-capi-talization rule	Consoli-dated	Mean (row)	Standart de-viation	Number of observations	Number of firms/holding structures	Number of MNEs
(1)						No	0.510 (1)	0.264	8,211	2,335	1,086
(2)						Yes	0.499 (2)	0.256	6,442	1,716	1,086
(3)	x					No	0.501 (3)	0.260	5,983	1,737	799
(4)	x					Yes	0.488 (4)	0.250	4,632	1,243	799
(5)	x	x				No	0.511 (5)	0.259	1,462	489	266
(6)	x	x				Yes	0.518 (6)	0.239	1,035	310	266
(7)	x	x	x			No	0.504 (7)	0.266	570	234	85
(8)	x	x	x			Yes	0.574 (8)	0.196	236	89	85
(9)	x	x	x	x		No	0.503 (9)	0.257	472	200	76
(10)	x	x	x	x		Yes	0.554 (10)	0.196	197	78	76
(11)	x	x	x	x	x	No	0.503 (11)	0.257	472	200	76
(12)	x	x	x	x	x	Yes	0.554 (12)	0.196	197	78	76

Source: Research Data and Service Centre (RDSC) of the Deutsche Bundesbank, Microdatabase Direct investment (MiDi) 1999-2014.

5. Results

5.1. Determinants of Holding Structures in the Case of M&As

In this section I present my results for the empirical analysis as specified in Section 3.

Table 5: Determinants of Holding Structures

Dependent Variable	(1) Holding (same country)	(2) Holding (interm. country)
STR	6.231***	3.196
	(2.160)	(4.217)
MA	1.361	1.217
	(0.990)	(1.090)
STR # MA	-3.737	-4.414
	(2.413)	(4.315)
GT Regime	0.096	-0.727
	(0.470)	(0.547)
GT Regime # MA	0.383	0.106
	(0.639)	(0.650)
WhT	-3.851	2.258
	(2.748)	(3.414)
MA # WhT	-0.243	-5.089
	(5.900)	(4.413)
ln(GDP)	0.058	0.096
	(0.064)	(0.129)
(ln)GDP per Capita	0.180	-0.275
	(0.195)	(0.356)
Inflation	-0.052	0.064
	(0.055)	(0.057)
Corruption	0.075	0.161
	(0.099)	(0.299)
Constant	-5.955***	-1.747
	(1.990)	(3.717)
Number of observations	1,842	1,842
Pseudo R-squared	0.061	0.054
Wald chi-squared	107.864	96.150
Chi-squared-test$^{\Delta}$	0.000	0.000

Source: Research Data and Service Centre (RDSC) of the Deutsche Bundesbank, Microdatabase Direct investment (MiDi) 1999-2014.
Notes: $^{\Delta}$p-value reported. The dependent variable is one, if the firm was held by a holding in the same country (column (1)) or an intermediary country (column (2)) in the year when it was founded. The standard errors are shown in parentheses. They are robust and clustered at the country level. The regressions include year-specific effects. *, ** and *** show significance at the level of 10%, 5% and 1%.

The results support my hypothesis H-1 according to which the tax rate of the host country should increase the probability that a firm is held by a holding in the same country. The coefficient 6.231 (together with the interaction effect with *MA* of -3.737) translates into a marginal effect of 0.434 (at the average of the control variables in the sample), which is also significant with a *p*-value of 0.030. This means that a 10 percentage point increase of the tax rate increases the probability that the investment firm is held via a holding in the same country by 4.3 percentage points, which yet seems to be a rather small effect. However, I do not find evidence

that this effect is particularly strong in case of M&As since the interaction between the tax rate and the variable indicating M&A firms is insignificant (though – as mentioned above – it is correctly included in the calculation of the marginal effect). Furthermore, I do not find evidence for the other hypotheses which are relevant in the context of those two regressions (hypotheses H-2 and H-3). Regarding control variables, all effects are insignificant.

As mentioned above, another way to investigate debt-push-down strategies is by looking at the debt ratios. Those results are shown in the following section.

5.2. Considering Debt-Push-Down Strategies When Analyzing Capital Structure Choices

The results from the previous regressions slightly indicate that MNEs place debt in particular at the level of holdings. In the following I present my results from the analysis where I test, whether the financial structures are in line with this finding. I start by investigating my hypothesis H-4. The respective results are shown in Table 6. Here I consider all firms, i.e., not just M&A firms. The additional effect of the tax rate on the debt ratio in case of M&A firms is measured by the interaction of *MA* and *STR*.

I find a significant positive effect of the tax rate on the external debt ratio (column (3)). According to this result, an increase of the tax rate by 10 percentage points increases the external debt ratio by about 2.3 percentage points. However, I do not find corresponding effects for the total and internal debt ratio. This is surprising given that other studies have found effects also for those debt ratios (see Section 1). One explanation may be the growing importance of thin-capitalization rules (some countries have introduced such rules rather late such as Netherlands or Italy (both in 2004)), which seem to be effective in preventing internal debt financing (Büttner et al., 2012). Earlier studies may not have fully captured this effect. Furthermore, I find no significant effect for the interaction with the variable *MA*, which may imply that there are no additional effects in case of M&As. However, the coefficient for *MA* is significantly negative in the regressions with the internal and total debt ratio as the dependent variables. This finding, which does not seem to be related to the tax rate, may be addressed in further research. As a first conclusion, I can state that my results confirm my hypothesis H-4 in so far, as the local tax rate has a positive effect on debt financing, however only in case of the external debt ratio and not in particular for M&A firms.

Table 6: Tax Influence on Capital Structures (unconsolidated debt ratios)

Dependent Variable	(1) TDR	(2) IDR	(3) EDR
STR	0.048	-0.180	0.228***
	(0.123)	(0.118)	(0.084)
MA	-0.089**	-0.120***	0.030
	(0.042)	(0.039)	(0.029)
STR # MA	0.122	0.096	0.026
	(0.146)	(0.129)	(0.104)
LCF	0.095***	0.074***	0.021***
	(0.007)	(0.007)	(0.006)
Sales	0.020***	-0.006**	0.026***
	(0.003)	(0.003)	(0.002)
Tangibility	-0.109***	-0.032*	-0.077***
	(0.017)	(0.016)	(0.016)
GDP Growth	0.010	0.030	-0.020
	(0.044)	(0.049)	(0.036)
Inflation	-0.001	0.000	-0.001
	(0.002)	(0.002)	(0.001)
Corruption	-0.008	0.000	-0.008*
	(0.005)	(0.004)	(0.004)
Constant	0.467***	0.342***	0.125***
	(0.036)	(0.034)	(0.026)
Number of observations	8,211	8,211	8,211
Number of MNEs	1086	1086	1086
R-squared	0.543	0.492	0.584

Source: Research Data and Service Centre (RDSC) of the Deutsche Bundesbank, Microdatabase Direct investment (MiDi) 1999-2014.
Notes: The regressions include year-specific and parent-specific effects. The standard errors are shown in parentheses. They are robust and clustered at the country-year level. *, ** and *** show significance at the level of 10%, 5% and 1%.

Regarding control variables, I would expect a negative effect for *LCF* (see Section 4) but find a significant positive effect. The coefficient for *Sales* is as expected, since I find a negative effect on the internal debt ratio and a positive effect on the external debt ratio. For the latter, this implies that in my analysis the effect that larger firms may easier receive debt financing presumably outweighs the effect that larger firms may also have tendency to rather use retained earnings as a source of financing. The coefficient for *Tangibility*, which should give a similar signal to external lenders as *Sales* (and where I expect no specific effect on the internal and total debt ratio) is however negative in all three columns. The negative effect of *Corruption* (which takes higher values in case of less corruption) is also against the above mentioned expectations.

I have already seen in Section 4, that if I consolidate the debt ratios of holding structures, the debt ratios are higher at least in particularly relevant subsamples. According to my hypothesis H-6 I also expect a stronger effect of the tax rate on the debt ratio if I consolidate firms with

their holdings in the same country. In addition I assume this increase of the tax sensitivity also for internal and external debt financing separately (hypothesis H-7). As can be seen in Table 7, the effect of the tax rate on the external debt ratio increases (by about 6 percentage points) and there is now also a significantly positive effect on the total debt ratio. Hence I find support for my hypothesis H-6 (only in the consolidated case, the effect on the total debt ratio is significant at all) and limited evidence for hypothesis H-7, i.e., only regarding external debt financing.

Table 7: Tax Influence on Capital Structures (consolidated debt ratios)

Dependent Variable	(1) CTDR	(2) CIDR	(3) CEDR
STR	0.229*	-0.056	0.285***
	(0.129)	(0.120)	(0.095)
MA	-0.112**	-0.152***	0.040
	(0.045)	(0.041)	(0.032)
STR # MA	0.172	0.220	-0.048
	(0.149)	(0.136)	(0.109)
LCF	0.081***	0.060***	0.021***
	(0.007)	(0.007)	(0.006)
Sales	0.008**	-0.010**	0.018***
	(0.004)	(0.004)	(0.004)
Tangibility	-0.006	0.041*	-0.047**
	(0.023)	(0.021)	(0.019)
GDP Growth	-0.010	0.023	-0.033
	(0.052)	(0.050)	(0.036)
Inflation	0.001	0.001	-0.001
	(0.002)	(0.002)	(0.001)
Corruption	-0.011*	-0.005	-0.006
	(0.006)	(0.005)	(0.005)
Constant	0.417***	0.298***	0.119***
	(0.038)	(0.034)	(0.029)
Number of observations	6,442	6,442	6,442
R-squared	0.641	0.583	0.656

Source: Research Data and Service Centre (RDSC) of the Deutsche Bundesbank, Microdatabase Direct investment (MiDi) 1999-2014.
Notes: The regressions include year-specific and parent-specific effects. The standard errors are shown in parentheses. They are robust and clustered at the country-year level. *, ** and *** show significance at the level of 10%, 5% and 1%.

Furthermore, the variable indicating M&A firms again seems to have a negative effect on the internal debt ratio and now also on the total debt ratio. However, the interaction of the tax rate with this variable is again insignificant in all three specifications. Hence, I do not find full support for my hypothesis H-6, which, as all my hypotheses, refers to M&A firms. However, I find the expected effect for the overall sample. The effects of the control variables do not change considerably, except that the sign for the effect of *Tangibility* on the internal debt ratio turns positive (and the effect on the total debt ratio gets insignificant).

For now I can conclude, that my first results indicate that debt financing at the level of holding firms is particularly relevant (Table 5) and consolidating financial structures leads to higher debt ratios (see Section 4) respectively a higher measured effect of the tax rate on the debt ratio (Table 7).

I would expect, that the increasing tax sensitivity is rather driven by those firms, which are part of a holding structure. This subsample is considered in the regressions in Table 8. The coefficient for the effect of the tax rate on the consolidated external debt ratio again increases considerably (to a value of 0.368). The effect on the total debt ratio turns insignificant again (also in the following specifications) and is hence not robust in my analysis. In this specification, I also find a significant effect for the variable *Inflation*. According to my reasoning in Section 4, a high inflation (i.e. low interest rates) should increase external borrowing. However, I find the opposite sign.

Table 8: Tax Influence on Capital Structures (consolidated debt ratios; only holding structures)

Dependent Variable	(1) CTDR	(2) CIDR	(3) CEDR
STR	0.361	-0.007	0.368*
	(0.354)	(0.357)	(0.217)
MA	-0.187	-0.132	-0.055
	(0.136)	(0.130)	(0.090)
STR # MA	0.630	0.341	0.290
	(0.450)	(0.452)	(0.264)
LCF	0.062***	0.059***	0.003
	(0.014)	(0.014)	(0.011)
Sales	-0.003	-0.029***	0.026***
	(0.009)	(0.010)	(0.009)
Tangibility	-0.085	-0.217***	0.133
	(0.088)	(0.072)	(0.082)
GDP Growth	0.067	0.088	-0.020
	(0.086)	(0.106)	(0.081)
Inflation	-0.002	0.005	-0.007*
	(0.004)	(0.005)	(0.004)
Corruption	0.012	0.015	-0.002
	(0.018)	(0.019)	(0.015)
Constant	0.352***	0.357***	-0.005
	(0.117)	(0.112)	(0.084)
Number of observations	1,041	1,041	1,041
R-squared	0.834	0.729	0.800

Source: Research Data and Service Centre (RDSC) of the Deutsche Bundesbank, Microdatabase Direct investment (MiDi) 1999-2014.

Notes: The regressions include year-specific and parent-specific effects. The standard errors are shown in parentheses. They are robust and clustered at the country-year level. *, ** and *** show significance at the level of 10%, 5% and 1%.

As mentioned in Section 3, debt financing at the level of holdings and the usage of the respective interest payments for offsetting profits of their subsidiaries in the same country is only possible, whenever there is a group tax regime. Therefore I also run separate regressions for firms which again belong to holding structures but are now also located in countries with such regimes (Table 9).

Table 9: Tax Influence on Capital Structures (consolidated debt ratios; only holding structures; group taxation regime in host country)

Dependent Variable	(1) CTDR	(2) CIDR	(3) CEDR
STR	0.595	0.052	0.543*
	(0.507)	(0.525)	(0.316)
MA	0.045	-0.030	0.074
	(0.179)	(0.171)	(0.123)
STR # MA	0.039	0.056	-0.018
	(0.592)	(0.591)	(0.357)
LCF	0.076***	0.079***	-0.004
	(0.014)	(0.015)	(0.012)
Sales	-0.003	-0.037***	0.034***
	(0.009)	(0.012)	(0.011)
Tangibility	0.061	-0.128*	0.189**
	(0.089)	(0.076)	(0.089)
Growth	0.136	0.105	0.031
	(0.090)	(0.116)	(0.081)
Inflation	-0.007	0.001	-0.008
	(0.004)	(0.005)	(0.005)
Corruption	-0.001	0.004	-0.005
	(0.018)	(0.019)	(0.016)
Constant	0.220	0.346**	-0.127
	(0.163)	(0.174)	(0.118)
Number of observations	909	909	909
R-squared	0.839	0.741	0.804

Source: Research Data and Service Centre (RDSC) of the Deutsche Bundesbank, Microdatabase Direct investment (MiDi) 1999-2014.
Notes: The regressions include year-specific and parent-specific effects. The standard errors are shown in parentheses. They are robust and clustered at the country-year level. *, ** and *** show significance at the level of 10%, 5% and 1%.

Indeed the effect on the external debt ratio is considerably more pronounced, implying that a 10 percentage point increase of the tax rate leads to a 5.4 percentage point increase of the debt ratio. As regards control variables, the major change to previous specifications is that now the share of tangible assets (measured by the variable *Tangibility*) has the expected positive effect on external borrowing whereas the effect of *Inflation* again turns insignificant.

Finally, in Table 10 I consider only such firms, which again belong to a holding structure but are now also located in countries with thin-capitalization rules or earnings stripping rules. As

mentioned above, holding structures may inter alia be used to circumvent such rules. Again I expect a stronger effect of the tax rate on the debt ratio compared to Table 8. Now, the effect on the total debt ratio becomes significant in case of M&A firms (with a coefficient of 0.817) but the effect of the tax rate on the external debt ratio becomes insignificant. Because of this mixed result I abstain from drawing conclusions here.

Table 10: Tax Influence on Capital Structures (consolidated debt ratios; only holding structures; thin-capitalization rules or earnings stripping rules in host country)

Dependent Variable	(1) CTDR	(2) CIDR	(3) CEDR
STR	0.266	-0.058	0.324
	(0.347)	(0.302)	(0.251)
MA	-0.233	-0.216*	-0.017
	(0.147)	(0.121)	(0.112)
STR # MA	0.817*	0.566	0.251
	(0.459)	(0.416)	(0.328)
LCF	0.053***	0.040**	0.013
	(0.015)	(0.015)	(0.012)
Sales	-0.002	-0.031***	0.029***
	(0.010)	(0.011)	(0.011)
Tangibility	-0.062	-0.182**	0.120
	(0.102)	(0.074)	(0.090)
GDP Growth	0.081	0.089	-0.008
	(0.096)	(0.113)	(0.089)
Inflation	-0.001	0.008	-0.009*
	(0.005)	(0.005)	(0.005)
Corruption	0.027	0.025	0.002
	(0.019)	(0.020)	(0.017)
Constant	0.356***	0.392***	-0.035
	(0.130)	(0.098)	(0.103)
Number of observations	855	855	855
R-squared	0.851	0.767	0.819

Source: Research Data and Service Centre (RDSC) of the Deutsche Bundesbank, Microdatabase Direct investment (MiDi) 1999-2014.
Notes: The regressions include year-specific and parent-specific effects. The standard errors are shown in parentheses. They are robust and clustered at the country-year level. *, ** and *** show significance at the level of 10%, 5% and 1%.

6. Concluding remarks

In this paper, I investigate the influence of tax incentives on the financial structures of M&As by MNEs. In case of M&As, purchase prices are often financed by high amounts of debt. From a tax perspective, it is beneficial to load the loans particularly on subsidiaries in countries with a high tax rate (debt push down). Additionally, I explain that it is often advantageous to place the debt at a holding in the country of the target firm, since it allows for debt financing up to the purchase price (and not just the amount of total assets).

I then investigate this potential tax influence on financial structures set up through M&As using a dataset of German MNEs. The analysis was separated into two steps. First, I investigate, whether financial considerations and associated tax benefits determine group and in particular holding structures. I show that the probability that a firm is held by a holding in the same country increases with the tax rate. In my empirical investigation, a 10 percentage point increase of the statutory profit tax rate increases the probability that the investment firm is held via a holding in the same country by about 4.3 percentage points. This supports my assumption, that it is advantageous for firms to place debt at the level of holdings in order to avoid taxes, but it is a rather small effect. However, I find no particularly strong effect in case of M&As.

In addition, if debt-push-down strategies involve holding structures, I show theoretically that it is necessary to consolidate financial structures of operating firms and those holdings which leads to higher debt ratios. I find that in the overall sample of firms and also for M&A firms in particular the total debt ratio however slightly declines with this consolidation. But if I consider M&A firms which belong to holding structures (i.e., for the subsample from which the effect of the consolidation stems), I see a considerable increase from the unconsolidated debt ratio (50.4 percent of debt relative to total capital) to the consolidated debt ratio (57.4 percent). According to that, I also find that indeed the effect of the tax rate on the external debt ratio increases with such a consolidation (but this effect cannot be found for the internal debt ratio and not in a robust way for the total debt ratio). This effect becomes stronger for firms which belong to a holding structure and even stronger if there is a group tax regime in the host country. To be precise, my results for the unconsolidated case show that an increase of the tax rate by 10 percentage points increases the debt ratio by 2.3 percentage points. For the consolidated case, this effect ranges between 2.9 percentage points (for all firms) and 5.4 percentage points (for firms that belong to a holding structure and are located in a country with a group tax regime). The stronger effect for the subsamples is as expected because I assume that the increase stems from such holding structures and profits of the firms have to be offset with the interest payments of the holding firms which requires a group tax regime. Finally, in at least some specifications I find a significantly negative effect of whether a firm entered the database through an M&A on the internal and total debt ratio as the dependent variables. This topic may be investigated in further research.

References

Altshuler, R., & Hubbard, R. G. (2003). The effect of the tax reform act of 1986 on the location of assets in financial services firms. *Journal of Public Economics, 87*(1), 109-127.

Belz, T., Robinson, L. A., Ruf, M., & Steffens, C. (2013). Tax avoidance as a driver of mergers and acquisitions. *mimeo*.

Büttner, T., Overesch, M., Schreiber, U., & Wamser, G. (2011). Corporation taxes and the debt policy of multinational firms. *Zeitschrift für Betriebswirtschaft, 81*(12), 1325-1339.

Büttner, T., Overesch, M., Schreiber, U., & Wamser, G. (2012). The impact of thin-capitalization rules on the capital structure of multinational firms. *Journal of Public Economics, 96*(11), 930-938.

Büttner, T., Overesch, M., & Wamser, G. (2011). Tax Status and Tax Response Heterogeneity of Multinationals' Debt Finance. *FinanzArchiv: Public Finance Analysis, 67*(2), 103-122.

Dreßler, D. (2012). Form follows function? Evidence on tax savings by multinational holding structures. *ZEW Discussion Paper, No. 12-057*.

Egger, P., Keuschnigg, C., Merlo, V., & Wamser, G. (2014). Corporate taxes and internal borrowing within multinational firms. *American Economic Journal: Economic Policy, 6*(2), 54-93.

Feld, L. P., Heckemeyer, J. H., & Overesch, M. (2013). Capital structure choice and company taxation: A meta-study. *Journal of Banking & Finance, 37*(8), 2850-2866.

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics, 60*(2), 187-243.

Huizinga, H., Laeven, L., & Nicodeme, G. (2008). Capital structure and international debt shifting. *Journal of Financial Economics, 88*(1), 80-118.

Huizinga, H. P., & Voget, J. (2009). International Taxation and the Direction and Volume of Cross-Border M&As. *The Journal of Finance, 64*(3), 1217-1249.

Jacobs, O. H. (2011). *Internationale Unternehmensbesteuerung: Deutsche Investitionen im Ausland, Ausländische Investitionen im Inland*. Munich: C. H. Beck.

Kraus, A., & Litzenberger, R. H. (1973). A state-preference model of optimal financial leverage. *The Journal of Finance, 28*(4), 911-922.

Lewellen, K., & Robinson, L. A. (2013). Internal ownership structures of US multinational firms. *mimeo*.

MacKie-Mason, J. K. (1990). Do taxes affect corporate financing decisions? *The Journal of Finance, 45*(5), 1471-1493.

Mintz, J. (2004). Conduit entities: Implications of indirect tax-efficient financing structures for real investment. *International Tax and Public Finance, 11*(4), 419-434.

Mintz, J. M., & Weichenrieder, A. J. (2010). *The The Indirect Side of Direct Investment: Multinational Company Finance and Taxation*. Cambridge, MA: MIT Press.

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics, 5*(2), 147-175.

Ruf, M. (2010). Holdings als Mittel der Steuerplanung zur Implementierung von steuerlich motiviertem Fremdkapital. *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung, 62*(8), 883-910.

Ruf, M. (2011). Why is the Response of Multinationals' Capital-Structure Choice to Tax Incentives That Low? Some Possible Explanations. *FinanzArchiv: Public Finance Analysis, 67*(2), 123-144.

Ruf, M., & Weichenrieder, A. J. (2012). The taxation of passive foreign investment: lessons from German experience. *Canadian Journal of Economics/Revue canadienne d'économique, 45*(4), 1504-1528.

Schild, C.-J., & Walter, F. (2016). Microdatabase Direct Investment 1999-2014, Data Report 2016-03 - Metadata Version 3: Deutsche Bundesbank Research Data and Service Centre.

Schindler, D., & Schjelderup, G. (2016). Multinationals and Income Shifting by Debt. *International Journal of the Economics of Business, 23*(3), 263-286.

UNCTAD. (2016). *World Investment Report 2016: Investor Nationality: Policy Challenges*. Geneva: UNCTAD.

Weichenrieder, A. J., & Mintz, J. (2008). What determines the use of holding companies and ownership chains? *Centre for Business Taxation Working Paper, WP 08/03*.