As Uncertain as Taxes

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Abstract

I investigate how the capital structure of firms is affected by uncertainty about the legal outcomes of corporate tax law. I create a simple model in which firms choose to either avoid taxes aggressively or conservatively, based on enforcement of laws and uncertainty about outcomes of the legal process. This theory shows under which conditions firms will avoid conservatively by using debt tax shields and when they will use more aggressive strategies. I suggest multiple novel proxies for the uncertainty about legal outcomes to provide empirical evidence to support the theory. This evidence is a first step towards understanding the effects of uncertainty about the interpretation of existing law on the decisions of companies.

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1 Introduction

"in this world nothing can be said to be certain, except death and taxes."

Benjamin Franklin, in a letter to Jean-Baptiste Leroy 1789

Franklin was right: corporations will always face some tax obligations over their lifetime. However, the extent of those obligations can be surprisingly uncertain. Companies face complex tax laws with different embedded incentives which make optimization of tax structures difficult. This is made more difficult by the fact that a company does not know ex-ante whether local tax authorities will agree with the company's interpretation of corporate tax law. Differences of opinion on the application of the law to a specific situation can lead to disputes over corporate tax liability. In this paper, I investigate how this uncertainty affects the financial policies of the firm.

Whether it is the capital structure (Modigliani and Miller, 1963), entry of new businesses (Da Rin, Di Giacomo, and Sembenelli, 2011) or payout policy (Brav et al., 2005), taxes play a significant role in the financial decision making of companies and are an important cost that is to be actively managed. As a result, tax-avoidance investment has become an important tool to increase bottom line performance. Firms can respond to mismatches between domestic laws of different countries or exploit loopholes to pay less taxes. Governments try to repair the tax leaks and counter international tax base erosion (OECD, 2014,a,b,c), often increasing the complexity of the laws in the process. This complexity can in turn lead to uncertainty, which can prevent companies from making optimal decisions (Sunstein, 2011; Slemrod and Kopczuk, 2002). Companies may invest in elaborate tax avoidance structures or do the opposite by over-complying with the law (Calfee and Craswell, 1984) to avoid the uncertainty. Since there are large amounts of money under contention and court cases can last for years with the added risk of penalties, the effects of uncertainty about tax law can be significant. Theory suggests that uncertainty in legislation can distort optimal investment decisions (Givati, 2009). However, the empirical evidence on the effects of uncertainty about legal outcomes is limited. This paper attempts to fill this gap.

In this paper I investigate how uncertainty about legal outcomes affects the capital

structure of companies. I argue that uncertainty about legal outcomes can explain a significant part of the cross country differences in capital structures and argue that it can also explain differences within a country. I first provide a simple model to formulate the hypotheses and show how uncertainty about legal outcomes, penalties and probability of audits affect a company's capital structure. Uncertainty will drive companies to either avoid taxes conservatively, using debt-shields, or aggressively using more complex avoidance strategies. I then investigate this empirically.

Uncertainty about legal outcomes means that a company does not know how the tax authority and courts will interpret the articles of law. The more ambiguous these articles are the more possibilities there are for tax avoidance. However, it also increases the probability that an audit by the tax authority leads to a negative outcome. The model predicts that if the chance of detection is low, uncertainty will increase the amount of tax avoidance. However, if punishments or audit probabilities are high the reward is no longer worth the risk. Aggressive tax avoidance strategies and tax avoidance using debt-shields can be seen as substitutes. One is a relatively safe strategy and the other carries a lot of uncertainty. This is in line with evidence found in Graham and Tucker (2006) who show for a sample of 44 proven tax shelter cases that these companies have lower average debt than comparable firms. In this paper I will show that uncertainty about legal outcomes is a significant factor in this trade-off.

I test the predictions of the model using multinational companies. Multinational companies are ideal for identifying the effect as I can exploit variation within the multinational. This creates a natural setting to compare the effects across countries, while eliminating the effects of differences in management and general attitude towards tax avoidance. I test the effects of uncertainty across firms which are part of multinational companies. Furthermore, recent debates and policy instruments mostly target international tax avoidance as it is costly for governments and raises questions about tax equality. By creating several novel proxies for uncertainty I provide important guidance for legislators and legal scholars with regards to the construction of new laws. By estimating the effects of uncertainty I can show the economic impact. Moreover, I add to our understanding of the international capital structure allocation of multinational companies and the capital structure literature

in general by explaining a larger degree of the heterogeneity in capital structures.

Despite its practical relevance, uncertainty in tax law is not a widely investigated issue (Zangari, Caiumi, and Hemmelgarn, 2017). Uncertainty about what future laws will look like is investigated in Gulen and Ion (2016) and will not be further investigated in this paper. Some evidence exists for the effects of complexity in the case of personal income tax. It is shown that private individuals make suboptimal decisions when rules are more complex. Sunstein (2011) and Abeler and Jäger (2015) suggest that limited cognitive abilities play a large role. Companies, with a large team of advisors at hand, should not be affected in the same way. However, law can be ambiguous and this will affect compliance cost and may also affect a company's investment decisions in light of the uncertainty it causes. To the best of my knowledge this will be the first paper empirically investigating the effects of uncertainty about legal outcomes of tax laws on capital structure.

I find that the effect of uncertainty on leverage depends on the degree of enforcement of the law. In countries with high audit probabilities uncertainty leads to more use of leverage. This is consistent with the idea of firms taking a conservative tax avoidance strategy. When audit probabilities are low we see the opposite. The negative effect in low-audit countries is about twice as strong as the positive effect in high-audit countries. I also observe that the audit probability by itself has a strong effect on leverage. Lastly, I find that the effect of tax rates on leverage depends on the audit probability as well. In low-audit countries the predictions of the trade-off theory (Kraus and Litzenberger, 1973) are found to not hold anymore. This is indicative of firms avoiding more taxes when the audit probability is low. This reduces the effect of facing a tax rate change.

There has been a theoretical literature starting with Becker (1968); Polinsky and Shavell (1979) and Calfee and Craswell (1984), which discusses the optimal trade-off between detection and punishment and the effects of introducing uncertainty into this setting. These authors show that, dependent on detection probability and punishment, firms either under- or over-comply with legislation when uncertainty is introduced. I add to this literature by providing empirical evidence on the effects of uncertainty and detection on corporate behavior. Graham and Tucker (2006) show, using a small sample of tax evading firms, that tax evasion can affect leverage. I show that uncertainty about legal

outcomes drives the effect, showing theoretically why a firms leverage and tax avoidance behavior are linked and providing empirical evidence for this mechanism for a broad set of firms. This provides implications for how countries should create new policy and helps explain the heterogeneity that is observed in capital structures. With an extension the model can also explain the over-compliance with tax laws that is observed in Allingham and Sandmo (1972). I also add to the literature about complexity and uncertainty in law (Pistor and Xu, 2002, 2003; Kaplow, 1995, 1999; Dari-Mattiacci and Deffains, 2007) by quantifying uncertainty and estimating its effects. Furthermore, I provide implications for policy and show that uncertainty does not only affect investment decisions, but also financing decisions of companies.

The structure of this paper is as follows: I describe the institutions involved in the tax process in section 2. I present the theoretical framework in section 3. Section 4 describes the data and how the relevant parameters are measured. Section 5 describes the estimation strategy and potential problems in estimation as well as the solutions. Section 6 presents the results and in section 7 robustness tests are presented. Section 8 concludes.

2 Institutional framework

In this section I describe how the taxation process works and which institutions are involved in this process. Details differ from country to country, but the general concept is similar.

The government will design a tax law. The law will set forth the tax rate and how to calculate the profit for tax purposes (the taxable base). Law cannot cover all possible contingencies that occur in everyday business.[1] Instead the law consists of a combination of limitative and suggestive articles. Limitative articles are those which list cases in which for instance a cost can be deducted from the taxable base. Suggestive articles give general principles for when an item is considered revenue or cost for tax purposes. For examples of both types or articles I refer the reader to appendix A.

After the end of the fiscal year a tax return is filed and the tax liability calculated. The

[1]It can be thought of as an incomplete contract as described in Hart and Moore (1988).

company will report its revenues and its deductible costs. This is where the incompleteness of the law can give rise to uncertainty. It is not ex-ante clear what the tax effects of some actions taken during the year will be. Moreover, the company can structure these actions in a way that will influence the tax treatment.[2,3]

The tax authority verifies the filing and collects the taxes. Due to the large amount of tax filings they can only audit a fraction of the companies that file each year. A company does not ex-ante know whether it will be audited. Calfee and Craswell (1984) shows that uncertainty about interpretation, high penalties and the audit probability will affect whether firms under- or over-comply with legislation. It is often argued that since the probability of an audit is low a company should file a dishonest return in all cases. However, the tax authority doesn't audit at random. Aggressive tax avoidance will draw attention and fines are charged if a position could not reasonably be considered defensible or the tax payer was grossly negligent. It is important to note that there is a big difference between a defensible tax avoidance strategy and an illegal tax evasion strategy. Defensibility, in this context, means that the firm can reasonably take this position, even though authorities may disagree with it.

The parties can go to court when they disagree about audit outcomes. After a ruling the tax is collected or returned and in most countries interest is added. Parties can appeal the ruling at a higher court. Both the lowest and the appeal courts deal with the interpretation of the facts and how to apply the law to these facts.[4] The decision depends on the legal and the economic reality. A judge can rule that an action lacks economic substance and serves only a tax avoidance purpose. thereby violating the spirit of the law. This can happen even if the action follows the letter of the law.

As a last resort parties can appeal at the highest court of the country. Generally, the

[2]Tax-avoidance investment is not necessarily judged as something bad in this paper. In many cases the avoidance of tax is both within the spirit and letter of the law. However, Graham (2006) shows that certain tax avoidance investments are not value enhancing.

[3]For instance, the owner of a firm draws up a credit line with the firm. The credit line is ever expanding and is never paid down. While legally a credit line a judge might rule this is a de facto dividend.

[4]For instance, the tax authority is of the opinion that a payment is a payment on equity, while the company is of the opinion that it is a payment on debt. The court will have to decide what the payment factually is on the basis of which rule and what consequence this has. In this case: deductible interest payment or non-deductible payment on equity.

highest court can only rule on the interpretation of the law and not on the interpretation of the facts of a case.[5] Such a court is referred to as a Court of Cassation. Once the highest court has ruled on the interpretation of the law a lower court has to apply this interpretation to the facts of this case and will keep applying it to future cases with a similar setting. So even in civil law countries case law carries significant weight.

A company can obtain certainty in advance by asking for an Advance Tax Ruling (ATR). This is a ruling given by the tax authority on how it will interpret the law in this specific case. However, these can only be obtained for real, planned investments and take time to acquire. The government does not necessarily give a ruling. If the ruling is not as beneficial as one would like one can expect that an audit follows if a different interpretation is applied. So while reducing the uncertainty an ATR can also pose a risk, as the company highlights its own tax avoidance behavior. Furthermore, asking for an ATR is equivalent to asking the tax authority to pre-audit a specific action in much detail, while audit probabilities and thoroughness in reality are less likely to be as invasive (Givati, 2009).

3 Theoretical framework

3.1 Baseline model

In this section I describe the theoretical background of the paper. The framework is in the tradition of Allingham and Sandmo (1972). However, whereas these authors look at tax evasion I will adjust the framework towards tax avoidance. This implies that rather than picking a certain level of income to under report, I allow my agent to pick between one aggressive and one conservative exogeneously given tax avoidance opportunity. I define the following variables:

$$P_e(u) = \text{probability of losing in court} \begin{cases} \text{loss with probability e} \\ \text{win with probability 1-e} \end{cases}$$

[5] This implies that the court can for instance rule on how debt and equity payments are defined, but not on whether or not the facts presented are correctly and wholly presented.

P_a = probability of being audited $\begin{cases} \text{audit with probability a} \\ \text{no audit with probability 1-a} \end{cases}$

R = required rate of return

r = interest charged and received on tax

τ = tax rate

x = debt

$y(u)$ = benefit of the uncertain avoidance strategy

$z(u)$ = cost of setting up the uncertain avoidance strategy

$c(x)$ = cost of the certain avoidance strategy

Note that R, r, τ are distributed on the $[0, 1]$ interval.

The firm wants to minimize its tax cost. The strategies the firm can chose reduce the tax bill in a fully legal and defensible way. For the purpose of this paper I will ignore tax evasion, although the model can be extended to include this aspect. Note that the firm chooses between a certain strategy and an uncertain project. In reality there could be a continuum of projects with various degrees of uncertainty for the firm to pick from. I abstract from this here.

The conservative strategy is an investment of which all consequences are known.[6] Equation 1 shows the payoff under certainty. There is a benefit consisting of a factor x which is increasing in the tax rate τ and a cost c which is a function of x.[7]

$$W_c = x\tau - c(x) \tag{1}$$

The aggressive tax avoidance strategy has some uncertainty with regards to the interpretation of the law. This means that ex-ante it is not clear whether or not the strategy is accepted in case of an audit. There will be three different possible outcomes. Firstly, the firm might not be audited at all. In this case the firm receives the benefit of the strategy. Secondly, the firm is audited and loses the case. In this case it has to repay the benefit

[6] While in reality such an optimization strategy is unlikely to exist this case is used for tractability and can be seen as the most certain strategy possible.

[7] This can be thought of in terms of the trade-off theory as set forth by Kraus and Litzenberger (1973). Where x is the debt and c is the bankruptcy cost function, which is increasing in debt. This interpretation suggests that $c(x)$ is a convex function of x.

and pay interest over the benefit. Thirdly, the firm is audited but wins the case. In this case the firm will lose the opportunity to reinvest the benefit for the duration of the legal proceedings.[8] In all cases the firm has to pay a cost of setting up and searching for the tax avoidance strategy and creating the necessary compliance documentation.

Uncertainty increases the payoff of possible avoidance strategies, but these strategies are more likely do be deemed abusive by the court. $P_e(0)$ can be thought of as the ex-ante expected probability of losing in court based on the strategy taken under certainty. When there is uncertainty there is some added positive probability that the strategy taken will be deemed abusive and therefore loses in court.[9]

$$W_u = \underbrace{y(u))\tau}_{\text{Benefit}} - P_a \underbrace{(P_e(u)y(u)\tau(1+r+(R-r))}_{\text{Cost when losing}} + \underbrace{(1-P_e(u))y(u)\tau(R-r))}_{\text{Cost when winning}} - z(u) \quad (2)$$

Equation 2 represents the payoff of the uncertain project.As can be seen the benefit $y(u)$ is also a function of the uncertainty about the legal outcome captured by $P_e(u)$. This captures the fact that more uncertainty creates more room for companies to exploit the law. However, this also increases compliance and search costs. Therefore the costs $z(u))$ are also a function of the uncertainty. For the firm to undertake the uncertain project the benefits have to exceed these up-front costs.

The firm optimizes the following objective function:

$$\max_{\alpha} \qquad U((1-\alpha)W_c + \alpha W_u) \tag{3}$$

The solution to this optimization problem is trivial. Whenever W_c is bigger than W_u the firm takes the certain strategy. If W_u is bigger than W_c it takes the uncertain strategy. While this may be an oversimplification of the actual decision process the comparative statics are of interest.

An increase or decrease in x will shift the balance towards the risky project. This is

[8]For instance Hanlon et al. (2017) find that companies with larger Unrecognized Tax Benefits hold more cash. Holding cash will carry an opportunity cost.

[9]If $P_e(o) = 1$ the aggressive strategy is not an avoidance, but an evasion strategy. The firm knows with certainty that it will lose a court case, even though it knows for sure how the law should be interpreted. This case is ignored in this paper, but can be created as an extension.

the result of the fact that W_c is in its optimum, balancing between the convex cost and the linear benefit of x. A decrease would mean the firm is not getting the optimum benefit, an increase would mean the firm is paying too high a cost. An increase in τ will increase W_c. At the old optimum the marginal benefit of increasing x is higher than the marginal cost $c(x)$.

I discuss the comparative statics for each parameter in equation W_u below.

$$P_a \uparrow \quad \Rightarrow \quad W_u \downarrow \tag{4}$$

Firstly, there is the effect of a change in the probability of being audited. Since an audit is costly to the firm an increase in this probability will lead to a decrease in the payoff of the uncertain project.

$$\begin{aligned}
\tau \quad \uparrow \quad &\Rightarrow \quad W_u \uparrow \quad \text{if } \frac{1}{P_a} > P_e(u)(1+r) + (R-r) \\
\tau \quad \uparrow \quad &\Rightarrow \quad W_u \downarrow \quad \text{if } \frac{1}{P_a} < P_e(u)(1+r) + (R-r) \\
y(u) \uparrow \quad &\Rightarrow \quad W_u \uparrow \quad \text{if } \frac{1}{P_a} > P_e(u)(1+r) + (R-r) \\
y(u) \uparrow \quad &\Rightarrow \quad W_u \downarrow \quad \text{if } \frac{1}{P_a} < P_e(u)(1+r) + (R-r)
\end{aligned} \tag{5}$$

Both τ and $y(u)$ have an ambiguous effect on the payoff function. While the benefit in case of no audit increases, the cost in case of audit also increases. As long as the inverse of the probability of being audited is larger than the expected penalty rates W_u increases. This suggests an interplay between tax rates and penalty rates. If penalty rates are high a change in τ and $y(u)$ has a negative effect, while if penalty rates are low the opposite holds true. There is also an interplay between the tax rate and audit probabilities. At low audit probabilities the effect of taxes is positive, while at high audit probabilities the effect

is negative. So at high audit probabilities and high punishment the effect is negative. [10]

$$
\begin{aligned}
u\uparrow \quad &\Rightarrow \quad W_u\uparrow \quad \text{if } \frac{\tau y'(u)-z'(u)}{P_a} > \tau((1+r)(P'_e(u)y(u)+Pe(u)y'(u))+y'(u)(R-r)) \\
u\uparrow \quad &\Rightarrow \quad W_u\downarrow \quad \text{if } \frac{\tau y'(u)-z'(u)}{P_a} < \tau((1+r)(P'_e(u)y(u)+Pe(u)y'(u))+y'(u)(R-r))
\end{aligned} \tag{6}
$$

Last, I turn to the probability of losing in court. This is the uncertainty about legal outcomes that I wish to investigate in this paper. The intuitive interpretation is that for low probabilities of an audit the uncertainty increases the payoff of the uncertain asset. However, if penalties are large enough the opposite occurs. We can also observe that the choice of the functional form will affect the outcome.

3.2 Possible extensions

There are several dimensions in which this framework can be extended. Below I will mention the most important ones and argue what their effects will be.

The introduction of risk aversion does not change the sign of the comparative statics unless the probability of an audit is very high. The thresholds for switching from W_c to W_u will be different. The most significant change in the case of risk aversion is that the firm decision to invest in the risky project will be decreasing in the degree of risk aversion.

I purposely focus on tax avoidance rather than tax evasion for two reasons. Firstly, tax avoidance is a prevalent practice and is perfectly legal. Secondly, companies utilizing pure tax evasion strategies like the ones described in Allingham and Sandmo (1972) should evade more than empirical evidence shows they do. While several solutions to this mismatch have been offered in the form of degrees of risk aversion, morality and fairness (Bernasconi, 1997; Bordignon, 1993; Gordon, 1987), this seems to be at odds with modern day auditing practice. Pure underreporting will likely trigger tax authorities' algorithms for detecting tax evasion, it is likely that pure evasion is met with increased audit rates. If the audit rate would increase in the probability of losing the cost of tax aggression would increase more quickly, reducing the benefit of tax evasion. Note that if one were to adapt the model

[10] Note that Slemrod and Kopczuk (2002); Kopczuk (2005) predict that the legal environment a firm operates in can change the effect of tax rate changes on financial policy. We observe that the uncertainty about the environment can create such an effect as well.

to include evasion, the penalty rate would be higher. As one cannot reasonably defend ones strategy one will receive a fine or prison sentence.

Another dimension in which firms differ, and one that is measurable in the empirical tests, is the size of the firm. To see what happens when utility becomes size dependent I first have to make assumptions on how costs and benefits are affected by the size of a company. Size reduces the probability of bankruptcy and the unit cost of bankruptcy. Therefore $c(x)$ is increasing at a reducing rate. As the benefit of the risk free project is the debt-shield it will be linearly increasing in size. The search and compliance costs of the risky project will be constant regardless of size. This is due to the fact that the costs of finding a good tax avoidance strategy stay the same.[11] Therefore $z(Pr(e))$ is constant in size. This implies that the difference between the two options of small and big firms should differ. For small firms there is less use of uncertain projects, as the risk free project's payoff is higher compared to the uncertain project. For big firms the differences are bigger and there is more use of uncertain projects, as the risk free project's payoff lags behind the uncertain project.

So small firms would like to take the uncertain project, but it is to costly. Larger firms can afford to take it and are more likely to do so.

Lastly, differences in the opportunity cost can create another dimension of heterogeneity. It is likely that certain types of firms will suffer more from having money tied up in court proceedings than others.

3.3 Hypotheses

H1: An increase in uncertainty increases the use of leverage when the probability of audit is high.

H2: An increase in uncertainty decreases leverage when the probability of audit is low.

H3: An increase in the tax rate decreases leverage if audit probability is low.

H4: An increase in the probability of an audit increases leverage.

[11] This is rather conservative as an argument can be made that a larger firm has many low hanging fruits when it comes to tax avoidance strategies, compared to very small firms which will have to make very specific investments.

4 Data and measurement

4.1 Measurement

As shown in section 3 costs of uncertainty derive from various sources. A firm uncertain about taxes may forgo profitable investment opportunities because of the tax risk involved. Furthermore, long running court cases can tie up a lot of money and come at significant costs. The size of the uncertainty as well as the risk of being audited will affect the impact of these costs.

As discussed in section 2 uncertainty itself arises as a result of a possible different interpretation of law. The degree of uncertainty can derive from two sources. Firstly, the company can take very aggressive tax positions.[12] In this case the uncertainty is created by the behavior of the firm and should not necessarily be considered as something unwanted as the firm chooses to take these actions. Secondly the complexity of the law itself creates the uncertainty.[13] In this case the uncertainty is created by the government. This means that the complexity of tax laws will influence the uncertainty faced by companies. This creates problems and opportunities for companies as they cannot avoid the uncertainty, but can use it.

I will investigate uncertainty created by the government. There are several ways of measuring this and I will apply several methods. Firstly, Abeler and Jäger (2015) suggest the size and number of articles and sub articles in a law affect uncertainty. While the size of the law is likely to cause an effect for personal income taxes, companies likely have more access to high skilled tax consultants, who can more easily navigate the multitude of articles of law.

This is why my preferred measure of uncertainty will look at uncertainty that exists even with these consultants. This can be measured by the age of the law and the structure of the law (Pistor and Xu, 2002, 2003). Structure is measured by the degree of limitative and suggestive rules in the law.[14] It is argued that older laws with limitative articles

[12] See for instance: Frank, Lynch, and Rego (2009) and Graham (2006)

[13] See for instance: Abeler and Jäger (2015) for the effects on individuals in an experimental setting.

[14] For an example see appendix A.

become unclear due to the fact that the law changes slower than the real world (Pistor and Xu, 2002, 2003; Dari-Mattiacci and Deffains, 2007).[15] Similarly, young laws with suggestive rules carry a lot of uncertainty. This is due to the fact that the interpretation of these suggestive rules has not been fully crystallized yet.

A way to reduce uncertainty is by looking at previous legal outcomes, just as in civil law countries this case law carries significant weight in common law countries. Rulings made by the highest courts will be used by lower courts to interpret the law in future court cases. As a result both the tax authority and the company can call on case law as a justification for their point of view. A suggestive law with a lot of case law is not nearly as uncertain as one without any case law. I will use the amount of cases ruled on by the highest court and the suggestiveness of the law as a proxy for uncertainty.

$$\text{Uncertainty}_{ct} = \frac{\text{Suggestive articles}_{ct}}{\text{Total articles}_{ct}} * \frac{20,000}{\text{Case law rulings}_{cT}} \tag{7}$$

Where c indicates the country and t the year. For a thorough description of when an article gets classified as suggestive I refer the reader to appendix B. I divide the inverse of the Case law rulings by 20,000 to ensure it's range matches that of the suggestiveness ratio. This way changes in rulings and suggestiveness have comparable effects on the measure. Without this correction all results carry through. The more suggestive articles there are in the law, the more uncertain the law is and the higher my measure for uncertainty is. Similarly, fewer case law rulings increase uncertainty and my measure.

For the expectation of being audited I use the actual amount of audits conducted in a country as a fraction of total tax returns. While I acknowledge this is a rough proxy, as some companies are by their nature more likely to be audited than others, it does ensure that the behavior of the company does not affect my proxy. This makes it exogeneous to the choices of any firm located in the country as they do not affect the countrywide level of audits.

[15] Consider a law that refers to the location of selling a product and the rise of internet sales, using a website hosting server at any place in the world. Though the law may be established, it cannot effectively deal with this new technology as it was not in existence when the law was drafted.

4.1.1 Possible alternative measures

To ensure that my measure captures what I intend it to capture I can also look at industries with special rules, outside of the regular corporate tax law. In many countries shipping companies and oil&gas companies face special tax regimes. I can use this to show that these companies are differently affected compared to other industries.

A last alternative is the use of a large shock in uncertainty. Changes to the law itself can be deemed largely endogeneous. However, the same cannot be said for court cases. These cases will affect other companies, but cannot be influenced by these companies. I will use landmark cases from the highest court in Italy.

Ideally speaking I would use landmark cases of the European Court of Justice (the high court of the EU), these would affect the EU countries, but not non-EU countries. However, the only non-EU country with widely available accounting data in my company dataset is Norway. Being part of the EEA its cases are handled by the Court of Justice of the European Free Trade Association States. However, the EFTA and EU courts follow each others decisions, rarely contradicting each other. Therefore, Norway is not a good control group for the EU.

Lastly, firms have the option of obtaining ATRs. This means that the tax authority gives its opinion about the tax effects of an investment. Depending on the country these rulings come at a cost, take time and are not always legally binding. Even if they are the tax authority does not have to give a ruling. I use the amount of ATRs requested and denied in the country ($\frac{\text{ATR granted}_{ct}}{\text{ATR requested}_{ct}}$). This can be seen as a lower bound on the probability of not being able to get certainty.[16] This can either be multiplied by Equation 7 or added instead of the uncertainty measure in Equation 7. Alternatively, I can include a set of dummies checking whether rulings can be obtained, whether they are binding and whether they are free. This measure will be used in robustness test in future versions of this paper.

[16]It is a lower bound since the selection into applying for an ATR is in favor of cases that can actually obtain an ATR.

4.2 Data

Tax rate data is obtained from the Ernst & Young's "World Wide Corporate Tax Guides". Ernst & Young is a large accounting and advisory firm that summarizes the tax systems around the world on a yearly basis. Changes in tax rates are available in these guides.

Information about audit probabilities are directly obtained from government annual reports and where necessary supplemented with publicly available information from tax advisory firms. The amount of audits and cases taken to court are available from the yearly reports of tax authorities. Countries don't all specify exactly the same information. All countries in my sample publish information on total thorough audits (audits where the tax inspector went on site, or conducted a full audit of the books). I divide this number by the total amount of corporate tax filings in the country. This information is available from either the tax authority or the central statistics agencies of the countries. Ideally speaking I would use the audits with respect to corporate income taxes only. However, due to the fact that audits often cover multiple taxes and limited data availability in some countries I cannot obtain this information. After collecting the information for a specific country I revisit the annual reports of previous countries to ensure definitions are comparable.

Information about the size, number of articles and structure of the law are obtained by reading the laws of the countries involved. This means that for each country in the sample I obtain the tax law as it existed in 2004.[17] I read every article and judge whether it is suggestive or limitative based on the rules set forth in Appendix B. Then I take the law of the next year and repeat this process until I reach the end of the sample period. Where necessary native speakers are used to translate law texts. In cases where the 2004 text is not available I start from the 2017 text. I then backwards engineer the changes to the law by going through the bills that passed both houses of parliament and contain changes to the corporate tax code. I verify that I capture all changes by looking at the complete text of the tax law in earlier years, when available.

Information on the rulings by courts of cassation are obtained from the websites of the supreme courts.[18] These courts also publish annual reports on their caseload. To ensure

[17] For some countries old law texts are available at the International Bureau for Fiscal Documentation (IBFD). Others were directly downloaded from government websites.

[18] Courts don't publish all cases, but the information is open to everyone ensuring that I can see

the numbers are comparable across countries I also download the full texts of all published rulings of these courts. These are processed to find which ones deal with taxes. This is then compared with the total amount of cases, to ensure that the ratio of published cases about taxes to published cases about other topics is similar across years. This is then used to correct for the fact that many courts publish information on the total rulings on administrative matters, rather than specifically taxes.

The company data comes from Bureau van Dijk's Orbis database. It is similar to that used in Brok (2016). The appendix of that paper is attached in Appendix **??**. The data includes information on a large subset of multinationals in Europe. I focus on multinationals as these all have opportunities to engage in tax avoidance investment. The dataset aggregates the information of a multinational at the country-year level. A multinational with three firms in the Netherlands and two in Belgium will show up in the data as one observation in the Netherlands and one in Belgium.

The dataset contains information from 7 countries: Austria, Belgium, Germany, Finland, France, Netherlands, and Sweden. The selection of countries is based on availability of data. Reporting on auditing and court cases is more extensive in Northern Europe. Furthermore, some of the legal information is only available in the language of the country itself. The availability of English texts or proficient translators limits the data.

4.3 Summary statistics

Table 1 shows the years for which data is available. It also shows the distribution across countries. In total there are 3,106 multinational year observations and 9,259 multinational-country-year observations. Some of the multinationals included have holding companies located outside of the countries for which I have data on the uncertainty measure.

In Table 2 it can be seen that the mean amount of court rulings is 1,320 (0.066*20,000). Note that this is the sum of court rulings in this year and previous years in the sample. The suggestiveness ratio shows that on average the laws contain one suggestive article for each seventeen limitative articles. It can also be noted that the audit probability is below 10%. This variable seems heavily skewed. In Table 3 it can be seen that this is

the information set of companies.

due to Austria's high audit probability. Considering the large deviation from the other countries it could be due to a difference in measurement. All tests in this paper have been run excluding Austria, the results are qualitatively the same. We can see that the countries with higher leverage seem to have lower suggestiveness ratios. This is consistent with the idea that less uncertainty leads to more use of leverage, which suggests limited opportunity to abuse the law. Multivariate regressions will have to point out whether this interacts with the audit probability as predicted. We see the opposite pattern for court rulings. As a higher amount of court rulings increases the certainty this is in line with the pattern of the suggestiveness ratio. The audit probability does not show a clear pattern.

If we turn to Figures 1 and 2 we can see that there is a positive correlation between leverage and taxes. This is what we expect on the basis of Kraus and Litzenberger (1973). However, if we look at the leverage and taxes in low audit-probability countries we see the opposite correlation. This is exactly what Hypothesis 3 predicts.

In Figure 3 we can see how the average suggestiveness and court rulings per year correlate with leverage. The suggestiveness ratio is the amount of suggestive articles divided by the total amount of articles in the law. Court rulings is the cumulative amount of court rulings in the country divided by 20,000. For the uncertainty measure the inverse of this is multiplied by the suggestiveness ratio. We see that the amount of court cases is strictly increasing, while leverage is strongly decreasing. The suggestiveness ratio has a slight upward trend. This is in line with what we saw in Table 3.

Figures 6 and 7 show the correlation between leverage and uncertainty for low and high audit probabilities. The audit probability is high when the audit probability in a country in a specific year is above the median audit probability for that year, for the entire sample. We can see that for high audit probabilities the effect of uncertainty is positively correlated with uncertainty. This suggests that when audit probabilities are high firms take the more certain option of using debt as a tax avoidance mechanism. However, when audit probabilities are low we see no such positive correlation. This is in line with hypotheses 1 and 2.

Lastly, we can see in Figure 4 that there is a strong positive correlation between leverage and audit probabilities. This is exactly what hypothesis 4 predicts.

5 Methodology

5.1 Identification

The dataset of all entities of multinationals allows me to look at how different entities under the same general management as part of the same multinational company in different countries adjust to uncertainty. This alleviates problems with differences in corporate aggression regarding tax strategies and other management decisions.[19]

The baseline regression equation is as follows:

$$Leverage_{ict} = Uncertainty_{ct} * \beta_1 + \text{Audit probability}_{ct} * \beta_2 + X_{ict} * \beta_3 + Z_{ct} * \beta_4 + \gamma_{ic} + \zeta_t + \epsilon_{ict} \tag{8}$$

Where c indicates the country, t time and i the multinational. X is a vector of company level control variables which includes the tax rate, tangibility, profitability, sales and depreciation. These are based on findings in Rajan and Zingales (1995) and are standard in the literature. Z includes GDP growth and interest rates. Ideally a year times multinational fixed effect is included. Due to most multinationals only being active in 2 or 3 countries I use a multinational-country fixed effect instead. According to hypothesis 4 the audit probability should have a positive effect on leverage. To test hypotheses 1 and 3 I add interactions between the audit probability and uncertainty to Equation 8.

5.2 Endogeneity

A major problem in identification is the fact that the choice to litigate, the choice to be aggressive and the choice to enter into an ATR is to a large part dependent on the company. This is largely mitigated by measuring all variables at the country level. This ensures that the choice to be aggressive is not related to my main explanatory variable. However, it also makes the data noisier, making it less likely to find a result.

It is reasonable to expect that the tax aggressiveness is an omitted variable in this case. I will tackle this problem in several ways. First, I include a multinational-country

[19] I can investigate at what level in the multinational uncertainty matters. For instance at the headquarters location, the local uncertainty of an entity or the weighted total uncertainty of all entities. The current version of this paper only looks at the local uncertainty.

fixed effect to tackle firm aggressiveness. This implicitly assumes it is non-time-varying. Secondly, I include firm level fundamentals as controls as they may affect avoidance choices. Ideally, I would include year times multinational fixed effects to controls for the firms aggressiveness each year. However the average multinational company only has activities in three countries.

A last issue is that of reverse causality. Firms could be lobbying for more uncertainty or entering in countries which have higher uncertainty to make use of the gaps in legislation this might create. Similarly, the legislator may create uncertainty to make use of the risk aversion of firms to keep them from using gaps.

While it would make more sense for a firm to directly lobby for lower taxes, rather than uncertainty which allows the reduction of taxes, it can be argued that this would lead to public outrage. For this to be a problem, firms on average have to act in a way that would cause a response by the government in their favor. On top of this they would have to similarly capture the courts of cassation, a completely separate and independent branch of the government.

6 Results

6.1 Baseline results

In this section I discuss the results from running Equation 8 with the inclusion of an interaction between uncertainty and a dummy that takes the value of 1 when the firm is located in a high audit country. High audit is defined as the audit rate being above the median audit rate in that year.

Table 4 shows the results of multivariate regressions. These regressions include fixed effects at the firm level and the year level. We can see that there is a negative effect of uncertainty on leverage. The effect of a one standard deviation change in uncertainty is about 0.024. This is an effect similar to a one standard deviation change in tax rates Brok (2016). We can also see that uncertainty has a positive effect on leverage in high audit probability countries, although only half as strong. The audit probability itself has a

strong positive effect on leverage. A one standard deviation change in audit probabilities leads to a 0.07 increase in leverage. The model explains roughly 75% of the variation in leverage.

Ideally speaking I would use firms in industries with a lot of special tax rules (e.g. shipping, oil and media)as a control group to see if they are not affected by the measure. However, my current sample contains to few firms in these industries.

7 Robustness and alternative explanations

7.1 Tax avoidance

An alternative explanation is that my measure captures a different countrywide trend that affects the way multinationals determine their capital structure. The theoretical framework has a second implication. The reverse of hypothesis 1 has to hold true for complex tax avoidance strategies.

H1: Uncertainty decreases the use of tax avoidance when the probability of audit is high.

Graham and Tucker (2006) provides evidence to support this theory. I will investigate this in depth in future versions of this paper.

7.2 Hybrid Mismatch

A popular tax avoidance strategy is that of the hybrid mismatch. This means that capital is supplied from one firm to another in such a way that in the country of the receiving party it is considered debt, with tax deductible interest, while in the country of the capital supplier it is considered equity, with tax exempt dividends. In future versions of this paper I will develop a measure that detects the likely use of hybrid mismatches in a given situation. I will investigate this in depth in future versions of this paper.

7.3 Court of cassation

In some of the countries tested the highest court is not a court of cassation, but a regular high court. While both mostly deal with the interpretation of law, a high court is allowed to rule on facts of a case. This could lead to more frequent rulings. I investigate whether the ratio of rulings to filings is similar across countries with a high court and a court of cassation. I find no differences.

8 Conclusion

I investigate the effect of the uncertainty about the interpretation of existing tax law on leverage. Theory suggests that a firm makes a trade-off between leverage based tax avoidance and other tax avoidance strategies. When audit probabilities are high we expect a positive effect of uncertainty and the tax rate on leverage. Furthermore, we expect that audit probabilities increase leverage. I supply suggestive evidence for these hypotheses.

This evidence is important for policy makers as it suggests that the use of suggestive, broad articles to curb tax avoidance is only effective if enforcement of the law is high. The effect of tax law enforcement is stronger than the effect previous studies find for an increase in tax rates. These results can explain a large degree of variation in leverage.

The welfare effect of a mismatch between enforcement and uncertainty is not discussed. Future research will have to point out how this mismatch affects entry of new companies and total investment. It is also unclear how this use of leverage as a tax avoidance tool affects firm performance.

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A Example of law

Example of a limitative article both the original and my translation from Dutch law. The example is article 13 from the Wet op de vennootschapsbelasting 1969 (2017) or 'Corporate income tax law 1969' .

Article 13

1 When determining the profit the benefits from a participation, as well as the costs related to the acquisition or sale of such a participation are not taken into account (participation exemption).

2 A holding is deemed to be a participation when the taxpayer:

a. is the holder of at least 5% of the issued and fully paid equity of a corporation of which the capital is fully or partially consisting of shares;

b. is the holder of at least 5% of the certificates of participation in a joint fund; wherein the total of other than singular certificates of participation are converted to a corresponding amount of singular certificates;

c. is a participant in a cooperation of a professional organization on cooperative grounds;

d. has part as a limited partner in the corporate holding of an open limited corporation and as a result shares in at least 5% of the benefits gained by the cooperation.

While this may still sound very vague, this is mostly due to the fact that a lot of jargon is used. The jargon used in this article is defined in corporate law. Once acquainted with the corporate law one can simply apply it to the particular situation. Those more versed in this jargon may be of the opinion that certain cases might escape this limitative summation. This is part of the weakness of limitative articles, as at the point of writing of this law these may have been the only options. In this particular case I have to add that the information presented above contains only the first two subsections of this particular article and it spends another sixteen subsections elaborating on this information. Further limiting and defining the concepts above. Anything not falling within the definition set forth here results in the participation exemption not applying to this particular company.

Example of a suggestive article both the original and my translation from Dutch law. The example is article 25 from chapter 3 of the Wet op de inkomstenbelasting 2001 (2017) or 'Income tax law 2001' . The example is used as the corporate income tax refers to this article for the determination of taxable profit.

Article 3.25 Yearly profit

The profit attributable to a year has to be determined according to good merchant practice, with a consistent application which is independent of the expected outcome. The consistent application can only be changed if good merchant practice justifies it.

The use of the phrase good merchant practice is very ambiguous. How does a good merchant calculate profits? The answer can be found in over 50 years of case law and is only limited by other provisions in the law. Without knowledge of the case law it is almost impossible to say where good merchant practice ends.

B Construction of uncertainty measure

For the measure of uncertainty I will look at the phrasing of law articles. I will make a simple count of suggestive and limitatively phrased articles. Suggestiveness implies that a article sets forth a general rule or guideline using words that do not have a consistent and known meaning in either common language or law itself. For this purpose the meaning attributed to the words in case law is ignored. The reason for ignoring case law is that the suggestive phrasing only becomes clear as case law develops and therefore will be interacted with it after determining whether it is suggestive or limitative. Taking it into account beforehand would ignore the time series development of the measure and would give me the discretion to choose when a phrase or article is no longer suggestive.

Some of the most common phrases that indicate that an article is suggestive are: 'normal value', 'in accordance with the ... principle', 'as is common', 'as is common between unrelated parties'. These all indicate some prior knowledge that is not defined in law. When a reference is made to GAAP or EU law makes an article non-suggestive even

if one of the above mentioned phrases is used.

Some may argue that I still have too much discretion in determining when something is suggestive. While I will of course argue the opposite this issue can easily be resolved. While vagueness is an inherently hard condition to judge, a lack of vagueness is not. It is quite clear when an article limitatively enumerates the cases in which a rule needs to be applied and how to apply this rule. So apart from a metric based on my judgment on suggestiveness I will also provide the same metric based on the more objectively measurable limitativeness. This will be based on sub articles per article and the prevalence of enumerations. I check by hand that non of these enumerations include a residual clause. Suggestiveness will then be calculated as the total articles minus those objectively limitative. Both measures will be used in the research, the former having my personal preference.

The measure is then determined as:

$$Uncertainty_{ct} = \frac{\text{Suggestive articles}_{ct}}{\text{Total articles}_{ct}} * \frac{20,000}{\text{Case law rulings}_{cT}} \tag{9}$$

Where:

$$\text{Suggestive articles}_{ct} = \text{Total articles}_{ct} - \text{Limitative articles}_{ct} \tag{10}$$

and T indicates all the time periods up to, but not including, time t. Time t is not included since the certainty the rulings at time t provide is only known for part of the year.

In my preferred setting I will directly determine the count of suggestive articles to be used in Equation 9. Limitative articles will be those that enumerate a specific set of cases in which it is applicable, or specific deductions that are applicable. Suggestive articles will be those that include phrases like: 'in accordance with the principle of' and 'as is generally acceptable' or comparable phrasing. To give the most common examples:
Economic value (unless referring to exchange traded assets): Suggestive
Any principles (most common, arm's length): Suggestive
Goal of making profit: Not-suggestive
On request you can get ... : Not-suggestive

Normal use: Suggestive

Mostly business like: Suggestive

Aimed at avoidance: Suggestive

Incidental : Not-suggestive

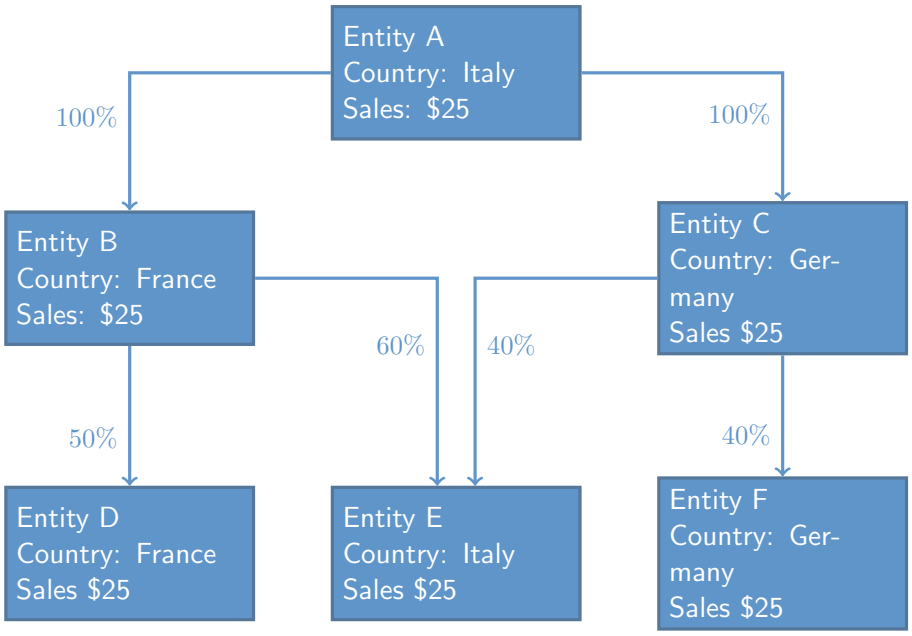
Non-excessive: Suggestive

Anything with an escape method: Not-suggestive

Anything with a if-non-of-the-above-clause: Suggestive

C Multinationals data

Consider the following corporate structure for the year 2005.



Entity A is considered to be the parent company. The owners can be either natural people or an investment firm. Investment firms, pension funds and natural persons are not considered to be part of the corporate structure of the multinational. These usually provide initial funds but are not expected to be part of the optimization of the corporate debt structure in any other way than as an outside 'bank'. Companies B, C and D are all fully owned by the parent, either directly or indirectly and as such are included as

part of the multinational. Entity E is partially owned by B and C. Entity D is a 50% owned subsidiary of entity B and as such is included in the structure. Entity F is partially owned by entity C and is also part of the structure. The corporate structure consists of six entities in a total of four countries. In the dataset they will be observed as follows:

Identifier Number	Year	Sales France	Sales Ger.	Sales Italy
1	2005	$25 + 25 = 50$	$25 + 25 = 50$	$25 + 25 = 50$

As can be seen the information of the two French and the two Italian companies is aggregated into one multinational-country data point. The observation in the above table is a multinational year observation. However, this is not the unit of measurement used in the regressions as no relevant way of determining what to regress on what can be made on the basis of this observation. The regressions use a multinational-country-year observation. This means:

Id. Nr.	Year	own country	Sales own country	Sales France	Sales Ger.	Sales Italy	Total sales
1	2005	France	50	$25 + 25 = 50$	$25 + 25 = 50$	$25 + 25 = 50$	150
1	2005	Germany	50	$25 + 25 = 50$	$25 + 25 = 50$	$25 + 25 = 50$	150
1	2005	Italy	50	$25 + 25 = 50$	$25 + 25 = 50$	$25 + 25 = 50$	150

As can be seen, each country of the multinational's structure enters into the data as a separate data point. Since changes in foreign entity policy will simultaneously affect the domestic decisions a way of weighting these effects has to be introduced.

So if I now want to see how the leverage reacts to tax in other countries I create a weighted average of the tax rates in the foreign countries. The weights(Wt) are calculated as follows:

Id. Nr.	Year	Own count.	Sales own	Sales Fra.	Wt. Fra.	Sales Ger.	Wt. Ger.	Sales Italy	Wt. Italy	Tot. sales other
1	2005	France	50	50	0	50	$\frac{50}{100}$	50	$\frac{50}{100}$	$50 + 50 = 100$
1	2005	Ger.	50	50	$\frac{50}{100}$	50	0	50	$\frac{50}{100}$	$50 + 50 = 100$
1	2005	Italy	50	50	$\frac{50}{100}$	50	$\frac{50}{100}$	50	0	$50 + 50 = 100$

As can be seen the weight a certain country has depends on the total sales in the countries not being the own country. This dataset lets me not only measure effects of Entity A lending to Entity B and vice versa, but also of Entity B lending to Entity C or Entity A to Entity F. This uses less assumptions about how the firm will structure its internal capital market.

Tables and figures

Table 1: Country distribution

Panel A shows the year distribution of the observations. Panel B provides an overview of where the holding companies and subsidiaries of the firms in the sample are located.

Panel A: Year distribution

Year	Observations	Percentage of total
2005	1,811	19.56%
2006	2,314	24.99%
2007	670	7.24%
2008	1,228	13.26%
2009	1,444	15.6%
2010	1,067	11.52%
2011	725	7.83%
Total	9,259	100%

Panel B: Country distribution

	Holding companies	Percentage of total	Total companies	Percentage of total
Austria	81	2.62%	627	6.77%
Belgium	513	16.52%	1,887	20.38%
Germany	376	12.11%	1,578	17.04%
Finland	120	3.86%	1,198	12.94%
France	251	8.08%	2,045	22.09%
Netherlands	101	3.25%	684	7.39%
Sweden	403	12.97%	1,240	13.39%
Rest of Europe	960	30.91%		
North America	297	9.56%		
Russia	2	0.06%		
Caribbean	2	0.06%		
Total	3,106	100%	9,259	100%

Table 2: Summary statistics

This table shows the standard deviation, mean and median of the main variables.

	Observations	Standard deviation	Mean	Median
Leverage	9,259	.242	.545	.564
Court rulings	9,259	.059	.066	.046
Suggestiveness ratio	9,259	.024	.054	.060
Audit probability	9,259	.063	.063	.041
Tax rate	9,259	.050	.296	.309

Table 3: Summary statistics by country

This table shows the mean of the main variables for each country.

	Leverage	Suggestiveness ratio	Court rulings	Audit probability
Austria	.405	.067	.066	.283
Netherlands	.434	.063	.045	.091
Sweden	.516	.064	.037	.040
Finland	.539	.075	.109	.043
France	.561	.023	.115	.034
Belgium	.578	.077	.011	.070
Germany	.614	.031	.066	.027
Total	.545	.054	.066	.063

Figure 1: Leverage and tax rates

On the left axis the average tax rate across countries is displayed. On the right axis average leverage is displayed. Leverage has been adjusted for the effect of GDP-growth and interest differences across countries.

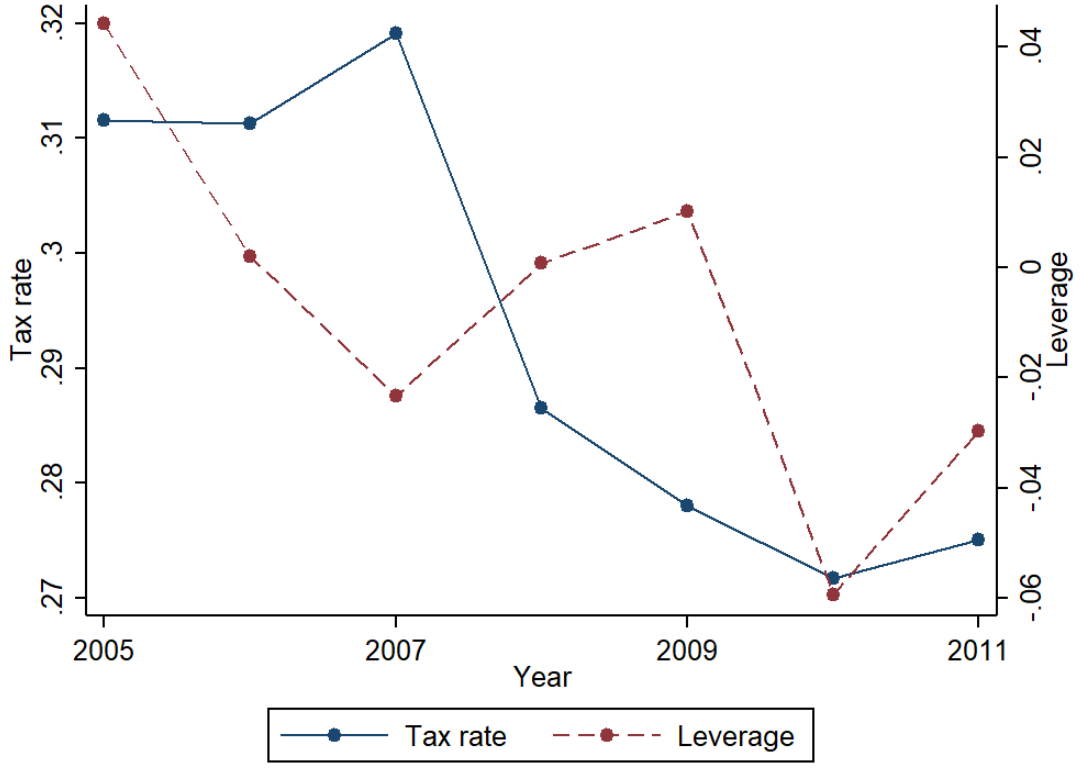


Figure 2: Leverage and tax rates in low audit probability countries

This figure shows the same information as Figure 1, but only for the firms located in countries with low audit probabilities. Low audit probability means the audit probability is below the median for all countries in the sample. On the left axis the average tax rate across countries is displayed. On the right axis average leverage is displayed. Leverage has been adjusted for the effect of GDP-growth and interest differences across countries.

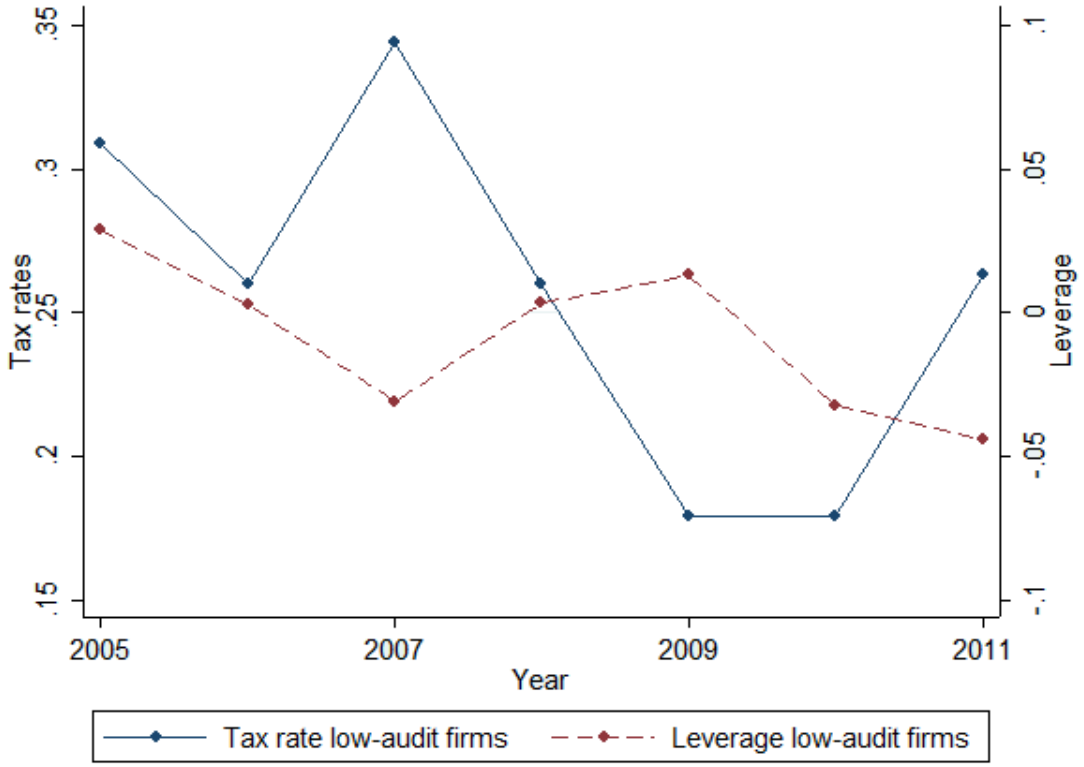


Figure 3: Leverage, suggestiveness and court cases

This figure shows the trends of the amount of rulings, the suggestiveness of the law and leverage. The amount of rulings is a sum of the current years rulings and those of the previous years. Suggestiveness is calculated every year as the ratio of suggestive to total articles in the tax law on corporate income. Leverage has been adjusted for the effect of GDP-growth and interest differences across countries.

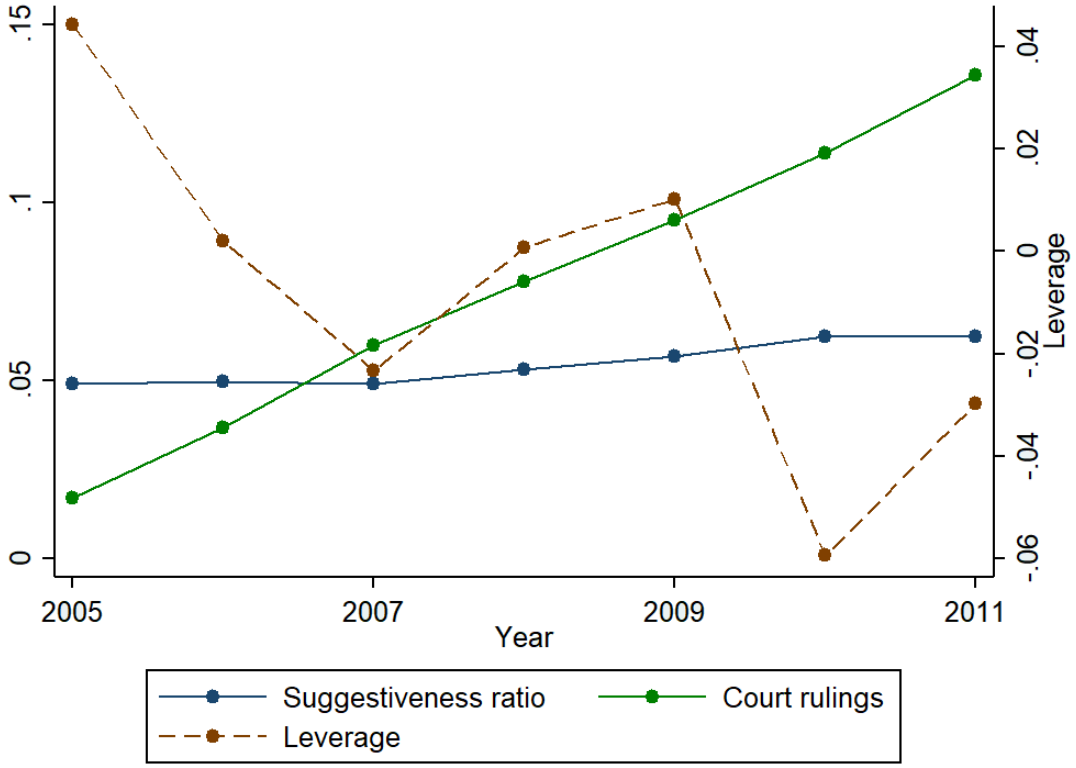


Figure 4: Leverage and audit probabilities

This figure shows the trend of the average audit probability and the leverage of firms. Leverage has been adjusted for the effect of GDP-growth and interest differences across countries.

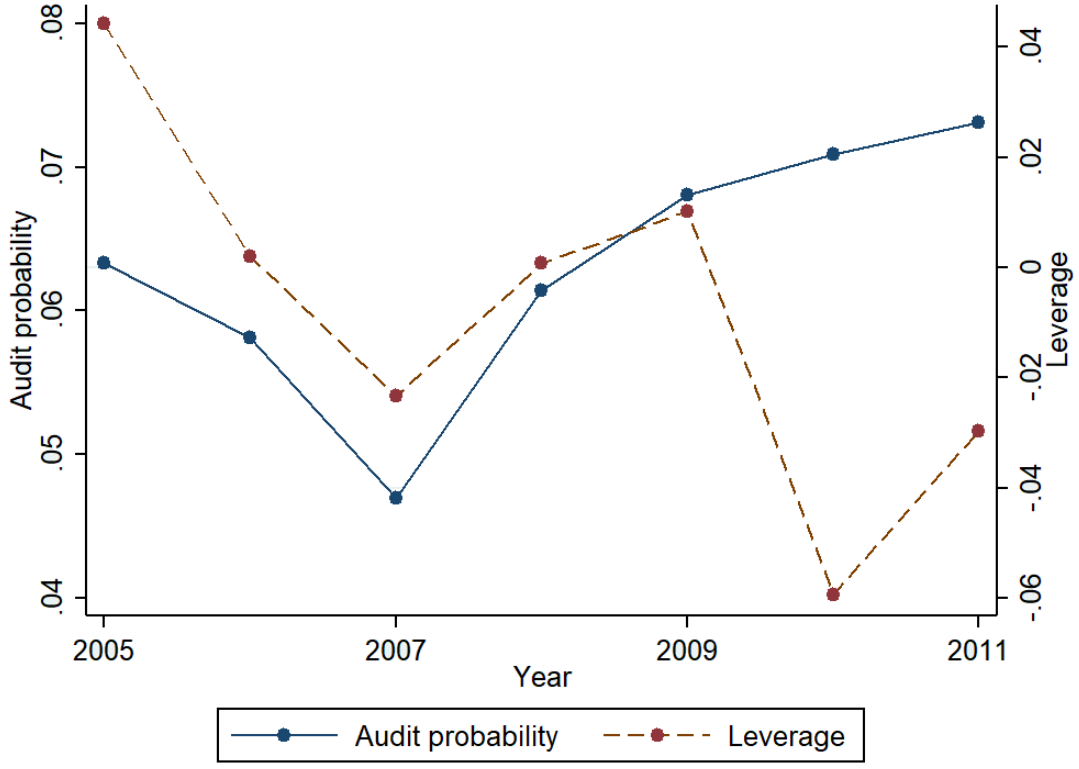


Table 4: Leverage and uncertainty

This table shows the effects of uncertainty on leverage. Columns 1 and 2 use an uncertainty measure based on that years suggestive articles divided by that years total articles of law. Columns 3 and 4 use that years suggestive articles divided by the total articles of law at the start of the sample. High audit probability is 1 if the audit probability in a country year is above the sample median for that year. Tangibility, depreciation, log of sales, ROA, GDP-growth, inflation and the tax rate are included as controls. Columns 2 and 4 also include an interaction between the tax rate and the audit probability. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage	(2) Leverage	(3) Leverage	(4) Leverage
Uncertainty	-0.005***	-0.005***	-0.005***	-0.005***
	(0.002)	(0.002)	(0.002)	(0.002)
Uncertainty * high audit prob.	0.007***	0.007***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)
Audit probability	1.179***	1.172***	1.176***	1.168***
	(0.324)	(0.324)	(0.324)	(0.324)
Tax audit interaction	No	Yes	No	Yes
Firm controls	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	9,249	9,249	9,249	9,249
R-squared	0.754	0.754	0.754	0.754

Figure 5: Leverage uncertainty for high and low audit probabilities

This figure shows the trend of the average audit probability and the leverage of firms for low and high audit probability countries. Leverage has been adjusted for the effect of GDP-growth and interest differences across countries.

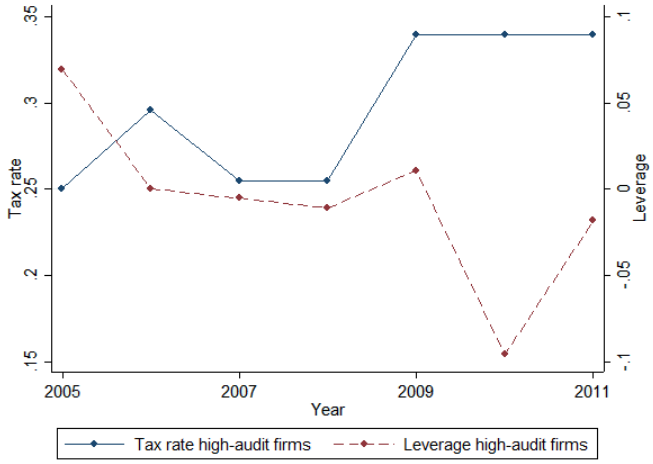


Figure 6: High audit probability

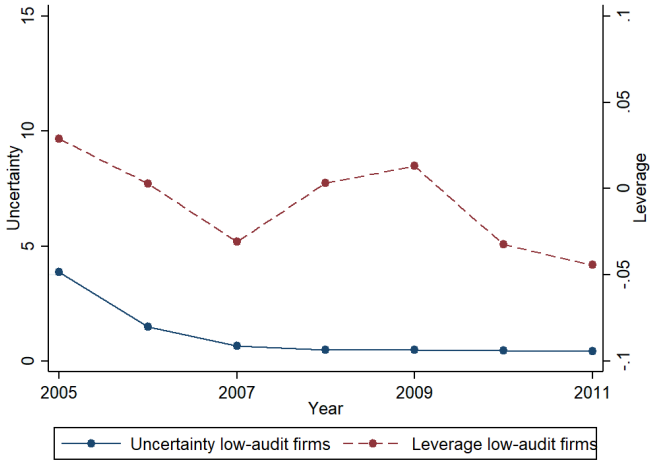


Figure 7: Low audit probability