Corporate Debt Structure: An analysis of different tax policies on banks, non-bank financial firms and non-financial firms

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Abstract:

Reducing leverage in firms has been a goal since the financial crisis of 2007-2008. To reduce debt bias multiple tax based policies have been proposed and implemented with many deviations. CBIT, ACE and TCR aim to limit leverage with different approaches. The outcome of these policies is not homogenous for all group of firms. Financial firms and especially banks can show undesired behavior if certain conditions are met. To maximise the effect of the policies, a careful calibration is needed. To study this behavior we collected a unique dataset comprising information on corporate tax rates and policies like CBIT, ACE and TCR.

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1. Introduction

"The great distortion" was the title of an article in the economist in 2015. The article argues that subsidies on debt need to be phased out and this so-called debt distortion reduces economic growth and increases inequality (Economist, 2015). Furthermore, an economy with highly levered banks and firms is more vulnerable to crises. Multinationals use debt to reduce tax liabilities in high corporate income tax (CIT) countries. This debt shifting is merely an arbitrage between different international tax systems. Interest payments are deductible in many tax codes around the world. Equity, however, does not receive such generous treatment. Firms are biased towards using debt rather than equity for tax reasons. Multinationals respond to tax rate increases with an increase in internal debt (Buettner, Overesch, Schreiber, & Wamser, 2009). This debt shifting behavior between countries is not a first-order macroeconomic concern since it does not alter the total level of debt (Luca & Tieman, 2016).

Debt bias and debt shifting are both important but in a different way. Welfare loss is believed to be small with debt shifting, but debt bias has high direct and indirect welfare costs. Since the financial crisis, there are concerns for firms and banks with high debt ratios. Policymakers and central banks tried to stabilize the market, but high debt ratios were a threat to financial stability. High debt levels come at a cost of higher bankruptcy cost and rollover risk. Direct bailout costs in Europe during the financial crisis could have been reduced by 17 to 77 percent if debt bias would have been eliminated (Langedijk, Nicodème, Pagano, & Rossi, 2015).

High debt levels are also a concern for households. After the financial crisis many countries have adopted new policies that lowered the incentives for debt financing by households. Interest on new mortgages were made not tax deducible or deductibility is gradually reduced. These policies lowered the debt bias for households but not for firms. Firms can more easily take advantage of different tax systems in the world and are therefore harder to target with country-specific policies.

The debate about tackling the problem of debt bias and debt shifting for firms is long-standing. The Allowance for Corporate Equity (ACE) was first proposed by The Institute of Fiscal Studies in 1991. In the original proposal, firms could get an allowance for equity based on the notional interest rate set by the government. Their reasoning is that you

should treat equity in the same way as debt. With the ACE policy firms could earn the same tax deduction. However, the corporate income tax rate has to be increased to keep the policy budget neutral. Belgium in 2006 and Italy in 2011, for example, have adopted the ACE in their own way. The Italian ACE is argued to be the most viable one of the two (Zangari, 2014). Other proposed solutions to reduce or remove the debt bias and debt shifting are the Thin Capitalization Rule (TCR) and the more extreme Comprehensive Business Income Tax (CBIT).

This thesis focusses on the effects of different policies that aim or could influence the leverage ratio for firms. It is well known that the corporate income tax has a positive influence on leverage. The ACE and TCR policies are approaches to lower the incentives for debt financing. Also the interaction effect of the policies with the corporate income tax is taken into account. In this thesis there is a distinction between three different groups of firms. Firms are divided into banks, non-bank firms in the financial sector and all other firms.

Most studies that investigate the effect of the ACE and TCR policies simple exclude banks in their research and do not make a distinction between non-bank financial firms and all other firms in the economy. Other studies that do make a distinction between banks and non-financial firms exclude non-bank financial firms in their analysis. This thesis is to my knowledge the first paper that includes all three groups to investigate the effect of the different tax policies.

To be able to investigate these issues for all three types of firms, we collected a unique dataset comprising the different cross-country tax policies and firm data needed to be able to executive the investigation. Part of the data is available as a commercial data set only.

The next section of the paper discusses the current stand of the empirical and theoretical literature on different policies and debt structures. Subsequently, section 3 describes the methodology and regression equation used for the analysis. It contains detailed descriptions of the variables used and investigates possible issues. Section 4 gives an overview of the datasets and summary statistics. Building on the previous sections, section 5 includes the empirical results. Section 6 concludes.

2. Theory and Policies

2.1 Theory of capital structures

Modigliani-Miller (MM) introduced their theory on capital structures in a highly stylized economy with perfect capital markets (Modigliani & Miller, 1958). Furthermore, taxes, bankruptcy costs, agency cost and asymmetric information are assumed to be non-existing. Proposition 1 of MM states that the value of a firm is independent of the capital structure. A firm completely financed with debt and a firm financed with only equity should be valued the same because the value of the firm depends on what it does, not how it is financed. Financial leverage is therefore irrelevant and cannot contribute to an improvement of firm value.

2.1.1Trade-Off theory

The trade-off theory adds tax shields and the cost of financial distress to the MM's Proposition 1. In the real world, taxation is an important factor in an economy and firms can accumulate huge tax deductions. Interest on debt is in general tax deductible rather than income from equity. This is the so-called tax shield. The cost of financial distress is the present value of a potential default. Firms maximize the positive effects of tax shield and minimize effects of financial distress on their value (Myers & Majluf, 1984) and (Myers S. C., 1984). Agency costs are also included in this optimization.

2.1.2 Pecking Order theory

The pecking order theory assumes perfect capital markets except for asymmetric information. Firms face a problem when deciding to raise new funds for a project with a positive NPV. Since there is asymmetric information an issue of new shares can only happen at a price lower than the market price. A stock issue thus leads to a fall in the stock price of the issuing firm. Investors interpret a stock issue as a negative signal and act accordingly. The average fall in the stock price is 2.7% (Asquith & Mullins Jr., 1986). The pecking order of capital structure states that firms prefer internal financing to external financing. Firms adapt their target dividend payout ratios slowly over time to the investment opportunities. Dividends are sticky and firms use cash or marketable securities to meet dividend payouts. External financing starts with debt, followed by hybrid securities and as last resort equity (Myers S. C., 1984).

2.2 Debt bias and debt shifting

Most countries with a corporate income tax system allow a deduction for interest payments on debt, but not on equity. This leads to a distortion in the choice between equity and debt financing. Debt bias is the preference for debt financing over equity financing above the level they would have chosen without tax incentives. Debt shifting is the utilization of the differences in CIT rates to reduce the tax expenses in high tax countries. Firms in high tax countries borrow money within the multinational group from entities in low tax countries. The interest payments on this loan are deductible in the high tax countries and lower the tax expenses in these countries. Debt shifting through intra-group borrowing increases the leverage of one of the firms in the group but leads to rather small financial stability risk. Debt shifting merely affects the allocation of risk within the group, but the risk overall does not increase. The overall leverage remains unchanged because debt shifting increases leverage in one part of the firm but decreases it in another. Debt shifting erodes the tax base and it is the same for all countries, but it is more important for developing countries (IMF, 2014). Their tax base is already weak due to corruption and a less advanced tax system.

Research into corporate debt structures and taxation have begun to take off in recent years. A literature review estimates that the CIT rate has a positive significant influence on the debt-asset ratio of 0.17-0.28[1] (de Mooij R. A., 2011). This means that removing the CIT in for example the Netherlands, with a 25% rate[2], reduces the leverage ratio by 4.25-7 percentage point[3]. On average banks are less responsive to tax incentives than non-banks. For non-banks, a U-shaped pattern is found between the size of the firm and the magnitude of tax response. Meaning that the largest responses to tax incentives are observed with both very small and very large firms. Large firms respond differently to tax incentives given their initial leverage ratio. At low leverage ratios, the firms are highly responsive, but this responsiveness decreases when leverage ratios increase. For banks, the tax response declines with an increase in assets. The largest banks are more or less unresponsive to tax incentives, independent of their initial leverage ratio. A reason for this unresponsiveness could be that large banks already have an optimal leverage ratio and have reached the regulatory ceiling. These banks are not flexible anymore and a new

[1] Differences arise from different definitions of debt
[2] Excluding the 20% tariff for earnings until €200.000
[3] 0.25*0.17=0.0425

tax policy does not have an effect. Another reason could be that shareholders do not allow to raise new equity because it does not benefit them. An equity raise benefits creditors. The leverage of the bank decreases and the likelihood that creditors are paid in full in case of bankruptcy increases. Shareholders will advocate against an equity raise and banks with high leverage will remain highly leveraged (de Mooij, Keen, & Orihara, 2013) and (WRR, 2019). Small banks, however, are more responsive to tax incentives than non-banks of similar size. Small banks can respond to new policies with an increase in equity or a decrease in debt. They are more flexible than large banks. Small and medium-sized banks respond in the same way as large non-banks. They are highly responsive at low initial leverage ratios, but this responsiveness declines for higher initial leverage ratios (Heckemeyer & de Mooij, 2017) & (de Mooij, Keen, & Orihara, 2013). Future research is needed to investigate the interplay of tax regimes and regulatory policies. Regulators require financial and non-financial firms to hold a certain amount of equity, but taxation incentivizes firms to hold more debt because of the debt bias.

2.3 Allowance for Corporate Equity

The Allowance for Corporate Equity was first proposed by The Institute of Fiscal Studies in 1991. In the original proposal, firms could get an allowance on the equity part based on a notional interest rate set by the government. Their reasoning is that you should treat equity in the same way as debt. With the ACE firms could earn the same tax deduction, but without cash outflows due to interest payments (Institute for Fiscal Studies, 1991). Introducing the ACE is strongly recommended in the Mirrlees Review of the UK tax system (Mirrlees, et al., 2011). Switching to ACE from a system without the deductibility of equity can be done within a year. Various countries adopted the ACE policy. Belgium, Cyprus, Italy, and Turkey, for example, have a version of the ACE today and none of these countries came across major complications (IMF, 2016). Table 1 includes all countries with an ACE policy in the past or present with their own specifics.

Zangari (2014) compares the different ACE policies in Belgium and Italy. An ACE system has drawbacks in the short run because it shrinks the tax base and therefore lowers the tax revenue. Italy and Belgium both took different approaches while implementing the ACE. Italy implemented an incremental ACE while Belgium used a full ACE. The incremental system uses the variation of equity compared to a base year equity. The full system uses all equity as the base. This has major implications. Italy uses an incremental

ACE system and only new equity compared to the base equity level in 2010 is entitled to receive a deduction. Belgium uses a full ACE system and with this system all equity is entitled. The Belgium system is more expensive in the short run compared to the Italian one. The rate to calculate the total tax deduction is different in all countries, see Table 1. Theoretically, the rate should be equal to the risk-free rate if the CIT rate is fixed and losses can be carried forward indefinitely. Most tax codes[4] do not allow for losses to be carried forward indefinitely and certainly not with interest added (IMF, 2016). The notional rate is mostly proxied by the yield of government bonds of the specific country.

Introducing the ACE without proper legislation erodes the tax base with new tax planning opportunities. Consider a country with a full ACE policy, an ACE rate of 5% and a firm with consolidated accounting data with assets and equity equal to 1000. See Figure 1 for a visual representation of the firm's balance with the allowance. The ACE rate is the rate that is used to calculate the allowance on equity. This firm has an ACE base of 1000 and is entitled to an allowance of 50. This allowance reduces the tax liability of the firm by lowering the tax base. When the firm is situated in a country with a 25% CIT rate, no ACE policy and a tax base of 400 the total tax liability is 100. If there is an ACE policy the tax base is reduced by the allowance. The tax base becomes 350 and the total tax liability is reduced to 87.5. But the tax rate can be increased to compensate for the budget loss.

In Figure 2 the firm is organized as follows: Firm A is a holding that has 100% ownership of firm B. Firm B has 100% ownership of firm C and firm D is fully owned by firm C. Without proper legislation all 4 firms are entitled to a deduction based on the ACE policy, since they all have 1000 equity on their balance sheet. The total allowance is 200 compared to 50 in the first case. This can quickly erode the tax base and tax revenue. Introducing an anti-cascading rule forces firms to subtract all equity owned in another firm from the ACE base. With a properly implemented anti-cascading rule only firm D benefits from the allowance.

Firm				
Assets	1000	Equity	1000	Ace Base = 1000 Allowance = 50

Figure 1: Firm only financed with equity

[4] Italy is an exception and allows losses to be carried forward indefinitely

Firm A				no anti-cascading rule	anti-cascading rule
Participation	1000	Equity	1000	Ace Base = 1000 Allowance = 50	Ace Base = 1000 - 1000 = 0 Allowance = 0
Firm B					
Participation	1000	Equity	1000	Ace Base = 1000 Allowance = 50	Ace Base = 1000 - 1000 = 0 Allowance = 0
Firm C					
Participation	1000	Equity	1000	Ace Base = 1000 Allowance = 50	Ace Base = 1000 - 1000 = 0 Allowance = 0
Firm D					
Assets	1000	Equity	1000	Ace Base = 1000 Allowance = 50	Ace Base = 1000 Allowance = 50
				Total allowance = 200	Total allowance = 50

Figure 2: Holding with multiple subsidiaries and only financed with equity

Another tax planning opportunity arises when countries cap the ACE base at zero. In Figure 3 we consider a firm that is not only financed with equity as in the previous examples, but also with debt. Assets are still worth 1000 but equity and debt are respectively 400 and 600. The ACE base is in this case 400 and the allowance is 20.

Firm				
Assets	1000	Equity	400	Ace Base = 400
		Debt	600	Allowance = 20

Figure 3: Firm financed with debt and equity

Figure 4, consider a holding firm A with full ownership of firm B. The ACE base[5] of firm A should be -600 and instead of giving a deduction to their taxes it should increase their tax liabilities with 30. Firm B has an allowance of 50. Figure 3 and the no zero bound example in Figure 4 both have an allowance of 20. However, some countries impose a zero bound on the ACE base. This leads to an allowance of 50 for a holding and 20 for a single firm. Countries impose a zero bound to firm A because they want to prevent the exit of these companies. Countries have to implement anti-avoidance rules to prevent abuse of the zero bound. It becomes even more complex when holdings have firms in non-ACE countries with different tax codes. For a successful implementation of the policy it is essential that no loopholes exist and budgetary costs are not excessive. The latter holds for policies which use an incremental ACE system.

Firm A				no zero bound	zero bound
Participation	1000	Equity Debt	400 600	Ace Base = -600 Allowance = -30	Ace Base = 0 Allowance = 0
Firm B					
Assets	1000	Equity	1000	Ace Base = 1000 Allowance = 50	Ace Base = 1000 Allowance = 50

Figure 4: Holding with multiple subsidiaries and financed with debt and equity

The effect on the leverage in Belgium following the introduction of the ACE was a reduction of 2 to 7 percent (Princen, 2012), see also (Schepens, 2016). Introducing a full ACE or an incremental ACE results in a decrease of the debt-asset ratio of respectively 5.3 and 3.1 percent (Hebous & Ruf, 2017). Only German multinationals are considered in their research and it contains only unconsolidated data. Therefore it only addresses debt shifting and not debt bias.

In 2013 Belgium introduced the fairness tax to tax firms that do not or pay very small amounts of CIT. These firms used a combination of paid dividends to a (foreign) mother firm and tax deductions to lower their tax base to zero in the daughter firm. The tax was set at 5.15% on dividends that have not been taxed before and used tax deductions in the daughter firm. The European Court nullified the law by 1st March 2018 because Belgium

[5] Equity – equity owned in another firm= 400 – 1000= -600

violated constitutional law; specifically the Treaty on the Functioning of the European Union and the European Parent-Subsidiary according to case C-68/15. The court upheld the law in the period 2014-2018. Firms could not claim back the paid tax for this period. The only exception was if the paid dividend from the daughter to the mother firms has been distributed to the shareholders of the mother firm. The Belgium case shows that taxation is complex and loopholes in the CIT can be hard to fix or reduced while still complying with EU law.

2.4 Thin Capitalization Rule

The Allowance for Corporate Equity is discussed in the previous paragraph. This policy intends to equalize the incentives for debt and equity financing by allowing a deduction for equity. Another, maybe complementary, policy is the Thin Capitalization Rule or TCR. Instead of allowing a deduction for equity, the TCR policy limits the deductibility of interest on debt. Since 1971 60 countries have adopted a version of a TCR policy, see Table 2. The TCR limits the deductibility of interest on debt above a predetermined debt ratio. The policies differ with regards to the debt base. Some countries apply the TCR on all debt and others only on party-related debt. Focusing only on party-related debt limits the ability to profit from debt shifting. The TCR has two main forms with each having different approaches. Countries either

- Set a maximum amount of debt that is eligible for deductible interest payments. For the remainder of this thesis this form will be defined as the *debt approach*. The approach can be further subdivided into an Arm's Length approach and the Ratio approach.

or

- Set a maximum amount of interest that can be deductible. For the remainder of this thesis this form will be defined as *interest approach*. It can also be called the Earnings-stripping approach.

2.4.1 Arm's Length approach

The Arm's Length approach only allows interest payments on debt to be deductible if a third party would be willing to lend under the same circumstances and conditions. The advantage of this approach is that it removes differences between domestic firms and firms that are part of a multinational. The latter one could, in absence of arm's length rules, deduct interest payments on a loan that would be unobtainable by a domestic firm. This

approach equalizes the interest deductibility between firms in an economy. A disadvantage is that the tax authority has to verify the conditions under which a third party would be willing to lend.

2.4.2 Ratio approach

The ratio approach sets a maximum amount of deductible interest expenses by using the debt to equity ratio of the firm. For example, Brasil uses a 3 to 1 ratio as can be seen in Table 2. The maximum deductible interest payments on debt are in this case 3 times the equity invested in the firm. The ratio differs across countries but is between 1 and 5 to 1. The advantage of this approach is that it is simple to implement and does not have the difficulties for the tax authorities that are present with the Arm's Length approach. However, this approach does not take into account the differences in certain industries. This could lead to competitive advantages for multinational firms. These firms could fully utilize the ratio while domestic firms would not be able to acquire the same level of loans.

2.4.3 Combining Ratio and Arm's Length approach

Countries apply a combination of both approaches with the ratio approach as basis. A sole Arm's Length approach without setting a maximum level of debt is rare and only 3 countries that have adopted this approach. The majority of countries that limit the amount of debt that has deductible interest payments implemented the ratio approach. However, there are differences and the countries that have implemented the ratio approach could be divided into two groups. One group implemented the ratio approach without putting further limitations on debt while other countries included the Arm's Length approach.

2.4.4 Earnings-Stripping approach

The earnings-stripping rule allows interest deductibility up until the net total interest expense reaches the set percentage of EBITA. This threshold lies mostly between 10 and 30 percent, but it is a guideline and not a rule (IMF, 2016). Again there are two groups of countries. Some apply the Interest Stripping approach to all outstanding debt and others limit the deductibility to debt that also qualifies under the Arm's Length approach.

2.4.5 Anti-avoidance rules

In the real world firms would optimize their taxability by changing the variables that they could influence. The TCR should have similar anti-avoidance rules as ACE. Otherwise multinational firms would, for example, temporarily lower their debt level on paper right before the reporting period and immediately reverse back to the old situation after. If not

properly regulated these practices could erode the tax base of a country. Debt and equity are clearly defined on paper but in the real world there could be discussion about what would qualify as debt and what as equity or vice versa.

2.4.6 Literature

A TCR applied to all debt leads to a decrease of the leverage ratio of 5 percentage points according to de Mooij & Hebous, 2017. There is no significant effect on the debt-equity ratio when the TCR only targets debt that qualifies under the Arm's Length approach. The TCR is more responsive in high tangible industries than in low tangible ones (de Mooij & Hebous, 2017). These results are based on a consolidated dataset with non-financial firms only. Some countries apply exceptions to banks concerning the TCRs, but not all of them.

This thesis extends the literature and investigates the effect of the TCR on banks, non-bank financial firms and non-financial firms. The debt-equity ratio decreases with 1.9 percent when all debt is subject to the TCR. When only Arm's Length debt is targeted the debt-equity ratio decreases with 6.3 percent. Arm's Length debt TCR also reduces the debt to asset ratio with 0.8 percent (Blouin, Huizinga, Laeven, & Nicodème, 2014). These results only reflect debt shifting rather than debt bias because unconsolidated data is used. A study for Germany shows that a TCR reduces the incentive to use internal debt (Buettner, Overesch, Schreiber, & Wamser, 2012). Non-financial firms reduce their leverage ratio by 1.0 to 1.3 percent point when confronted with a TCR. When the TCR is applied to all debt it reduces the leverage ratio by 5.0 to 5.6 percent point. The Arm's Length TCR reduces the debt ratio by 0.6 percent point, but the effect is not statistically significant when controlled for industry-year fixed effects (IMF, 2016). This study uses consolidated data and the results thus include the debt bias.

2.5 Comprehensive Business Income Tax

The comprehensive business income tax fully neutralizes the debt bias by simply removing the deduction on debt. The original CBIT proposal came from the US Treasury in 1992. It suggested splitting all firms into two categories, namely CBIT and non-CBIT firms. Only very small firms are in the non-CBIT category. All other firms are in the CBIT category and are therefore denied the use of interest deductibility. This policy increases the cost of capital and reduces investments. On the other hand, the CBIT increases the tax base which gives the opportunity to reduce the CIT. This reduction leads to welfare benefits for the specific country if all other countries do not change their CIT. The other countries lose welfare due to profit shifting and the exemption for double taxation (de

Mooij & Devereux, 2011). This can escalate the race to the bottom of the CIT rate and put pressure on the revenue neutrality of the CBIT as a whole. Another major concern is that CBIT does not tax banks but shifts the tax burden to non-financial firms. Banks are financed by deposits. These deposits are used to lend out money and generate interest income. The CBIT does not allow a deduction on debt for banks and other firms but it does not tax received interest payments from other CBIT firms either. Lending is a core business for banks and under CBIT the interest payments banks receive are untaxed. But the interest payments on deposits, which make up a large part of a bank's balance sheet, are not deductable either. In a CBIT country non-bank firms account for the whole tax base. If a country adopts the CBIT on its own it creates a double taxation problem for foreign banks. These are taxed on their income in the CBIT country, but also in their home country. Introducing the CBIT in a single country creates many problems and therefore it is not adopted anywhere in the world. The CBIT implementation needs to be done in consultation with many countries and that creates a lot of problems, delays, and conflicts of interest. The CBIT can be combined with the ACE to limit manipulation with transfer pricing (Schindler & Vrijburg, 2019). The CBIT in this proposal is not a classic CBIT but it is transformed towards TCR.

2.6 Basel regulations

This thesis investages different tax policies that aim to lower leverage for bank, non-bank financial firms and non-financial firms. The Basel agreement also aimed to lower the leverage for banks by increasing the capital requirements. The different Basel agreements are briefly summarised below.

The Basel agreement was a response to the liquidation of a European bank in 1974. The G-10 established the Basel Committee on Banking Supervision (BCBS) that published a set of minimum capital requirements for banks in 1988. The main focus of Basel I is credit risk (CR) and risk-weighted assets (RWA). Banks have to hold capital of at least 8% compared to their outstanding RWA. Each asset category is classified as a risk percentage. For example US treasury bill is classified at 0% but real estate at 100%. Capital consists of Tier 1 and Tier 2 capital. A bank that has 1 billion in RWA has to have at least 80 million in combined Tier 1 and Tier 2 capital.

Basel II was introduced in 1992 after significant losses in the markets by banks due to poor risk management. Basel II extended the first agreement with further regulations and

consists of 3 main pillars. Minimum capital requirements, supervisory review and market discipline. This agreement extends the calculations of RWA and introduced the Value at Risk approach for estimating market risk. Basel II takes into account the credit rating of assets in regulating risk weight percentages.

After the credit crisis of 2007-2008 Basel II was extended to Basel III. Base III was implemented in 2018 but the first proposal was already published in 2009. The agreement extends the first pillar of Basel II concerning the minimum capital requirements. Under Basel III banks have to hold an additional 2.5 percent capital as capital conservation buffer. This extra buffer is meant to absorb losses in period of stress such as in the credit crisis.

3. Methodology

The thesis uses the same reduced-form baseline regression formula as the paper of Heckemeyer and de Mooij (2017) and other empirical literature on corporate finance. But with the introduction of an ACE and TCR dummy variable. The analysis uses a normal OLS regression and is divided between banks, non-bank financials and non-financial firms.

3.1 Banks

3.1.1 Allowance for Corporate Equity

In this thesis the following specification is used in regressions:

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 ACE_{ct} + \beta_8 ACE_{ct} * \tau_{ct} + \beta_9 BC_i + \theta_C + \mu_t + \varepsilon_{ict} \quad (1)$$

The subscript *i* denotes a firm, the subscript *c* denotes each country and *t* denotes each year. The dependent variable, *lev,* is the leverage ratio defined as total debt divided by total assets and τ is the CIT in a country. The vector $\boldsymbol{x}_{it}$ contains variables that have an influence on leverage ratios. It includes tangibility defined as fixed assets divided by total assets, profitability defined as operating income divided by total assets and the market-to-book ratio defined as the market value of equity divided by the book value of equity (Fan, Titman, & Twite, 2012). The market-to-book ratio captures variables that are otherwise hard to use due to data limitations. It is a proxy for creditworthiness, future growth, markets' confidence in management and operating risk. The firm size is defined as the natural logarithm of total assets.

The vector $\boldsymbol{z}_{ct}$ contains the growth rate of GDP and inflation. The variable *ACE* is a dummy variable for the allowance for corporate equity with a value 1 if the country has an ACE system and 0 otherwise. An interaction term between the CIT rate and the natural logarithm of firm size and its square is included to investigate if the size of banks has an influence on the effect of CIT on leverage. The other interaction effects are between the CIT rate and the ACE policy. This term is included to investigate if the effect of the CIT on leverage differs for countries with an ACE policy. There is also a variable for binding capital restrictions, *BC,* under Basel III. The regression also includes dummy variables for country and time. The last term is a general error term.

There might be non-linear effects between firm size and leverage. This can be due to scale effects. To allow for such effects a Taylor approximation is used with a squared term. When a Taylor approximation is included in the regression the interpretation of the relationship is extended. Without a Taylor approximation the coefficient is interpreted as a linear positive or negative relationship. Adding the approximation to the analysis extends the relationship with convexity and concavity.

$$f(x) = \sum_{n=0}^{\infty} \frac{f^{(n)}(a)}{n!}(z-a)^n \tag{2}$$

Equation 2 is the general expression of the Tylor series. This thesis uses a second-order derivative of the Taylor series and can be written as:

$$f(x) = f(a) + f'(a)(x-a) + \frac{1}{2}f''(a)(x-a)^2 \tag{3}$$

$f(a)$ is the intercept, $f'(a)(x-a)$ is the slope term and $\frac{1}{2}f''(a)(x-a)^2$ shows the convexity or concavity of the formula.

3.1.2 Thin Capitalization Rule

The next specification is to analyse the TCR policy. The variables and subscripts in Equation 4 have the same meaning and interpretation as in Equation 1. Only the *TCR* dummy variable replaces the *ACE* variable.

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 TCR_{ct} + \beta_8 TCR_{ct} * \tau_{ct} + \beta_9 BC_i + \theta_C + \mu_t + \varepsilon_{ict} \tag{4}$$

TCR is a variable that captures all countries with a TCR. It has a value 1 when there is a TCR policy that has no limitation to banks and 0 otherwise. Later on, a further distinction is made within TCR countries since there are 2 different forms with different approaches. These forms are the debt approach and the interest approach.

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 TCRDEBT_{ct} + \beta_8 TCRDEBT_{ct} * \tau_{ct} + \beta_9 BC_i + \theta_C + \mu_t + \varepsilon_{ict} \tag{5}$$

The variables and subscripts in Equation 5 have the same meaning and interpretation as in Equation 1. Only variable *TCR* is replaced with *TCRDEBT*. This variable captures all countries that use a debt approach with a value 1 and 0 otherwise. Simultaneously Equation 6 is used for the countries that follow the interest approach. Where variable *TCR*

is replaced with *TCRINT*. Again the dummy variable has a value of 1 when a country follows the interest approach and 0 otherwise.

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 TCRINT_{ct} + \beta_8 TCRINT_{ct} * \tau_{ct} + \beta_9 BC_i + \theta_C + \mu_t + \varepsilon_{ict} \quad (6)$$

All dummy variables with versions of the TCR are also used for the interaction with the CIT rate. Table 3 gives a summary of all variables with explanations.

Furthermore, this thesis also considers:

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 TCRARM_{ct} + \beta_8 TCRARM_{ct} * \tau_{ct} + \beta_9 BC_i + \theta_C + \mu_t + \varepsilon_{ict} \quad (7)$$

Variable *TCRARM* is a dummy variable to investigate countries that do follow the Arm's Length approach but without setting an absolute debt maximum as under the debt approach.

The final set of equations comprises equations 8 to 11. These equations follow the same logic as Equations 4 to 7 but with a further distinction within the TCR system. The new TCR variables are briefly described below. However the estimates are relegated to Appendix 4.

Variable *TCRDEBTARM* in Equation 8, captures countries that follow the debt approach in combination with restrictions described in the Arm's Length approach. In this case, interest payments on debt cannot be deducted if the debt qualifies under the normal debt approach but fails the Arm's Length approach. These loans have too favorable terms that no third party would be willing to accept.

Variable *TCRDEBTALL* in Equation 9, captures countries that follow the debt approach but do not restrict deductibility based on the Arm's Length approach. All interest payments on debt that fall below the threshold will be deductible. Regardless of the terms of the loan.

Variable *TCRINTARM* in Equation 10, captures countries that follow the interest approach and do restrict deductibility based on the Arm's Length approach. Interest payments are deductible if the terms of the loan are acceptable to a third party and the total interest payments fall below the threshold.

Variable *TCRINTALL* in Equation 11, captures countries that follow the interest approach and do not restrict deductibility on Arm's Length approach. All interest payments are deductible if the total amount of interest payments fall below the threshold.

3.2 Non-bank financial firms

The analysis of non-bank financial firms follows the same specification as for banks. Only the binding capital restriction variable *BC* is removed and subindustries are introduced:

$$lev_{isct} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 ACE_{ct} + \beta_8 ACE_{ct} * \tau_{ct} + \delta_s + \theta_C + \mu_t + \varepsilon_{isct} \quad (12)$$

$$lev_{isct} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 TCR_{ct} + \beta_8 TCR_{ct} * \tau_{ct} + \delta_s + \theta_C + \mu_t + \varepsilon_{isct} \quad (13)$$

The subscript *i* denotes each firm, the subscript *s* denotes the subindustry, the subscript *c* denotes each country and *t* denotes each year. The subindustry variable uses the Industry Classification Benchmark which divides firms into 10 industries, 19 supersectors, 41 sectors and 114 subsectors.

Equation 12 is used to analyse non-bank financial firms in combination with the ACE policy and Equation 13 is used for TCR analysis. Equations 5-11 are still used to further investigate the different TCR policies but the equations are not reported for brevity.

3.3 Non-financial firms

The analysis of non-financial firms follows the same regression equations as non-bank financial firms.

$$lev_{isct} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 ACE_{ct} + \beta_8 ACE_{ct} * \tau_{ct} + \delta_s + \theta_C + \mu_t + \varepsilon_{idsct} \quad (14)$$

$$lev_{isct} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 TCR_{ct} + \beta_8 TCR_{ct} * \tau_{ct} + \delta_s + \theta_C + \mu_t + \varepsilon_{idsct} \quad (15)$$

The subscript *i* denotes each firm, the subscript *d* denotes the industry, the subscript *s* denotes the subindustry, the subscript *c* denotes each country and *t* denotes each year. The subindustry variable uses the Industry Classification Benchmark which divides firms into 10 industries, 19 supersectors, 41 sectors and 114 subsectors.

Equation 14 is used to analyse non-financial firms in combination with the ACE policy and Equation 15 is used for TCR analysis.

3.4 Expected signs

Appendix 3 contains an overview of the variables and the expected signs. The CIT rate is expected to have a positive coefficient because of the tax shield. An increase in CIT rate has a positive influence on leverage. Larger firms have higher leverage and therefore this coefficient is also expected to be positive. The marginal increase in leverage is however expected to be diminishing in firm size. Therefore the squared term of firm size is expected to have a negative coefficient.

The coefficients of the different policies are expected to have negative coefficients. These policies aim to decrease leverage. The policies interact also with the CIT rate and this can lead to different results given a certain CIT rate. Firms that have a binding capital restriction have higher leverage. This coefficient is therefore expected to be positive. Tangibility is expected to have a positive coefficient for non-banks as this is a typical find (Heckemeyer & de Mooij, 2017). Tangibility is a proxy for collateral and this increases access to external funding. Higher tangibility ratios therefore increase leverage ratios. The coefficient for banks can be different due to the nature of banking. The assets for banks are mostly loans and these are not tangible assets. High profitability is a proxy for the overall health of the firm and high profits increase access to external funding. Thus increasing leverage. However, high profits also increase the equity of the company and therefore decrease leverage. The effect on leverage is unambiguous. The market-to-book ratio captures variables that are otherwise hard to use due to data limitations. The expected coefficient is positive. Richly valued firms could attract more external funding than lower valued companies.

GDP growth has not theoretical implications for debt ratios and therefore the coefficient is unambiguous (Heckemeyer & de Mooij, 2017). High GDP growth could signal high profits which would increase the equity within firms. This could lead to decreasing leverage. High inflation increases leverage for non-bank and non-financial firms since it lowers the cost of borrowing. The coefficient is expected to be positive for these groups. Banks could be discouraged to supply additional debt and the expected coefficient is negative for this group.

4. Data

Data on firm-level for banks, non-bank financials, and non-financial firms are taken from Worldscope. It contains data on a consolidated level and only firms that are publicly listed and which are still in operation[6] are taken into account. By using consolidated over unconsolidated data the interpretation of the regression analysis is about debt bias. The sample has data for 14 years between 2003 and 2016 with 1400 banks across 65 countries, 4981 non-bank financial firms across 92 countries and 32157 non-financial firms across 74 countries. The CIT variable is obtained from the Corporate tax rates table of KPMG and GDP Growth and Inflation are retrieved from the World Economic Outlook Database of the IMF. Appendix 6 contains the descriptive statistics for all variables used in the regressions. These values are more extreme than in Hebous and Martin (2017), de Mooij, Keen and Orihara (2013) and Heckemeyer and de Mooij (2017) since the data is not winsorized at a 1 or 5 percent level to eliminate extreme values. Appendix 5 describes the considerable effort and steps taken to compile the consistent dataset.

The log assets and market-to-book ratio, for example, have more extreme values than in the papers mentioned earlier. By expanding the independent variables this thesis includes the observations in both extremes, the lower and upper tail of the distribution. While analyzing policies these values should be included because banks, especially larger banks, can have an enormous influence on the world economy. If tax policies do not influence banks in the right tail of the leverage distribution the policy itself becomes less effective in preventing a crisis.

Figure 5 describes the distribution of total assets for banks. The data shows that most banks have a logarithmic total asset value between 19 and 25. These values correspond to respectively 178 million and 72 billion. The total assets of non-bank financial firms are mostly between 15 and 23 respectively 3.2 million and 9.7 billion, see Figure 6. Non-financial firms have a similar distribution as non-bank financial firms although the upper tail is lower and less dense, see Figure 7. Banks tend to be much larger than non-bank financial firms and non-financial firms and they also differ in distribution. One explanation for the relatively outsized balance sheets of banks, is the fact that banks create deposits simultaneously with loans (both of equal size). That is, banks provide the

[6] As of 2017

funding themselves. This makes that the balance sheet can expand relatively easily, see (WRR, 2019). While non-bank financial firms and non-financial firms have a more normal shaped distribution. Banks have a positively skewed distribution.

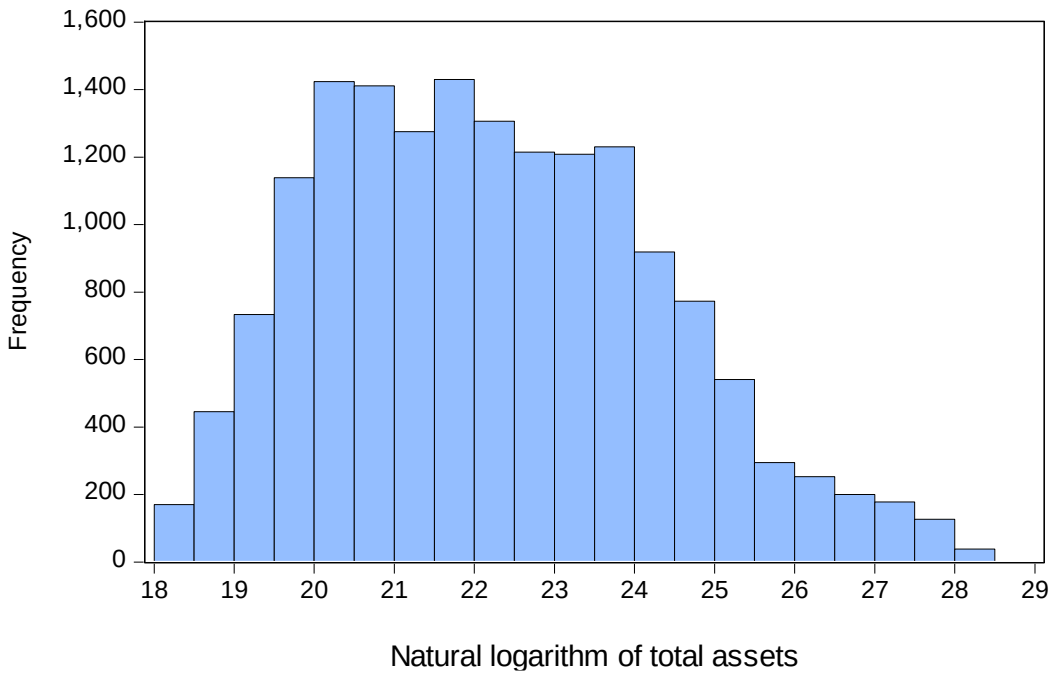

Figure 5: Natural logarithm of total assets for banks

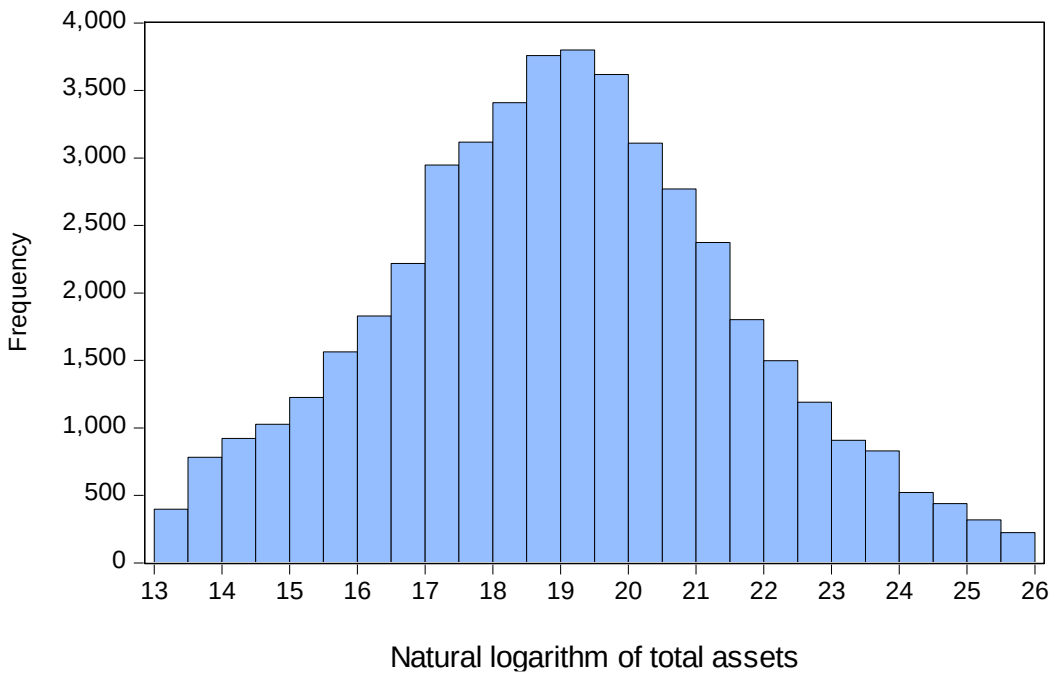

Figure 6: Natural logarithm of total assets for non-bank financial firms

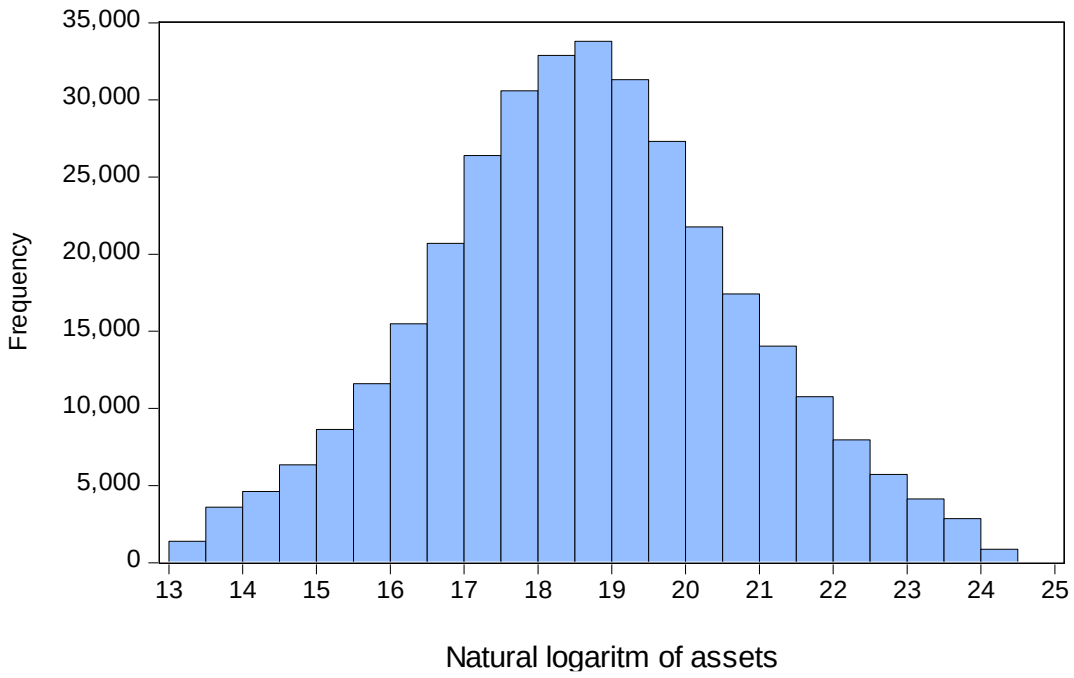

Figure 7: Natural logarithm of total assets for non-financial firms

Appendix 1 contains the countries that have implemented the ACE policy. There are not many countries with an ACE policy and the implementation also differs slightly between countries. All countries are however treated as if there was one general ACE policy for this thesis. The number of observations for the ACE policy are 2 to 3 percent for the different samples, as can be seen in Appendix 6. The mean of dummy variables can be interpreted as the percentage of the sample because the dummy has either value 1 or 0.

Appendix 2 contains the countries that have implemented a form of a TCR policy. As already explained earlier there is not a general form of the TCR. The number of observations for the TCR policy is much larger than for the ACE policy. A 48 to 62 percent of all firms in the sample have a form of TCR. Since the TCR policies can be fundamentally different, analyzing having a TCR or not can be misleading. Therefore each form and approach of TCR has an individual variable. Most countries with a TCR follow the debt approach, specifically the debt approach in combination with the Arm's Length approach. The interest approach is adopted in a minority of cases with only 3 to 6 percent of all firms in the sample. There are almost no observations for countries that follow an interest approach in combination with an Arm's Length approach.

Using consolidated data can be a problem while analyzing the effect of policies on the leverage of firms. The CIT variable captures the corporate income tax rate of the country in which the headquarter of the firm is located. Multinationals have many entities in different countries with different CIT rates. The data ignores the tax rates for local entities and applies the tax rate of the home country to the entire income. Using an unconsolidated dataset solves this problem, but then a distinction between debt shifting and debt bias is no longer possible. In this case the correct corporate tax rate is used for each subsidiary. However, it is no longer possible to make a distinction regarding the nature of the debt. It can either be debt shifting or debt bias. If consolidated data is used the interfirm transactions relating to debt are eliminated.

This thesis is about the debt bias so it is not ideal to use unconsolidated data. Also, some countries tax firms on their worldwide income instead of their local income. This alters the tax variable in unconsolidated data too. The CIT rate variable can also be transformed to the average tax rate. This variable can be used with consolidated data, but it is endogenous as it depends on the leverage ratio (Heckemeyer & de Mooij, 2017). The average tax rate variable depends on the CIT rate in the country and the level of debt. When a firm has high debt levels the effective CIT rate decreases. This translates into the average tax rate variable. This thesis uses the CIT rates of countries rather than the average tax rate in the analysis. Consolidated data is used since the thesis investigates the effect of debt bias on leverage in combination with different policies.

5. Empirical Analysis

Tables 1, 2 and 3 show the results for Equations (1) to (15) estimated by OLS for banks, non-bank financial firms and non-financial firms. All regression models are controlled for GDP growth, inflation, profitability, market-to-bank ratio, year fixed effects and country fixed effects. Non-bank financial firms are also controlled on a subsector level and non-financial firms are controlled on sector and subsector level.

5.1 CIT

The corporate income tax increases the leverage for all three groups of firms. Model 1 in all three tables shows a positive relationship between leverage and the CIT rate. Banks increase their leverage with 0.010, non-bank financial firms by 0.218 and non-financial firms by 0.305. These coefficients translate to 0.10, 2.18 and 3.05 percentage point increase in leverage on average when the CIT rate is increased by 10 percent point. The marginal tax effect on banks is less than on non-bank financial firms and non-financial firms. In the literature, all non-bank financial firms are generally included in the non-bank category. Further dividing the non-bank group, as done in this thesis, shows that there is a difference in magnitude between non-bank financial firms and non-financial firms.

The effect for non-bank financial firms and non-financial firms is larger compared to Heckemeyer and De Mooij (2012). A reason for the difference in marginal tax effects for banks and other firms could be that banks are more heavily regulated. Moreover, the leverage in banks is already extremely high and cannot go much higher even if there was no capital regulation. The Basel agreements introduced capital restrictions for banks. When the restrictions are binding banks cannot adjust their leverage upwards. Banks can in this case no longer increase their leverage even if they wanted to. Non-bank financial firms and non-financial firms are less regulated and therefore they are able to adjust their leverage upwards if they choose to do so. Moreover, their existing leverage levels are much lower.

Model 10 includes a binding capital restriction variable for banks. Banks that have binding capital restrictions have on average 0.030 higher leverage than banks that do not have binding capital restrictions. This explains why banks respond less to CIT rate increases compared to the other two groups. Even if banks do not have binding capital restrictions they cannot increase the leverage too much. If they would increase their leverage too

much banks would be faced with binding capital restrictions. Non-bank financial firms and non-financial firms do not or to a lesser extent face binding capital restrictions. Therefore these groups can increase leverage much more than banks do when there is a change in the CIT rate.

Table 1: Leverage regressions for banks

Model	(1)	(2)	(3)	(4)	(5)
CIT	0.010** (0.004)	0.237*** (0.043)	1.354*** (0.418)	1.473*** (0.419)	1.469*** (0.419)
Log assets	0.006*** (0.000)	0.010*** (0.001)	0.046*** (0.012)	0.049*** (0.012)	0.049*** (0.012)
Log assets squared			-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Log assets cubed					
Log assets * CIT		-0.010*** (0.002)	-0.108*** (0.037)	-0.119*** (0.037)	-0.118*** (0.037)
Log assets squared * CIT			0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)
ACE				-0.009*** (0.002)	-0.000 (0.012)
ACE*CIT					-0.027 (0.035)
TCR					
TCRARM					
TCRDEBT					
TCRINT					
TCRDEBTARM					
TCRDEBTARM*CIT					
TCRDEBTALL					
TCRDEBTALL*CIT					
TCRINTARM					
TCRINTARM*CIT					
TCRINTALL					
TCRINTALL*CIT					
BC					
GDP Growth	-0.038*** (0.009)	-0.037*** (0.009)	-0.036*** (0.009)	-0.041*** (0.009)	-0.040*** (0.009)
Inflation	-0.021*** (0.007)	-0.017*** (0.007)	-0.016** (0.007)	-0.013* (0.007)	-0.013* (0.007)
Profitability	-1.279*** (0.032)	-1.272*** (0.032)	-1.278*** (0.032)	-1.278*** (0.032)	-1.277*** (0.032)
Tangibility	-0.235*** (0.030)	-0.237*** (0.030)	-0.237*** (0.030)	-0.243*** (0.030)	-0.243*** (0.030)
Market-to-Book	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001** (0.000)	0.001** (0.000)
Constant	4.510*** (0.159)	4.513*** (0.159)	4.093*** (0.218)	4.064*** (0.218)	4.073*** (0.218)
Year	YES	YES	YES	YES	YES
Country	YES	YES	YES	YES	YES
N	14209	14209	14209	14209	14209
R^2	0.240	0,241	0.242	0.2244	0.244

Note: The dependent variable is the leverage ratio defined as total liabilities divided by total assets. Standard errors are in parentheses and asterisks denote significance at a 1, 5, 10 percent level with respectively ***, ** and *.

Table 1 continued: Leverage regressions for banks

Model	(6)	(7)	(8)	(9)	(10)
CIT	1.349*** (0.418)	1.379*** (0.419)	2.549*** (0.417)	1.723*** (0.421)	0.019*** (0.005)
Log assets	0.048*** (0.012)	0.048*** (0.013)	0.074*** (0.012)	0.045*** (0.013)	0.163*** (0.038)
Log assets squared	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.007*** (0.002)
Log assets cubed					0.000*** (0.000)
Log assets * CIT	-0.107*** (0.037)	-0.110*** (0.037)	-0.197*** (0.037)	-0.124*** (0.037)	
Log assets squared * CIT	0.002*** (0.001)	0.002*** (0.001)	0.004*** (0.001)	0.003*** (0.001)	
ACE					
ACE*CIT					
TCR	0.002** (0.001)				
TCRARM		0.001 (0.003)			
TCRDEBT		0.003*** (0.001)			
TCRINT		-0.002 (0.002)			
TCRDEBTARM			-0.004*** (0.001)	0.008** (0.004)	
TCRDEBTARM*CIT				-0.026** (0.011)	
TCRDEBTALL			0.019*** (0.001)	-0.041*** (0.004)	
TCRDEBTALL*CIT				0.187*** (0.013)	
TCRINTARM			0.039*** (0.014)	0.139 (0.179)	
TCRINTARM*CIT				-0.473 (0.834)	
TCRINTALL			-0.000 (0.001)		
TCRINTALL*CIT					
BC					0.030*** (0.004)
GDP Growth	-0.031*** (0.009)	-0.031*** (0.009)	-0.034*** (0.009)	-0.027*** (0.009)	-0.041*** (0.010)
Inflation	-0.015** (0.007)	-0.015** (0.007)	-0.016** (0.007)	-0.003 (0.007)	-0.036*** (0.009)
Profitability	-1.274*** (0.032)	-1.277*** (0.032)	-1.201*** (0.032)	-1.211*** (0.031)	-1.315*** (0.039)
Tangibility	-0.236*** (0.030)	-0.236*** (0.030)	-0.261*** (0.030)	-0.271*** (0.029)	-0.238*** (0.035)
Market-to-Book	0.001*** (0.000)	0.001*** (0.000)	0.003*** (0.000)	0.004*** (0.000)	0.001*** (0.001)
Constant	4.089*** (0.218)	4.090*** (0.218)	3.423*** (0.218)	3.228*** (0.218)	3.523* (0.332)
Year	YES	YES	YES	YES	YES
Country	YES	YES	YES	YES	YES
N	14209	14209	14209	14209	14209
R^2	0.242	0.243	0.265	0.278	0.267

Note: The dependent variable is the leverage ratio defined as total liabilities divided by total assets. Standard errors are in parentheses and asterisks denote significance at a 1, 5, 10 percent level with respectively ***, ** and *.

Table 2: Leverage regressions for non-banks financial firms

Model	(1)	(2)	(3)	(4)	(5)
CIT	0.218*** (0.017)	0.353*** (0.123)	4.662*** (0.762)	4.684*** (0.762)	4.753*** (0.761)
Log assets	0.058*** (0.001)	0.060*** (0.002)	0.230*** (0.024)	0.231*** (0.024)	0.232*** (0.024)
Log assets squared			-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
Log assets * CIT		-0.007 (0.006)	-0.449*** (0.077)	-0.450*** (0.077)	-0.455*** (0.077)
Log assets squared * CIT			0.011*** (0.002)	0.011*** (0.002)	0.011*** (0.002)
ACE				-0.033*** (0.008)	0.319*** (0.054)
ACE*CIT					-1.081*** (0.163)
TCR					
TCRARM					
TCRARM*CIT					
TCRDEBT					
TCRINT					
TCRDEBTARM					
TCRDEBTARM*CIT					
TCRDEBTALL					
TCRDEBTALL*CIT					
TCRINTARM					
TCRINTARM*CIT					
TCRINTALL					
TCRINTALL*CIT					
GDP Growth	-0.197*** (0.038)	-0.201*** (0.039)	-0.204*** (0.039)	-0.227*** (0.039)	-0.231*** (0.039)
Inflation	0.093** (0.038)	0.091** (0.039)	0.096** (0.039)	0.103*** (0.039)	0.108*** (0.039)
Profitability	-0.253*** (0.012)	-0.253*** (0.012)	-0.269*** (0.012)	-0.270*** (0.012)	-0.270*** (0.012)
Tangibility	-0.065*** (0.005)	-0.065*** (0.005)	-0.067*** (0.005)	-0.068*** (0.005)	-0.067*** (0.005)
Market-to-Book	0.029*** (0.001)	0.029*** (0.001)	0.029*** (0.001)	0.029*** (0.001)	0.029*** (0.001)
Constant	4.714*** (0.678)	4.693*** (0.679)	2.820*** (0.724)	2.685*** (0.725)	2.919*** (0.725)
Year	YES	YES	YES	YES	YES
Country	YES	YES	YES	YES	YES
Subindustry	YES	YES	YES	YES	YES
N	34137	34137	34137	34137	34137
R^2	0.318	0.318	0.319	0.320	0.321

Note: The dependent variable is the leverage ratio defined as total liabilities divided by total assets. Standard errors are in parentheses and asterisks denote significance at a 1, 5, 10 percent level with respectively ***, ** and *.

Table 2 continued: Leverage regressions for non-banks financial firms

Model	(6)	(7)	(8)	(9)
CIT	4.983*** (0.760)	4.930*** (0.760)	5.488*** (0.760)	6.884*** (0.780)
Log assets	0.247*** (0.024)	0.246*** (0.024)	0.261*** (0.024)	0.300*** (0.024)
Log assets squared	-0.005*** (0.001)	-0.004*** (0.001)	-0.005*** (0.001)	-0.006*** (0.001)
Log assets * CIT	-0.479*** (0.070)	-0.476*** (0.077)	-0.530*** (0.077)	-0.672*** (0.079)
Log assets squared * CIT	0.012*** (0.002)	0.012*** (0.002)	0.013*** (0.002)	0.017*** (0.002)
ACE				
ACE*CIT				
TCR	0.043** (0.003)			
TCRARM		0.038*** (0.006)	0.038*** (0.006)	-0.017 (0.031)
TCRARM*CIT				-0.172 (0.110)
TCRDEBT		0.041*** (0.003)		
TCRINT		0.052*** (0.006)		
TCRDEBTARM			0.027*** (0.003)	0.152*** (0.004)
TCRDEBTARM*CIT				-0.436*** (0.038)
TCRDEBTALL			0.080*** (0.004)	0.034*** (0.016)
TCRDEBTALL*CIT				0.115** (0.049)
TCRINTARM			0.014 (0.031)	0.129 (0.368)
TCRINTARM*CIT				-0.520 (1.737)
TCRINTALL			0.057*** (0.006)	0.199*** (0.041)
TCRINTALL*CIT				-0.482*** (0.127)
GDP Growth	-0.057 (0.040)	-0.052 (0.040)	0.016 (0.041)	-0.096** (0.042)
Inflation	0.155*** (0.007)	0.158*** (0.039)	0.216*** (0.039)	0.195*** (0.039)
Profitability	-0.268*** (0.012)	-0.268*** (0.012)	-0.277*** (0.012)	-0.279*** (0.012)
Tangibility	-0.064*** (0.005)	-0.065*** (0.005)	-0.067*** (0.005)	-0.067*** (0.005)
Market-to-Book	0.027*** (0.001)	0.027*** (0.001)	0.028*** (0.001)	0.029*** (0.001)
Constant	3.918*** (0.725)	3.824*** (0.728)	3.279*** (0.728)	3.677*** (0.737)
Year	YES	YES	YES	YES
Country	YES	YES	YES	YES
Subindustry	YES	YES	YES	YES
N	34137	34137	34137	34137
R^2	0.324	0.324	0.327	0.331

Note: The dependent variable is the leverage ratio defined as total liabilities divided by total assets. Standard errors are in parentheses and asterisks denote significance at a 1, 5, 10 percent level with respectively ***, ** and *.

Table 3: Leverage regressions for non-financial firms

Model	(1)	(2)	(3)	(4)	(5)
CIT	0.304*** (0.006)	0.461*** (0.051)	-1.849*** (0.386)	-1.860*** (0.386)	-1.851*** (0.386)
Log assets	0.036*** (0.000)	0.039*** (0.001)	0.501*** (0.031)	0.507*** (0.031)	0.507*** (0.031)
Log assets squared			-0.025*** (0.002)	-0.025*** (0.002)	-0.025*** (0.002)
Log assets cubed			0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Log assets * CIT		-0.008*** (0.003)	0.235*** (0.040)	0.236*** (0.040)	0.235*** (0.040)
Log assets squared * CIT			-0.006*** (0.001)	-0.006*** (0.001)	-0.006*** (0.001)
ACE				0.047*** (0.003)	0.226*** (0.021)
ACE*CIT					-0.551*** (0.163)
TCR					
TCRARM					
TCRARM*CIT					
TCRDEBT					
TCRINT					
TCRDEBTARM					
TCRDEBTARM*CIT					
TCRDEBTALL					
TCRDEBTALL*CIT					
TCRINTARM					
TCRINTARM*CIT					
TCRINTALL					
TCRINTALL*CIT					
GDP Growth	0.033** (0.013)	0.031** (0.013)	0.009 (0.013)	0.023* (0.013)	0.023* (0.013)
Inflation	0.796*** (0.014)	0.793*** (0.014)	0.807*** (0.014)	0.779*** (0.014)	0.782*** (0.014)
Profitability	-0.061*** (0.003)	-0.061*** (0.003)	-0.081*** (0.004)	-0.079*** (0.004)	-0.079*** (0.004)
Tangibility	0.044*** (0.005)	0.044*** (0.002)	0.045*** (0.002)	0.046*** (0.002)	0.046*** (0.002)
Market-to-Book	0.006*** (0.000)	0.006*** (0.000)	0.007*** (0.000)	0.007*** (0.000)	0.007*** (0.000)
Constant	1.797*** (0.218)	1.765*** (0.218)	-1.104*** (0.307)	-1.038*** (0.307)	-0.938*** (0.307)
Year	YES	YES	YES	YES	YES
Country	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES
Subindustry	YES	YES	YES	YES	YES
N	271352	271352	271352	271352	271352
R^2	0.138	0.138	0.140	0.141	0.141

Note: The dependent variable is the leverage ratio defined as total liabilities divided by total assets. Standard errors are in parentheses and asterisks denote significance at a 1, 5, 10 percent level with respectively ***, ** and *.

Table 3 continued: Leverage regressions for non-financial firms

Model	(6)	(7)	(8)	(9)
CIT	-1.493*** (0.306)	-1.041*** (0.382)	-1.043*** (0.385)	0.045*** (0.385)
Log assets	0.381*** (0.031)	0.355*** (0.031)	0.355*** (0.031)	0.364*** (0.031)
Log assets squared	-0.018*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)	-0.017*** (0.002)
Log assets cubed	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Log assets * CIT	0.201*** (0.040)	0.150*** (0.040)	0.150*** (0.040)	0.054 (0.040)
Log assets squared * CIT	-0.005*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.001 (0.001)
ACE				
ACE*CIT				
TCR	-0.058*** (0.001)			
TCRARM		-0.014*** (0.002)	-0.014*** (0.002)	0.123*** (0.012)
TCRARM*CIT				-0.542*** (0.043)
TCRDEBT		-0.067*** (0.001)		
TCRINT		0.047*** (0.002)		
TCRDEBTARM			-0.067*** (0.001)	0.088*** (0.004)
TCRDEBTARM*CIT				-0.569*** (0.013)
TCRDEBTALL			-0.067*** (0.001)	-0.056*** (0.006)
TCRDEBTALL*CIT				-0.103*** (0.017)
TCRINTARM			0.057*** (0.011)	0.271** (0.117)
TCRINTARM*CIT				-0.938* (0.555)
TCRINTALL			0.047*** (0.002)	0.254*** (0.015)
TCRINTALL*CIT				-0.725*** (0.046)
GDP Growth	-0.156*** (0.013)	-0.027** (0.013)	-0.029** (0.013)	-0.197*** (0.014)
Inflation	0.631*** (0.014)	0.597*** (0.014)	0.597*** (0.014)	0.543*** (0.015)
Profitability	-0.096*** (0.004)	-0.099*** (0.004)	-0.099*** (0.004)	-0.107*** (0.004)
Tangibility	0.048*** (0.002)	0.053*** (0.002)	0.053*** (0.002)	0.051*** (0.002)
Market-to-Book	0.009*** (0.000)	0.008*** (0.000)	0.008*** (0.000)	0.009*** (0.000)
Constant	-2.740*** (0.306)	-3.410*** (0.306)	-3.434*** (0.306)	-2.101*** (0.307)
Year	YES	YES	YES	YES
Country	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Subindustry	YES	YES	YES	YES
N	271352	271352	271352	271352
R^2	0.152	0.162	0.162	0.169

Note: The dependent variable is the leverage ratio defined as total liabilities divided by total assets. Standard errors are in parentheses and asterisks denote significance at a 1, 5, 10 percent level with respectively ***, ** and *.

5.2 Firm size and interaction term

Leverage ratios increase in firm size for all groups as can be seen in Model 1. An interaction term of firm size and CIT rate is added in Model 2. This term is significant and negative for banks and non-financial firms. For non-bank financial firms the term is also negative but not significant. Leverage is increasing in firm size for all groups but the slope is different. Non-bank financial firms and non-financial firms increase leverage more than banks with respect to the same change in firm size. In other words, a one unit increase in firm size increases leverage for non-bank financial firms and non-financial firms more than for banks.

In the literature only firm size and CIT rates are used in the analysis. This thesis also considers interaction terms of both variables to investigate the effect on leverage. To interpret the effect of CIT on leverage the derivative of the specification in Model 2 is used. Mean values of Appendix 6 are used in formulas or the value 1 or 0 in case of dummy variables. The calculation below is for banks but non-bank financial firms and non-financial firms follow the same steps. This calculation is used to derive and interpret all percentage point coefficients in this thesis.

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3 \ln(firm\ size) + \beta_4\tau_{ct} * \ln(firm\ size) + \varepsilon_{ict}$$

If the CIT rate and firm size are independent, then the conditional expectation of leverage given both independent variables is

$$E[lev|\tau_{ct}, firm\ size] = \beta_1 + \beta_2\tau_{ct} + \beta_3 \ln(firm\ size) + \beta_4\tau_{ct} * \ln(firm\ size)$$

The conditional expectation of *lev* given τ is

$$E[lev|\tau_{ct}] = \beta_1 + \beta_2\tau_{ct} + \beta_3 E[\ln(firm\ size)] + \beta_4\tau_{ct} * \mathrm{E}[\ln(firm\ size)]$$

Partial differentiation with respect to τ gives

$$\frac{\partial E[lev|\tau_{ct}]}{\partial \tau_{ct}} = \beta_2 + \beta_4\, \mathrm{E}[\ln(firm\ size)]$$

The so-called delta coefficient is

$$\frac{\partial E[lev|\tau_{ct}]}{\partial \tau_{ct}} = 0.237 - 0.010 * \mathrm{E}[\ln(firm\ size)] = 0.237 - 0.010 * 22.3154 = 0.014$$

And where 22.3154 is the average log firm size from Table 6.

The conditional expectation of lev given the firm size is

$$\frac{\partial E[lev|firm\ size]}{\partial firm\ size} = 0.010 - 0.010 * \mathrm{E}[\tau_{ct}] = 0.010 - 0.010 * 0.32 = 0.007$$

A 10 percentage point increase in the CIT rate leads to a 0.14 percentage point increase in leverage for the average banks with respect to size. Table 4 contains the delta coefficients for Model 2. Non-bank financial firms increase leverage with 2.17 percentage point and non-financial firms increase leverage with 3.10 percentage point if the CIT rate is increased with 10 percentage point. The interaction term for non-bank financial firms is not significant. The CIT rate and firms size do not have a joint effect on leverage. Banks and non-bank financial firms do have a joint significant effect on leverage. Banks have a coefficient of -0.010 and non-bank financial firms have a coefficient of -0.008.

Group	Delta
Banks	0.014
Non-bank financial firms	0.217
Non-financial firms	0.310

Table 4: Results derivative of Model 2 with respect to CIT rate

This relationship of the above analysis is linear and that is not necessarily the correct relationship. Larger firms can set a different leverage ratio and respond differently to changes in the CIT rate. This is due to larger firms getting lower interest rates on debt. Larger firms can also use market power and competitive advantage to get lower interest rates. A Taylor expansion is used to get a better approximation for this non-linear relationship. By introducing a squared term for firm size, the convexity and concavity of the relationship can be determined in Model 3. The models for non-financial firms include both a squared and cubed term for firm size to have a better approximation.

As stated earlier, the leverage is increasing in firm size but the slopes of the three groups are different. Model 3 includes a squared term for firm size. This coefficient is negative for all three groups. This means that the marginal effect of the positive relationship between leverage and firm size is decreasing in firm size. Larger firms increase their leverage by less than proportionally in comparison with smaller ones. This gives a concave relationship. Larger firms are generally more mature or established firms with already a close to optimal leverage ratio. These firms can adapt slower and to a lesser extent than

young small firms. It is easier to change the financial structure of a firm with a firm size of 100 million than it is for a firm with firm size of 10 billion.

Model 3 also includes interaction terms between CIT and firm size. The variables on their own have a positive relationship with leverage. However, it is also possible that there is a joint effect on leverage. The interaction term for banks and non-bank financial firms is concave. The marginal effect of the positive relationship between leverage and both firm size and CIT rates is decreasing. This extends the finding in Model 2 that larger firms increase leverage by less than smaller firms. Model 3 shows that firms increase leverage less in high CIT countries than in low CIT countries. A reason could be that it becomes more difficult to fully utilize the higher tax deductibility. This can be due to restrictions in the Basel agreement for banks. Non-bank financial firms are also faced with local regulations. Another possibility is that both groups are already close to their optimal leverage ratio. Firms can also view a change in the CIT rate from 10 to 11 percent as a huge deviation that can influence their leverage ratio in order to reduce their tax liability. A change from 30 to 31 percent can be seen as a small deviation and the optimal leverage ratio is already in place. This will result in lower changes in leverage ratio for higher CIT rates. Non-financial firms, however, have a convex relationship. The marginal effect of the positive relationship between leverage and both firm size and CIT rates is increasing. Non-financial firms are less regulated and can decrease their tax liability more aggressively than the more regulated financial sector.

5.3 ACE policy

Models 4 and 5 analyse the ACE policy. The effect of firm size and CIT rates does not change for these models compared to Models 1 to 3. Model 4 includes the ACE dummy variable in the regression of Model 3. It extends the analysis of leverage with government policies aiming to reduce leverage. Banks and non-bank financial firms decrease their leverage respectively with 0.9 and 3.3 percentage point. Non-financial firms increase their leverage with 4.7 percentage point. These results can be interpreted with the trade-off theory.

Banks and non-bank financial firms show different responses than non-financial firms regarding the balance between the positive tax shield and the negative cost of distress. Banks and non-bank financial firms use the equity allowance to lower their financial distress cost. Their tax shield will also lower depending on the parameters but they value

the decrease in distress cost more than the decrease in tax shield. Firms in the financial sector are also regulated to take into account the cost of distress for the whole economy if the financial sector is in distress. Non-financial firms can see the ACE policy as a signal. The cost of distress is lowered by the ACE policy but it applies to all firms. If the cost of distress is lowered the non-financial firms can increase their leverage to arrive at a new equilibrium. Because banks lower their leverage the systematic risk decreases. This also decreases the risk that non-financial firms are unable to borrow from their banks due to distress. Therefore these firms can increase their leverage.

Model 5 introduces an interaction term between the ACE policy and the CIT rate. The ACE policy tries to alter the leverage by trying to reduce the distortion due to taxation. If there is no taxation the ACE policy will not work. To calculate the effect for banks of having an ACE policy the same principle is used as before. Table 5 contains the delta coefficients of model 5.

Group	Delta
Banks	-0.009
Non-bank financial firms	0.016
Non-financial firms	0.064

Table 5: Results derivative of Model 5 with respect to ACE

Banks decrease their leverage with a 0.90 percentage point when a country implements an ACE policy. Non-bank financial firms and non-financial firms increase their leverage with respectively 1.60 and 6.40 percentage point. The same reasoning applies as stated in the trade-off interpretation earlier. A case can be made that banks due to the Basel agreements have lowered the financial distress costs for all firms. The other firms increase leverage to reach a new equilibrium.

Consider two cases with two non-financial firms each where all independent variables are the same except the CIT rate and the ACE dummy. The results are interpreted by comparing two identical firms that only differ in CIT rate based on Model 5 in Table 3. One firm has a 15 percent CIT rate and one has a 30 percent CIT rate. The firm with a 15 percent CIT rate and the ACE policy is the base leverage. The firm with a 30 percent CIT rate and ACE decreases leverage with 1.56 percentage point compared to the base leverage. If the same scenario without an ACE policy is used the results change. The firm

with a 30 percent CIT rate increases leverage with 6.70 percentage point compared to the base leverage.

[The formula of Model 5 is:

$$lev_{ct} = -1.851 * \tau_{ct} + 0.507 * \ln(firm\ size) - 0.025 * \ln(firm\ size)^2 + 0.000452 * \ln(firm\ size)^3 + 0.235 * \tau_{ct} * \ln(firm\ size) - 0.006 * \tau_{ct} * \ln\ (firm\ size)^2 + 0.226 * ACE_{ct} - 0.551 * ACE_{ct} * \tau_{ct}$$

The CIT rate is either 15 or 30 percent, the average firm size is 18.8583 and the ACE is set at 1 or 0. Other values are omitted since these are equal for both values of CIT and cancel out. Substituting these values in the formula and deduction the formula for CIT rate 30 percent from the formula with 15 percent and ACE gives:

$lev_{ct} = -1.851 * 0.15 + 0.507 * 18.8583 - 0.025 * 18.8583^2 + 0.000452 * 18.8583^3 + 0.235 * 0.15 * 18.8583 - 0.006 * 0.15 * 18.8583^2 + 0.226 - 0.551 * 0.15 - (-1.851 * 0.3 + 0.507 * 18.8583 - 0.025 * 18.8583^2 + 0.000452 * 18.8583^3 + 0.235 * 0.3 * 18.8583 - 0.006 * 0.3 * 18.8583^2 + 0.226 - 0.551 * 0.3)$ = -0.0156

The comparison without the ACE is:

$lev_{ct} = -1.851 * 0.15 + 0.507 * 18.8583 - 0.025 * 18.8583^2 + 0.000452 * 18.8583^3 + 0.235 * 0.15 * 18.8583 - 0.006 * 0.15 * 18.8583^2 - (-1.851 * 0.3 + 0.507 * 18.8583 - 0.025 * 18.8583^2 + 0.000452 * 18.8583^3 + 0.235 * 0.3 * 18.8583 - 0.006 * 0.3 * 18.8583^2)$ = 0.0670]

For countries that introduce an ACE policy it is important to have a CIT rate that is high enough to sort any effect. Latvia, for example, had a CIT rate of 15 percent when the country had an ACE policy. It repealed the ACE policy in 2014 and the reason could be that the policy was not effective because the CIT rate was too low. The introduction of an ACE policy in combination with an increase in CIT rate can change the leverage of firms. Firms have to adapt to the new situation and can use equity financing to reduce the increase in their tax liability.

5.4 TCR policy

Models 6-9 analyse the TCR policy. Model 6 introduces the TCR dummy variable in the regression equation. Having a TCR increases the leverage with 0.2 percentage point for banks, 4.3 percentage point for non-bank financial firms but decrease leverage with 5.8

percentage point for non-financial firms. This is the opposite effect of the ACE policy and can also be interpreted with the trade-off theory. The TCR aims to limit the deductibility of interest on debt. Firms respond by changing their close to optimal leverage structure slightly. The present value of the tax shield decreases because of the limitation on the deductibility of interest. The present value of the tax shield decreases more for banks in relative terms because they are highly levered compared to non-bank financial firms and non-financial firms. When the implementation of the TCR policy is combined with a decrease in the CIT rate the leverage can increase for banks (WRR, 2019). When interest rates increase banks will take on more risk.

However, many countries adopted exceptions for banks while introducing the TCR policy. Banks can therefore often still deduct the full interest payments from their tax liability. Non-bank financial and non-financial firms do however face the limitation on the deductibility of interest. Non-financial firms lower their leverage by switching from debt financing to equity financing. This lowers the financial cost of distress for the firm but also for non-bank financial firms and banks. Banks also take into account the financial cost of distress for the economy as a whole. The cost decreases because non-financial firms decrease their leverage and become therefore less risky. Non-bank financial firms can then increase their leverage until there is a new equilibrium between the present value of the tax shield and the financial cost of distress. Banks can increase their leverage too but are faced with regulations from the Basel agreement. Because of binding capital restrictions they cannot increase leverage too much. Banks also have to take into account the present value of distress and this increases more for banks.

Model 7 splits the TCR dummy variable into multiple forms. The Arm's Length approach is not significant for banks. Non-bank financial firms increase leverage with 3.8 percentage point and non-financial firms decrease leverage with 1.4 percentage point. The Ratio approach increases leverage with 0.3 percentage point for banks and 4.1 percentage point for non-bank financial firms. Non-financial firms decrease leverage with 6.7 percentage point. The Earnings-stripping approach is not significant for banks but non-bank financial firms and non-financial firms increase leverage by 5.2 and 4.7 percentage point respectively.

The TCR variables can be divided into more categories, Model 8. The Ratio approach and Earnings-stripping approach can be combined with the Arm's Length approach. Banks

decrease leverage with 0.4 percentage point when countries introduce the Ratio approach together with the Arm's Length approach. They increase leverage with 1.9 percentage point when there is no further restriction while implementing the Ratio approach. The Earnings-stripping approach in combination with the Arm's Length approach increases leverage with 3.9 percentage point. The Earnings-stripping approach with no further restrictions does not have a significant effect on leverage.

Non-bank financial firms increase leverage for different TCR dummy variables. The Earnings-stripping approach in combination with the Arm's Length approach does not have a significant effect. Non-financial firms decrease leverage with the Ratio approach by 6.7 percentage point. Having the Arm's Length approach combination does not change the result.

Model 9 introduces an interaction term between the TCR policy and the CIT rate. The TCR policy tries to alter the leverage by trying to reduce the distortion due to taxation. If there is no taxation the TCR policy will not work. To calculate the effect for non-financial firms of having a TCR policy the same principle is used as earlier. Table 6-9 contain the results.

Group	Delta
Banks	-0.000
Non-bank financial firms	0.030
Non-financial firms	-0.080

Table 6: Results derivative of Model 9 with respect to TCRDEBTARM

Group	Delta
Banks	0.019
Non-bank financial firms	0.066
Non-financial firms	-0.086

Table 7: Results derivative of Model 9 with respect to TCRDEBTALL

Group	Delta
Banks	-0.012
Non-bank financial firms	-0.017
Non-financial firms	-0.005

Table 8: Results derivative of Model 9 with respect to TCRINTARM

Group	Delta
Banks	-
Non-bank financial firms	0.064
Non-financial firms	0.040

Table 9: Results derivative of Model 9 with respect to TCRINTALL

The Ratio approach with and without the combination with the Arm's Length approach decreases leverage for non-financial firms with 8.0 and 8.6 percentage points respectively. Non-bank financial firms increase leverage by 3.0 percentage point if the Ratio approach is combined with the Arm's Length approach. They increase it with 6.6 percentage point if only the Ratio approach is implemented. Banks decrease leverage if both approach are implemented. The delta is however very close to zero so the marginal effect is almost nihil. Banks increase leverage by 1.9 percentage point with only the Ratio approach.

The Earnings-stripping approach combined with the Arm's Length approach decreases leverage with 1.2, 1.7 and 0.5 percentage point for banks, non-bank financial firms and non-financial firms respectively. This effect for banks and non-bank financial firms does not significantly differ from zero since the coefficients in Model 9 are not significant. Without the Arm's Length approach the leverage is increased with 6.4 and 4.0 percentage point for non-bank financial firms and non-financial firms respectively. The interaction effect in Model 9 is only included in the model if the base effect of the policy itself was significant in Model 8. The interest approach is ineffective for banks. For non-bank financial firms the policy is only effective if it is not combined with the Arm's Length approach.

6. Summary

The positive relationships described in the literature between leverage and CIT rates and firm size and leverage are confirmed. Larger firms do also increase leverage but the relationship is concave. The marginal effect is decreasing in firm size. An increase in the CIT rate increase the leverage for all firms. There is also a joint effect of both variables. This thesis is the first that investigates the joint effect on leverage. Banks and non-bank financial firms increase leverage less in high CIT countries than in low CIT countries. Non-financial firms have a convex relationship between leverage and the joint effect of firm size and CIT rate. They can reduce their tax liability more aggressively than the more regulated banks and non-bank financial firms.

The ACE policy can reduce leverage but should be implemented with a carefully set CIT rate and anti-avoidance regulations. Decreasing the leverage of banks can result in leverage being increased by non-financial firms if the CIT rate is set too low. Banks can increase leverage only slightly before triggering capital restrictions. Therefore they cannot respond in the same way as other firms. Even if banks want to increase the leverage with new regulations they cannot due to the Basel agreement. A case can be made that the ACE policy does only have the desired effect on banks due to the limited possibility of increasing leverage. The ACE introduces new opportunities to lower the tax liability for banks. Banks in practice only choose to increase their equity financing since the leverage is already near the maximum allowed level.

The Basel agreement lowered the financial distress costs for all firms. Banks and non-bank financial firms lowered their leverage. Firms in the financial sector are also regulated to take into account the cost of distress for the whole economy if the financial sector is in distress. Non-financial firms can see the ACE policy as a signal. The cost of distress is lowered by the ACE policy but it applies to all firms. If the cost of distress is lowered the non-financial firms can increase their leverage to arrive at a new equilibrium. Because banks lower their leverage the systematic risk decreases. This also decreases the risk that non-financial firms are unable to borrow from their banks due to distress. Therefore these firms can increase their leverage.

When the implementation of the TCR policy is combined with a decrease in the CIT rate the leverage can increase for banks. When interest rates increase banks will take on more risk. The TCR policy is more appropriate for non-financial firms, as it also lowers debt

shifting. It has the desired effect when the CIT rate is set high enough and the debt approach is implemented. A country can choose to further limit the deductibility of debt by combining the Ratio approach with the Arm's Length approach. Any introduction of the TCR policy has to be carefully monitored and adjusted if needed.

Further analysis is needed to fine-tune the policies to have the intended effect. Countries around the world have implemented their own policy that deviates slightly. Therefore the analysis done in this thesis is not sufficient evidence to state what the correct policy should be. This thesis shows evidence that the debt approach is better for non-financial firms and the ACE policy is better for banks. However, case studies for different countries have to be done to check if the generalized conclusions of this thesis also hold for individual cases. A combined ACE and TCR policy can potentially lower leverage for banks, non-bank financial firms and non-financial firms. The CIT rate can deviate for the different types of firms to lower the leverage in all groups.

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8. Appendix

Appendix 1: Countries with ACE systems

Country	Period	Name	Base/Rate	Details
Austria	2000–2004	Notional interest	Book value of new (post-reform) equity/ Average return of government bonds in secondary markets plus 0.8 pp	The notional return is taxed at a reduced rate of 25 percent instead of 34 percent.
Belgium	Since 2006	Notional interest deduction	Book value of equity; the rate is the average monthly government bond rate of year preceding fiscal year by 2 years. The rate was initially capped at 6.5 percent, but was lowered to 3 percent in 2013. Special SME rate is 0.5 pp higher.	The notional return is deductible. In 2013, new legislative changes eliminated carrying forward of the unused allowances and levied a tax on distributed dividends of large firms.
Brazil	Since 1996	Remuneration of equity	Book value of equity/Rate applicable to long-term loans	Up to the level of the notional return, dividends can be paid as "interest on equity". This is deductible for all corporate income taxes and subject to the usual withholding tax on interest.
Croatia	1994–2000	Protective interest	Book value of equity/5 percent plus inflation rate of industrial goods if positive.	The notional return is deductible.
Italy	1997–2003	Dual income tax	Book value of new (post-reform) equity. From 2000: 120 percent of new equity. In 2001: 140 percent of new equity, then again 100 percent of new equity. /7 percent 1997–2000, 6 percent 2001	The notional return is taxed at a reduced rate of 19 percent. Other profits are taxed at 37 percent (34 percent in 2003). Before 2001, the average tax must be at least 27 percent.
	Since 2012	Notional interest deduction (NID)	New equity (the amount of increase in equity over a 2010 base equity amount)/For the first three fiscal years (2011, 2012, 2013): 3 percent; 4 percent for the 2014 fiscal year; 4.5 percent for 2015; 4.75% 2016; for subsequent years the rate will be based on the Italian public debt securities' average return and a risk factor and will be annually set by the Minister of Finance.	Italian resident companies and Italian permanent establishments of non-resident companies can deduct the NID (with certain exclusions and deductions). The new equity does not include any profits from that year. It can be calculated based on qualifying upward and downward equity adjustments after 2010. It may not exceed the company's equity at the end of the given fiscal year.
Latvia	2009-2014	Notional interest deduction	Retained earnings/ The specified percentage is the weighted average rate of interest on loans to non-financial enterprises made in the current taxable period. 5.05 percent in 2010, 4.37 percent in 2011.	The deduction is equal to the specified percentage of the retained earnings of the immediately preceding taxable period.
Liechtenstein	Since 2011	Notional interest deduction	Modified equity/ The applicable interest rate is specified annually, depending on the market development (currently: 4 percent).	The notional return is deductible.
Portugal	2010–2013, replacement by 2014	Notional interest deduction	Share contributions during 2010 until 2013 respectively the share capital/SME's held by individuals, venture capital companies and business angels can benefit for a three-year period from a notional interest deduction of 3 percent on the amount of cash contributions by shareholders to share capital made during 2010 through 2013; from 2014, individual-owned micro, small and medium-sized enterprises may deduct 5 percent of the company's share capital for three years (limited to EUR 200,000).	The notional return is deductible.
Cyprus	Since January 2015		New equity defined as any equity introduced in the business on or after 1 January 2015 in the form of issued share capital and share premium (provided it is fully paid); the interest rate of the 10-year government bond yield of the country in which the new equity is invested increased by 3% having as a lower limit the 10-year government bond yield of the Republic of Cyprus increased by 3%.	

Note: The sources of information are: PwC European Tax Newsalert, Washington National Tax Services (WNTS) Publication (2012), p. 1-3; Deloitte International Tax: Italy Highlights 2014, p. 3; European Tax Handbook 2012, p. 508; ZEW Project for the EU Commission, TAXUD/2008/CC/099, Final Report (2012), p. A-4; EY Worldwide Corporate Tax Guide 2013/14, p. 752, 753; PwC Worldwide Tax Summaries: Corporate Taxes 2013/14, 1926; KPMG, Unternehmenssteuerreform III: http://www.kpmg.com/ch/de/services/tax/corporate-tax/seiten/swiss-corporate-tax-reform.aspx, retrieved 10/04/14; and Klemm (2007).

Source: (Hebous & Ruf, 2017) & (IMF, 2016)

Appendix 2: Countries with TCR systems

Thin Cap Rule Type	Country	Year	Equity-Debt Ratio / EBITDFA
Debt approach with Arm's Length approach	Argentina	1999	2:1
	Belarus	2013	1:1
	Brazil	2011	2:1
	Canada	1972	1.5:1
	Chile	2012	3:1
	China*	2008	2:1
	Czech Republic*	2007	4:1
	Ecuador	2007	3:1
	Egypt	2005	4:1
	El Salvador	2012	3:1
	France*	2007	1.5:1
	Ghana*	2000	2:1
	Gibraltar	2010	5:1
	Kenya*	2006	3:1
	Korea, Republic of*	1997	2:1
	Lithuania	2002	4:1
	Macedonia*		3:1
	Mexico	2005	3:1
	Mongolia	2005	3:1
	Mozambique	2008	2:1
	Namibia	2012	3:1
	Oman	2012	2:1
	Peru	2007	3:1
	Poland	1999	1:1
	Rwanda*	2008	4:1
	Slovenia	2005	4:1
	Sri Lanka	2006	3:1
	Taiwan*	2011	3:1
	Turkey	2006	3:1
	Uganda	2013	1.5:1
	United States	1989	1.5:1
	Venezuela	2007	1:1
	Yemen	2010	7:3
Debit approach	Albania*	2000	4:1
	Australia*	1997	1.5:1
	Bulgaria	2006	3:1
	Colombia	2013	3:1
	Croatia	2005	4:1
	Denmark	1998	4:1
	Dominican Republic	2013	3:1
	Hungary	2000	3:1
	Indonesia*	2016	4:1
	Japan	1992	3:1
	Latvia	2003	4:1
	New Zealand	1995	1.6:1
	Papua New Guinea	2013	2:1
	Romania	2006	3:1
	Serbia	2001	4:1
	Zimbabwe	2011	3:1
Arm's-length approach	Kazakhstan	2008	
	South Africa	1995	
	United Kingdom	1999	
Interest approach	Germany	1994	30%
	Greece	2010	40%
	Italy	2003	30%
	Portugal	1996	30%
	Spain	1996	30%
Interest approach with Arm's Length approach	Finland	2013	25%
	Norway*	2014	30%
	Slovakia	2015	25%

*Exceptions for banks
Sources: (de Mooij & Hebous, 2017) & (IMF, 2016) modified

Appendix 3: Summary of all variables

Variable	Expected Sign	Description
Lev	Dependent variable	The leverage ratio defined as total liabilities divided by total assets, also known as debt-asset ratio
CIT	+	Corporate income tax in a country
Firm size	+	Total assets of a firm
Log firm size	+	Natural logarithm of total assets
Log firm size squared	-	Natural logarithm of total assets squared
Tangibility	+	Fixed assets divided by total assets
Profitability	+/-	Operating income divided by total assets
Market-to-book	+	Market value of the equity divided by the book value of equity
GDP growth	+	Annual GDP growth
Inflation	+/-	Annual change in consumer price index
ACE	-	Dummy variable for countries with Allowance for Corporate Equity
TCR	-	Dummy variable for countries with Thin Capitalization Rule
TCRDEBT	-	Dummy variable for countries with a debt approach
TCRINT	-	Dummy variable for countries with an interest approach
TCRARM	-	Dummy variable for countries with only Arm's Length approach
TCRDEBTARM	-	Dummy variable for countries with a debt approach and Arm's Length approach
TCRDEBTALL	-	Dummy variable for countries with a debt approach and without Arm's Length approach
TCRINTARM	-	Dummy variable for countries with an interest approach and Arm's Length approach
TCRINTALL	-	Dummy variable for countries with an interest approach and without Arm's Length approach
BC	+	Dummy variable for Binding Capital restrictions under Basel III
Industry		Control variable based on the Industry Classification Benchmark
Sector		Control variable based on the Industry Classification Benchmark

Appendix 4: Equation 8 to 11

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 TCRDEBTARM_{ct} + \beta_8 TCRDEBTARM_{ct} * \tau_{ct} + \beta_9 BC_i + \theta_C + \mu_t + \varepsilon_{ict} \quad (8)$$

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 \mathrm{TCRDEBTALL}_{ct} + \beta_8 \mathrm{TCRDEBTALL}_{ct} * \tau_{ct} + \beta_9 BC_i + \theta_C + \mu_t + \varepsilon_{ict} \quad (9)$$

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 TCRINTARM_{ct} + \beta_8 TCRINTARM_{ct} * \tau_{ct} + \beta_9 BC_i + \theta_C + \mu_t + \varepsilon_{ict} \quad (10)$$

$$lev_{ict} = \beta_1 + \beta_2\tau_{ct} + \beta_3\boldsymbol{x}_{it} + \beta_4\tau_{ct} * \ln(firm\ size) + \beta_5\tau_{ct} * \ln(firm\ size)^2 + \beta_6\boldsymbol{z}_{ct} + \beta_7 TCRINTALL_{ct} + \beta_8 TCRINTALL_{ct} * \tau_{ct} + \beta_9 BC_i + \theta_C + \mu_t + \varepsilon_{ict} \quad (11)$$

Appendix 5: Dataset

This thesis uses the same baseline regression formula as the paper of Heckemeyer and de Mooij (2017). Therefore the dataset from this paper would be useful in analyzing the effects of different tax policies. However, after reaching out to Ruud de Mooij he stated that the data could not be shared with anyone outside the IMF due to Worldscope being a commercial dataset. He also confirmed the difficulty of finding longer consistent dataseries.

The only way to continue this thesis was to construct the dataset myself from scratch by using the subscriptions from the university. All other variables needed for the thesis were added later.

Starting from scratch, the first data that had to be collected was the ISIN codes for all firms around the world. This extended the original research by separating all firms into three categories, banks, non-bank financial firms and non-financial firms. Besides the ISIN codes also the name, country, country code, industry and subindustry data were collected from Worldscope using Datastream. The data could only be collected on an industry level so everything had to be manually combined into the needed categories. Figure 8 contains an example of the layout for banks.

tf.ISIN	Entity Name	tf.Country Code	tf.Address Country	ICBIndustry	tf.ICBSubsector
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	8000	8355
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	8000	8355
US3369011032	1ST SOURCE CORPORATION	USA	UNITED STATES	8000	8355
JP3352000008	77 BANK LIMITED (THE)	JPN	JAPAN	8000	8355
DK0010230630	A/S GRONLANDSBANKEN	DNK	DENMARK	8000	8355
DK0060133841	A/S MONS BANK	DNK	DENMARK	8000	8355
DK0010017797	A/S MORSO BANK	DNK	DENMARK	8000	8355

Figure 8: ISIN codes banks and other data.

The next challenge was finding the needed WC codes for all used variables in this thesis. The following codes were used:

- WC02999: Total Assets
- WC01250: Operating Income
- WC05491: Book value-out shares
- WC03501: Common shareholders' equity
- WC02501: Property, Plant & Equipment
- WC03351: Total Liabilities
- WC03255: Total Debt
- WC03995: Total shareholders' equity

- WC08001: Market Capitalization

For banks only:

- WC18228: Tier 1 Capital
- WC03998: Total Capital
- WC18229: Tier 2 Capital
- WC18156: Risk-Weighted Assets

At this stage of data collection there were 1406 ISIN codes for banks, 6486 for non-bank financial firms and 54414 non-financial firms.

In the next stage of data collection all WC codes were extracted for all ISIN codes for the largest period available. This stage had severe technical limitations in 2017 when this data was extracted. Only 2000 ISIN codes could be uploaded at a time to extract the data for all WC codes over the period 2000-2017. This meant that, given the ISIN codes per category, 1 run was needed for banks, 4 runs for non-bank financial firms and 28 runs for non-financial firms. All data was retrieved in constant US Dollars for easy comparison.

Name	Code	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1ST COLONIAL BANCORP - TOTAL ASSETS (~U$)	US3197161066(WC02999)~U$	30728	79619	98139	117771	135653	163599	184278	217943	231991	NA
1ST COLONIAL BANCORP - OPERATING INCOME (~U$)	US3197161066(WC01250)~U$	-290	267	833	854	1009	1011	1134	1137	514	NA
1ST COLONIAL BANCORP - BOOK VALUE-OUT SHARES-FISCAL (~U$)	US3197161066(WC05491)~U$	3,638	3,679	4,005	4,145	4,744	6,266	6,275	6,351	5,625	NA
1ST COLONIAL BANCORP - COMMON SHAREHOLDERS' EQUITY (~U$)	US3197161066(WC03501)~U$	5302	6769	9202	9551	17399	19813	20836	21722	21791	NA
1ST COLONIAL BANCORP - PROPERTY, PLANT & EQUIP - NET (~U$)	US3197161066(WC02501)~U$	436	442	763	935	949	2105	1978	2141	2175	NA
1ST COLONIAL BANCORP - TOTAL LIABILITIES (~U$)	US3197161066(WC03351)~U$	25426	72850	88937	108220	118254	143786	163442	196221	210200	NA
1ST COLONIAL BANCORP - TOTAL DEBT (~U$)	US3197161066(WC03255)~U$	1993	5526	6073	4087	7146	9942	6711	6302	9484	NA
1ST COLONIAL BANCORP - TOTAL SHAREHOLDERS EQUITY (~U$)	US3197161066(WC03995)~U$	5302	6769	9202	9551	17399	19813	20836	21722	21791	NA
1ST COLONIAL BANCORP - MARKET CAPITALIZATION (~U$)	US3197161066(WC08001)~U$	6796	9734	11516	14953	23980	20769	22474	18230	15898	NA
1ST CONSTITUTION - TOTAL ASSETS (~U$)	US31986N1028(WC02999)~U$	178840	223183	268708	293483	335830	372495	392678	429152	546287	677996
1ST CONSTITUTION - OPERATING INCOME (~U$)	US31986N1028(WC01250)~U$	2722	3389	4207	5005	6038	6655	7447	8105	3999	3353
1ST CONSTITUTION - BOOK VALUE-OUT SHARES-FISCAL (~U$)	US31986N1028(WC05491)~U$	2,96	3,244	3,895	4,323	4,648	5,483	6,305	7,293	7,752	7,877
1ST CONSTITUTION - COMMON SHAREHOLDERS' EQUITY (~U$)	US31986N1028(WC03501)~U$	15221	17433	20995	23585	26790	29797	35197	40973	43620	45401
1ST CONSTITUTION - PROPERTY, PLANT & EQUIP - NET (~U$)	US31986N1028(WC02501)~U$	940	999	1277	1362	NA	2597	3034	2760	2302	4899
1ST CONSTITUTION - TOTAL LIABILITIES (~U$)	US31986N1028(WC03351)~U$	163620	205751	247713	269898	309040	342699	357481	388178	490667	620595
1ST CONSTITUTION - TOTAL DEBT (~U$)	US31986N1028(WC03255)~U$	32335	19308	25555	22576	9700	33655	40912	54157	70057	NA
1ST CONSTITUTION - TOTAL SHAREHOLDERS EQUITY (~U$)	US31986N1028(WC03995)~U$	15221	17433	20995	23585	26790	29797	35197	40973	55620	57214
1ST CONSTITUTION - MARKET CAPITALIZATION (~U$)	US31986N1028(WC08001)~U$	13956	29300	41927	48460	61169	70218	70291	60267	40389	25401

Figure 9: Example of data for 2 banks.

See Figure 9 for an example of the data layout for 2 banks for the full period 2000 to 2017. Years 2010 to 2017 are not shown because of the size of the figure. A similar dataset has been collected for the bank only WC codes. Not all ISIN codes were recognized so these had to be removed from the dataset.

For all 3 categories the data had to be combined in a format that could be used for analysis. The data could vary for each firm and WC code for each year in the dataset. See Figure 10 for a partial view of the layout for the final bank dataset. The dataset has been linked with formulas on ISIN, WC code and year level to combine it into a correct and full dataset. It is a combination of both datasets mentioned earlier. This took a lot of time since the datasets

do not have the same layout and are very large. Due to data for 2000 to 2002 and 2017 not being available for all categories these years were removed from the analysis.

ISIN CODE	Company	Countrycode	Country	Country2	Industry	SubIndustry	year	WC02999	WC01250	WC05491	WC03501	WC02501	WC03351	WC03255	WC03995	WC08001
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2003	117771	854	4,145	9551	935	108220	4087	9551	14953
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2004	135653	1009	4,744	17399	949	118254	7146	17399	23980
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2005	163599	1011	6,266	19813	2105	143786	9942	19813	20769
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2006	184278	1134	6,275	20836	1978	163442	6711	20836	22474
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2007	217943	1137	6,351	21722	2141	196221	6302	21722	18230
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2008	231991	514	5,625	21791	2175	210200	9484	21791	15898
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2009	NA	NA	NA	NA	NA	NA	NA	NA	NA
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2010	NA	NA	NA	NA	NA	NA	NA	NA	NA
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2011	290774	7595	6,604	24219	NA	266555	0	24219	11917
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2012	NA	NA	NA	NA	NA	NA	NA	NA	NA
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2013	NA	NA	NA	NA	NA	NA	NA	NA	NA
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2014	NA	NA	NA	NA	NA	NA	NA	NA	NA
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2015	NA	NA	NA	NA	NA	NA	NA	NA	NA
US3197161066	1ST COLONIAL BANCORP, INC.	USA	UNITED STATES	0	8000	8355	2016	NA	NA	NA	NA	NA	NA	NA	NA	35021
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2003	293483	5005	4,323	23585	1362	269898	22576	23585	48460
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2004	335830	6038	4,648	26790	NA	309040	9700	26790	61169
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2005	372495	6655	5,483	29797	2597	342699	33655	29797	70218
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2006	392678	7447	6,305	35197	3034	357481	40912	35197	70291
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2007	429152	8105	7,293	40973	2760	388178	54157	40973	60267
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2008	546287	3999	7,752	43620	2302	490667	70057	55620	40389
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2009	677996	3353	7,877	45401	4899	620595	NA	57214	25401
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2010	644395	4575	8,104	49681	6149	594714	44457	49681	41118
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2011	791727	5223	9,326	55000	10439	736727	106857	55000	33866
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2012	840968	7032	9,871	65054	10630	775915	60957	65054	49873
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2013	742325	8065	10,305	68358	10044	673967	28557	68358	66185
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2014	956779	6961	11,075	87110	11373	869669	43664	87110	77691
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2015	967991	12726	12,112	95960	11109	872031	77453	95961	97113
US31986N1028	1ST CONSTITUTION BANCORP	USA	UNITED STATES	0	8000	8355	2016	1038213	13908	13,11	104801	10673	933412	91607	104801	149484

Figure 10: Bank dataset with data from WC codes and ISIN combined.

Worldscope data is in thousands so the data was adjusted to show correct values by creating new variables based on multiplying the old data with 1000. At this stage all ratios and dummy variables were created. The dummy variables for ACE and TCR were created based on data in Appendix 1 and 2. The Corporate Income Tax was added based on data from the Corporate tax rates table of KPMG. Inflation and GDP growth were added based on the World Economic Outlook Database of the IMF. All extra variables were matched on country and year level.

The last stage concerned checking the data reliability. Such as correcting data points and ultimately removing data points for which no dependent variable was available. All these steps had to be done three separate times for all categories. Also unavailable data had to be coded properly as NA so it would be picked up correctly while analyzing the data. These last steps took considerable effort and time to get a consistent and complete dataset that could be used for this thesis.

Appendix 6: Descriptive statistics

Variable	Sample	N	Mean	SD	Median	Minimum	Maximum
Leverage ratio	Banks	14209	0.9025	0.0395	0.9078	0.6903	0.9754
	Non-Bank fin	34137	0.4989	0.2713	0.5182	0.0135	0.9986
	Non-financial	279373	0.4445	0.2220	0.4508	0.0112	0.9991
CIT	Banks	14209	0.3200	0.0934	0.3500	0.0000	0.5500
	Non-Bank fin	34137	0.2806	0.0892	0.2800	0.0000	0.5500
	Non-financial	279373	0.2945	0.0789	0.3000	0.0000	0.5500
Log Assets	Banks	14209	22.3154	2.0574	22.1879	18.1006	28.1309
	Non-Bank fin	34137	19.4465	2.3940	19.3750	13.2104	25.9639
	Non-financial	279373	18.9299	1.9737	18.8583	13.2621	24.1892
GDP Growth	Banks	14209	0.0295	0.0366	0.0257	-0.1646	0.2617
	Non-Bank fin	34137	0.0370	0.0335	0.0310	-0.1646	0.2617
	Non-financial	279373	0.0360	0.0345	0.0283	-0.1646	0.2617
Inflation	Banks	14209	0.0335	0.0434	0.0243	-0.0488	1.1180
	Non-Bank fin	34137	0.0313	0.0334	0.0251	-0.0488	2.5439
	Non-financial	279373	0.0268	0.0230	0.0207	-0.0488	2.5439
Profitability	Banks	14209	0.0114	0.0107	0.0112	-0.0472	0.0623
	Non-Bank fin	34137	0.0193	0.1067	0.0235	-0.9706	0.4310
	Non-financial	279373	0.0254	0.1300	0.0442	-0.8421	0.2883
Tangibility	Banks	14209	0.0156	0.0103	0.0133	0.0010	0.0710
	Non-Bank fin	34137	0.1768	0.2674	0.0333	0.0000	0.9761
	Non-financial	279373	0.3126	0.2324	0.2749	0.0000	0.9422
Market-to-Book	Banks	14209	1.2988	0.7861	1.1385	0.1647	5.2461
	Non-Bank fin	34137	1.4414	1.2718	1.0175	0.0461	7.3409
	Non-financial	279373	2.0476	2.1646	1.3483	0.1009	17.7338
ACE	Banks	14209	0.0315	0.1747	0.0000	0.0000	1.0000
	Non-Bank fin	34137	0.0297	0.1699	0.0000	0.0000	1.0000
	Non-financial	279373	0.0196	0.1385	0.0000	0.0000	1.0000
TCR	Banks	14209	0.6243	0.4843	1.0000	0.0000	1.0000
	Non-Bank fin	34137	0.4834	0.4997	0.0000	0.0000	1.0000
	Non-financial	279373	0.6270	0.4836	1.0000	0.0000	1.0000
TCRARM	Banks	14209	0.0088	0.0934	0.0000	0.0000	1.0000
	Non-Bank fin	34137	0.0517	0.2214	0.0000	0.0000	1.0000
	Non-financial	279373	0.0374	0.1896	0.0000	0.0000	1.0000
TCRDEBT	Banks	14209	0.5872	0.4924	1.0000	0.0000	1.0000
	Non-Bank fin	34137	0.3729	0.4836	0.0000	0.0000	1.0000
	Non-financial	279373	0.5545	0.4970	1.0000	0.0000	1.0000
TCRDEBTALL	Banks	14209	0.1078	0.3102	0.0000	0.0000	1.0000
	Non-Bank fin	34137	0.1111	0.3142	0.0000	0.0000	1.0000
	Non-financial	279373	0.1958	0.3969	0.0000	0.0000	1.0000
TCRDEBTARM	Banks	14209	0.4793	0.4996	0.0000	0.0000	1.0000
	Non-Bank fin	34137	0.2618	0.4396	0.0000	0.0000	1.0000
	Non-financial	279373	0.3587	0.4796	0.0000	0.0000	1.0000
TCRINT	Banks	14209	0.0269	0.1618	0.0000	0.0000	1.0000
	Non-Bank fin	34137	0.0562	0.2302	0.0000	0.0000	1.0000
	Non-financial	279373	0.0348	0.1832	0.0000	0.0000	1.0000
TCRINTALL	Banks	14209	0.0265	0.1605	0.0000	0.0000	1.0000
	Non-Bank fin	34137	0.0538	0.2257	0.0000	0.0000	1.0000
	Non-financial	279373	0.0324	0.1769	0.0000	0.0000	1.0000
TCRINTARM	Banks	14209	0.0004	0.0205	0.0000	0.0000	1.0000
	Non-Bank fin	34137	0.0015	0.0390	0.0000	0.0000	1.0000
	Non-financial	279373	0.0014	0.0370	0.0000	0.0000	1.0000
BC	Banks	14209	0.0167	0.1027	0.0000	0.0000	1.0000