

Accounting, Audit & Control

# Master thesis

*How do family- and private ownership structures influence the level of tax aggressiveness in the EU over time?*

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## **I. Abstract**

This paper examines whether family or/and private ownership influences the level of tax aggressiveness of firms over time. Tax aggressiveness is defined as any tax minimization strategy or a subset of strategies. Firms have big incentives to reduce their tax base because tax expense is the most significant business cost, and has a direct impact on profitability and shareholders' value. The tax-aggressive firms also face costs, like time and effort, fees of external advisors, potential penalty costs, and potential repetitional damage costs. The main argument to be tax aggressive as a manager is based on the agency theory. The different agency conflicts of family firms compared to non-family firms, and private firms compared to public firms, could affect the level of tax aggressive behavior of the firm. The sample consists of 1.602.799 firm-year observations from a 8-year period (2012-2019). This study finds that the average effective tax rate of EU firms declined over time, which implies that firms become on average more tax aggressive. This study also finds that the influence of family firms on the level of tax aggressiveness is non-existent. The association of private ownership and ETR is negative, which implies that firms with private ownership become more tax aggressive over time. However, when a firm is a private owned family-firm, this association is not found. Private owned family-firms doesn't explicitly become more or less tax aggressive over the given sample period. But, public non-family firms become less tax aggressive over time.

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### III. Introduction

#### 1. Motivation

Taxation can be defined as the “*taking of money or property or service, by the government*” (Adams, 1982). Income tax is an important income source for governments to provide government services. Some groups might benefit more from public goods than other groups. This disparity in benefits increases the incentive for disadvantaged groups to avoid paying for public goods. Tax aggressiveness is defined as any tax minimization strategy or a subset of strategies. Companies have big incentives to reduce their tax base because tax expense is the most significant business cost and has a direct impact on profitability and shareholders’ value. Planning practices cost countries 100-240 billion USD in lost revenue annually, which is the equivalent to 4-10% of the global corporate income tax revenue (OECD, 2013).

A media-driven belief that has emerged over the last decade is that tax avoidance by firms has increased (Duhigg & Kocieniewski, 2012). This belief is proven by Markle and Shackelford (2012), who examined U.S. Effective tax rates (ETR) related to ETRs around the world and found evidence of a decline in ETR’s overtime. Dyreng et al. (2017) report that cash ETRs over the past 25 years decreased significantly over the sample period. The expectation is that ownership structures influence the tax aggressive behavior of firms, because of several divergent characteristics. Family firms vs. non-family firms, and private vs. public firms are the most divergent ownership structures. Thus, this paper attempts to answer the following research question:

*RQ: How do family- and private ownership structures influence the level of tax aggressiveness in the EU over time?*

The tax-avoiding companies also face costs, like time and effort, fees of external advisors, potential penalty costs, and potential reputational damage costs. There is a difference between tax avoidance and tax evasion. Tax evasion is beyond the law, while tax avoidance would rest within the practices considered licit. In this thesis, tax aggressiveness encompasses tax planning activities that are legal (tax avoidance), as well as activities that may fall into the grey area, or that are illegal (tax evasion). The term *tax aggressiveness* can be used interchangeably with *tax avoidance* and *tax management*.

Family firms are firms where the key executives, directors, or majority shareholders are part of the founding family, either by blood or marriage (Chen et al., 2010). Because of their ownership structure, family firms tend to have a greater socioemotional wealth (Berrone et al., 2012), tend to have a greater long-term orientation compared to non-family firms (Miroshnychenko et al., 2020), tend to focus more on innovation and sustainability due to their long-term orientation (Choi et al., 2015), and tend to have better insider control and organizational focus. In family, firms are ownership kinship-based and concentrated, which is characterized by the governance of united ownership and control (De Massis et al., 2015). Family firms have smaller agency conflicts between owners and managers, and a greater conflict between large and small shareholders. The main argument to be tax aggressive as a manager is based on the agency theory (Fama & Jensen, 1983). The different agency conflicts of family firms compared to non-family firms could affect the level of tax aggressive behavior of firms (Chen et al., 2010).

The difference between public and private firms is that the shares of public firms are sold in the stock market to the public whereas the shares of private firms are privately held by a limited number of

shareholders. The concentration of ownership of selected individuals by private firms is somewhat similar to family firms. In line with the previously discussed changing agency conflicts, may these capital structures also lead to the different behavior of the management. Managers of public firms have incentives to meet and beat analysts' forecasts to satisfy and attract investors to the stock market. They also tend to be more bureaucratic, less materialistic, and have weaker organizational commitment compared to managers in private firms (Boyne, 2002). In contrast to private firms who in general face fewer agency problems, since the shares of these firms are often in hands of firm management or shareholders who have a special association with the firm (Fama & Jensen, 1983). The existing literature shows mixed results regarding the influence of ownership structure on the level of tax aggressiveness.

## **2. Data and methodology**

The sample consists of 1.602.799 firm-year observations in the period from 2012 to 2019. The model is based on the cross-sectional regression model developed by Chen et al. (2010). This model is used by several researchers to analyze the relation between tax aggressiveness and family firms. Family ownership is measured as a dummy variable, which has the value of 1 if the firm is owned by a family and zero otherwise. Private ownership is measured as a dummy variable, which has the value of 1 if the firm is owned by a private structure, and zero if the firm is owned by a public structure. Several control variables are added, based on the research model of Thomson et. al (2018).

## **3. Main findings**

This study finds that the average effective tax rate (ETR) of EU firms declined over time, which implies that firms become on average more tax aggressive. This study also finds a non-observable association between family firms and the ETR over time, which implies that family ownership doesn't explicitly increase or reduce the level of tax aggressiveness over time. The association of private ownership and ETR is negative. Also, firms with private ownership differ significantly from firms with public ownership for every sample year, which implies that firms with private ownership become more tax aggressive over time. However, when a firm is a private owned family-firm, this association is not found. Private owned family-firms doesn't explicitly become more or less tax aggressive over the given sample period. But, public non-family firms become less tax aggressive over time.

## **4. Contribution**

This thesis contributes to current knowledge in two ways. First, this thesis provides more insight into the association between tax avoidance and the ownership structure of the firm. Prior literature found mixed results about this topic. Two streams of literature of private firms and family firms are combined to analyze their influence on tax aggressiveness together over time. As far as I know, this specific topic has not been investigated before, and this thesis aims to fill this gap in the literature. Second, this thesis makes a direct contribution to several papers in the existing literature. For example, Shackelford and Shevlin (2001) mentioned in their conclusion that ownership structures are understudied components of tax aggressiveness and requested more research regarding this topic. The impact of ownership structures over time is taken into account by the comparison between private- and public firms, and between family- and non-family firms. Pierk (2016) concluded that public firms are more tax aggressive than private firms, based on evidence from Germany. The Pierk (2016) paper recommends further investigation of cross-country differences. This thesis follows this recommendation by examining the differences in the degree of tax avoidance among Europe.

Last, the findings of this thesis should be interpreted with the knowledge and context of the ongoing debate of Base Erosion and Profit Shifting (BEPS). The purpose of this thesis is to identify trends in tax aggressive behavior of companies over time in general, and not to measure specific income-shifting techniques by the public- and family firms (Johansson et al., 2017). A large stream of literature has investigated income shifting within MNCs, which found for the EU that a 10-percentage point decrease in a country's tax rate is associated with a 13 percent increase in reported income (Huizinga et al., 2008). Income shifting is a specific technique to avoid taxes, which is something different than tax aggressiveness. Thus, the results of this thesis should not be directly associated with the BEPS project as this could lead to misleading interpretations regarding BEPS.

## 5. Limitations of findings

This research faces several limitations. Firstly, financial information is not always available. For private firms was the market-to-book ratio (MB) and foreign income (FI) not available, so could not be controlled for in the regression. Second, the sample composition is not equally distributed. The sample of the non-family firm is almost three times as big as the sample of the family firm. The difference in sample between public- and private firms is many times bigger. Namely, the sample of the private firm is almost ten times as big as the sample of the public firm. Further research could use a sample which is more equally distributed. Last, this study focusses on EU-firms. The results might not be applicable for non-EU firms, due to cultural differences. Further research could investigate if these results are also applicable for other continents and compare continents to each other.

## IV. Literature overview

The literature overview part of this thesis is twofold. First, this section provides a detailed description of the concepts to give more insight into the research question, by discussing the main findings of prior literature. The most important concepts within this thesis are *tax aggressiveness*, *family firms*, and *private- and public firms*. Second, this section provides a literature overview of the most important conclusions drawn in prior research on tax aggressiveness. Following the existing literature, hypotheses are drawn regarding the influence of ownership structures (family- vs. non-family firms, and private- vs. public firms) on the level of tax aggressiveness.

### 1. Concepts

*Definition: Tax avoidance*

Taxation can be defined as the “*taking of money or property or service, by the government*” (Adams, 1982). The government can be defined as an “*organization that provides protection and justice in return for revenue*” (North et al., 1973). This provision is mentioned as a public good: “*once produced, people cannot be excluded from enjoying*” (North et al., 1973). Income tax is an important income source for governments to provide government services.

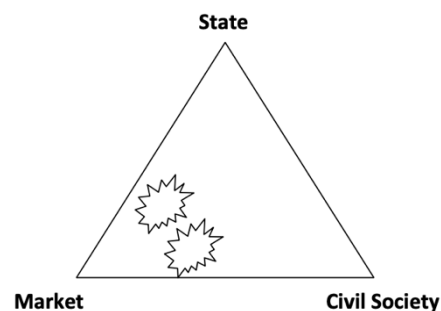


Figure 1: Conflict of paying taxes (Source: Tulder et al., 2006)

Public goods might benefit some groups rather than others, which increases incentives to avoid paying for the public goods. The use or overuse by firms without paying for their fair share of the resource is called the free-rider problem. That those public goods might benefit some groups rather than others, is giving rise to free-riding problems. A conflict thus arises between the market (company), state, and society (see figure 1).

Tax aggressiveness is defined as any tax minimization strategy or a subset of strategies. The lower the effective tax rate, the more tax aggressive firms are (Hanlon & Heitzman, 2010). Companies have big incentives to reduce their tax base because tax expense is the most significant business cost and has a direct impact on profitability and shareholders' value. Firms can enjoy benefits but also face costs from tax management. Graham (2013) wrote an exhaustive review of prior literature, which analyzed the tax strategy behavior that companies apply to minimize the payment of their share of taxes. As illustrated by Fama & Jensen (1983), the main argument to be tax aggressive is based on the agency theory. The company is seen as a pure nexus of contracts whose activity should be only focused on the association between managers and shareholders. For shareholders' profit, maximization is the ultimate objective for the company. The payment of income taxes exhibits the characteristics of a business transaction, and tax planning becomes a legitimate activity aiming at minimizing tax payables (Avi-Yonah, 2008). In the last decades, globalization has led to an open society which has resulted in the interaction between domestic tax systems. This enables companies to manage their tax expense by finding loopholes and frictions in the tax law. They are exploiting these possibilities to minimize the share of taxes to be paid (OECD, 2013). When looking at multinational activity related to the ETR, few studies are available. Markle et al. (2009) investigated the ETR of 85 (domestic and multinational) firms from 1988 to 2007 and found that both groups had similar ETR's which indicates that multinationals look for the most optimal domestic tax rate. One limitation to their study is that they controlled for size in terms of assets, and not in terms of the number of subsidiaries. This limitation theoretically means that there could be a difference between high international developed firms, and firms with only one subsidiary. These planning practices cost countries 100-240 billion USD in lost revenue annually, which is the equivalent to 4-10% of the global corporate income tax revenue (OECD, 2013).

Not only the government face costs by companies engaging in tax management, but also the companies themselves experience downsides from tax management. A lot of time and effort is investigated to implement tax planning strategies, and in most cases this planning assignment will be outsourced to external tax advisors and -consultants (Seidman & Stomberg, 2012). Tax evasion is not legal, so firms can face potential penalties imposed by the IRS. Furthermore, agency costs arise accompanying tax aggressive activities (Desai et al., 2006). Tax aggressive activities are complex and could be used to mask rent extraction, such as earnings management and other consumer behavior. Shareholders will change their behavior and price to protect themselves in an efficient capital market (price discount) (Chen, 2010). A final potential cost of tax management is potential reputational damage. The research found that aggressive corporate tax strategies diminish corporate success with consumers (Hardeck & Hertl, 2014).

There is a difference between tax avoidance and tax evasion. In academic literature, the concept of tax avoidance is usually distinguished from that of tax evasion regarding legal considerations (Cowell, 1985). Tax evasion is beyond the law, while tax avoidance would rest within the practices considered licit. Nevertheless, when companies are using an optimal tax structure by manipulating the tax base, the boundaries between tax evasion and -avoidance tend to blur. Companies rely on the services of lawyers and advisors to minimize their tax burdens, and most tax systems rely on the voluntary compliance of taxpayers. From a social point of view, a legal complicated build taxation construction by tax advisors

is often seen as tax evasion. In this thesis, tax aggressiveness encompasses tax planning activities that are legal (tax avoidance), as well as activities that may fall into the grey area, or that are illegal (tax evasion). The term *tax aggressiveness* can be used interchangeably with *tax avoidance* and *tax management*.

*Definition: Family firm*

In this paper, the definition of family firms as suggested by Chen et al. (2010) is used. This is done to make this research comparable to the existing literature. Chen et al. (2010) defined family firms as: "*The family business is a business governed and/or managed to shape and pursue the vision of the business held by a dominant coalition controlled by members of the same family or a small number of families in a manner that is potentially sustainable across generations of the family or families*". Key elements out of this definition are: (1) the founding family by blood or marriage are (2) key executives, directors, or block holders in the firm. Family firms face paradoxes due to their founding nature that are unique and unusual (Chrisman et al., 2015). The two main reasons are: (1) the unique bond between family and business that define the nature of the family firm, and (2) the challenge related to the combination of the competing demands for long- and short-term success, family control, family ties, business growth and longevity (Zellweger, 2014). This paradox requires a *both/ and* mindset, instead of *or/ between* (also: paradoxical thinking). This kind of leadership makes that several characteristics differentiate a family firm from a non-family firm.

First, family firms tend to have more non-financial aspects of the firm that meet the family's affective needs, such as identity, the ability to exercise family influence, and the perpetuation of the family dynasty. Gómez-Mejía et al. (2007) defined this phenomenon as the socioemotional wealth (SEW) perspective. According to the SEW perspective, family member executives make choices and decisions based on gains or losses in SEW (Berrone et al., 2012). Meaning that if the socioemotional endowment gets threatened, executives tend to make decisions that are not driven by economic logic, even it could harm the firm in the future. One example of an irrational decision is when the family firm threatens to go bankrupt. The family firm has big incentives to reduce the tax expenses by earnings management, even when the costs of the reputational damage are higher for the firm and management (Stockmans et al., 2010). Secondly, in contrast to the SEW perspective, family firms tend to have long time horizon view for their firm (Miroshnychenko et al., 2020). According to Kappes & Schmit (2013), the reason for this is trans-generation succession, because they plan to pass on the baton one day. In line with their long-term vision, family firms are more focused on innovation and have more incentives to invest in research and development. This could potentially lead to aggressive cross-border tax structures by shifting R&D revenues and costs (Choi et al., 2015). Lastly, family firms have more insider control and organizational focus. In family firms, ownership is kinship-based and concentrated, which is characterized by the governance of united ownership and control (De Massis et al., 2015). As a result of the more concentrated ownership, family firms have smaller agency conflicts between owners and managers, and a greater conflict between large and small shareholders. Agency conflicts could affect the tax aggressiveness of firms (Chen et al., 2010).

*Definition: Private ownership*

A firm is public when all or a large portion of the shares are traded on the stock market, meaning shareholders have a claim to part of the company's assets and profits. In private firms, the shares are privately held by its shareholders. This means that in most cases the company is held by its founders,



management, or a group of private investors. Differences in tax management between public- and private firms are expected due to differences in ownership structures.

The main differences between public- and private firms are differences in disclosures and ownership. Public firms sell their shares to the public, so they are required to disclose their financial information to everyone. The main objectives of public firms' financial statements are informing their shareholders about their performance and tax determination. This is in contrast to private firms, who financial statements mainly use for tax determination (Ball & Shivakumar, 2004). Because of this, the quality of disclosures tends to be much higher for public firms and private firms' reported earnings are more likely to be affected by their efforts to manage taxes. The following two factors determine at which level tax incentives influence the financial statements: (1) the more often the financial statement is used by closing business contracts and -transactions, the lower the influence of tax incentives in the financial statement (Beatty & Harris, 1998). (2) The more consistent the accounting- and tax accounting rules, the stronger the impact of tax incentives (Ball et al., 2000).

Furthermore, public firms generate capital from selling their stocks on the public market to (for a large part) public investors, whereas private firms retrieve their capital mostly from private equity and loans (Reardon, 2017). These capital structures may lead to the different behavior of the management. Management is assumed to follow their own interest and to reach thresholds to options. Managers of public firms who have incentives to meet and beat analysts forecast to satisfy and attract investors on the stock market, and tend to be more bureaucratic, less materialistic, and have weaker organizational commitment compared to private firms (Boyne, 2002). This stands in contrast to the situation in private firms. The shares of these private firms are often in hands of firm management or shareholders who have a special relationship with the firm. Private firms therefore in general face less agency problems (Fama & Jensen, 1983).

This study examines the differences in the level of tax aggressive behavior between family- and non-family firms, and between firms with private- and public ownership. The goal of this thesis is to combine the two streams of literature, to examine whether these differences also exist for private non-family firms, public non-family firms, private family firms, and public family firms. The table is prepared for clarification:

Table 1: firm matrix

	<b>Private ownership</b>	<b>Public ownership</b>
<b>Family firms</b>	Private family firms	Public family firms
<b>Non-family firms</b>	Private non-family firms	Public non-family firms

## 2. Literature and hypothesis development

This thesis aims to test how family- and private ownership influence the level of tax aggressiveness of European firms over time. Prior literature presented substantial evidence regarding the scale of tax avoidance. Firstly, existing literature on tax avoidance in E.U. over time will be discussed. Secondly, the impact of family- and private ownership on the level of tax avoidance will be described. Three hypotheses have been developed to examine the influence of family- and private ownership on the level of tax aggressiveness of European firms over time.

Newspapers report anecdotal evidence of tax avoidance activities to minimize the tax burden without violating tax laws by multinational corporations of tax avoidance almost daily (Hakim, 2014). A media-driven belief that has emerged over the last decade is that tax avoidance by firms has increased (Duhigg & Kocieniewski, 2012). However, most studies of tax avoidance have been cross-sectional, some studies have also examined inter-temporal changes and are related to the level of tax aggressiveness of firms over time. Markle and Shackelford (2012) examined U.S. ETRs related to ETRs around the world and found evidence of a decline in ETR's overtime. This means that both in the U.S. and the control, firms become more tax aggressive over time. Dyreng et al. (2017) report that cash ETRs over the past 25 years decreased significantly over the sample period. From 32 percent in 1988 (begin sample period) to 27 percent in 2012 (ending sample period), which means a cumulative decline of 5%. Thomson and Watrin (2018) contributed to the academic literature in two ways. First, (1) they extended the research if Dyreng et al. (2017) by comparing the U.S. tax avoidance trends to the tax avoidance behavior of EU firms, and second (2) they extended the research of Markle and Shackelford (2012) by considering changes in the statutory tax rate over time. Their results show that the mean effective tax rate of U.S. firms and E.U. firms are similar. In addition, they find that the difference between the STR and the ETR of EU firms has declined, indicating that, on average, tax avoidance in EU firms may have decreased over time. Regarding these conclusions, the first hypothesis is formulated as follows:

**H1:** *The level of tax aggressiveness in the EU declined over time.*

In the last decades, several researchers examined if family-structured firms behaved differently than non-family firms. What is unknown to the public, is that family firms are the most dominating form of business in most countries worldwide, which makes it an important topic in today's literature (Anderson & Reeb, 2003). In the prior paragraph, the characteristics of family firms are discussed. Family firms have much higher ownership than a regular manager of CEO, and thus the owner captures much more of the tax savings. Second, most family firms have at least one family member sitting on the board of directors, which makes the owners' influence greater. The potential benefits are larger for family owners than for managers in non-family firms. However, the costs are also higher through the special agency conflict as discussed above. The paper written by Chen et al. (2010) is partly comparable to this research, so I will discuss their findings in detail.

Chen et al. (2010) studied in their paper the implications of non-tax cost considerations arising from the unique agency conflict in family firms for their tax management activities, by investigating whether family firms are more or less tax aggressive than non-family firms. Family firms face higher non-tax agency costs, because of their larger dominant-small shareholder conflict: family owners have greater opportunities for rent extraction, but at the same time non-family shareholders can penalize family members' self-dealing by discounting the share price. Tax aggressiveness is defined as the downward management of taxable income through planning activities. They used two tax rate measures and two book-tax difference measures to examine tax aggressiveness. Their sample consists of 3.865 firm-year observations from S&P 1500 firms (U.S. market) in the period 1996-2000. Chen et al. (2010) find that family firms have higher effective tax rates. This suggests that family firms face higher non-tax costs and are considered less tax aggressive than non-family firms.

Other literature by Shackelford et al. (2001) concluded that family firms have greater incentives to manage their earnings upwards to preserve their socioemotional wealth. Family owners have a great number of shares, so they could benefit more from tax savings. On the other hand, the impact of reputational costs and penalty costs by authorities are higher. The impact of the advantages and disadvantages of tax aggressiveness appears higher for family firms compared to non-family firms.

Unfortunately, there is not much research done on this topic. Other literature generally focuses on the differences in firms' tax reporting between private- and public companies in a few selected industries. Family firms have similar characteristics as private firms, like the concentration of ownership of selected individuals. As described in the next paragraph, there is no general conclusion within this research subject. In the next session, the prior literature on tax aggressiveness by private firms will be discussed. Through the contradicting results and the lack of unambiguous evidence on the influence of family ownership on the level of tax aggressiveness, the following hypothesis is formulated:

**H2:** *Family ownership does not influence the level of tax aggressiveness over time.*

To develop the last hypothesis, literature is provided which relates to the differences between private- and public firms in ownership structure and taxation. The differences in stock ownership are expected to influence tax aggressiveness. Mixed results are shown within the existing literature, so both sides will be illuminated.

Cloyd et al. (1996) find that private firms are more likely to engage in tax management and tend to be more tax aggressive compared to public firms. They explain that public firms have greater non-tax costs from reporting lower income for tax purposes. Management needs to incorporate the size of the costs and benefits by engaging in aggressive tax structures. When the costs are disproportional high, management has no incentives to engage in these aggressive strategies. A more recent study by Badartscher et al. (2016) proposes a new measure of confirming tax avoidance and confirmed the findings of Cloyd et al. (1996) by showing that private firms engage more in tax aggressive strategies. However, the different incentives to engage in tax aggressive strategies make that their measure can potentially be biased. The incentives to engage in tax aggressive structures are potentially different due to the different costs and benefits. Public firms are required to disclose more information about earnings than private firms. This information helps tax authorities to detect tax aggressive structures, so the costs for public firms are higher than for private firms (Jacob et al., 2014). Also, public firms face potentially higher costs because they are more likely to be covered in the financial press. Beuselinck et al. (2015) find that E.U. private multinationals are more likely to shift income from high- to low-rate countries. One explanation for this finding is that profit shifting currently receives much (negative) media attention, so public firms face higher costs and use (potentially) different tax strategies.

In contrast, prior literature provided also evidence that public, not private, firms are more tax aggressive. Penno and Simon (1986) were the first who studied the differences between public- and private firms. They find by using a questionnaire that publicly traded firms are more likely to use income-increasing accounting methods (choice of inventory- and depreciation method) than private firms. The driver for public firms to participate more in income-increasing accounting methods is following this paper their participation in the external equity market and/or the accompanying dilution of ownership control. Beatty and Harris (1998) extended this research and studied earnings management between public listed- and private banks and shown a similar finding that publicly listed banks are more engaged in earnings management than private banks. A more recent study by Pierk (2016) confirmed their findings and find that German public firms are more tax aggressive compared to private firms, the effective tax rates in the financial statements are significantly lower for German public firms.

Contradicting results exist regarding the influence of ownership structure on the level of tax aggressiveness. There is no literature on the combination of the two streams of literature of the differences in tax aggressiveness between public family, private family, public nonfamily, and private

non-family firms. Through the contradicting results and the lack of unambiguous evidence on the influence of ownership on the level of tax aggressiveness, the following hypothesis is formulated:

**H3:** *Private ownership does not influence the level of tax aggressiveness over time.*

## V. Data & Methodology

This section provides a description of the sample selection process and the research design. *Tax aggressiveness over time* is not directly observable, because companies do not disclose how much tax they avoid. The methodology section describes how *tax aggressiveness* is approached, based on existing literature. After that section, the control variables are described and defined within the used dataset.

### 1. Sample selection

The required financial data is available through databases within the Wharton Research Data Services system, Bureau van Dijk's Amadeus (*Analyze Major Databases from European Sources*). The Statutory corporate income tax rates are available through the OECD.stat database. Bureau van Dijk's Amadeus is a database of the comparable financial and business information on Europe's largest firms and provides data on financials and shareholders of 19 million public- and private companies across Europe. The full sample consists of 4.221.142 firm-year observations between 2012 and 2019. The years before 2012 are excluded because financial data for companies within Amadeus is retained for a rolling period of 7 years. When a new year of data is added, the oldest year is dropped, meaning only the most recent data for each company is available. Observations of Year 2020 are excluded because relatively few observations are published (see appendix A for infographic).

In line with prior literature, several adjustments are made to the dataset. Observations are excluded with either a negative pretax income or taxation or with missing values. Financial firms are removed from the sample because financial firms have a different view on leverage. This process is summarized in table 1. Financial information in the Amadeus database is reported in the currency of each European country. The currency used is stored in the variable *currency*, which is in most of the observation's Euro (*EUR*). To allow comparison between countries that use different currencies, Amadeus provides a variable, *EXCHRATE2* which contains the exchange rate to euros at the date closing date (therefore, this is not an average). The exchange rate is in €/ local currency. To make the EU data comparable, the data is of all countries transformed to euros. The final sample consists of 1.602.799 firm-year observations.

Table 2: sample selection

Number of observations found in Amadeus 2012-2020 (Financials)	4.221.142
Number of observations found in Amadeus 2012-2020 (Owners)	1.867.853
Number of observations found in OECD.stat (Statutory Tax Rates)	324
<hr/>	
<i>Less: Remove duplicates</i>	
<i>Financials</i>	<i>(1.296)</i>
<i>Owners</i>	<i>(1.229.313)</i>
<i>Tax Rates</i>	<i>(0)</i>
Merge datasets – Financial dataset is leading	
<i>Add: Merge financials with owners. A growing number of observations because of multiple owner structures firms.</i>	<i>831.950</i>
<i>Less: Merge financials with statutory tax rates. Reducing the number of observations because of missing country-variable.</i>	<i>(1.105236)</i>
<i>Less: Remove duplicates Total dataset</i>	<i>(0)</i>
<i>Less: Remove firm observations with pre-tax income less than zero</i>	<i>(1.359.699)</i>
<i>Less: Remove firm observations - Financial firms (Code = 52)</i>	<i>(123.427)</i>
<i>Less: Remove firm observations with tax payable less than zero</i>	<i>(323.994)</i>
<i>Less: Remove firm observations with Effective tax rate &gt;100%</i>	<i>(48.395)</i>
<i>Less: Remove firm observations with missing values</i>	<i>(202.051)</i>
<i>Less: Remove firm observations out of the year 2020</i>	<i>(24.769)</i>
<i>Less: Remove firm observations out of the year 2020</i>	<i>(24.769)</i>
<i>Less: Remove firm observations with Difference tax rate &lt; -10%</i>	<i>(261.426)</i>
Total number of observations in the final sample	<b>1.602.799</b>

## 2. Research design

The research question is twofold, namely if the level of tax aggressive behavior is reduced over time, and what the influence of family- and private ownership is on the level of tax aggressiveness over time.

To examine whether the level of tax aggressiveness of family- (non-family-) and private (public) firms is reduced over time, I will run several cross-sectional regressions with the dependent variable *tax aggressiveness*. The research design is based on the cross-sectional regression model by the paper of Chen et al. (2010). This model is used by several researchers to analyze the relation between tax aggressiveness and family firms. Based on the research model of Thomson et. al (2018), control variables are added to analyze the influence of private ownership on tax aggressiveness.

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * PRIVATE_i + \beta_2 * FAMILY_i + \beta_3 * PRIVATE_i * FAMILY_i + \beta_4 * ROA_i + \beta_5 * LEV_i + \beta_6 * SIZE_{LOG_i} + \beta_7 * PPE_i + \beta_8 * CURASS_i + \beta_9 * INTASS_i + IndustryDummies + IndustryDummies + YearDummies + \varepsilon_{i,t}$$

To absorb any tax rate change at the country level, a second cross-sectional regression is created. In this regression country-year fixed effects are added, instead of the country- and year fixed effects. In the OLS-output table, one additional column will be added, for the output of this OLS regression. When the output of both OLS regressions doesn't differ significantly, we can conclude that there have been no major tax rate changes within the EU.

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * PRIVATE_i + \beta_2 * FAMILY_i + \beta_3 * PRIVATE_i * FAMILY_i + \beta_4 * ROA_i + \beta_5 * LEV_i + \beta_6 * SIZE_{LOG_i} + \beta_7 * PPE_i + \beta_8 * CURASS_i + \beta_9 * INTASS_i + IndustryDummies + CountryYearDummies + \varepsilon_i$$

To examine the influence of family- and/or private ownership on the level of tax aggressiveness over time, I created an additional regression with a changing independent dummy variable. To absorb the effect of a public family ownership structure on the level of tax aggressiveness of a firm over time, I created a dummy variable that has the value of 1 when PRIVATE = 0 and FAMILY = 1. The coefficient of Ownership is the main effect between the groups. The coefficients of the interaction term (Ownership \* YearDummies) test if the coefficient of the year from the selected group significantly differs from the total dataset.

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * Ownership_i + \beta_2 * YearDummies + \beta_3 * Ownership_i * YearDummies + \beta_4 * ROA_{i,t} + \beta_5 * LEV_i + \beta_6 * SIZE_{LOG_i} + \beta_7 * PPE_i + \beta_8 * CURASS_i + \beta_9 * INTASS_i + IndustryDummies + CountryDummies + \varepsilon_i$$

For each observation of all regressions  $i = 1, \dots, n$ . The epsilon describes the random component (error) of the linear relationship between tax aggressiveness and the independent variables. The variable definition is explained below. An overview of the used variables can be found in table 2. The first part in the result section is the difference in *tax aggressiveness* between countries over time. After that analysis, the distinction between public- and private entities, and family- and non-family firms will be analyzed.

## 2.1 Dependent Variable: Tax Avoidance measures

The most challenging part as defined in literature is the construction of the independent variable *tax aggressiveness* and the researchers' definition and measurement of tax aggressiveness (Hanlon et al, 2010). There is no clear measure for *tax aggressiveness* because companies do not disclose how much tax they avoid. Prior research does not rely on a single measure of *tax aggressiveness*, because every measure has its limitations. To identify firms who consistently pursue strategies toward the more aggressive tax strategies, and predict which firms do this, I will use two different proxies for *tax aggressiveness*. These two proxies will be tested for distribution. The proxy with the highest explaining value is taken as the dependent variable. An overview of the used variables for this measure can be found in table 1.

The first proxy is a broadly used measure in the literature about taxes, the ETR. This measurement assesses the tax performance of firms and is a good measure to evaluate a firm's tax burden because it provides us the percentage of tax the firms had paid compared to the taxable revenue. In the ETR are deferred taxes included and thus information about future taxes. More precisely, by including deferred taxes, ETR provides permanent tax differences. Permanent tax differences are more likely to be an outcome of tax aggressive structures (Janssen et al., 2000). The lower the ETR, the more likely the tax aggressiveness activities (Phillips, 2003) (Mills, 1998).

$$ETR = \frac{\text{Income Tax Expense}}{\text{Earnings before taxes}}$$

The second proxy I will use for tax aggressiveness is the Difference between the statutory tax rate (STR) and ETR, as included by Thomsen et al. (2018). This is also a widely used proxy for tax aggressiveness. A higher value of this proxy means a higher level of tax avoidance. The firm's STR is the statutory tax rate of the state of residence of the parent company (e.g., head country). This measure captures (1) the different levels and (2) the time-varying STRs within family and non-family firms, and is calculated as follows:

$$Diff_{i,t} = STR - ETR$$

Table 3: Variable description (measure Tax aggressiveness)

Variable	Description	Amadeus variable
<i>Income Tax Expense</i>	What an entity has <b>determined</b> is owed in taxes based on standard business accounting rules, reported in the income statement.	PLBT - PLAT
<i>Earnings before taxes</i>	Measure in the income statement of the financial performance of the company, the calculation is revenue minus expenses, excluding taxes.	PLBT
<i>STR<sub>i,t</sub></i>	Statutory tax rate	Manually

## 2.2 Independent variables

PRIVATE is a dummy variable and will have a value of one if the entity is a private firm, and zero otherwise. A company is considered to be public when a large portion of the shares are traded on the stock market. A company is considered to be private when the shares are privately held by its shareholders. In the Amadeus database it is given if the entity is public or private (QUOTED). FAMILY is a dummy variable and will have a value of one if the entity is a family firm, and zero otherwise. A company is considered to be a family firm when the majority of the shareholders (>50%) are private shareholders, individuals, or families. More in detail, nameless private stockholders (code D by SH\_TYPE in Amadeus) and one or more named individuals or families (code I by SH\_TYPE in Amadeus). With the model (eq. 1) is examined whether there is a significant influence on tax aggressiveness due to the drivers of a family company and/or a private owned company. If family firms (private firms) tend to be more tax aggressive, a negative coefficient is expected on the  $FAMILY_{i,t}$  ( $PRIVATE_{i,t}$ ) variable  $\beta_1$  ( $\beta_2$ ). Because the ETR decreases when the degree of tax aggressiveness increases, due to a lower tax expense by the company. For an analysis of whether the effect on tax

aggressiveness is strengthened or weakened when a company is a family firm and a private firm, an interaction term is added for the  $FAMILY_{i,t}$  and  $PRIVATE_{i,t}$  variable. This effect will be shown in the coefficient of variable  $\beta_3$ .

### 2.3 Control variables

The model (equation 1) includes several control variables, to control for firm characteristics that could affect the level of tax aggressiveness of the firm. As described in the literature review, companies conduct a cost-benefit analysis to plan the most optimal tax strategy. Prior literature identified an association between several firm characteristics and tax aggressive behavior, such as profitability, leverage, size, and assets (e.g., Frank et al., 2009). These firm characteristics will be explained and included in the research model.

*Profitability:* Yermack (1996) concluded a strong association between a firm's past performance and its current performance. Thus, the firm's profitability prospect is based on its past performance. The manager's incentive for profitable aggressive tax structures increases when deteriorating firm performance is identified with lower firm performance in the future (Belz et al., 2013). In line with prior literature, (1) return on assets (ROA) is used as a proxy for profitability (Operating profit or loss (EBIT) / Total assets).

*Leverage:* Secondly, leverage is incorporated as a control variable. Gupta & Newberry (1997) found a relation between the ETR and the capital structure and profitability of U.S. companies. Regarding the capital structure, this is based on the premise that interest payments are exempted from tax, and dividends are not exempted. So, interest payments are seen as costs for tax base calculations, and dividends payments not. Belz et al. (2013) also used leverage in their research, to measure the degree of debt shifting by multinationals, to exploit the potential tax shield savings in the high tax rate-countries. (2) Leverage is determined by scaling the long-term debt by assets (long-term debt / total assets).

*Firm size:* Prior literature concludes that the relation between family ownership and firm performance is stronger for small than it is for large companies (Chen et al., 2010). The paper of Chen et al. (2010) is controlled for size by using the natural logarithm of equity. For EU private companies is this data not available, so in this research, the natural logarithm of total assets is used. The control variable (3) SIZE\_LOG is the natural logarithm of total assets, and controls for the size of the firm.

*Assets:* (4) PPE (fixed tangible assets/ total assets), (5) CURAS (current assets/ total assets) and (6) INTASS (intangible fixed assets/ total assets) are control variables to identify differences in book- and tax reporting values, which could indicate tax aggressiveness behavior. Differences in the book- and tax reporting values may occur for instance by different treatments of depreciation expense for tax and financial reporting purposes.

*Fixed effects:* The research must address year-fixed effects. This inclusion is aimed to guarantee for no macro-economic events that have influenced the performance of the related year. Besides companies' financial characteristics, all prior mentioned studies included operating industry and the home country as determinants of the ETR. In the report of the OECD in 2013 is mentioned that most countries have different tax legislation and that some are more favorable than others. These differences between countries are magnified for some industries. Dyreng et al. (2017) found these differences and concluded that certain industries have on average a lower ETR due to this different legislation. The fixed effect variables (7) INDUSTRY, (8) YEAR, and (9) COUNTRY are incorporated to control for the fixed



effects out of industry-sector effects, year-effects, and country-effects. In the second model are (7) INDUSTRY and (8) YearCountry incorporated, to absorb any tax rate change at the country level. Due to the linear nature of the regression model and the non-linear nature of the industry- and country differences, I add these control variables as categorical dummy variables based on the industry- and country code.

Last, all variables are winsorized at 99% to control for outliers.

Table 4: Variable description (control variables)

Variable	Description	Amadeus variable
<i>TaxAgg<sub>i,t</sub></i>	Tax aggressiveness for firm i, year t	
<i>PRIVATE<sub>i,t</sub></i>	Dummy variable with the value one in case of a private firm and zero otherwise.	One if public firm, zero otherwise
<i>FAMILY<sub>i,t</sub></i>	Dummy variable with the value one in case of family ownership and zero otherwise.	One if shareholder SH_TYPE is D or I, zero otherwise
<i>Ownership<sub>i,t</sub></i>	Dummy variable with the value one in case of a family(private) or non-family(public) ownership and zero otherwise.	Manually
<i>ROA<sub>i,t</sub></i>	Return on assets for firm i, year t. ROA is the operating p/l (EBIT) scaled by the total assets.	OPPL/TOAS
<i>LEV<sub>i,t</sub></i>	Leverage for firm i, year t, which is measured as the long-term debt scaled by the total assets.	LTDB/TOAS
<i>SIZE_LOG<sub>i,t</sub></i>	Size for firm i, year t is measured as the natural logarithm of the total assets.	LN(TOAS)
<i>PPE<sub>i,t</sub></i>	Property, plant, and equipment for firm i, year t, measured as the tangible fixed assets scaled by the total assets.	TFAS/TOAS
<i>CURASS<sub>i,t</sub></i>	Current assets for firm i, year t scaled by the total assets.	CURAS/ TOAS
<i>INTASS<sub>i,t</sub></i>	Intangible assets for firm i, year t scaled by the total assets.	IFAS/TOAS

## VI. Results and analysis

### 1. Descriptive statistics

This section consists of two parts. Firstly, the descriptive statistics of the firm year observations with one condition (family vs. non-family, and private vs. public). Secondly, the descriptive statistics of the firm year observations with two conditions. The total sample exist of 1.602.799 firm-year observations from 2012 to 2019, consisting of 460.248 (28,72%) family firms, 1.142.551 (71,28%) non-family firms, 1.451.797 (90,58%) private firms, and 151.002 (9,42%) public firms. Appendix A describes the distribution between these observations in detail. The most important findings within this data are described in the next paragraphs.

First, the differences in sample between family- and non-family firms. It is remarkable that the sample of family firms only consists of 28,72% of the total sample, which means that the non-family firm sample is almost three times as big. Luckily, the total sample is big enough to make up for this difference. The average ETR is higher for family firms (18,68%) compared to non-family firms (16,46%), implying that non- family firms are more tax aggressive than family firms. The statistics of the diff-variable are also remarkable. The difference between the STR and ETR for non-family firms is

(6,88%), almost one and a half times as big as for family firms (4,81%). This implies that non-family firms are mostly located in low-taxed countries. However, univariate results have potential endogeneity concerns as they do not control for firm characteristics and should be interpreted with caution.

Second, the differences in sample between firms with private- and public ownership. As observed in the descriptive statistics of family firms, the ETR for private firms (17,35%) is a few percent higher compared to public firms (14,65%). In contrast to the findings by family firms, is the difference between the STR and ETR for both groups are comparable to each other. Between the firms with private- and public ownership structures, I observe a difference for the variables PPE, CURASS and INTASS. All three variables have higher means in the private sample, which implies that the firm characteristics slightly differ between these samples.

Regarding ROA, LEV, and SIZE\_LOG no major differences between the groups are observed.

Table 5: Descriptive statistics Full sample

Variable	N	Mean	Min	Q1	Median	Q3	Max
<i>ETR<sub>i</sub></i>	1.602.799	17.10	0.00	3.319	19.06	28.07	87.36
<i>Diff<sub>i</sub></i>	1.602.799	6.29	-10.00	-0.09	2.59	10.68	38.00
<i>ROA<sub>i</sub></i>	1.602.799	0.29	-0.01	0.01	0.05	0.11	0.45
<i>LEV<sub>i</sub></i>	1.602.799	0.09	0.00	0.00	0.01	0.11	0.80
<i>SIZE_LOG<sub>i</sub></i>	1.602.799	17.74	14.15	16.29	17.36	18.87	23.76
<i>PPE<sub>i</sub></i>	1.602.799	0.17	0.00	1.01	0.08	0.26	0.96
<i>CURASS<sub>i</sub></i>	1.602.799	0.50	0.00	0.11	0.53	0.83	1.17
<i>INTASS<sub>i</sub></i>	1.602.799	0.03	0.00	0.00	0.00	0.01	0.60

Table 6: Descriptive statistics Family firms

Variable	N	Mean	Min	Q1	Median	Q3	Max
<i>ETR<sub>i</sub></i>	460.248	18.68	0.00	4.79	21.84	29.13	87.36
<i>Diff<sub>i</sub></i>	460.248	4.81	-10.00	-1.05	2.31	7.62	38.00
<i>ROA<sub>i</sub></i>	460.248	0.08	-0.01	0.02	0.05	0.10	0.45
<i>LEV<sub>i</sub></i>	460.248	0.08	0.00	0.00	0.02	0.11	0.80
<i>SIZE_LOG<sub>i</sub></i>	460.248	17.12	14.15	15.94	16.84	17.98	23.76
<i>PPE<sub>i</sub></i>	460.248	0.18	0.00	0.01	0.10	0.28	0.96
<i>CURASS<sub>i</sub></i>	460.248	0.60	0.00	0.18	0.60	0.84	1.17
<i>INTASS<sub>i</sub></i>	460.248	0.00	0.00	0.00	0.02	0.01	0.60

Table 7: Descriptive statistics Non-family firms

Variable	N	Mean	Min	Q1	Median	Q3	Max
<i>ETR<sub>i</sub></i>	1.142.551	16.46	0.00	2.97	17.58	27.61	87.36
<i>Diff<sub>i</sub></i>	1.142.551	6.88	-10.00	0.03	2.71	11.94	38.00
<i>ROA<sub>i</sub></i>	1.142.551	0.08	-0.01	0.01	0.05	0.11	0.45
<i>LEV<sub>i</sub></i>	1.142.551	0.09	0.00	0.00	0.01	0.11	0.80
<i>SIZE_LOG<sub>i</sub></i>	1.142.551	17.99	14.15	16.49	17.63	19.19	23.76
<i>PPE<sub>i</sub></i>	1.142.551	0.18	0.00	0.01	0.07	0.25	0.96
<i>CURASS<sub>i</sub></i>	1.142.551	0.48	0.00	0.10	0.50	0.83	1.17
<i>INTASS<sub>i</sub></i>	1.142.551	0.04	0.00	0.00	0.00	0.02	0.60

Table 8: Descriptive statistics Private firms

Variable	N	Mean	Min	Q1	Median	Q3	Max
<i>ETR<sub>i</sub></i>	1.451.797	17.35	0.00	3.37	19.70	28.32	87.36
<i>Diff<sub>i</sub></i>	1.451.797	6.25	-10.00	-0.17	2.56	10.69	38.00
<i>ROA<sub>i</sub></i>	1.451.797	0.08	-0.01	0.01	0.05	0.11	0.45
<i>LEV<sub>i</sub></i>	1.451.797	0.09	0.00	0.00	0.01	0.11	0.80
<i>SIZE_LOG<sub>i</sub></i>	1.451.797	17.48	14.15	16.20	17.19	18.49	23.76
<i>PPE<sub>i</sub></i>	1.451.797	0.18	0.00	0.01	0.08	0.26	0.96
<i>CURASS<sub>i</sub></i>	1.451.797	0.52	0.00	0.12	0.57	0.85	1.17
<i>INTASS<sub>i</sub></i>	1.451.797	0.02	0.00	0.00	0.00	0.01	0.60

Table 9: Descriptive statistics Public firms

Variable	N	Mean	Min	Q1	Median	Q3	Max
<i>ETR<sub>i</sub></i>	151.002	14.65	0.00	2.94	13.03	24.99	87.36
<i>Diff<sub>i</sub></i>	151.002	6.66	-10.00	1.10	3.09	10.62	38.00
<i>ROA<sub>i</sub></i>	151.002	0.06	-0.01	0.01	0.04	0.09	0.45
<i>LEV<sub>i</sub></i>	151.002	0.12	0.00	0.00	0.04	0.19	0.80
<i>SIZE_LOG<sub>i</sub></i>	151.002	20.26	14.15	18.71	20.25	21.95	23.76
<i>PPE<sub>i</sub></i>	151.002	0.14	0.00	0.01	0.06	0.20	0.96
<i>CURASS<sub>i</sub></i>	151.002	0.34	0.00	0.08	0.29	0.55	1.17
<i>INTASS<sub>i</sub></i>	151.002	0.11	0.00	0.00	0.03	0.16	0.60

Table 10, 11, 12 and 13 shows the descriptive statistics of private non-family, public non-family, private family, and public family firms. The sample consists of 1.010.389 (63,04%) private non-family firm observations, 132.162 (8,24%) public non-family firm observations, 441.408 (30,3%) private family firm observations, and 18.840 (0,01%) public family firm observations. The most important findings within this data are described in the next paragraphs.

The ETR is higher for private family firms (18,90%) compared to public family firms (13,52%), implying that public family firms are more tax aggressive than private family firms. The difference in ETR between private non-family firms (16,67%) and public non-family firms (14,81%) is also observed, but this difference is less significant. Notably, the difference in the mean Diff between the Statutory Tax Rate and the ETR (*Diff-variable*) is nearly around zero between the groups, except from private family firms (average difference: -1,25%). Tables 5 and -6 show that the Diff for private non-family firms (6,90%) is almost equal to public non-family firms (6,71%). The difference between private family firms (4,75%) compared to public family firms (6,28%) is slightly bigger. One explanation for this finding is that private family firms are mainly located in countries with a low statutory tax rate.

Regarding ROA, LEV, and SIZE\_LOG no major differences between the groups are observed.

Table 10: Descriptive statistics Private non-family firms

Variable	N	Mean	Min	Q1	Median	Q3	Max
<i>ETR<sub>i</sub></i>	1.010.389	16.67	0.00	2.97	18.16	27.89	87.36
<i>Diff<sub>i</sub></i>	1.010.389	6.90	-10.00	0.00	2.66	12.10	38.00
<i>PRIVATE<sub>i</sub></i>	1.010.389	1	1	1	1	1	1
<i>FAMILY<sub>i</sub></i>	1.010.389	0	0	0	0	0	0
<i>ROA<sub>i</sub></i>	1.010.389	0.08	-0.01	0.1	0.05	0.11	0.45
<i>LEV<sub>i</sub></i>	1.010.389	0.09	0.00	0.00	0.01	0.10	0.80
<i>SIZE_LOG<sub>i</sub></i>	1.010.389	17.68	14.15	16.37	17.40	18.75	23.76
<i>PPE<sub>i</sub></i>	1.010.389	0.18	0.00	0.01	0.07	0.25	0.96
<i>CURASS<sub>i</sub></i>	1.010.389	0.50	0.00	0.10	0.54	0.85	1.17
<i>INTASS<sub>i</sub></i>	1.010.389	0.03	0.00	0.00	0.00	0.01	0.60

Table 11: Descriptive statistics Public non-family firms

Variable	N	Mean	Min	Q1	Median	Q3	Max
<i>ETR<sub>i</sub></i>	132.162	14.81	0.00	2.97	13.48	25.17	87.36
<i>Diff<sub>i</sub></i>	132.162	6.71	-10.00	1.03	3.10	10.87	38.00
<i>PRIVATE<sub>i</sub></i>	132.162	0	0	0	0	0	0
<i>FAMILY<sub>i</sub></i>	132.162	0	0	0	0	0	0
<i>ROA<sub>i</sub></i>	132.162	0.06	-0.01	0.01	0.04	0.09	0.45
<i>LEV<sub>i</sub></i>	132.162	0.12	0.00	0.00	0.05	0.20	0.80
<i>SIZE_LOG<sub>i</sub></i>	132.162	20.36	14.15	18.82	20.35	22.02	23.76
<i>PPE<sub>i</sub></i>	132.162	0.14	0.00	0.01	0.06	0.20	0.96
<i>CURASS<sub>i</sub></i>	132.162	0.34	0.00	0.08	0.29	0.55	1.17
<i>INTASS<sub>i</sub></i>	132.162	0.12	0.00	0.00	0.03	0.16	0.60

Table 12: Descriptive statistics Private family firms

Variable	N	Mean	Min	Q1	Median	Q3	Max
<i>ETR<sub>i</sub></i>	441.408	18.90	0.00	5.07	22.20	29.28	87.36
<i>Diff<sub>i</sub></i>	441.408	4.75	-10.00	-1.13	2.27	7.57	38.00
<i>PRIVATE<sub>i</sub></i>	441.408	1	1	1	1	1	1
<i>FAMILY<sub>i</sub></i>	441.408	1	1	1	1	1	1
<i>ROA<sub>i</sub></i>	441.408	0.08	-0.01	0.02	0.05	0.11	0.45
<i>LEV<sub>i</sub></i>	441.408	0.08	0.00	0.00	0.02	0.11	0.80
<i>SIZE_LOG<sub>i</sub></i>	441.408	17.01	14.15	15.92	16.79	17.84	23.76
<i>PPE<sub>i</sub></i>	441.408	0.18	0.00	0.19	0.61	0.85	1.17
<i>CURASS<sub>i</sub></i>	441.408	0.61	0.00	0.19	0.61	0.54	1.16
<i>INTASS<sub>i</sub></i>	441.408	0.02	0.00	0.00	0.00	0.01	0.60

Table 13: Descriptive statistics Public family firms

Variable	N	Mean	Min	Q1	Median	Q3	Max
<i>ETR<sub>i</sub></i>	18.840	13.54	0.00	2.76	9.35	23.78	87.36
<i>Diff<sub>i</sub></i>	18.840	6.28	-10.00	1.43	3.04	8.85	38.00
<i>PRIVATE<sub>i</sub></i>	18.840	0	0	0	0	0	0
<i>FAMILY<sub>i</sub></i>	18.840	1	1	1	1	1	1
<i>ROA<sub>i</sub></i>	18.840	0.06	-0.01	0.01	0.04	0.09	0.45
<i>LEV<sub>i</sub></i>	18.840	0.10	0.00	0.00	0.03	0.15	0.79
<i>SIZE_LOG<sub>i</sub></i>	18.840	19.54	14.15	17.88	19.45	21.19	23.76
<i>PPE<sub>i</sub></i>	18.840	0.05	0.00	0.01	0.05	0.17	0.96
<i>CURASS<sub>i</sub></i>	18.840	0.34	0.00	0.08	0.25	0.57	1.17
<i>INTASS<sub>i</sub></i>	18.840	0.10	0.00	0.00	0.02	0.12	0.60

## 2. Correlation matrix

Table 14 provides the Pearson (below the diagonal) and Spearman (above the diagonal) correlations among the variables and control variables. The Pearson correlation evaluates the linear relationship between two continuous variables, and the Spearman correlation evaluates this relationship based on a ranked dataset (monotonic relationship). All correlations are significant at a 1% significance level. Both, FAMILY and PRIVATE are positively related to ETR. A lower ETR indicates that firms are more tax aggressive, so this observation indicates that both private- and family firms are less tax aggressive. These observations are in line with the prior discussed descriptive statistics. Control variables ROA, CURASS and INTASS are significant positively related to ETR, and LEV, SIZE\_LOG and PPE are significant negatively related to ETR.

Table 14: Correlation matrix

	<i>ETR<sub>i</sub></i>	<i>PRIVATE<sub>i</sub></i>	<i>FAMILY<sub>i</sub></i>	<i>ROA<sub>i</sub></i>	<i>LEV<sub>i</sub></i>	<i>SIZE LOG<sub>i</sub></i>	<i>PPE<sub>i</sub></i>	<i>CURASS</i>
<i>ETR<sub>i</sub></i>		0.06 ***	0.08 ***	0.52 ***	0.15 ***	-0.35 ***	0.30 ***	0.54 ***
<i>PRIVATE<sub>i</sub></i>	0.06 ***		0.12 ***	0.04 ***	-0.10 ***	-0.34 ***	0.05 ***	0.14 ***
<i>FAMILY<sub>i</sub></i>	0.08 ***	0.12 ***		0.02 ***	0.05 ***	-0.20 ***	0.06 ***	0.06 ***
<i>ROA<sub>i</sub></i>	0.37 ***	0.05 ***	0.00 ***		0.11 ***	-0.42 ***	0.36 ***	0.57 ***
<i>LEV<sub>i</sub></i>	0.10 ***	-0.05 ***	-0.03 ***	-0.01 ***		0.01 ***	0.42 ***	-0.05 ***
<i>SIZE_LOG<sub>i</sub></i>	-0.35 ***	-0.41 ***	-0.20 ***	-0.33 ***	0.04 ***		-0.15 ***	-0.57 ***
<i>PPE<sub>i</sub></i>	0.18 ***	0.05 ***	0.01 ***	0.09 ***	0.42 ***	-0.07 ***		0.06 ***
<i>CURASS<sub>i</sub></i>	0.55 ***	0.14 ***	0.07 ***	-0.46 ***	-0.11 ***	-0.54 ***	-0.15 ***	
<i>INTASS<sub>i</sub></i>	0.13 ***	-0.28 ***	-0.07 ***	0.09 ***	0.11 ***	0.12 ***	-0.04 ***	-0.03 ***

Notes: Pearson correlations are reported below the diagonal and Spearman correlations are reported above the diagonal. All variables defined in table 2 and 3. T-statistics are reported in parentheses below the coefficient estimates. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent, respectively. Industry fixed effects and country fixed effects are included in the estimations.

## 3. Tax avoidance behaviors over time, OLS regression output

In this section, the found results are analyzed. This section will fall into two parts, the OLS regression output and the time series analysis. To test the relation between tax avoidance and (non-) private- and (non-)family firms over time, two proxies are used to measure tax aggressiveness. These two proxies are tested for distribution. The proxy with the highest explaining value is taken as the dependent variable for multiple analyses. For both variables, I calculated the R-squared. The ETR-proxy (R-squared = 0,5043) has a higher explaining value relieve to the Diff-proxy (R-squared = 0, 3005), so ETR will be used within the regression analysis as a proxy for tax aggressiveness. The difference between the statutory tax rate and the effective tax rate explains how much tax firms are avoiding and helps to answer the question how the tax avoidance behavior changed over time. For the time series analysis, the Diff is also calculated to observe where the lowest actual tax rate is paid.

Table 15 provides the results of the OLS regression, with the ETR as a proxy for tax avoidance. Column (a) shows the model with fixed effects of year and country, and column (b) the model with only with country-year fixed effects to absorb any tax rate change at the country level. Between these two columns, there are no major differences. This implies that there have not been great tax rate changes within the EU for the given sample-period. The coefficient of YearDummies of the first model (table 16) is negatively significant growing. This negative coefficient implies that the ETR is higher in earlier years, which indicates that the tax aggressive behavior of firms increased over the years. The coefficient of the PRIVATE variable (-0,35) is negative and significant at a 1% significance level, which implies that the average ETR tends to be lower when a firm is a private firm. The FAMILY variable (-0,22 \*\*\*) is also negative, so the average ETR also tends to be lower when a firm is a family firm. Continuing, when a firm is a private family firm, I find a significant positive coefficient of 1,12. This significant positive coefficient is conflicting with the previously observed coefficients of PRIVATE and FAMILY.

Table 15: Linear regression output

	Coefficient (a)	Coefficient (b)
<i>ETR<sub>i,t</sub></i>		
<i>Intercept</i>	5.25 (35.73, ***)	3.30 (0.00)
<i>PRIVATE<sub>i</sub></i>	-0.35 (-11.48, ***)	-0.33 (0.00)
<i>FAMILY<sub>i</sub></i>	-0.22 (-3.28, **)	-0.22 (0.00)
<i>PRIVATE<sub>i</sub> * FAMILY<sub>i</sub></i>	1.12 (15.07, ***)	1.13 (0.00)
<i>ROA<sub>i,t</sub></i>	15.80 (161.66, ***)	15.81 (0.00)
<i>LEV<sub>i</sub></i>	0.29 (5.36, ***)	0.51 (0.00)
<i>SIZE_LOG<sub>i</sub></i>	0.16 (29.76, ***)	0.15 (0.00)
<i>PPE<sub>i</sub></i>	8.52 (190.77, ***)	8.61 (0.00)
<i>CURASS<sub>i</sub></i>	11.64 (285,04, ***)	11.78 (0.00)
<i>INTASS<sub>i</sub></i>	14.63 (168,67, ***)	14.75 (0.00)
<i>IndustryDummies</i>	Yes	Yes
<i>YearDummies</i>	Yes	-
<i>CountryDummies</i>	Yes	-
<i>CountryYearDummies</i>	-	Yes
<i>Adj. R-squared</i>	50.43%	51.16%

OLS-regression:

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * PRIVATE_{i,t} + \beta_2 * FAMILY_{i,t} + \beta_3 * PRIVATE_{i,t} * FAMILY_{i,t} + \beta_4 * ROA_{i,t} + \beta_5 * LEV_{i,t} + \beta_6 * SIZE_{LOG_{i,t}} + \beta_7 * PPE_{i,t} + \beta_8 * CURASS_{i,t} + \beta_9 * INTASS_{i,t} + IndustryDummies + YearDummies + CountryDummies (+ CountryYearDummies) + \varepsilon_{i,t}$$

Notes: This table provides the results of the OLS regression. The sample consists of 1.602.799 firm observations between 2012-2019. PRIVATE is a dummy variable which has a value of one if the firm is a private firm and zero otherwise. FAMILY is a dummy variable which has a value of one if the firm is a family firm and zero otherwise. The ETR is the effective tax rate measured as the total tax expense divided by the pre-tax income. ROA, LEV, SIZE\_LOG, PPE, CURASS and INTASS are included as control variables. Year, country, and industry dummies are included to control for year, country, and industry fixed effects. All variables are winsorized at a 99% level. T-values are reported in parentheses below the coefficient estimates. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent, respectively. Industry fixed effects and country fixed effects are included in the estimations.

### *Analysis hypothesis 1*

The first hypothesis stated the level of tax aggressiveness declined over time following several papers. To answer hypothesis 1, I begin my analysis with a country-by-country analysis of mean ETRs and DIFFs over the 7-year sample period (figure 1). Second, I will analyze the average development of the ETR and Diff within Europe. Last, I will interpret the OLS regression analysis.

For the country-by-country analysis, I included only countries with more than 5000 observations<sup>1</sup>. Firms domiciled in Ireland have the lowest mean ETR (12,65%). The average ETR varies between the 12,65% and 27,26% (Italy). This observation could suggest that firms domiciled in Ireland have more tax aggressive behavior than firms domiciled in Italy. The ETR explained only the Effective Tax Rate, and the statutory tax rate (STR) is not taken into account in the calculation. In figure 1b, the average difference between the STR and ETR per country is plotted. Remarkable is the negative DIFF for Ireland (-0,15%), which implies that the average ETR paid in Ireland is higher than the Statutory Tax Rate. The highest difference between the STR and ETR is measured in France (16,63%), which is a good indicator that firms domiciled in France have more tax aggressive behavior than firms domiciled in other countries within the EU.

Second, to analyze the average development of the ETR and Diff from 2012 to 2019, all country results are summarized in one plot (figure 2). Regarding the time trend, the average ETR of firms was 18,73% in 2012, and 16,06% in 2019. Regarding to the average Diff of firms was 6,12% in 2012, and 5,75% in 2019. The significant growing downward trend of the ETR is also observed within the year-dummy analysis (table 16). The coefficient of the year dummies is the growth factor of the ETR by year. For the whole sample period is a negative coefficient found. This negative coefficient implies that the ETR is higher in earlier years, which indicates that the tax aggressive behavior of firms increased over the years. The lowest ETR is found in 2019, and the biggest drop is observed within 2018 and 2019. These findings oppose the expectation that the average level of tax aggressiveness in the EU has increased of time. Statistically significant evidence is found to support that it has decreased over time. H1 is thus rejected.

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<sup>1</sup> Included for this analysis: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Portugal, Slovenia, Spain, Switzerland, United Kingdom. Excluded for this analysis (number of observations in dataset): Czech Republic (182), Denmark (905), Estonia (890), Hungary (3), Iceland (5), Latvia (4402), Norway (2100), Sweden (1638), Turkey (848).

Table 16: Output coefficient Year-Dummies

	Coefficient
$Year2013_i$	-0.45 (-14.11, ***)
$Year2014_i$	-1.00 (-31.41, ***)
$Year2015_i$	-1.53 (-50.73, ***)
$Year2016_i$	-1.68 (-56.93, ***)
$Year2017_i$	-2.10 (-71.96, ***)
$Year2018_i$	-2.46 (-84.08, ***)
$Year2019_i$	-2.45 (-82.80, ***)

Notes: This table provides additional results of the OLS regression, the coefficients of the included Year fixed effects dummies. The sample consists of 1.602.799 firm observations between 2012-2019. T-values are reported in parentheses below the coefficient estimates. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent, respectively.

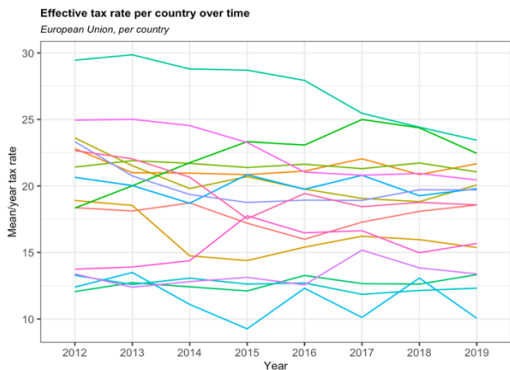


Figure 1a

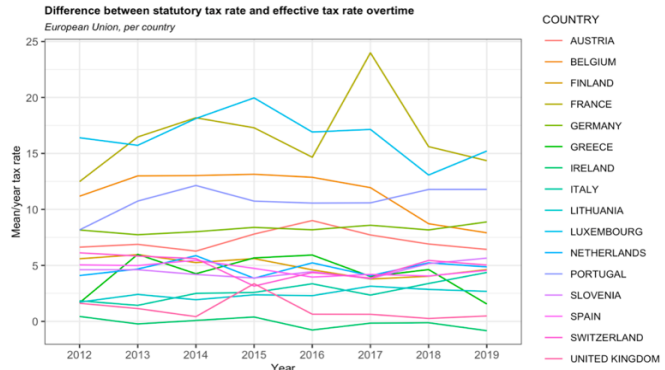


Figure 1b

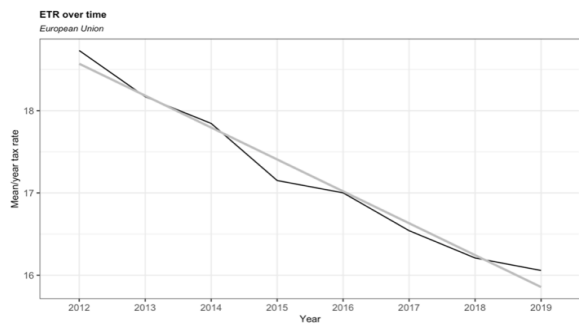


Figure 2a

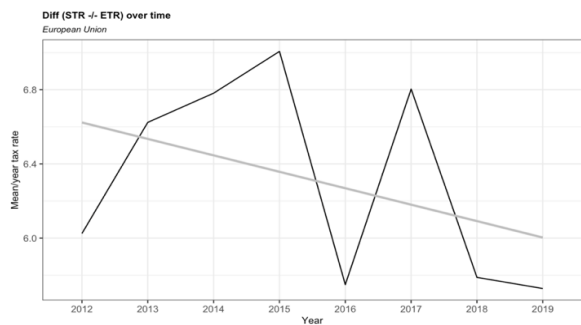


Figure 2b



*Analysis hypotheses 2 and 3*

The second hypothesis stated that family ownership reduces the level of tax aggressiveness over time. Figure 3a shows that family firms have a higher ETR than non-family firms. This implies that non-family firms are more tax aggressive than family firms. Figure 3b confirms this implication by showing a lower difference between the statutory tax rate and effective tax rate for family firms. These findings are in contrast with the OLS regression output in table 15. Within the data is found that the ETR reduces when a firm is a family firm, more than when a firm is not a family firm (FAMILY = -0.22 \*\*\*). One possible explanation for this contrary result is the difference in the number of observations within the groups; the total number of observations of private (public) non-family firms is ten times the size of the total number of observations of private (public) family firms.

The over time-analysis of the impact of family ownership on the level of tax aggressiveness is summarized in table 17. In column a (b) are the year effects of family firms (non-family firms) on the ETR. In line with the findings of hypothesis 1, is observed an increasing downward time trend. Remarkable is that in the first four years the negative growth rate for non-family firms is bigger than family firms. An opposite effect is observed after 2016. Both, family firms and non-family firms become more tax aggressive over time. But, when a firm is a family firm, they are less aggressive compared to non-family firms.

The coefficients of the interaction term of year and family are shown in column c, to test if the two coefficients are significantly different between the two groups. The p-value for FAMILY is significant, which indicates that the relationship between FAMILY and ETR is significant (1.04 \*\*\*). This positive relationship is in line with the observed results in figure 3a. The coefficient of the interaction term of the Year 2014, 2017, 2018, and 2019 are statistically significant at a 1% significance level, which means that for these years the level of tax aggressiveness differs between family firms and non-family firms.

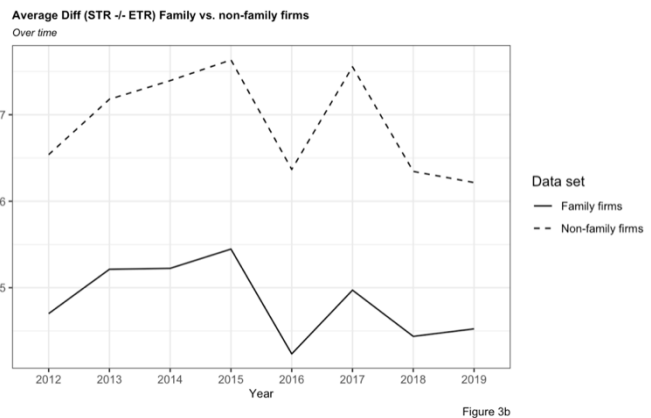
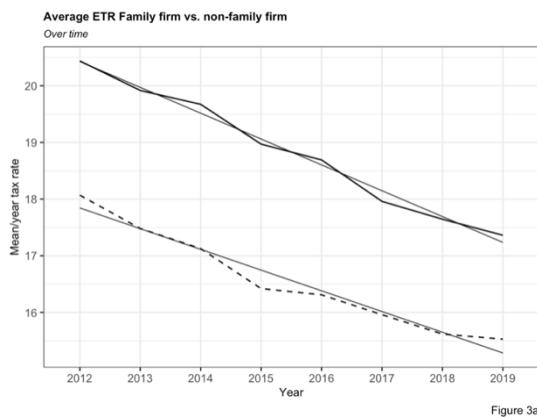


Table 17: Output coefficient Year-Dummies, Family firms

	Family firms (a)	Non-family firms (b)	$FAMILY_{i,t} * YearDummies$ (c)
<b>ETR</b>			
$FAMILY_{i,t}$			1.04 (20.58, ***)
$Year2013_i$	-0.34 (-6.22, ***)	-0.49 (-12.81, ***)	0.12 (1.62, )
$Year2014_i$	-0.82 (-15.53, ***)	-1.04 (-28.01, ***)	0.24 (3.47, ***)
$Year2015_i$	-1.43 (-27.51, ***)	-1.55 (-42.39, ***)	0.06 (0.86, ***)
$Year2016_i$	-1.67 (-32.85, ***)	-1.67 (-46.69, ***)	-0.02 (-0.35, ***)
$Year2017_i$	-2.37 (-47.02, ***)	-1.98 (-55.86, ***)	-0.40 (-6.18, ***)
$Year2018_i$	-2.79 (-55.43, ***)	-2.32 (-65.32, ***)	-0.47 (-7.24, ***)
$Year2019_i$	-2.99 (-58.91, ***)	-2.21 (-61.68, ***)	-0.85 (-13.02, ***)
<b>Control variables</b>	Yes	Yes	Yes
<b>IndustryDummies</b>	Yes	Yes	Yes
<b>CountryDummies</b>	Yes	Yes	Yes

OLS-regression (a) and (b), filtered on specific ownership structures:

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * PRIVATE_i + \beta_2 * FAMILY_i + \beta_3 * PRIVATE_i * FAMILY_i + \beta_4 * ROA_i + \beta_5 * LEV_i + \beta_6 * SIZE\_LOG_i + \beta_7 * PPE_i + \beta_8 * CURASS_i + \beta_9 * INTASS_i + IndustryDummies + IndustryDummies + YearDummies + \varepsilon_{i,t}$$

OLS-regression (c):

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * Ownership_i + \beta_2 * YearDummies + \beta_3 * Ownership_i * YearDummies + \beta_4 * ROA_{i,t} + \beta_5 * LEV_i + \beta_6 * SIZE\_LOG_i + \beta_7 * PPE_i + \beta_8 * CURASS_i + \beta_9 * INTASS_i + IndustryDummies + CountryDummies + \varepsilon_i$$

Notes: This table provides the results of the OLS regression, where ownership is the type of firm. The sample consists of family ownership consists of 460.248 firm-year observations between 2012-2019, and the sample of non-family ownership consists of 1.142.551 firm-year observations. The total sample used for column c exists of 1.602.799 firm-year observations between 2012-2019. ROA, LEV, SIZE\_LOG, PPE, CURASS and INTASS are included as control variables. Country and industry dummies are included to control for year, country and industry fixed effects. All variables are winsorized at a 99% level. T-values are reported in parentheses below the coefficient estimates. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent, respectively. Industry fixed effects and country fixed effects are included in the estimations.

The third and last hypothesis stated that private ownership does not influence the level of tax aggressiveness over time. Figure 4a shows that public ownership is associated with a higher ETR, and public ownership leads to less tax aggressive behavior. This association is partially observable in figure 4b. The difference between the STR and ETR is smaller for public ownership, but the difference between public- and private ownership is not as big as expected based on figure 4a. One possible explanation is that public ownership firms are mainly located in low-tax countries. The regression output finds similar results. According to the OLS output (-0.35 \*\*\*, -0.33 \*\*\*), are private firms negatively related to the effective tax rate, which implies that private ownership reduces the effective tax rate. This finding implies that private non-family firms are more tax aggressive than public non-family firms.

The over time-analysis of the impact of private ownership on the level of tax aggressiveness is summarized in table 18. In column a (b) are the year effect of private ownership (public ownership) on the ETR. In line with the findings in hypothesis 1, I observe an increasing downward time trend. The coefficients of the interaction term of year and family are shown in column c, to test if the two coefficients of Year are significantly different between private- and public firms. The p-value for PRIVATE is significant, which indicates that the relationship between PRIVATE and ETR is significant. The coefficients of the interaction term of all years except from 2013 are statistically significant at a 1% significance level, which means that for these years the level of tax aggressiveness significant differs between firms with private- and public ownership.

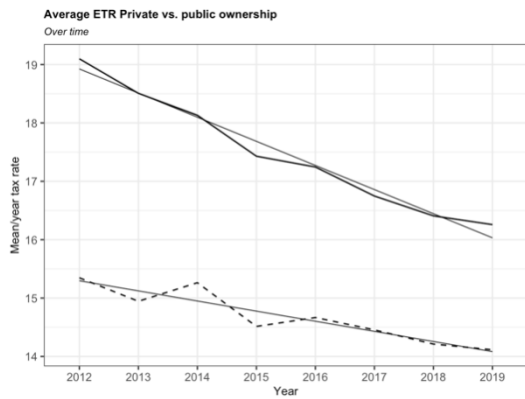


Figure 4a

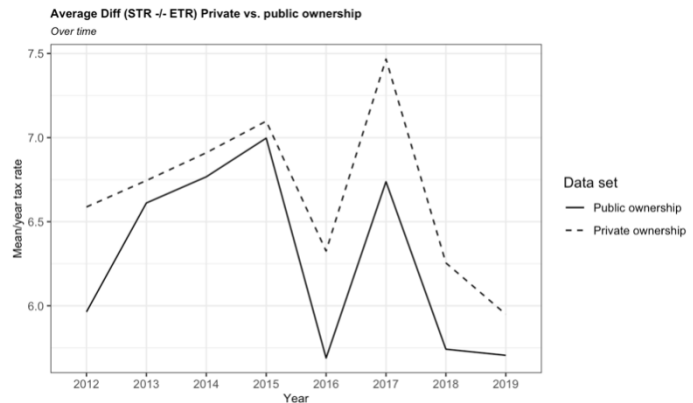


Figure 4b

Table 18: Output Year coefficient, Private- and public ownership

	Private ownership (a)	Public ownership (b)	<i>PRIVATE</i> <sub><i>i,t</i></sub> * <i>YearDummies</i> (c)
<i>ETR</i> <sub><i>i,t</i></sub>			-0.50
<i>PRIVATE</i> <sub><i>i,t</i></sub>			(6.42, ***)
<i>Year2013</i> <sub><i>i</i></sub>	-0.47 (-14.34, ***)	-0.10 (-1.13, )	-0.25 (-2.36, **)
<i>Year2014</i> <sub><i>i</i></sub>	-1.03 (-31.95, ***)	-0.59 (-6.65, ***)	-0.49 (-4.77, ***)
<i>Year2015</i> <sub><i>i</i></sub>	-1.58 (-49.99, ***)	-0.94 (-10.64, ***)	-0.75 (-7.35, ***)
<i>Year2016</i> <sub><i>i</i></sub>	-1.74 (-56.14, ***)	-1.05 (-12.22, ***)	-0.69 (-6.87, ***)
<i>Year2017</i> <sub><i>i</i></sub>	-2.16 (-70.65, ***)	-1.38 (-16.02, ***)	-0.76 (-7.58, ***)
<i>Year2018</i> <sub><i>i</i></sub>	-2.53 (-82.70, ***)	-1.52 (-17.61, ***)	-0.97 (-9.75, ***)
<i>Year2019</i> <sub><i>i</i></sub>	-2.55 (-82.17, ***)	-1.31 (-15.18, ***)	-1.28 (-12.78, ***)
<i>Control variables</i>	Yes	Yes	Yes
<i>IndustryDummies</i>	Yes	Yes	Yes
<i>CountryDummies</i>	Yes	Yes	Yes

OLS-regression (a) and (b), filtered on specific ownership structures:

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * PRIVATE_i + \beta_2 * FAMILY_i + \beta_3 * PRIVATE_i * FAMILY_i + \beta_4 * ROA_i + \beta_5 * LEV_i + \beta_6 * SIZE\_LOG_i + \beta_7 * PPE_i + \beta_8 * CURASS_i + \beta_9 * INTASS_i + IndustryDummies + IndustryDummies + YearDummies + \varepsilon_{i,t}$$

OLS-regression (c):

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * Ownership_i + \beta_2 * YearDummies + \beta_3 * Ownership_i * YearDummies + \beta_4 * ROA_{i,t} + \beta_5 * LEV_i + \beta_6 * SIZE\_LOG_i + \beta_7 * PPE_i + \beta_8 * CURASS_i + \beta_9 * INTASS_i + IndustryDummies + CountryDummies + \varepsilon_i$$

Notes: This table provides the results of the OLS regression, where ownership is the type of firm. The sample consists of private ownership consists of 145.179 firm-year observations between 2012-2019, and the sample of public ownership consists of 1.457.620 firm-year observations. The total sample used for column c exists of 1.602.799 firm-year observations between 2012-2019. ROA, LEV, SIZE\_LOG, PPE, CURASS and INTASS are included as control variables. Country and industry dummies are included to control for year, country and industry fixed effects. All variables are winsorized at a 99% level. T-values are reported in parentheses below the coefficient estimates. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent, respectively. Industry fixed effects and country fixed effects are included in the estimations.

Finally, the results of public family firms, private family firms, public non-family firms, and private non-family firms will be discussed. In figure 5 is plotted the average ETR (a) and Diff (b) between these groups. In figure 5a I observe a downward for all groups. This observation confirms the prior analysis, all groups become on average more tax aggressive over time. The coefficients of the ETR over time are summarized in table 19. However, a remarkable result is found within the interaction term of the OLS regression. The interaction term between FAMILY and PRIVATE is positive (PRIVATE x FAMILY = 1,12 \*\*\*; 1.13 \*\*\*), which implies that private family firms are less tax aggressive compared to the other groups. This is remarkable, because of the negative coefficient of both, PRIVATE and FAMILY. One possible explanation is the skewed sample composition.

In table 20 is the interaction effect summarized between the specific group and the total dataset, to test if the group is significantly different from the total dataset. Remarkable is that private non-family ownership has a significant negative effect on the level of tax aggressiveness in the earlier years (2013, 2014, 2015, 2016), and a significant positive effect in the last year (2019). Except from 2013, the public non-family ownership structure has a positive influence on the ETR, which implies that public non-family firms become less tax aggressive over time. Compared to the total dataset, are public family firms significantly less tax aggressive in 2018 and 2019. An opposite result is found for private family firms, which are significantly more tax aggressive compared to the total dataset in 2017, 2018, 2019.

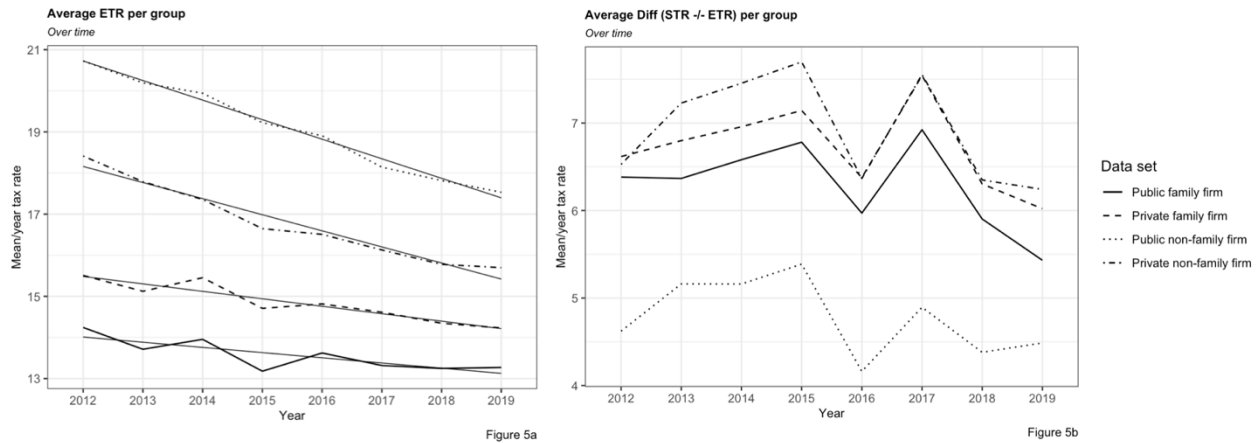


Table 19: Output Year coefficient, Private- and Family firms

	Public family firms	Private family firms	Public non-family firms	Private non-family firms
<i>Year2013<sub>i</sub></i>	-0.44 (-14.02, ***)	-0.47 (-12.87, ***)	-0.46 (-14.03, ***)	-0.32 (-6.16, ***)
<i>Year2014<sub>i</sub></i>	-1.00 (-32.17, ***)	-1.06 (-29.44, ***)	-1.03 (-32.07, ***)	-0.76 (-14.92, ***)
<i>Year2015<sub>i</sub></i>	-1.54 (-50.51, ***)	-1.54 (-43.66, ***)	-1.59 (-50.32, ***)	-1.33 (-26.77, ***)
<i>Year2016<sub>i</sub></i>	-1.69 (-56.70, ***)	-1.67 (-48.37, ***)	-1.73 (-56.00, ***)	-1.54 (-31.74, ***)
<i>Year2017<sub>i</sub></i>	-2.11 (-71.55, ***)	-1.99 (58.08, ***)	-2.16 (-70.49, ***)	-2.15 (-44.68, ***)
<i>Year2018<sub>i</sub></i>	-2.46 (-83.64, ***)	-2.32 (-67.77, ***)	-2.52 (-82.50, ***)	-2.50 (-52.03, ***)
<i>Year2019<sub>i</sub></i>	-2.46 (-82.42, ***)	-2.20 (-63.64, ***)	-2.53 (-81.95, ***)	-2.64 (-54.30, ***)

OLS-regression, filtered on specific ownership structures:

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * PRIVATE_i + \beta_2 * FAMILY_i + \beta_3 * PRIVATE_i * FAMILY_i + \beta_4 * ROA_i + \beta_5 * LEV_i + \beta_6 * SIZE\_LOG_i + \beta_7 * PPE_i + \beta_8 * CURASS_i + \beta_9 * INTASS_i + IndustryDummies + IndustryDummies + YearDummies + \varepsilon_{i,t}$$

Notes: This table provides additional results of the OLS regression showed in table 15, the coefficients of the included Year fixed effects dummies. The sample consists of 1.010.389 (63,04%) private non-family firm observations, 132.162 (8,24%) public non-family firm observations, 441.408 (30,3%) private family firm observations, and 18.840 (0,01%) public family firm observations. T-values are reported in parentheses below the coefficient estimates. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent, respectively.

Table 20: Output Interaction effects different groups and year-dummies

	Public family firms	Private family firms	Public non-family firms	Private non-family firms
<i>Public family</i>	-0.79 (-14.02, ***)			
<i>Private family</i>		1.13 (22.20, ***)		
<i>Public non – family</i>			-0.44 (-5.35, ***)	
<i>Private non – family</i>				-0.70 (-15.03, ***)
<i>Year2013<sub>i</sub></i>	0.24 (0.87, )	0.10 (1.41, )	0.24 (2.16, *)	-0.19 (-2.90, ***)
<i>Year2014<sub>i</sub></i>	0.37 (1.37, )	0.22 (3.16, **)	0.50 (4.52, ***)	-0.37 (-5.87, ***)
<i>Year2015<sub>i</sub></i>	0.63 (2.29, **)	0.02 (0.23, )	0.75 (6.90, ***)	-0.31 (-4.91, ***)
<i>Year2016<sub>i</sub></i>	0.74 (2.75, ***)	-0.08 (-1.14, )	0.66 (6.20, ***)	-0.21 (-3.44, ***)
<i>Year2017<sub>i</sub></i>	0.75 (2.78, ***)	-0.46 (-7.08, ***)	0.73 (6.94, ***)	0.10 (1.59, )
<i>Year2018<sub>i</sub></i>	1.06 (3.92, ***)	-0.55 (-8.42, ***)	0.93 (8.80, ***)	0.09 (1.56, )
<i>Year2019<sub>i</sub></i>	1.34 (4.97, ***)	-0.96 (-14.49, ***)	1.23 (11.61, ***)	0.33 (5.43, ***)
<i>Control variables</i>	Yes ***	Yes ***	Yes ***	Yes ***
<i>IndustryDummies</i>	Yes	Yes	Yes	Yes
<i>CountryDummies</i>	Yes	Yes	Yes	Yes

OLS-regression:

$$TaxAgg_{i,t} = \alpha_1 + \beta_1 * Ownership_i + \beta_2 * YearDummies + \beta_3 * Ownership_i * YearDummies + \beta_4 * ROA_{i,t} + \beta_5 * LEV_i + \beta_6 * SIZE\_LOG_i + \beta_7 * PPE_i + \beta_8 * CURASS_i + \beta_9 * INTASS_i + IndustryDummies + CountryDummies + \varepsilon_i$$

Notes: This table provides the results of the OLS regression, where ownership is the type of firm. The sample consists of 1.010.389 (63,04%) private non-family firm observations, 132.162 (8,24%) public non-family firm observations, 441.408 (30,3%) private family firm observations, and 18.840 (0,01%) public family firm observations. ROA, LEV, SIZE\_LOG, PPE, CURASS and INTASS are included as control variables. Country and industry dummies are included to control for year, country and industry fixed effects. All variables are winsorized at a 99% level. T-values are reported in parentheses below the coefficient estimates. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent, respectively. Industry fixed effects and country fixed effects are included in the estimations.

To conclude, answering the hypotheses. The first hypothesis stated the level tax aggressiveness declined over time in accordance with prior literature. Opposite results can be found in this thesis. The results show that the average ETR of EU firms declined over time, which implies that they become more tax aggressive. Therefore, sufficient evidence is found to reject H1.

The second hypothesis stated that family ownership does not influence the level of tax aggressiveness over time. I found a significant positive association between family ownership and the ETR, which implies that family firms reduce the level of tax aggressiveness compared to the total dataset. However, the interaction term between family and the time-period is not positive and significant for all years. This implies that the difference between family firms and non-family firms in the level of tax aggressiveness is not observable within the total period. Additionally, this result of reducing the

level of tax aggressiveness is also not observable for private family firms. One possible explanation for this finding is the difference in the number of observations within the groups; the total number of observations of private (public) non-family firms is ten times the size of the total number of observations of private (public) family firms. Sufficient evidence is found to accept H2, family ownership doesn't explicitly increase or reduce the level of tax aggressiveness over time.

The third and last hypothesis stated that private ownership does not influence the level of tax aggressiveness over time. I found a significant negative relationship between private ownership and the ETR. In addition, firms with private ownership differ significantly negative from firms with public ownership for every sample year. These significant negative associations between private ownership and the ETR imply that private ownership increased the level of tax aggressiveness over time. This relation is as well found within the combination of firms with family- and private ownership. Sufficient evidence is found to reject H3, private ownership increases the level of tax aggressiveness over time.

## **VII. Conclusion**

This thesis aims to examine how tax aggressive behavior of firms developed over the period between 2012 and 2019, and how private- and family ownership structures affect this behavior. This paper examined if family firms have a higher level of tax aggressiveness than non-family firms, and if firms with private ownership are more tax aggressive compared to firms with public ownership. Tax aggressive behavior of firms is defined as any tax minimization strategy or a subset of strategies. Companies have big incentives to reduce their tax base because tax expense is the most significant business cost and has a direct impact on profitability and shareholders' value. The tax aggressive companies face also costs, like time and effort, fees of external advisors, potential penalty costs, and potential repetitional damage costs. Countries have big incentives to mitigate tax avoidance, planning practices cost countries 4-10% of the global corporate income tax revenue annually.

This thesis aims to contribute by providing more insight into the association between tax avoidance and the ownership structure of the firm, and by making a direct contribution to several papers in the existing literature. Prior literature found mixed results about components of this topic, like the influence of family- and private ownership structures separately. As far as I know, this specific topic has not been investigated before, and this thesis aims to fill this gap in the literature. One side note: the findings of this thesis should be interpreted with the knowledge and context of the ongoing debate of Base Erosion and Profit Shifting (BEPS). The purpose of this thesis is to identify trends in tax aggressive behavior of companies over time in general, and not to measure specific income-shifting techniques by public- and family firms. Income shifting is a specific technique to avoid taxes, which is something different than tax aggressiveness.

The sample consists of 1.602.799 firm-year observations in the period from 2012 to 2019. The model is based on the cross-sectional regression model by the paper of Chen et al. (2010). This model is used by several researchers to analyze the relation between tax aggressiveness and family firms. Family ownership is measured as a dummy variable, which has the value of 1 if the firm is owned by a family and zero otherwise. Private ownership is measured as a dummy variable, which has the value of 1 if the firm is owned by a private structure, and zero if the firm is owned by a public structure. Several control variables are added, based on the research model of Thomson et. al (2018).

The results show that the average ETR of EU firms declined over time, which implies that firms become more tax aggressive. Firms domiciled in Ireland have the lowest mean ETR. This observation could suggest that firms domiciled in Ireland have more tax aggressive behavior than firms in other EU-countries. Regarding the effect of family ownership, I found a positive association, the difference between family firms and non-family firms in their level of tax aggressiveness was not observable over the sample period. This finding imply that family ownership doesn't explicitly reduce the level of tax aggressiveness over time. In contrast to the influence of family ownership on the level of tax aggressiveness, is the influence of private ownership on the level of tax aggressiveness observable. I found a significant negative relationship between private ownership and the ETR over time. In addition, firms with private ownership differ significantly from firms with public ownership for every sample year. These significant negative relationships between private ownership and the ETR imply that private ownership increased the level of tax aggressiveness over time. However, when a firm is a private owned family-firm, this association is not found. Private owned family-firms doesn't explicitly become more or less tax aggressive over the given sample period. But, public non-family firms become less tax aggressive over time.

This thesis contributes to current knowledge in two ways. First, this thesis provides more insight into the association between tax avoidance and the ownership structure of the firm. Prior literature found mixed results about this topic. Two streams of literature of private firms and family firms are combined to analyze their influence on tax aggressiveness together over time. Second, this thesis makes a direct contribution to several papers in the existing literature. For example, previous literature mentioned in their conclusion that ownership structures are understudied components of tax aggressiveness and requested more research regarding this topic. The impact of ownership structures over time is taken into account by the comparison between private- and public firms, and between family- and non-family firms. Another paper concluded that public firms are more tax aggressive than private firms, based on evidence from Germany. This thesis follows the recommendation for further investigation by examining the differences in the degree of tax avoidance among Europe.

This research faces several limitations. Firstly, financial information is not always available. For private firms was the market-to-book ratio (MB) and foreign income (FI) not available, so could not be controlled for in the regression. In previous research on tax aggressiveness at only public firms, these control variables could be included. Further research should check if this data is available in other databases and add this manually to the firm-year observations. Second, the sample composition is not equally distributed. The total sample exist of 1.602.799 firm-year observations from 2012 to 2019, consisting of 460.248 (28,72%) family firms, 1.142.551 (71,28%) non-family firms, 1.451.797 (90,58%) private firms, and 151.002 (9,42%) public firms. The sample of the non-family firm is almost three times as big as the sample of the family firm. The difference in sample between public- and private firms is many times bigger. Namely, the sample of the private firm is almost ten times as big as the sample of the public firm. Further research could use a sample which is more equally distributed. Last, this study focusses on EU-firms. The results might not be applicable for non-EU firms, due to cultural differences. Further research could investigate if these results are also applicable for other continents and compare continents to each other.



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# Appendix

## A: Sample distribution

As described in section 4.2 (research design), all continuous variables are winsorized at 99%. To check the distribution of the variables, I made some info-graphics. I added some notes.

### 1. Density ETR and Diff

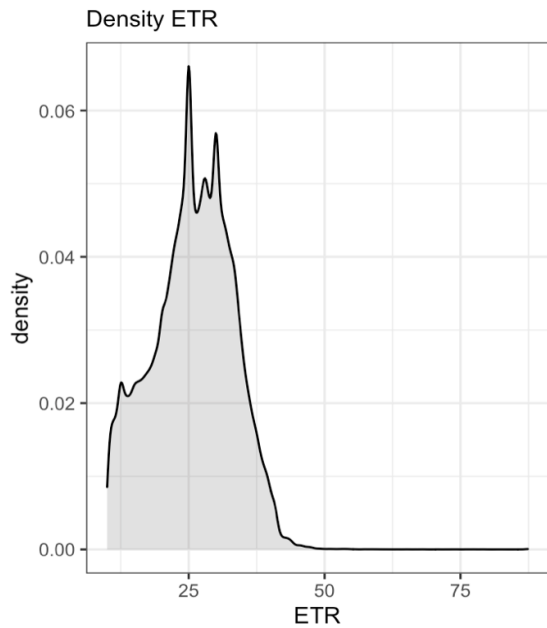


Figure 4.1

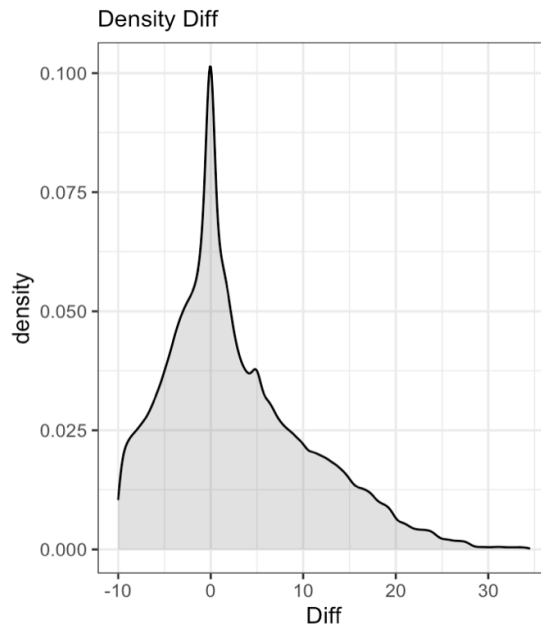


Figure 4.2

### 2. Boxplot control-variables

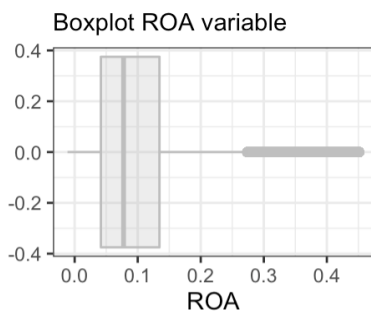


Figure 5.1

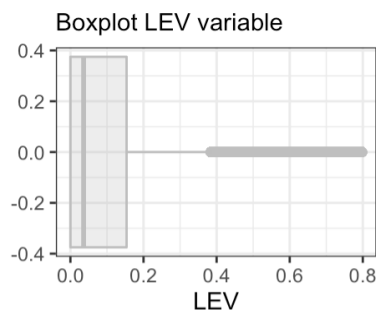


Figure 5.2

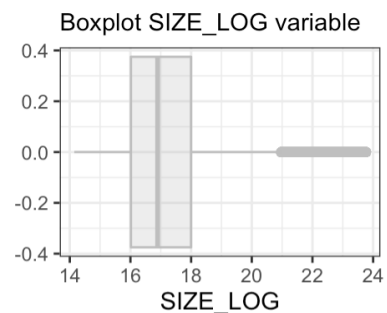


Figure 5.3

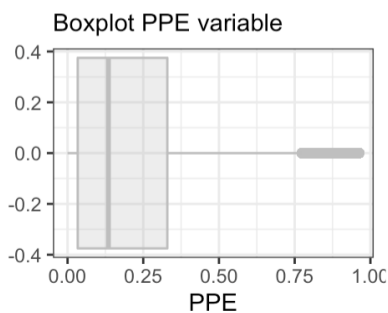


Figure 5.4

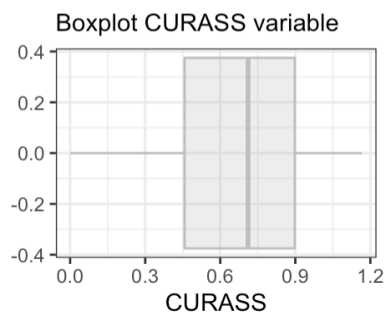


Figure 5.5

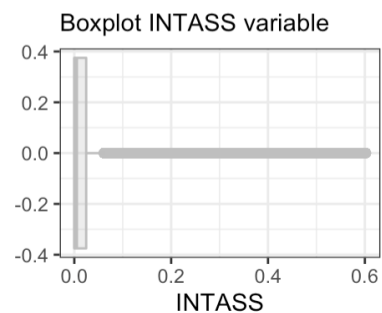


Figure 5.6

### 3. Distribution character variables

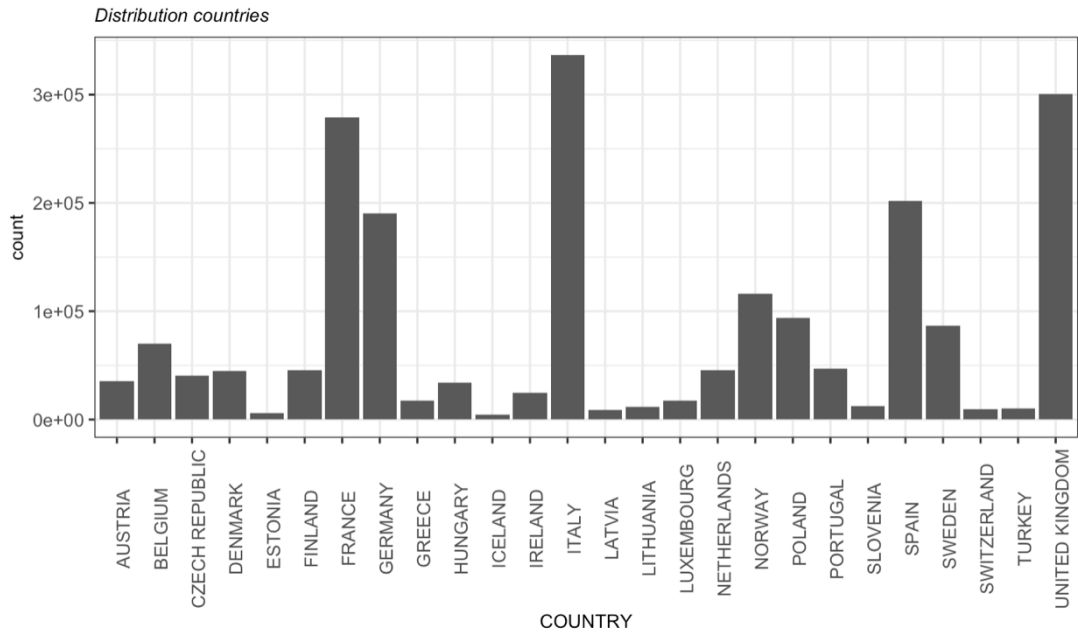


Figure 6.1

All countries are included in the final sample, except from the first analysis how the level of tax aggressiveness developed over time by country (paragraph 5.1). In this analysis are excluded (number of observations): Czech Republic (182), Denmark (905), Estonia (890), Hungary (3), Iceland (5), Latvia (4402), Norway (2100), Sweden (1638), Turkey (848).

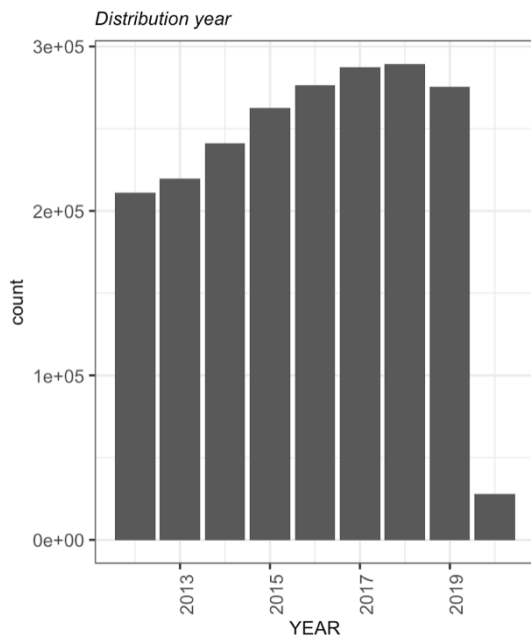


Figure 6.2

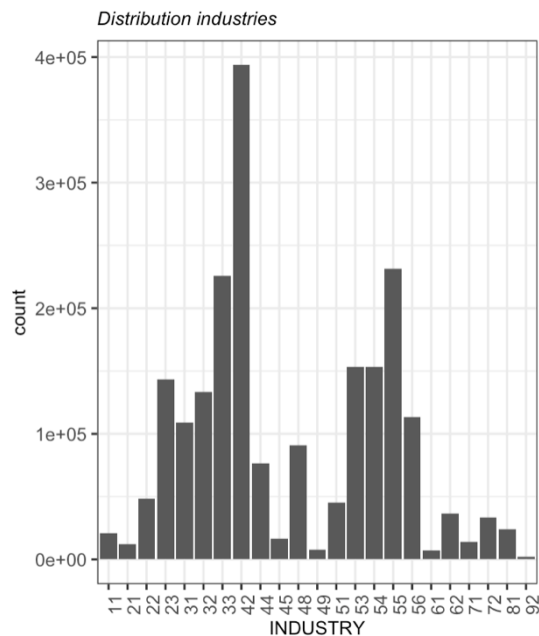


Figure 6.3

Year 2020 is excluded from the final dataset, because of its number of observations compared to the other years. Industry 52 is excluded from the final dataset, because of the nature of the sector (financial industry).