

Breaking tax avoidance: limiting the deduction of interest payments

An analysis of the effects of the earnings stripping rule on the debt levels and effective tax rate of the firms that are affected



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Abstract

This paper examines the influence of the earnings stripping rule on the debt levels and the effective tax rate of the affected firms. The earnings stripping rule was introduced in the EU through the means of an EU Directive that focused on the limitation of tax avoidance opportunities. The rule was implemented in the Netherlands and throughout the EU in 2019. The earnings stripping rule limits the deduction of interest payment when a certain threshold, which is based on a proportion of EBITDA or a fixed number, is crossed. Previous literature has studied the effects of general interest limitation rules, which largely found that debt levels decrease and the effective tax rate increases. These rules were, however, different in their approach, compared to the earnings stripping rule. This paper starts with the institutional background in the Netherlands, after which the previous research surrounding the topic is reviewed. Then the obtained data is described, and the data is studied using a difference-in-difference approach. The main results showed that the earnings stripping rule reduced debt levels and decreased the effective tax rate at the affected firms. The decrease in the effective tax rate does not correspond with what could be expected from the previous literature. The sensitivity analysis in which the loss-making firms were excluded from the sample, showed that the debt levels were also reduced but the effective tax rate increased. The results of both the main analysis and the sensitivity analysis were, however, all statistically insignificant.

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Chapter 1 Introduction

Tax avoidance has been a phenomenon that countries have tried to combat in various ways over the years. Firms would employ tactics such as profit shifting to lower-taxed countries to avoid paying taxes in countries with higher taxes. An individual country is, however, not powerful enough on its own to oppose tax avoidance, as firms could use the tax avoidance opportunities that other countries could provide. In 1961 the Organisation for Economic Cooperation and Development (OECD) was created by 38 countries to stimulate economic growth and trade. One of the topics that was identified in the late 1990s as harmful to their goals was tax avoidance. During the next two decades, member countries started to introduce thin capitalization rules that limited the amount of interest that a firm could deduct from their taxable profit. The goal of these rules was to reduce profit shifting to lower-taxed countries by means of internal debt. A firm could for example deduct interest in a higher-taxed country that was paid to a subsidiary in a lower-taxed country, which would lead to the profit being shifted to the lower-taxed country. The thin capitalization rules limited the amount of interest that could be deducted based on a debt-to-equity ratio. If a firm had a higher debt-to-equity ratio than the thin capitalization rules allowed, the excess interest could not be deducted (OECD, 2012). Countries, however, differed in the strictness of these rules. Certain countries only calculated the debt-to-equity ratio using internal debt, while others also included external debt. The height of the debt-to-equity ratio itself also differed between countries.

In October 2015 the OECD recommended that its members replace these thin capitalization rules based on a debt-to-equity ratio with a rule that is based on a percentage of EBITDA. These recommendations were adopted by the EU Council in Directive 2016/1164 which laid down rules about limiting tax avoidance practices. The directive contained measures such as the taxation of dividend payouts from tax havens to which profits were shifted. The directive also introduced a new rule that limited interest deductions, the earnings stripping rule. Unlike the thin capitalization measures that were implemented before, the earnings stripping rule would have to be implemented by all EU member states in a more cohesive manner. It would therefore be the first time that EU member states handle the same rules regarding the limitation of excessive interest deductions. The directive had to be adopted by member states by January 1st, 2019. According to the directive, the reason for implementing these anti-tax avoidance measures was that the public by that time had become more aware of the tactics used by firms to reduce their tax burden. The preamble of the directive explained that these measures were required to restore the trust of the public in the tax system and to give member states the tools to effectively collect corporation taxes.

The earnings stripping rule is different in both scope and functioning compared to the previous thin capitalization rules. The impact of the latter rules has already been extensively studied in the economic literature. Buettner et al. (2012) studied the effects of the thin capitalization rules on the capital structure of German multinationals. Merlo, Rieder, and

Wamser (2019) researched what the effects were on the location of foreign affiliates of multinationals. The earnings stripping rule has, however, not yet been the subject of empirical research. Studying the effects of the earnings stripping rule is, however, important since it is now the recommended practice by the OECD, and it attempts to combat one of the two major tactics used to avoid taxes (Taylor and Richardson, 2012).

Since the earnings stripping rule has now been implemented throughout the EU and other countries, it would be valuable to study the effects of the earnings stripping rule on the capital structure of firms and whether the earnings stripping rule has been effective in limiting tax avoidance of firms. In certain countries, there were, however, already thin capitalization rules in place when the earnings stripping rule was first introduced. These rules being in place could take away from the effect of the earnings stripping rule since thin capitalization rules also target one of the targets of the earnings stripping rule. In the Netherlands, the thin capitalization rules were, however, abolished in 2013 and there were not any rules present that in general restricted interest deductions. The implementation of the earnings stripping rule took place in 2019, which allows for a clean research setting and therefore a clear measurement of the effect of the earnings stripping rule. The research question of this thesis is therefore:

“Has the earnings stripping rule changed the capital structure of firms located in the Netherlands, and has it been effective in reducing tax avoidance of firms located in the Netherlands?”

The data for this thesis is obtained from the Orbis database, which is compiled by Bureau van Dijk. The dataset used in this thesis contains 77 unique firms and 385 firm financial years, spanning from 2018 until 2022. The sample is relatively small because the availability of the data points that are required to answer the research question is limited for firms that are located in the Netherlands. Since the implementation of the earnings stripping rule can be considered an exogenous shock, difference-in-difference analysis is used to analyse the dataset. In this analysis, the treatment group consists of firms that were affected by the implementation of the earnings stripping rule and the control group consists of firms that were not affected by the earnings stripping rule. This research design is then used to, first, study the effect of the earnings stripping rule on the debt levels of the firms that were affected by the rule. Second, the effect of the earnings stripping rule on the effective tax rate of the firms that are affected by the rule is studied. Third and final, the effect of the tightening of the earnings stripping rule in 2022 on the debt levels is studied.

The main results indicate that debt levels are reduced at the firms that were affected by the earnings stripping rule and that the effective tax rate decreased. The decrease in the effective tax rate does not correspond to what could be expected from the second hypothesis, where an increase in the effective tax rate would be expected. In the sensitivity

analysis, where all loss-making firms were excluded, the debt levels of the affected firms also decreased. The effective tax rate of this sample, however, increased, which corresponds with the second hypothesis. All results were, however, statistically insignificant. The contribution of these results is that, even though they are statistically insignificant, the earnings stripping rule has a negative effect on the debt levels and a positive effect on the effective tax rate of the affected firms. Further, and more detailed, analysis would however lead to a more conclusive answer.

This thesis will consist of seven further chapters. In Chapter 2, the institutional background behind the earnings stripping rule and its differences with the thin capitalization rule will be discussed. In Chapter 3, the previous literature surrounding the topic of interest limitation rules and tax avoidance will be discussed. In Chapter 4, the hypotheses will be developed. In Chapter 5, the methodology that will be used to produce the results will be discussed. In Chapter 6, the data that is used to produce the results will be discussed. In Chapter 7, the results will be displayed and interpreted. In Chapter 8, a sensitivity analysis will be conducted and in Chapter 9 the thesis will be concluded and discussed.

Chapter 2 Institutional Background

2.1 Dutch Corporation Tax

In the Netherlands, tax is collected from corporations and entities via the Wet op de Vennootschapsbelasting 1969 (Dutch Corporation Tax Code). The Dutch corporation tax is levied from entities that are located in the Netherlands, such as private or limited liability corporations, but also from certain foundations and associations. The corporation tax is also collected from foreign companies that receive income that originates from the Netherlands. The former is a resident taxpayer, and the latter is a non-resident taxpayer.

According to Article 7, the tax base of a resident taxpayer is the taxable profit earned in their fiscal year less any losses from previous years that can still be offset. In Article 8, the taxable profit is defined by referencing the definition of profit in the Dutch Personal Income Tax. This means that profit consists of any benefit, in whatever form or by whatever name, that arises during the fiscal year. From this taxable profit, expenses can be deducted unless they have been specifically excluded by law or practice. An example of an expense that cannot be deducted is dividends that have been handed out to stockholders.

2.2 Interest Limitation Rules in Dutch Tax Law

As previously mentioned in the introduction, interest payments can be used to avoid taxation. From 1 January 2004 until 1 January 2013 the Dutch Corporation Tax Code had a thin capitalization rule in Article 10d that used a debt-to-equity ratio of 3:1. The Dutch thin capitalization rule applied to all debt, whereas other countries only targeted related-party debt. If a taxpayer was, however, not associated with another taxpayer, the thin capitalization rule did not apply to that taxpayer. A standalone entity was therefore not limited in their interest deductions.

From 1 January 2013, the thin capitalization rule was abolished as part of a package of measures intended to improve the investment climate in the Netherlands. From that date on, no rule generally restricted the deduction of interests.

The lack of a general interest limitation rule was amended by the earnings stripping rule. This rule was part of a directive of the EU Council that must be implemented by the EU member states. The directive stipulated the minimum requirements that must be implemented, member states could, however, implement more strict rules. It also provided some options that member states may implement if they wish, one example of this is the option to exclude firms that are active in the financial sector from the rules. By now all EU member states have implemented the earnings stripping rule, and the Netherlands has implemented the rule in Article 15b of the Dutch corporation tax code.

Article 15b stipulates that the sum of interests cannot be deducted from the taxable income if the sum is higher than the applicable limit. The applicable limit is the highest of either 20%

of EBITDA or €1.000.000. The sum of interest consists of the interest paid on cash loans less the interest received on cash loans. The article then stipulates how EBITDA is exactly calculated and that interests originating from income that is taxed in another state will not be included in the sum of interests. The Netherlands has chosen to allow for unlimited carryforward of undeducted interest if there is space to do so in the future. The carryforward of any undeducted interest will, however, be lost if the ownership of the taxpayer is changed for more than 30%. The article ends with the definition of what a loan is and extends the definition of interest to also include currency results that originate from a loan.

2.3 Differences between the Earnings Stripping Rule and Thin Capitalization Rule

The requirements and wording of the earnings stripping rule have remained broadly the same since its implementation in 2019. The most notable change is the tightening of the rule in 2022. From 2019 until 2021 the limit of the earnings stripping rule was the highest of either 30% of EBITDA or €1.000.000. The former limit was tightened in 2022 to 20% of EBITDA. The limit was not only tightened for technical reasons, such as the progression to a more equal treatment of debt and equity in the Dutch corporation tax (Vijlbrief, 2021). It was instead mostly tightened to generate €700.000.000 in additional revenues for the state with which it could finance goals such as the increase of teacher's salaries (Hermans, 2021).

While the thin capitalization rule and the earnings stripping rule target the same practice, namely the excessive deduction of interest, the differences between them are extensive.

The main difference is how it is determined what constitutes an excessive amount of interest deductions. The thin capitalization rule uses a debt-to-equity ratio to determine whether there are excessive interest deductions. This poses a problem for firms that have a lot of intangible assets, as these are harder to value than tangible assets. This could therefore start a discussion between a tax authority and a taxpayer. The tax authority will want the equity to be valued lower than the taxpayer would want it to be since a lower value of equity will mean that the ratio is exceeded more quickly. The earnings stripping rule uses EBITDA to determine the limit at which interest deductions are deemed excessive. There is therefore less space for discussions to be had since EBITDA is not affected by values that can be determined subjectively. From a legal standpoint, it is also easier to identify whether a payment is an interest payment than it is to identify whether an obligation constitutes debt or equity. Stevens (2017) however, does note that using EBITDA does introduce some uncertainty since EBITDA is not known at the beginning of the fiscal year and is subject to more volatility than the debt-to-equity ratio.

Another difference is the requirement to allocate debts to the correct revenue-generating activities. Interest payments that are associated with a loan that is used for assets that generate tax-exempt revenues, must be eliminated from the debt-to-equity ratio. This must

be done to prevent interest deductions for revenues that are tax-exempt. With the earnings stripping rule, these tax-exempt revenues are already eliminated from the EBITDA, which means that an allocation is not necessary since the limit is calculated as a percentage of EBITDA (Stevens, 2017).

The final main difference is that the earnings stripping rule directly targets the problem of excessive interest deductions, whereas the thin capitalization rule uses a two-step approach. The system of the earnings stripping rule is more direct since it limits the root of the problem, excessive interest deductions, by setting the limit based on the figure that must be protected, which is EBITDA. The thin capitalization rule first calculates whether a firm exceeds the debt-to-equity ratio and then limits the interest deductions based on the proportion of excessive debt. This two-step approach limits the effectiveness of the thin capitalization rule to limit excessive interest deductions since it uses a proxy to determine whether the interest deductions are excessive, whereas the earnings stripping rule uses the interest deductions themselves.

The last noteworthy difference is not a general difference but rather a difference between the implementation of individual countries. The thin capitalization rules were not part of a coordinated effort to implement such rules, countries therefore utilised different limits and the limits were composed of different factors. An overview of the different thin capitalization rules was created by Buettner et al. (2012), which showed that the difference between the limits was extensive. France for example utilised a debt-to-equity ratio of 1.5:1, where debt only consisted of related-party debt. Slovenia used the same definition of debt but utilised a much higher debt-to-equity ratio of 8:1. Bulgaria applied a ratio of 3:1 and used total debt as the definition of debt, but excluded debt owed to financial institutions. On the other hand, Luxembourg did not exclude debt owed to financial institutions but applied a higher ratio of 5.7:1. These differences are now also amended since the directive of the EU contains harmonised legislation that must be adopted by EU members. The diversity in definitions and ratios between countries is therefore also largely remedied.

Chapter 3 Literature Review

3.1 Debt Finance Theories

To be able to study the effects of the earnings stripping rule, a good understanding of the underlying mechanisms that have led to the introduction of the rule is needed. When firms make financing decisions, for example, whether to use internal or external debt financing, they will take a multitude of factors into account. Myers (2001) describes which methods firms might use to decide between equity and debt financing. There are in general three theories, each of which concentrates on a certain detail, that can explain firm financing behaviour.

First of all, there is the trade-off theory, which focuses on the tax advantages of using debt to finance investment. According to the theory, firms find the level at which the value of additional saved taxes by increasing interest deductions is lower than the potential financial risks involved with more debt. Firms will therefore borrow until borrowing more will result in higher costs associated with potential financial distress than the tax saved by interest deductions.

The second theory is the pecking order theory, which focuses on costs resulting from information asymmetry. Firms prefer certain financing instruments over others because of their associated borrowing costs. A firm would start with internal financing by using for example retained earnings, rather than external financing. This is because with internal financing there are no information asymmetries between the lender and borrower, leading to lower borrowing costs. If a firm has to use external financing, it will start with the least risk-carrying instrument and then work its way down the list to more risk-involved instruments. The reason for this is that the borrowing cost for the company will increase with the amount of risk that is involved in the instrument. Debt for example has lower borrowing costs than equity since debt holders have a preferential claim over a company's assets in the event of bankruptcy. Firms will therefore prefer debt issuance over equity issuance.

The third and final theory is the free cash flow theory, which focuses on agency costs resulting from the firm-manager relationship. Since the priorities of managers are not always aligned with the priorities of the firm, managers might waste excess cash on activities that are not profitable. To prevent this a firm can use debt financing to force cash pay-outs to creditors, instead of wasting cash on unprofitable activities.

3.2 Debt Finance Theories applied to firms

An example of research that shows the trade-off theory at work is the research conducted by Huizinga et al. (2008). They created a model that looked at the optimal debt policy of a multinational firm and took taxation into account. The model incorporated factors related to international taxation and bankruptcy risk because of overleveraging, which are the two drivers behind the trade-off theory of Myers (2001). They assume that the parent company guarantees the debts of all of its subsidiaries and that the risk of bankruptcy therefore rests on the multinational as a whole. The goal of the multinational is to maximise its value when

using debt by optimising the level of debt at each subsidiary and fully utilising the tax advantages. They then assume that there is an optimal debt ratio for the multinational and that deviations from this ratio by local subsidiaries because of tax incentives will imply costs and risks to the multinational. The model uses the optimal debt ratio of the multinational and two tax-related terms. The first one is local taxation and the second is the difference between local and international taxation, weighted by assets. Using these factors, they try to predict the optimal debt ratio for a given country.

Their subsequent empirical analysis used a dataset that consisted of financial data on the internal debt positions of all companies located in 32 European countries between 1994 and 2003. They found that local firms had a rather low reaction in terms of increasing debt when the tax rate increased. For multinational firms, they, however, found a larger effect that showed that multinationals move debt out of lower-taxed countries to higher-taxed countries to take advantage of the tax benefits of debt.

Chen and Chen (2011) researched whether the pecking order theory could explain the capital structure of Taiwanese companies that were active in the electronics sector. They chose to focus on the electronics sector, as this is the most important industry in Taiwan. They then assembled a database of firms that were listed on the Taiwanese stock exchange in 2009. By using regression analysis, they found a negative relationship between the debt usage of a firm and its profitability. This is in line with the pecking order theory since more profitable firms have more retained earnings that can be used instead of debt. For firms with growth opportunities, they found a negative relationship with debt usage. This is also in line with the pecking order theory since growing firms tend to already reinvest their retained earnings into their businesses and therefore have less capital available to them. To further expand those firms would have to attract additional funds, which they would do by attracting debt. Chen and Chen (2011), however, did not find significant evidence that asset tangibility and debt usage are related because of the set-up of the research. According to the pecking order theory, they should have found a positive relationship. That is because having more fixed assets would make it less hard for a creditor to foreclose on a debtor and therefore make it cheaper to issue a loan. Finally, they also did not find a positive relationship between debt usage and taxation. The reason given for this was the 2008 financial crisis, which affected Taiwanese electronic companies.

The papers of Huizinga et al. (2008) and Chen and Chen (2011) demonstrate that firms indeed behave along the lines of the financial behaviour strategies that were laid out by Myers (2001). Firms indeed attempt to strike a balance between the tax advantages that come from debt financing and bankruptcy risks. They, however, also appear to prefer certain financial instruments over others. There are, however, also other factors that can influence the choice of a firm for a particular financial instrument. One of these examples is the limitation of the deductibility of interest payments to combat tax avoidance tactics. Most countries employed thin capitalization rules in the late 1990s and early 2000s to restrict

deductions of interest payments that originate from internal financing. The papers of Huizinga et al. (2008) and Chen and Chen (2011) did not study the effects of these rules but rather focused on a company's debt policy.

3.3 Influence of Thin Capitalization Rules on Debt Levels

Buettner et al. (2012) did, however, study the influence of these thin capitalization rules on the capital structure of a firm. They focused their research on multinational companies that were headquartered in Germany between 1996 and 2004. The main aim of their research was to identify whether internal debt was being replaced by external debt. In their model, they employ the strictness of the local thin capitalization rules, as each country has its own limits at which interest payments are not deductible anymore. They find that multinationals tend to shift their internal debt to countries with high tax rates and high external borrowing costs. This is because the tax advantage in those countries will be largest and there will be a higher saving on external borrowing costs. In quantitative terms, this means that without a thin capitalization rule, a 10-percentage point increase in the tax rate will result in a 9,5% higher parent-debt-to-capital ratio. When there is a thin capitalization rule with a debt-to-equity ratio of 2:1 and the tax rate is increased by the same 10 percentage points, they find that the parent-debt-to-capital ratio only increases by 2,5%. They interpret this as evidence that internal debt is less sensitive to the tax rate when a thin capitalization rule is implemented. When the tax rate remains the same and a thin capitalization rule with a debt-to-equity ratio of 2:1 is implemented, they find that internal debt declines by 3,2 percentage points because the tax advantage is reduced. They also find that firms increase their external debt ratio by 0,6 percentage points when the tax rate is increased by 10 percentage points, and there is a thin capitalization rule with a debt-to-equity ratio of 2:1. When the tax rate is unchanged and there is a thin capitalization rule with a debt-to-equity ratio of 2:1, they find that the external debt ratio increases by 2 percentage points. These results show that they do not find a clear substitution effect of internal debt for external debt and find that the overall debt level is reduced after the implementation of the thin capitalization rules.

An extension of the previous research of Buettner et al. (2012) is the research that was conducted by Wamser (2014). He specifically researched whether there is a substitution effect of external debt instead of internal debt in the presence of a thin capitalization rule. The research setting was again Germany but the research methods that were used, were different from those that were used by Buettner et al. (2012). Instead of regression analysis, propensity score matching was utilised to create a treatment and control group, after which the treatment effect was reviewed. In 2001 the German thin capitalization rule was tightened, this tightening of the rules was used to create the treatment and control groups. The treatment group consisted of firms that were not affected by the thin capitalization rule before the tightening but were affected after the tightening of the rule. The control group consisted of firms that were not affected by the rule, both before and after the tightening of the rule. The assignment of the firms was, however, done by using both a probit and a logit

regression model, which predicted the probability of a firm being treated by the tightening of the rule in 2001. The firms were then matched based on their propensity score using five different matching techniques, after which the average treatment effect was reviewed. The average treatment effect that was obtained ranged between a 5,1 and 7,2 percentage point increase in the external-debt-to-capital ratio after the tightening of the rule in 2001. For the internal debt-to-capital ratio, he found a 9,7 to 10,1 percentage point decrease in the ratio. Finally, the total-debt-to-total assets ratio decreased between 3,2 to 4,8 percentage points. These results show the same effects that Buettner et al. (2012) observed, namely that the share of external debt indeed increases in the presence of a (more tight) thin capitalization rule. What was, however, not observed, was a clear substitution effect of external debt instead of internal debt.

A different research setting was used in the research conducted by Blouin et al. (2014). The research of Blouin et al. (2014) focused on multinationals from the United States and their foreign affiliates during the period 1982-2004, whereas previous research mostly focused on multinational firms that were located in Germany. By using regression analysis, they found that affiliates that were located abroad and were faced with thin capitalization rules that applied to total debt had on average a 1,9% lower debt-to-assets ratio. When multinationals were faced with a thin capitalization rule that only applied to internal debt, they experienced a 6,3% decrease in their internal-debt-to-assets ratio and a 0,8% decrease in their total-debt-to-assets ratio. On top of this, they also extended their research by looking at the effect of a thin capitalization rule on the valuation of a firm. The assumption is that a thin capitalization rule will harm firm valuation since it limits the ability of a firm to utilise the tax advantages that debt financing allows. By studying the effects on Tobin's q, they found that the applicability of a thin capitalization rule resulted in a 0,051 decrease in Tobin's q. Considering that the mean was 0,239 and the standard deviation was 1,539, the results clearly show a negative effect on the value of a firm.

Combined, these papers show that companies respond to the tax incentives and rules that are present in both the local taxation scheme and the taxation schemes of other countries. Taylor and Richardson (2012) consequently researched which tax avoidance opportunities are used most by publicly listed Australian firms. They created a sample of 203 publicly listed Australian firms over the years 2006-2009. The sample was then studied using regression analysis, in which the dependent variable was the long-run effective tax rate and the independent variables were tax avoidance tactics. The regression analysis was also conducted using the difference between pre-tax accounting income and taxable income scaled by total assets. They found that firms use thin capitalization, transfer pricing, income shifting, multinationality, and tax haven utilisation to avoid taxation in Australia. The strongest results were, however, for thin capitalization and transfer pricing, which means that limiting these tax avoidance methods would lead to the highest increase in tax collection.

Chapter 4 Hypothesis Development

4.1 Earnings Stripping Rule and Debt Levels

What can be deduced from the previous literature is that firms prefer certain financial instruments over others and that they indeed try to optimise their tax shield by utilising debt to shift their profits and lower their tax obligations. On top of this, firms also respond to both the implementation and the change of the thin capitalization rule. Since the goal of the thin capitalization rule and the earnings stripping rule is the same, namely combatting tax avoidance tactics through excessive interest deductions, the same results could be expected. The first hypothesis is therefore that the introduction of the earnings stripping rule will cause debt levels to be lowered at the affected firms.

The reason why it can be expected that debt levels will decrease is that before the implementation of the earnings stripping rule, there were no general interest limitation rules in the Netherlands. Firms were therefore free to choose their debt levels and were also free to deduct as much interest as they would like. The research of Huizinga et al. (2008) has shown that without any limits, firms will increase their debt until the bankruptcy risks outweigh the tax benefits. The implementation of the earnings stripping rule should therefore cause the debt levels of firms to be lowered, as was seen in the research that covered the effects of the thin capitalization rule.

4.2 Earnings Stripping Rule and Tax Avoidance

On top of its goal to reduce excessive interest deductions, the earnings stripping rule was also introduced to reduce tax-avoiding behaviour. The effectiveness of an interest limitation rule on the tax burden of a firm has not previously been studied. Research by Taylor and Richardson (2012) has, however, shown that thin capitalization is one of the two most used tactics in Australia to avoid taxation. An interest limitation rule, such as the earnings stripping rule, should therefore influence the tax burden of firms that are affected by it since a previous tax avoidance tactic has been made redundant. The second hypothesis is therefore that the introduction of earnings stripping will lead to an increase of the tax burden for firms that are affected.

4.3 Tightening of the Earnings Stripping Rule

As previously discussed, the limit of the earnings stripping rule was tightened in 2022 from 30% of EBITDA to 20% of EBITDA. Although there is not much data available after the tightening of the rule, only one fiscal year has passed since, it should still have had an effect on the firms that were affected. Previous research by Wamser (2014) around the tightening of the thin capitalization rule in Germany in 2001 showed a decrease in internal debt, an increase in external debt, and a decrease in total debt. The thin capitalization rule in Germany, however, only targeted interest deductions that originated from related party debt, whereas the earnings stripping rule applies interest deductions that originate from both internal and external debt. Since the earnings stripping rule does not differentiate between internal debt and external debt, the focus will be on total debt. The effect on total debt that was observed by Wamser (2014) could therefore also be observed when the tightening of the earnings stripping rule in 2022 is further examined. The third hypothesis is therefore that the tightening of the earnings stripping rule in 2022 will cause a decrease in total debt levels at the firms that are affected.

Chapter 5 Methodology

The three hypotheses that were specified in the previous section expect that the debt levels will decrease and the tax burden will increase at the firms that are affected by the earnings stripping rule. To test these hypotheses, difference-in-difference analysis will be used, which is a widely used method to evaluate exogenous shocks created by events such as the implementation of new laws. The shock in the case of the earnings stripping rule is the implementation of the law in 2019. The difference-in-difference method attempts to determine the effect of the shock by measuring the difference in outcome between a firm that is affected and the outcome if the firm had not been affected. This is, however, not possible since a firm cannot be both affected and not affected at the same time. The difference-in-difference method resolves this by creating a group that is affected by the policy, the treatment group, and a comparable group that is not affected by the policy, the control group. If the treatment group and control group have similar characteristics and therefore would have had the same outcomes in the absence of the shock, one can assume that the control group is a suitable alternative to measure the effect of the shock.

5.1 Treatment Group and Control Group Design

The treatment group will consist of firms that have been affected by the earnings stripping rule in 2019. The firms in this group will be assigned based on their financial statements in 2018 since their statements from 2019 will already have been treated by the earnings stripping rule. To assign the firms, their EBITDA will be calculated according to the definition in Article 15b of the Dutch tax code. If their interest expenses exceed the highest of 30% of EBITDA, or €1.000.000, the firm will be assigned to the treatment group. The control group will be composed of firms that were not affected by the earnings stripping rule in 2019. The firms in the control group will also be selected based on their financial statements from 2018. If their interest expenses were lower than the limits set by the earnings stripping rule, they will be part of the control group. This will result in the following overview of the groups in the tests for the first and second hypotheses:

Table 1: Distribution Treatment and Control Group for H1 and H2

Type of group	Criteria
Treatment group	Interest expenses of more than the highest of 30% of EBITDA or €1.000.000
Control group	Interest expenses of less than the highest of 30% of EBITDA or €1.000.000

5.2 Regression Design First Hypothesis

The outcome variable of interest in the case of the first hypothesis will be the debt levels of a firm. The debt level of a firm is captured by the debt-to-asset level of that firm (Blouin et al, 2014). The debt-to-asset level is, however, not only affected by the earnings stripping rule but also by other factors. The control variables will be specified differently when testing the hypotheses. This is because different factors influence each of the measures that will be tested. When testing the first hypothesis, the level of debt of a company will be tested. The first control variable will be the logarithm of sales. Blouin et al. (2014) found that larger firms with better performance have better access to credit. To control for this, the logarithm of

total sales will be added as a control variable. The second control variable for firms with better borrowing power is the amount of tangible assets divided by total assets. Firms with relatively more tangible assets compared to intangible assets have better borrowing conditions since tangible assets are more easily sold in the event of bankruptcy and therefore more easily serve as collateral (Buettner et al, 2012). The third control variable will be the interest coverage ratio of the firm, which is calculated by dividing a firm's earnings before interest and tax (EBIT) by their interest expenses. Firms that have a relatively low interest coverage ratio will be perceived as more risk-containing borrowers since those firms have fewer resources to pay their interest obligations. Lenders will therefore not be inclined to lend those firms money and those firms will therefore have lower borrowing power (Bongini et al., 2000). To control for this, the interest coverage ratio is added since it shows how many financial resources a firm has. The final control variable will be the age of the company. Companies build up a reputation throughout their existence, which might result in them having better borrowing conditions, because of their perceived reputation (Hyytinen and Pajarinen, 2007). To control for this factor, the age of the companies will be used as a control variable. The regression formula for the first hypothesis will be the following:

$$Debt\ levels_{it} = \alpha_{it} + \beta_1 * Treatment_{it} + \beta_2 * Post_{it} + \beta_3 * Treatment_{it} * Post_{it} + \beta_4 * logSales_{it} + \beta_5 * Tangibility_{it} + \beta_6 * interest\ coverage_{it} + \beta_7 * age_{it} + \varepsilon_{it}$$

5.3 Regression Design Second Hypothesis

When testing the second hypothesis, the effective tax rate of the firms that are affected by the earnings stripping rule will be tested. In this research, the effective tax rate will be used to measure tax avoidance since it shows the actual tax burden experienced by a firm. Using annual tax liability and pre-tax income will, however, result in effects being captured that do not stem from tax-avoiding behaviour (Dyreng et al, 2008). Up to 2021 the Dutch tax law, for example, allowed losses from previous years to be carried forward up to six years. Since 2022 losses can be carried forward without a term limit. By using a long-term measure, yearly differences, such as previous tax credits being settled, would cause less distortion in the tax liability. It is, however, not possible to use a long-term measure in this research since this would not allow for measurement of the impact of the earnings stripping rule on the tax burden.

The effective tax rate is again not only affected by the presence of the earnings stripping rule but also by other factors. The first control variable will again be the size of the firm. Richardson and Lanis (2007) found that there is a negative relationship between the size of a firm and its effective tax rate. They attribute this to the fact that larger firms have a greater ability to conduct tax planning and lobby tax authorities. Unlike the research of Richardson and Lanis (2007), the logarithm of sales will be used to control for firm size. This is because using assets will create a bias towards asset-intensive firms (Blouin et al, 2014). The second

control variable will be a dummy variable that indicates whether a company is a multinational company. Multinational companies have more opportunities to avoid taxes since they can use the differences between national tax regulations to commit tax avoidance (Rego, 2003). The third control variable will be firm profitability. Since tax is paid as a percentage of pre-tax profit, firms with higher profitability will have a greater incentive to commit tax avoidance (Dunbar et al, 2010). To control for firm profitability, the return-on-assets ratio (ROA) will be added. The final control variable will be a firm's research and development expenditure. There are various tax credits available in the Netherlands for R&D activities, which will result in a lower effective tax rate for firms that use them. To control for this, R&D expenditure scaled by total assets (RDA) is added as a control variable. The regression formula for the second hypothesis will be the following:

$$ETR_{it} = \alpha_{it} + \beta_1 * Treatment_{it} + \beta_2 * Post_{it} + \beta_3 * Treatment_{it} * Post_{it} + \beta_4 * logSales_{it} + \beta_5 * multi_{it} + \beta_6 * ROA_{it} + \beta_7 * RDA_{it} + \varepsilon_{it}$$

5.4 Regression Design and Group Design Third Hypothesis

The third hypothesis concerns the effect of the tightening of the earnings stripping rule in 2022 from 30% of EBITDA to 20% of EBITDA on the debt levels of the firms that are affected. The firms that are affected by this change are those that had interest expenses of less than 30% of EBITDA in 2021 but had interest expenses of more than 20% in 2022. The treatment and control will therefore have to be redefined. That will result in the following overview of the treatment and control groups:

Table 2: Distribution Treatment and Control Group for H3

Type of group	Criteria
Treatment group	<ul style="list-style-type: none"> • Interest expenses of less than the highest of 30% of EBITDA or €1.000.000 in 2021. • Interest expenses of more than 20% of EBITDA or €1.000.000 in 2022.
Control group	<ul style="list-style-type: none"> • Interest expenses of less than the highest of 30% of EBITDA or €1.000.000 in 2021. • Interest expenses of less than 20% of EBITDA or €1.000.000 in 2022.

The outcome variable is the same as in the first hypothesis, namely debt levels, the control variables will therefore be the same as in the first regression. The control variables will be the logarithm of sales to control for firm size; asset tangibility, which is captured by dividing intangible assets with total assets to control for borrowing power; the interest coverage ratio to control for bankruptcy risk; and finally, the age of a firm to control for the reputation that a firm might have. This will result in the following regression formula for the third hypothesis:

$$\begin{aligned} \text{Debt levels}_{it} = & \alpha_{it} + \beta_1 * \text{Treatment}_{it} + \beta_2 * \text{Post}_{it} + \beta_3 * \text{Treatment}_{it} * \text{Post}_{it} + \beta_4 \\ & * \log\text{Sales}_{it} + \beta_5 * \text{Tangibility}_{it} + \beta_6 * \text{interest coverage}_{it} + \beta_7 * \text{age}_{it} \\ & + \varepsilon_{it} \end{aligned}$$

Chapter 6 Data

The research question examines two different effects of the earnings stripping rule. The first part of the research question investigates the effect on the capital structure of firms located in the Netherlands. The second part of the question focuses on the effect of the earnings stripping rule on the tax avoidance levels of the same firms. The data required to analyse these effects must consist of firm financial data of companies located in the Netherlands. The Orbis database is compiled by Bureau van Dijk and contains the firm financial data of Dutch companies that file financial results with the Dutch Chamber of Commerce. The database therefore includes both private and public companies.

6.1 Anticipation Effect

The EU directive from which the earnings stripping rule originates was announced in July 2016 and the deadline for it to have been implemented by the member states was 1 January 2019. One might therefore expect firms to already adjust their debt levels to be in line with the oncoming regulation. A similar effect was found by Fiechter et al. (2022) when they researched the anticipatory effects of firms that were affected by the EU directive that mandated the publication of corporate social responsibility reports. However, the EU directive that they researched did not affect the bottom line of the firms that were affected and instead influenced the public's perception of those firms. Anticipatory effects are therefore not to be expected for the earnings stripping rule. The chosen years for this research will therefore be the years 2018 to 2022.

6.2 Variable Selection and Creation

The earnings stripping rule does not differentiate between industries or firm size, all industries and firm sizes are therefore kept in the database. The variables that are selected are the variables that are used to create the control variables and to create the measures that capture the effects that are examined by the research question, which results in a final dataset consisting of 77 unique firms and 385 firm financial years. These variables include:

- Net Income
- Total Depreciation
- Interest Paid
- Intangible Assets
- Total Assets
- Total Sales
- Total Debt
- Research & Development expenses
- Year of incorporation
- Tax Expense

Using these variables, first of all, the variable EBITDA according to the definition of Article 15b is created. Total depreciation, interest paid and tax expense are added to net income to create the variable EBITDA. EBITDA is then used to create a column with the applicable limit for the earnings stripping rule. If the limit based on a proportion of EBITDA is lower than €1.000.000, the applicable limit will be €1.000.000. If the limit based on a proportion of EBITDA is higher than €1.000.000, the applicable limit will be the limit based on a proportion

of EBITDA. The limit that is obtained will be used to assess whether a firm is a control firm or a treated firm, using the criteria that were specified in the methodology section. This results in a treatment group consisting of 98 observations and a control group of 287 observations for the first and second hypotheses. For the third hypothesis, the treatment group is made up of 28 observations and the control group is made up of 126 observations.

After the creation of the limit, the control variables are created. The logarithm is applied to total sales; research & development expenses are divided by total assets; the amount of intangible assets is divided by total Assets to obtain the intangibility of a firm's assets; net income is divided by total assets to create ROA; the interest coverage ratio is created by first adding depreciation to net income to obtain EBIT, which is then divided by the interest expenses; the year of the observation is subtracted by the year of incorporation of the firm to obtain the age of the firm in the year of the observation; and the control variable indicating whether a company is a multinational entity is added. Finally, the tax expense is divided by the income before taxes to create the effective tax rate, and the total debt is divided by total assets to create the debt-to-assets measure.

6.3 Descriptive Statistics

Table 3: Descriptive statistics of full sample

Variable	N	Min	1 st Qua	Median	Mean	3 rd Qua	Max	Std. Dev.
DTA	385	0,00	0,12	0,23	0,27	0,34	1,89	0,26
ETR	385	-1,79	0,02	0,17	0,13	0,26	1,31	0,34
logSALES	385	13,53	18,51	20,93	20,45	22,55	25,23	2,62
INTANGratio	385	0,00	0,04	0,15	0,22	0,37	0,80	0,21
ICR	385	-50,04	1,68	6,94	10,89	14,58	122,25	22,42
Age	385	3,00	17,00	31,00	56,22	72,00	340,00	60,43
RDA	385	0,00	0,00	0,00	0,02	0,03	0,33	0,05
ROA	385	-1,59	0,00	0,04	0,01	0,07	0,41	0,18

Note: All variables are Winsorized at 1% and 99%

Table 1 contains the descriptive statistics of the firms and variables that will be used in the analyses. The mean debt-to-assets ratio is 27%, which means that 27% of a firm's operation is financed by debt. The mean effective tax rate is 17%, which is lower than the statutory tax rate of 19% for the first €200.000 of profit and 25,8% for profit exceeding €200.000. This could imply that firms conduct tax-avoiding behaviour, it could also mean that firms have settled their tax assets that they obtained when they were loss-making or that they are engaged in activities for which tax credits are available. The mean intangibility ratio is 22%, which means that on average 22% of a firm's assets are intangible. The mean interest coverage ratio is 10,89, which implies that on average a firm has a 10,89 times higher EBIT than interest expenses. The average age of a firm in the sample is 56 years. Finally, the average R&D expense divided by assets is 2% and the average return-on-assets is 0,5%.

Chapter 7 Results

7.1 Results Regression Hypothesis 1

In this section, the results obtained from the different regression analyses will be displayed and discussed in the order in which they have been discussed so far. First, the effects of the earnings stripping rule on debt levels will be discussed, followed by the effects on the effective tax rate, and lastly the effects of the tightening of the rule in 2022 on debt levels.

Table 4: Result regression analysis for H1

DTA	Without treatment (significance)	Without control variables (significance)	With control variables (significance)
Constant	0,258 (0,000)***	0,205 (0,000)***	0,412 (0,000)***
Post	-0,009 (0,813)	-0,011 (0,808)	-0,004 (0,932)
Treated		0,176 (0,005)***	0,159 (0,012)***
Post*Treated		-0,028 (0,688)	-0,042 (0,547)
logSALES			-0,009 (0,076)**
ICR			-0,001 (0,254)
Age			-0,001 (0,005)***
INTANGratio			0,142 (0,029)***
Year fixed effects	Yes	Yes	Yes
R-squared	0,009	0,084	0,121
Adjusted R-squared	-0,002	0,069	0,097

Note: ** indicates a significance level of less than 10%; *** indicates a significance level of less than 5%

What can be observed from the second column of Table 4 is that firms have 0,9% lower debt levels after the implementation of the earnings stripping rule in 2019. The coefficient is, however, insignificant and therefore cannot be interpreted as such. In the third column of Table 4, the regression for the first hypothesis is displayed without including the control variables. The only significant result of the regression is that a firm that would be affected by the earnings stripping rule has 17,6% higher debt levels than firms that would not be affected. This result is to be expected since the firms that are targeted by the earnings stripping rule are firms that excessively deduct interest, which originates from debt. The other results are that all firms after the implementation have 1,1% lower debt levels and that firms that are affected by the earnings stripping rule after the implementation have 2,8% lower debt levels. These last two results are, however, insignificant, which means that they cannot be interpreted as such. The fourth column displays the results obtained from the full regression with all control variables for hypothesis 1. The main result of interest is

that a firm that is restricted by the earnings stripping rule in their deduction of interest payments has 4,2% lower debt levels compared to a firm that is not restricted. This result is in line with results obtained by Blouin et al. (2014), who found that the thin capitalization rule decreased debt levels at the firms that were affected. The coefficient is, however, not significant and therefore cannot be interpreted as such. The full regression also displays that with the inclusion of the control variables, firms in the period after the implementation have 0,4% lower debt levels, this result is, however, again insignificant. On top of this, firms that would be treated by the earnings stripping rule have 15,9% higher debt levels than firms that would not be treated. This result can be interpreted since it is significant. This is to be expected since the earnings stripping rule targets firms that have excessive interest deductions, which originate from debt. Finally, all control variables that are included are significant, which indicates that they indeed affect debt levels at firms. The logarithm of total sales has a negative impact on debt levels, which is the opposite of what would be deducted from previous literature. The logarithm of sales represents the size of a firm, which according to previous research by Blouin et al. (2014) should be positively associated with debt levels since a larger firm will have better access to credit than a smaller firm. The negative result is, however, in line with the pecking order theory, which theorises that a firm will start with internal financing before external financing since internal financing costs less. A larger firm has more access to internal financing than a smaller firm, and a larger firm will therefore use less debt than a smaller firm. The interest coverage ratio also has a negative sign, which means that a firm that has comparatively lower interest payments and higher EBIT and therefore has less bankruptcy risk and more borrowing power, will have lower debt levels. This result is consistent with the previous literature, where Bongini et al. (2000) found that firms with a higher interest coverage ratio had lower leverage. The coefficient is, however, very small and insignificant, it, therefore, cannot be interpreted as such. A very small but significant effect is observed for the age of a firm, where an older firm will have lower debt levels than a younger firm. This is inconsistent with the previous literature, where Hyytinen and Pajarinen (2008) found that older firms have better access to debt than younger firms. The result is, however, only very slightly negative and should be interpreted carefully since the sample size is again limited. Finally, the ratio of intangible assets to total assets shows a positive effect on the debt levels of a firm. This is inconsistent with the previous literature, where it was found that a firm with more intangible assets has worse access to credit. The magnitude of the coefficient is, however, large, and the result is significant, which means that it should therefore be interpreted as such.

What can be concluded from the first analysis is that the obtained results show that the earnings stripping rule has influenced firms that were affected by it since, in both the analysis with and without the control variables, the coefficient of the Post*Treated was negative. The coefficient was, however, insignificant, in both instances and therefore only serves as limited evidence. The first hypothesis therefore cannot be rejected.

7.2 Results Regression Hypothesis 2

Table 5: Result regression analysis for H2

ETR	Without treatment (significance)	Without control variables (significance)	With control variables (significance)
Constant	0,099 (0,012)***	0,126 (0,006)***	-0,363 (0,023)
Post	0,021 (0,703)	0,048 (0,432)	0,032 (0,596)
Treated		-0,091 (0,276)	-0,077 (0,357)
Post*Treated		-0,059 (0,526)	-0,042 (0,645)
logSALES			0,022 (0,004)***
ROA			-0,065 (0,515)
RDA			-0,605 (0,147)
Multi			0,066 (0,088)**
Year fixed effects	Yes	Yes	Yes
R-squared	0,019	0,056	0,102
Adjusted R-squared	0,009	0,041	0,078

Note: ** indicates a significance level of less than 10%; *** indicates a significance level of less than 5%

The second column of Table 5 displays that firms in the period after the implementation of the earnings stripping rule have a 2,1% higher effective tax rate compared to the period before the implementation. The result is, however, insignificant and therefore cannot be interpreted as such. The third column contains the results of the regression without the control variables. It again shows that firms in the period after the implementation of the earnings stripping rule have a higher effective tax rate, in this instance, it is 4,8% higher. The firms that would be affected by the rule have a 9,1% lower effective tax rate than the control group. This is to be expected since the earnings stripping rule targets firms that conduct tax-avoiding behaviour, which would have a lower effective tax rate than those that do not. Finally, firms that are actually affected by the earnings stripping rule in the period after its implementation have a 5,9% lower effective tax rate than those that were not affected by the earnings stripping rule. This result suggests that the earnings stripping rule is not effective or that firms have found other tax avoidance tactics since the firms affected by the rule still have a lower effective tax rate than the control group. The results are, however, all insignificant and therefore can again not be interpreted as such. The fourth column contains the results of the full regression model, including the control variables. Again, the firms in the period after the implementation have a 3,2% higher effective tax rate. On top of this, firms that would be affected have a 7,7% lower effective tax rate than those in the control group, and the firms that are affected by the earnings stripping rule in the period after its implementation have a 4,2% lower effective tax rate. These results again suggest that the

earnings stripping rule is not effective or that firms have shifted their tax avoidance strategies. The results are, however, again insignificant and therefore cannot be interpreted as such. The control variable logSALES suggests that a larger firm will have a higher effective tax rate than a smaller firm. This is going against previous literature, which concluded that larger firms have greater tax-planning opportunities and therefore have a lower effective tax rate. The result is, however, significant and can therefore be interpreted. The control variable return-on-assets displays a negative value, which suggests that a more profitable firm has a lower effective tax rate than a less profitable firm. This is in line with previous research that found that more profitable firms have a larger incentive to commit tax avoidance since the rewards are higher. The result is, however, insignificant, which means that it cannot be interpreted as such. The control variable that controls for the R&D expenses scaled by the total assets of a firm has a negative value, which means that higher R&D expenses scaled by total assets lower the effective tax rate. This is again in line with what is to be expected since the Dutch tax code contains several specific tax credits for R&D expenses. Finally, the control variable that controls whether a firm is a multinational firm has a positive sign. This means that a firm that is a multinational has a higher effective tax rate than a firm that only operates in one country. This is not in line with previous literature, where it was suggested that multinational firms have greater tax-planning opportunities and therefore have a lower effective tax rate. The result is, however, significant and can therefore be interpreted.

What can be derived from the second regression analysis is that the results suggest that the effective tax rate of the firms that are affected by the earnings stripping rule has not increased but has decreased. The coefficient of Post*Treated was negative in both the regression with and without the control variables. These findings indicate that the firms that are affected by the earnings stripping rule have either found new tax avoidance strategies or that the earnings stripping rule is not effective in reducing tax-avoiding behaviour using interest payments. The obtained results were, however, insignificant and therefore only serve as limited evidence. The second hypothesis can therefore also not be rejected.

7.3 Results Regression Hypothesis 3

Table 6: Result regression analysis for H3

Variable	Without treatment (significance)	Without control variables (significance)	With control variables (significance)
Constant	0,264 (0,000)***	0,229 (0,000)***	0,192 (0,258)
Post	-0,016 (0,674)	-0,026 (0,512)	-0,029 (0,452)
Treated		0,122 (0,005)***	0,097 (0,055)**
Post*Treated		-0,002 (0,985)	0,017 (0,858)
logSALES			0,004 (0,597)
ICR			-0,001 (0,192)
Age			-0,002 (0,167)
INTANGratio			0,077 (0,428)
Year fixed effects	Yes	Yes	Yes
R-squared	0,001	0,057	0,087
Adjusted R-squared	-0,005	0,038	0,044

Note: ** indicates a significance level of less than 10%; *** indicates a significance level of less than 5%

Table 6 contains the results of regression analyses that test whether the tightening of the earnings stripping rule in 2022 influenced the debt levels of the firms that were affected. The second column indicated that firms in the period after the tightening had 1,6% lower debt levels than firms in the period before the tightening. The result is, however, insignificant, which means that it cannot be interpreted as such. The third column contains the results of the regression model without the control variables. The main result is that firms that fall under the criteria of the earnings stripping rule have 12,2% higher debt levels than firms that are in the control group. This result is significant and can therefore be interpreted as such. The other results imply that firms in the period after the tightening of the rule have 2,6% lower debt levels and that firms that are affected by the tightening of the rule have 0,2% lower debt levels. The latter is to be expected when looking at the previous literature. These results are, however, insignificant which means that they cannot be interpreted as such. The fourth column contains the results from the full regression model with the control variables. The main result of interest is that a firm that is affected by the earnings stripping rule after the tightening has 1,7% higher debt levels than a firm that is not treated by the rule. This is not in line with the previous research by Wamser (2014) where it was found that the tightening of the thin capitalization rule decreased total debt. The result is, however, insignificant and can therefore not be interpreted as such. Furthermore, the results suggest that firms in the period after the tightening had 2,9% lower debt levels than they did in the period before the tightening. This result is, however, again insignificant,

meaning that it cannot be interpreted as such. Firms that fulfil the criteria of the earnings stripping rule have 9,7% higher debt levels than those that do not. This is again to be expected since the earnings stripping rule targets firms that have excessive interest deductions, which originate from debt. The result is also significant, which means that it can be interpreted as such. The logarithm of sales has a positive sign, meaning that larger firms have higher debt levels. This is consistent with previous literature, the result is, however, insignificant and can therefore not be interpreted as such. The interest coverage ratio is negative and therefore suggests that a firm that has lower interest payments and higher EBIT, has lower debt levels. This is not consistent with previous research, the result is, however, again insignificant and therefore cannot be interpreted as such. The control variable for age displays similar results, namely a negative sign whereas a positive sign would be expected from the previous literature. The result is, however, again insignificant and can therefore not be interpreted as such. Finally, the proportion of intangible assets divided by total assets displays a positive sign. This means that firms with more intangible assets will have higher debt levels. This is also inconsistent with previous literature, the result is, however, insignificant and therefore cannot be interpreted.

The third regression analysis shows that the effects on the debt levels of firms that were not affected by the earnings stripping rule before the tightening but were affected by it after the tightening are mixed. The coefficient of Post*Treated is very small and negative when the control variables are excluded, while it is small and positive when the control variables are included. In both instances, the coefficient Post*Treated is insignificant. The control variables are, however, also all insignificant. It is therefore not possible to draw conclusions from this analysis, and the third hypothesis can therefore not be rejected.

Chapter 8 Sensitivity Analysis

8.1 Introduction Sensitivity Analysis

The sample used in the previous regression analyses contained all firms with the data available in the Orbis database that was required for the main analysis. That sample therefore also contained firms that were not profitable in a particular year, which would lead to negative results for net income, return-on-assets, tax, and the effective tax rate. Although this is not troublesome, since the earnings stripping rule is also applicable when a firm is loss-making, it does make it more difficult to capture the effects of the earnings stripping rule. That is because a firm that is in financial distress will display different characteristics than profitable firms. A firm that is in distress will, for example, increase its tax avoidance behaviour and therefore also its use of the tax benefits that debt financing provides (Dang & Tran, 2021). On top of this, their tax liability will be low or negative since there is no profit to be taxed. This would create a downward bias, falsely displaying results that indicate more tax-avoiding behaviour. Including loss-making firms could therefore introduce noise in the form of firms that previously did not use interest deductions for tax avoidance purposes but have started since they are in financial distress and cause a negative bias for the effective tax rate. The sample period includes years in which the economy and financial markets have been very volatile because of the pandemic, which would increase the likelihood of noise in the previously described form. It would therefore be valuable to exclude these loss-making firms from the sample and repeat the analyses that were previously conducted.

There are 27 firms and 135 firm financial years left in the sample after deleting the firms that had reported negative net income. The treatment group now contains 13 observations, and the control group now contains 122 observations. The control variables are created using the method that has previously been described in the Data section.

8.2 Descriptive Statistics Sensitivity Analysis

Table 7: Descriptive statistics of reduced sample

Var	N	Min	1 st Qua	Median	Mean	3 rd Qua	Max	Std. Dev.
DTA	135	0,00	0,12	0,20	0,22	0,30	0,52	0,13
ETR	135	0,04	0,16	0,22	0,22	0,27	0,49	0,09
logSALES	135	18,25	21,09	21,95	21,96	22,86	25,64	1,58
INTANGratio	135	0,00	0,13	0,27	0,29	0,38	0,79	0,19
ICR	135	1,73	5,62	9,29	17,68	15,90	120,67	24,60
Age	135	3,00	23,00	48,00	68,30	121,00	189,00	58,59
RDA	135	0,00	0,00	0,00	0,02	0,03	0,09	0,03
ROA	135	0,01	0,04	0,06	0,07	0,09	0,20	0,04

Note: All variables are Winsorized at 1% and 99%

The average debt-to-assets ratio of the sample without the loss-making firms is 22%, which is lower than the full sample. The second difference is that the effective tax rate is higher than the full sample, it is now 22% instead of the previous 13%. This result is much closer to the statutory tax rate of the Netherlands, which implies that excluding the loss-making firms removes the downward bias of the effective tax rate. The intangibility ratio is also higher than the full sample, it is now 28% instead of 22%. The interest coverage ratio is also higher than the full sample, it is now 17,68 whereas it previously was 10,89. This could be because

the loss-making firms create a downward bias for the EBIT, which is the numerator in the interest coverage ratio. The average age is also higher than the average age of the full sample, it is now 68,3 years instead of 56,22. The average research and development expenses scaled by total assets is the same as in the full sample, the upper limit is, however, now 9% instead of 33%. Finally, the average return-on-assets is higher than the full sample. In the previous sample, it was 1%, whereas now it is 9%. This could again be because the loss-making firms create a downward bias for Net Income, which causes the return-on-assets to be lower.

Table 8: Results regression analysis with reduced sample for H1, H2 and H3

Variable	DTA (significance)	ETR (significance)	DTA – Tightening (significance)
Constant	0,178 (0,227)	0,421 (0,000)***	0,082 (0,492)
Post	0,006 (0,869)	-0,011 (0,615)	-0,029 (0,317)
Treated	0,124 (0,037)***	-0,093 (0,016)***	0,0387 (0,362)
Post*Treated	-0,002 (0,982)	0,049 (0,250)	-0,005 (0,936)
logSALES	0,001 (0,984)	-0,005 (0,300)	0,009 (0,128)
ICR	-0,001 (0,024)***	XXX	-0,001 (0,009)***
Age	0,001 (0,952)	XXX	-0,001 (0,392)
INTANGratio	0,049 (0,365)	XXX	-0,021 (0,750)
Multi	XXX	-0,018 (0,246)	XXX
ROA	XXX	-0,979 (0,000)***	XXX
RDA	XXX	-0,654 (0,023)***	XXX
Year fixed effect	Yes	Yes	Yes
R-squared	0,198	0,343	0,099
Adjusted R-squared	0,133	0,289	0,047

Note: ** indicates a significance level of less than 10%; *** indicates a significance level of less than 5%

8.2 Results Sensitivity Analysis Hypothesis 1

The results in the second column of Table 8 show the results from the full regression with control variables for the first hypothesis, which examines the consequences of the earnings stripping rule on the debt levels of the affected firms. The first result is that firms in the period after the implementation of the earnings stripping rule have 0,6% higher debt levels than firms before the implementation. The coefficient is, however, insignificant and therefore cannot be interpreted as such. The second result is that firms that would be

affected by the earnings stripping rule have 12,4% higher debt levels than the firms in the control group. Since this result is significant, it can be interpreted as such. The third result is the result of interest, it shows that a firm that is affected by the earnings stripping rule has 0,2% lower debt levels, after the rule has been implemented. The result is, however, insignificant, which means that it cannot be interpreted as such. The only significant and interpretable control variable is the control variable for the interest coverage ratio, which indicates that a firm with a higher ratio has lower debt levels. This is again consistent with the previous literature. logSALES indicates that a firm with higher sales will have higher debt levels, which is in line with previous research. The control variable age indicates that an older firm will have higher debt levels than a younger firm, which is consistent with previous literature since older firms will have a better reputation and therefore more borrowing power. Finally, firms with a higher ratio of intangible assets divided by total assets will have higher debt levels than firms with a lower ratio. This result is again inconsistent with previous literature, where it is expected that higher intangible assets will lead to lower borrowing power. The control variables for the interest coverage ratio, the age of a firm, and the ratio of intangible assets are, however, all insignificant and can therefore not be interpreted as such.

The main differences between this analysis and the first analysis are that the coefficient of Post is slightly positive instead of slightly negative; the coefficient of Post*Treated is much smaller; logSALES is positive instead of negative but is also insignificant; the ratio of intangible assets is much smaller and also insignificant; age is now positive instead of negative, but is also insignificant; and lastly, the interest coverage ratio has the same coefficient but is now significant instead of insignificant. From the previous literature, it could be deduced that the loss-making firms would introduce noise in the analysis. The results from the sensitivity analysis, however, show that the results did not become stronger.

8.3 Results Sensitivity Analysis Hypothesis 2

The third column contains the results of the sensitivity analysis of the second hypothesis, which examines the effects of the earnings stripping rule on the effective tax rate of the affected companies. The first result is that firms in the period after the implementation of the earnings stripping rule have a 1,1% lower effective tax rate than the period before the implementation. The result is, however, not significant. The second result is, however, significant and can therefore be interpreted. Firms that would be treated by the earnings stripping rule have a 9,3% lower effective tax rate than firms that would not be treated by the earnings stripping rule. This is again in line with what is to be expected since the earnings stripping rule targets firms that engage in tax avoidance, which manifests itself through a lower effective tax rate. The third result is the main result of interest, which indicates that firms that are affected by the earnings stripping rule in the period after its implementation have a 4,9% higher effective tax rate. This result indicates that the earnings stripping rule has been effective in reducing tax avoiding behaviour since the effective tax rate has increased. The result is, however, not significant, which means that it cannot be interpreted as such. The first control variable is the control variable logSALES, which indicates that as the size of a firm increases, its effective tax rate will decrease. This result is consistent with the previous literature, where it was found that larger firms have more opportunities to engage in tax avoidance than smaller firms (Richardson and Lanis, 2007). The result is, however, not significant and can therefore not be interpreted as such. The

second control variable is the dummy variable, which indicates whether a firm is a multinational. It shows that a firm that is a multinational has a 1,8% lower effective tax rate than a firm that is not a multinational. This result is also consistent with the work of Rego (2003) where it was found that a multinational has more opportunities to engage in tax avoidance and therefore has a lower effective tax rate. The result is, however, again insignificant, which means that it cannot be interpreted as such. The final two control variables are, however, significant and can therefore be interpreted. The control variable ROA indicates that a firm that has a 1% increase in their return-on-assets, will have a $0,01 * 0,979 = 0,979\%$ lower effective tax rate. This result is consistent with the previous literature, where Dunbar et al. (2010) found that firms with more profitability will engage more in tax avoidance. The final control variable RDA indicates that a firm that has a 1% increase in their research and development expenses scaled by total assets will experience a $0,01 * 0,654 = 0,654\%$ reduction of their effective tax rate. This is also consistent with what is to be expected since the Dutch tax code has special tax credits for research and development expenses.

Unlike the sensitivity analysis of the first hypothesis, the results of the sensitivity analysis of the second hypothesis are more meaningful. First, the adjusted R-squared of the model (28,9%) is higher than the model with the full sample (7,8%). This means that the fit of the model has improved by excluding the loss-making firms. Second, the control variables for firm size and being a multinational now have the signs that are to be expected based on the previous literature. Finally, the significance of the Post*Treated has increased from 0,645 to 0,250. Although it is still insignificant, it is now less insignificant than before. On top of this, the sign of Post*Treated is now positive, which is what could be expected according to the previous literature. Since the result is still insignificant, the result still cannot be interpreted, and the second hypothesis can therefore still not be rejected.

8.4 Results Sensitivity Analysis Hypothesis 3

The fourth column contains the sensitivity analysis for the third hypothesis, which examines the effect of the tightening of the earnings stripping rule in 2022 on the debt levels of the firms that were affected. The first result is that firms in the period after the implementation of the earnings stripping rule have 2,9% lower debt levels than before the implementation. This magnitude is the same as what was obtained in the analysis of the full sample, although it is slightly less insignificant, it is still insignificant and therefore cannot be interpreted. The second result is that firms that would be affected by the earnings stripping rule have 3,87% higher debt levels than the firms in the control group. The result is, however, insignificant and therefore cannot be interpreted. The main result of interest is that firms that are treated by the earnings stripping rule in the period after its implementation have 0,5% lower debt levels than the control group. This result is consistent with the results that were obtained by Wamser (2014), the magnitude of the result is, however, much smaller. The result is also insignificant, which means that it cannot be interpreted as such. The first control variable for firm size indicates that a larger firm will have more debt than a smaller firm, which is consistent with previous literature. The result is, however, insignificant and can therefore not be interpreted. The second control variable, which controls for bankruptcy risk by examining the interest coverage ratio, implies that a firm with relatively higher EBIT and lower interest expenses will have lower debt levels. This is again contrary to the previous literature, but since the result is significant, it does imply that such a relationship indeed exists. The

magnitude of the coefficient is, however, small, which means the economic and practical significance is therefore moderate. The third control variable is the age of a firm, which suggests that the debt levels of older firms are lower than those of younger firms. This is also not in line with the previous literature, the result is, however, again insignificant and therefore cannot be interpreted as such. Finally, the ratio of intangible assets to total assets implies that an increase in intangible assets will result in lower debt levels. This is consistent with previous literature, which found that intangible assets are negatively associated with debt levels since it is more difficult to foreclose on intangible assets than it is on tangible assets. The result is, however, insignificant and can therefore not be interpreted as such.

The main difference between the sensitivity analysis and the main analysis of the third hypothesis is that the coefficient of Post*Treated is negative instead of positive. A negative coefficient of Post*Treated is more aligned with the previous literature, which implied that firms affected by an interest limitation rule would experience decreased debt levels. The magnitude of the coefficient is, however, small, and the economic significance is therefore also limited. On top of this, the coefficient is still not significant, and a conclusion can therefore not be drawn.

Chapter 9 Conclusion & discussion

The main research question of this thesis was the following:

“Has the earnings stripping rule changed the capital structure of firms located in the Netherlands, and has it been effective in reducing tax avoidance of firms located in the Netherlands?”

The results that were acquired in the results section do not lead to a conclusive answer to the research question since the results were all insignificant. The main result for the first hypothesis suggests that a firm that is treated by the earnings stripping rule has 4,2% lower debt levels than a firm in the control group. This result is what could be expected from the previous research, where it was found that the interest limitation rules decreased the debt levels at the affected firms (Buettner et al., 2012). The results that are obtained are, however, insignificant, which means that such a direct conclusion cannot be drawn for the earnings stripping rule. In the sensitivity analysis, where the loss-making firms were left out of the sample, the obtained results were weaker than the results that were obtained from the full sample. The first hypothesis, which examined whether debt levels would be reduced at the firms that are affected by the earnings stripping rule therefore cannot be rejected.

The main results for the second hypothesis suggested that firms that are treated by the earnings stripping rule have a 4,2% lower effective tax rate than those that are not treated by the earnings stripping rule. This result goes against what could be deduced from previous research, where it was instead found that the introduction of an interest limitation rule caused the effective tax rate to increase at the firms that were treated (Taylor and Richardson, 2013). The result was, however, again insignificant, which means that a relationship cannot be concluded as such. The sensitivity analysis, however, displayed a positive value of 4,9%, which means that when the loss-making firms are excluded from the sample, the results are in line with the previous literature. Excluding the loss-making firms seems to indeed remove the downward bias towards a lower effective tax rate, which results from the loss-making firms being granted tax assets that can be settled in the future. The results are, however, again not significant, which means that a relationship cannot be concluded and that the hypothesis cannot be rejected.

The results for the third hypothesis indicated that the debt levels of the firms that were not affected by the earnings stripping rule in 2021 but were affected by the rule after it tightened in 2022, increased by 1,7% compared to the control group. This result is not what was to be expected from the previous literature, which found that a tightening of a general interest limitation rule would lead to lower debt levels at the firms that were not affected by the rule before its tightening (Wamser, 2014). The result was, however, again insignificant. The sensitivity analysis displayed a decrease in debt levels of 0,5%. This result is consistent with the previous literature in terms of its sign, its magnitude is, however, much smaller compared to what was found in the research by Wamser (2014). This result is, however, also insignificant, which means that a conclusion cannot be drawn as such. The third hypothesis therefore cannot be rejected.

Since the results that were obtained were all insignificant, no direct conclusion could be drawn. There can be several reasons why this is the case. The first and most important reason is the sample size that was used in the analyses. The sample consisted of 77 firms that were traced over five years, leading to 385 firm financial years. The Orbis database, however, contains more than seven million firms that are located in the Netherlands. The availability of specific data points, such as the interest paid by a firm, is very limited. The sample that is used in this thesis is therefore constrained, and it could therefore be beneficial to incorporate a larger sample since this sample might not be able to fully capture the relationship between debt levels, the effective tax rate, and the earnings stripping rule.

Another cause of the insignificant results could be omitted variable bias in the analyses. Unlike previous research, the analyses in this thesis did not use industry-fixed effects. The reason for this was that the number of different industries (61) was close to the number of firms (77) that were present in the dataset. Including the industry fixed effects led to overfitting of the statistical model with an adjusted R-squared of higher than 80%. This consequently caused the power and magnitude of the control variables and the variables of interest to drop and therefore further reduce the explanatory power of the model. If a larger sample size were to be used, the industry fixed effects could be included to control for the effects of a particular industry on debt levels and the effective tax rate.

Finally, an addition could be the use of a different method to analyse the sample. In this thesis, difference-in-difference analysis was used to study the sample. Although this method applies to the sample that was used and the topic that was being studied, the use of a different empirical method could be valuable. Wamser (2014) for example, used propensity score matching to study the tightening of the German thin capitalization rule in 2001. Incorporating another research method is, however, beyond the scope of this thesis and would therefore be beneficial for future research.

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Appendix A

Variable	Description
Post	Dummy variable that is 0 for 2018 and 1 for 2019 and later
Treated	Dummy variable that is 1 if a firm is part of the treatment group and is 0 if the firm is part of the control group
Post*Treated	Difference-in-Difference estimator that is 1 if an observation is in the period from 2019 and later and is part of the treatment group
logSALES	Logarithm applied to Total Sales
ICR	Interest Coverage Ratio (EBIT/Interest Expenses)
Age	Age of the firm in years
INTANGratio	Intangible Assets scaled by Total Assets (Intangible Assets/Total Assets)
Multi	Dummy variable that is 1 when a firm is a multinational and 0 if it is not
ROA	Return-on-Assets (Net Income/Total Assets)
RDA	Research & Development Expenses scaled by Total Assets (R&D Expenses/Total Assets)